

Shipping container types and dimensions

20', 40', High Cube, reefer, open top, flat rack: which cargo goes in which container?

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Online interactive version: <https://ozgurkonakci.com/en/guide/container-types/>

SHORT ANSWER

The most common shipping containers are the 20' and 40' standard (DC) boxes. A 20' DC measures about $5.90 \times 2.35 \times 2.39$ m inside (33 m^3), a 40' DC about $12.03 \times 2.35 \times 2.39$ m (68 m^3), and a 40' High Cube has about 2.70 m internal height (76 m^3). A 20' suits heavy cargo; a 40' HC suits light, bulky cargo.

Why are containers standard?

The external dimensions of shipping containers are set by ISO standards. This means the same container can travel on a ship, through a port, on a truck and on a train without ever being opened. Much of the speed of today's international trade rests on this standard.

There are two basic lengths: **20 feet** and **40 feet**. Ship capacity and port statistics are measured in **TEU** (twenty-foot equivalent units). A 20' container counts as 1 TEU and a 40' container as 2 TEU. A "24,000 TEU ship" is described in this unit.

Container codes

In practice, containers are referred to by abbreviations:

- **DC / GP / DV:** Dry Container, General Purpose. The standard dry cargo container.
- **HC / HQ:** High Cube. About 30 cm taller than standard.
- **RF / RH:** Reefer (refrigerated) / Reefer High Cube.
- **OT:** Open Top. No fixed roof; covered with a tarpaulin.
- **FR:** Flat Rack. A platform without side walls or roof.

Container explorer

Choose a type and the scale drawing, internal dimensions, door opening and weight capacity update. The proportions in the drawings are real, so you can compare a 20' and a 40' by eye.

Type	Internal length	Internal width	Internal height	Door (W × H)	Volume	Tare	Max payload	Max gross
20' Standard (Dry)	5.90 m	2.35 m	2.39 m	2.34 m × 2.29 m	33.2 m³	2,300 kg	30,200 kg	32,500 kg
40' Standard (Dry)	12.03 m	2.35 m	2.40 m	2.34 m × 2.29 m	67.7 m³	3,700 kg	28,800 kg	32,500 kg
40' High Cube	12.03 m	2.34 m	2.70 m	2.34 m × 2.60 m	76.3 m³	3,850 kg	28,650 kg	32,500 kg
45' High Cube	13.56 m	2.35 m	2.70 m	2.34 m × 2.60 m	86.0 m³	4,700 kg	27,800 kg	32,500 kg
20' Reefer	5.45 m	2.28 m	2.27 m	2.29 m × 2.26 m	28.2 m³	2,905 kg	27,575 kg	30,480 kg
40' Reefer High Cube	11.58 m	2.28 m	2.53 m	2.28 m × 2.54 m	66.7 m³	4,300 kg	29,700 kg	34,000 kg
20' Open Top	5.90 m	2.35 m	2.38 m	2.23 m × 2.28 m	32.5 m³	2,450 kg	30,050 kg	32,500 kg
40' Open Top	12.03 m	2.35 m	2.38 m	2.21 m × 2.29 m	66.4 m³	3,850 kg	26,630 kg	30,480 kg
20' Flat Rack	5.61 m	2.23 m	—	—	—	2,740 kg	31,260 kg	34,000 kg
40' Flat Rack	11.65 m	2.22 m	—	—	—	5,950 kg	44,050 kg	50,000 kg

Source: Hapag-Lloyd, Container Specification. The first variant of each type is shown; values vary by shipping line and year of manufacture. For flat racks, height and volume are determined by the cargo itself.

Typical uses

20' Standard (Dry): General dry cargo. Preferred for heavy, dense cargo (stone, metal, chemicals), where the weight limit is reached before the volume limit.

40' Standard (Dry): Bulky general dry cargo. Twice the volume of a 20', but no higher weight capacity.

40' High Cube: Light but bulky cargo (furniture, textiles, household appliances). About 30 cm taller than a standard 40'.

45' High Cube: Very bulky, light cargo. Not available at every port or on every route.

20' Reefer: Temperature-controlled cargo: food, pharmaceuticals, chemicals. The refrigeration unit reduces the internal space; no cargo may be loaded above the load line.

40' Reefer High Cube: The most common type for temperature-controlled cargo: fresh fruit and vegetables, frozen meat and seafood.

20' Open Top: Cargo that must be loaded from above by crane or is too tall for a closed box (machinery, marble blocks). The top is covered with a tarpaulin.

40' Open Top: Long cargo loaded from above: pipes, timber, machine parts.

20' Flat Rack: A platform without side walls or roof. Heavy out-of-gauge (OOG) cargo: construction machinery, transformers, boats.

40' Flat Rack: Long, heavy out-of-gauge cargo. The cargo may exceed the container's width and height; this requires extra freight and special planning.

Volume or weight?

A container has two limits: **volume** (m³) and **maximum payload** (kg). Which one you reach first depends on the density of the cargo.

- **Heavy cargo** (marble, metal, chemicals) reaches the weight limit before filling the space. A 20' container is enough for these; a 40' gives no extra weight capacity.
- **Light, bulky cargo** (textiles, furniture, plastics) fills the space before reaching the weight limit. A 40' HC is the most efficient choice for these.

Note: a container's technical maximum weight is not the only limit on what you can load. **Road weight limits** are often more restrictive. Even if a 40' container is technically rated for well over 28 tonnes, the combined weight of tractor, chassis and container must stay within each country's legal limit. Check the limits in every country the cargo will cross before loading.

VGM: verified gross mass

Under the SOLAS (Safety of Life at Sea) Convention, the shipper must declare the **verified gross mass (VGM)** of every container to the carrier before it is loaded on the vessel. A container without a VGM is not loaded. The VGM is the total weight of the cargo, packaging, pallets, securing material and the container's tare.

Pallet loading calculator

How many pallets fit in a container? The calculator below works out the **theoretical** single-layer layout for the container and pallet type you choose, placing pallets in two orientations side by side to find the maximum.

Container	Euro pallet (EUR/EPAL) (1.2 × 0.8 m)	Standard / industrial pallet (1.2 × 1 m)
20' Standard (Dry)	11	9
40' Standard (Dry)	25	22

Container	Euro pallet (EUR/EPAL) (1.2 × 0.8 m)	Standard / industrial pallet (1.2 × 1 m)
40' High Cube	25	22
45' High Cube	27	24
20' Reefer	10	9
40' Reefer High Cube	23	20
20' Open Top	11	9
40' Open Top	25	22

Theoretical single-layer layout, calculated from the internal floor dimensions with rows in two orientations.
In practice there may be 1–2 fewer pallets.

In practice, door frames, pallet overhang and handling margins usually mean 1–2 fewer pallets. The common rule of thumb in the field is 23–24 Euro pallets and 20–21 standard pallets in a 40' container.

Test yourself

1. You need to ship 22 tonnes of marble blocks. Would you suggest a 20' or a 40'? *(Answer: A 20'. The cargo reaches the weight limit before the volume limit; a 40' gives no extra capacity and costs more in freight.)*
2. How many containers can 3 TEU be? *(Answer: Three 20' containers, or one 40' and one 20'.)*
3. Which container can carry a machine that is 2.9 metres high? *(Answer: An open top or a flat rack. The internal height of a 40' HC is 2.70 m.)*

Frequently asked questions

How many Euro pallets fit in a 40-foot container?

A theoretical single-layer layout fits 25 Euro pallets in a 40' standard container; in practice 23–24 are usually loaded because of the door frame and handling margins. For standard 1.20 × 1.00 m pallets the figure is 20–21.

Does a 40' container carry more weight than a 20'?

It has about twice the volume, but not a higher payload; in the source examples a 20' DC takes 30,200 kg and a 40' DC 28,800 kg. That is why heavy cargo goes in 20' boxes.

How tall is a High Cube container?

Its external height is 9'6" (2.90 m) and its internal height about 2.70 m, roughly 30 cm more than a standard container.

SOURCES

Hapag-Lloyd — Container Specification — https://epub.sub.uni-hamburg.de/epub/volltexte/2018/78453/pdf/17038_Update_Container_Specification_engl_sRGB.pdf

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