RP BUSINESS

STUFFING CONTAINERS

This guide has been produced to help you stow and secure your cargo adequately and thus avoid damage. It is based on the expertise of our loading specialists, as well as analyses of cargo damage in the past.
Safely stowing cargo in containers involves expenditure, but the outlay is worthwhile, since if consignments are damaged costs are generally considerably higher.
This brochure cannot, of course, cover all aspects of securing cargo in containers. Our experts in our sales offices, one of which is very close to you, will gladly help you with further information.

1. Stresses during transport

1.1. Mechanical stresses

Cargo securing must withstand all stresses resulting from sea and land transport, as well as container handling. Closed containers cannot be inspected during transport. Cargo securing cannot be improved or altered after the container has been closed. The packing company thus has to know what types of stress occur during transport. Basically, we differentiate between two types of mechanical stress.

Static forces are caused by stacking and standing cargo on the floor of the container. The main factor is stacking pressure, causing bending and buckling, particularly in the bottom layers. The stacking pressure depends on the dimensions, weight, shape and height of the cargo involved.

Dynamic forces occur during loading, land or sea transport and handling operations. There are differences between acceleration, impact and vibration forces. Acceleration and jolts occur during loading, braking, shunting, handling, lifting and setting down, and in curves. Even at sea, acceleration is caused by rolling, pitching and vertical movements. Vibrations are caused by, for instance, the ship's engine, gears and propeller, the truck suspension and road and rail surfaces in a wide range of frequencies and amplitudes.

1.2. Climatic stresses

Goods are very frequently subject to climatic stresses while being transported. These occur even during storage, and while containers are being packed. Climatic stresses are caused by changing climatic conditions during transport by road, inland waterway vessel or rail, and particularly when cargo on board an ocean-going vessel passes through various climatic zones. Extreme climatic stresses can occur in winter at temperatures below freezing point, when passing through tropical climatic zones or when moving from the tropics to temperate climatic zones.
All closed containers protect the cargo inside against external climatic influences, such as rain, snow, sea water, saltwater spray, fog and UV radiation. Even though the boxes are protected against external influences, condensation may occur inside. The relative humidity in the container is influenced by the moisture that is brought into it on loading, and any subsequent change in temperature. Sources of moisture are the enclosed air in the container, the cargo itself, its packaging or the stowage material. Some cargoes emit a considerable amount of water over a longer period, while most packaging, stowage material and some cargoes absorb moisture.

Moist air condenses if the ambient temperature falls below the dew point, the condensate forming first on the cargo packaging, container wall or roof. The condensate then drips from the roof on to the cargo, causing damage the cargo such as rust, marks, staining, mould, discolouration, sticking together of wet cartons, peeling off of labels or collapsing of stacks. The temperature inside a container depends on the outside temperature and the stowage position of the box on board the ship. The container can be warmed by direct solar radiation on deck or heated fuel tanks next to the hatch. The air temperature within the container below the roof can deviate from the ambient air by 20–30°C. Temperatures of up to 60°C are thus possible. The internal temperature can also in-crease as a result of the spontaneous heating of the cargo.

Condensation water on roof, dry bag already completely soaked

1.3. Biological stresses

High temperatures, moisture or poor ventilation in the container can lead to cargo or packaging being attacked by insects, fungi, mould, bacteria or micro-organisms. Mostly, the cargo is biologically contaminated even before it is stowed in the container.
Insect infestation from outside in a closed container is almost impossible. The cargo should, therefore, be packed with the greatest possible care. Some countries regulate the fumigation of packaging and dunnage by law. The customer then requires a certificate confirming that the timber used is free of insects.

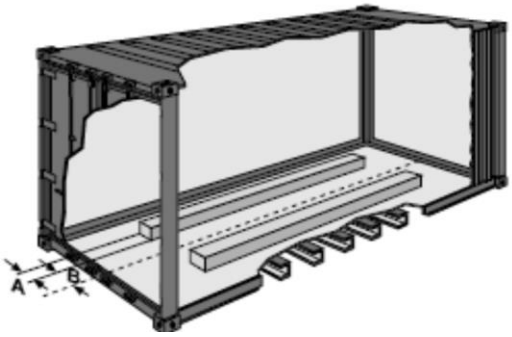
1.4. Chemical stresses

Chemical stresses depend on the type of cargo, temperature, moisture and movement of the ship. Some chemical products tend to heat spontaneously. Hazardous goods must be transported in accordance with the hazardous goods regulations. One basis is the IMDG Code, published by the International Maritime Organisation. RP Business has its own dangerous goods department, which will gladly answer any queries.

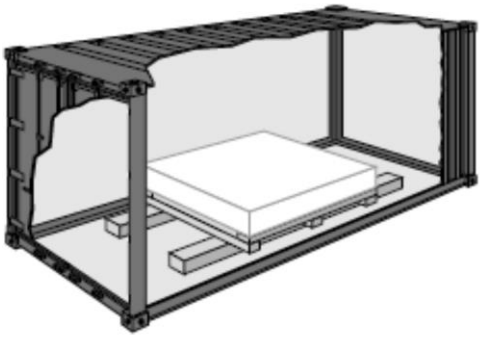
2. Preparations for container transport

2.1. Weight limits and weight distribution

The permissible gross weight of most 20‘ and 40‘ standard containers is 30,480kg. Some newer containers have higher gross weights. Depending on the design series, the maximum payload is derived from the gross weight minus empty weight, which varies.
The bottom crossbars of a container are the load support elements for taking the weight of the cargo. If the permitted load limit is fully reached, all bottom crossbars must be evenly loaded. The cargo weight must thus be distributed over the entire length of the container. The floor is not designed for heavy selective loads. If the cargo is short-er, or stands on a shorter length on the floor, the permitted load is lower. A maximum floor load is 4.5t per running metre for a 20‘ container and 3t per running metre for a 40‘ container. To check the floor load, the cargo length (m) is divided by the cargo weight (t). Example: cargo weight 10t, supporting length 4m, load per metre: 10/4=2.5t/m.
Wooden beams can be used lengthwise for distributing individual heavy weights. These must have specific minimum dimensions and a minimum distance from the centre of the container.



Design of a Standard container floor and wooden beams for bedding heavy cargo



Lengthened support for better weight distribution

2.2. Securing devices in containers

There are many ways of securing cargo in a standard container. Lashing devices are fixed along the longitudinal beams on the floor, on the roof and near the corner posts. Every lashing device has a safe working load of 1t.
The corrugation in the side walls can be used for securing cargo lengthwise with transverse wooden beams.
It has to be noted that the container end and side walls can take only large surface loads and are not suitable for selective stresses.
The following table gives an overview of securing devices for containers and their use.

Design element	Cargo securing
. Lashing eyes on corner posts, roof and floor longitudinal beams or rings in floor	. For fastening ropes, plastic straps, metal brackets, quick-acting locks, etc.
. Corrugation in side walls	. For securing cargo lengthwise. . Timber lying crosswise can be wedged in the corrugation.
. Corner posts	. Chocking heavy items of cargo to prevent horizontal slipping.

Lashing points in a standard container on the roof edge, at the corner post and small vents for air-pressure equalisation

2.3. General rules for securing cargo

When packing a container or securing cargo, the Guidelines for Packing and Securing Cargoes in Containers for Transport by Land or by Sea (Container Packing Guidelines) issued by the International Maritime Organization (IMO) and International Labour Organization (ILO), must be observed.
Unlike cargo securing as is usual for land transport, cargo carried by sea must also be secured within a container against all ship movements, such as rolling, pitching and yawing. The best way of securing cargo is to distribute it without any gaps over the en-tire floor. If gaps cannot be avoided, the space between the packaging and container walls must be filled using air bags, dunnage or other stowage material.

2.4. Checking containers before loading

Containers are controlled at every interchange. In addition to these inspections, we recommend customers always carry out a careful check of the following items after receiving a container:

External checklist:
. There are no holes or cracks in walls, floor or roof.
. Doors are easy to operate.
. Locking devices and handles function properly.
. Customs seal device must be in orderly condition.
. No self-adhesive labels from previous cargo (e.g. IMDG placards), dangerous goods stickers are permitted only if there are dangerous goods in the container.

Check from inside:
. Container is free of dirt and cargo residue, clean and odourless.
. There are no nails or other protruding objects that could damage the cargo.
. Container is completely dry inside. Any condensation or hoar frost must be removed in order to avoid corrosion and moisture damage to cargo.
. Container is proof against condensation water. Possible test method: Enter the container, close both doors and check whether any light comes through cracks, holes or door seals.

2.5. Returning containers

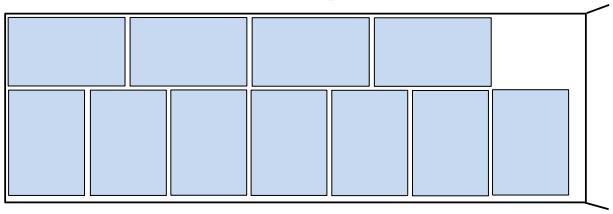
After a shipment, the container is usually returned to the predetermined depot. The container must be:
. Free of nails or damage to floor
. Without damage to walls and doors

3. Containers Specifications

3.1. Container 20' DV

Dimensions:
Inside length: 5.89 m
Inside Width: 2.33m
Inside Height: 2.38m
Capacity: 33.18 m3

Europallets Capacity: 11



3.2. Container 40' DV

Dimensions 40' DV:
Inside length: 12.01 m
Inside Width: 2.33m
Inside Height: 2.38m
Capacity: 67.67 m3

Europallets Capacity: 25

Dimensions 40' HC (High
Inside length: 12.01 m
Inside Width: 2.33m
Inside Height: 2.69m
Capacity: 76.28 m3