

Reefer containers and the cold chain

Set point, ventilation, PTI and airflow: what to watch with temperature-controlled cargo.

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Online interactive version: <https://ozgurkonakci.com/en/guide/reefer-cold-chain/>

SHORT ANSWER

A reefer container keeps its internal temperature at a set value (the set point) with its own refrigeration unit. It is designed to maintain the temperature of cargo that has already been brought to the right temperature, not to cool cargo down. For cold air to flow up from the floor through the cargo, it must be loaded without exceeding the load line and without blocking the air channels.

How does a reefer container work?

A reefer (refrigerated) container keeps its internal temperature at the set value with the refrigeration unit in its front wall. Cold air leaves the bottom of the unit, travels through the **T-shaped channels** in the floor, rises up through the cargo and returns to the unit along the roof. So the cargo itself shapes the airflow.

There are two basic types of cargo:

- **Frozen:** Meat, seafood, frozen food. The aim is to maintain the temperature; the cargo does not respire.
- **Chilled:** Fresh fruit and vegetables, flowers. The produce is still alive, respire and produces heat, so ventilation and humidity settings also matter.

Information to give at booking

- **Set point:** The carrying temperature. State the unit (°C or °F) clearly; mixing up units is a known cause of losses.
- **Ventilation:** For fresh produce, the fresh air exchange setting (m³/hour).
- **Humidity:** Dehumidification for some products.
- **Controlled atmosphere (CA):** For some fruit, shelf life is extended by adjusting oxygen and carbon dioxide levels.

These values depend on the product and are the exporter's responsibility. Follow the guidance of product specialists and the carrier.

Pre-loading checklist

Set point and unit (°C) stated in the booking — Mixing up °C and °F is a known cause of losses; the set point should also appear on the bill of lading.

Ventilation and humidity settings agreed — Fresh produce respire, so fresh air exchange is set for the product. For frozen cargo ventilation is closed.

Container has a valid PTI — The PTI shows that the unit and sensors have been tested; check the PTI label and date.

Cargo pre-cooled to carrying temperature — A reefer is designed to maintain temperature, not to cool the cargo down.

Container not pre-cooled unless loading from a cold store — When a pre-cooled container is opened, warm humid air enters and condenses; follow the carrier's instructions.

Cargo below the red load line — If the line is exceeded, cold air cannot return along the roof to the unit.

Floor channels clear, gaps checked — The T-floor must not be covered; large gaps short-circuit the airflow.

Temperature logger placed — An independent record is the strongest evidence in a claim.

Genset and power plan for the road leg — Power interruptions are among the most common points where the cold chain breaks.

Phytosanitary and health certificates ready — Missing certificates for food and plant products hold the cargo at destination and increase temperature risk.

Airflow: the most common mistake

A large share of reefer claims comes from blocked airflow:

- The cargo must not go above the **red load line** inside the container; otherwise cold air cannot return to the unit.
- The T-shaped floor channels must not be **covered** with paper, cardboard or stretch film.
- Avoid large gaps at the door end and between pallets where cold air can short-circuit.
- For fresh produce, the ventilation holes in the packaging should line up with the airflow.

Where does the cold chain break?

The cold chain means keeping a product at the right temperature without interruption from production to consumption. The riskiest points are:

- Loading warm cargo (no pre-cooling)
- Leaving the doors open for long during loading
- Power interruptions at the terminal or on the road (genset failure, container not plugged in)
- Waiting at transshipment ports
- Opening the container for a customs inspection

The container's temperature records (data logger) are the most important evidence in a claim. If needed, add a separate independent temperature recorder to the cargo.

Test yourself

1. Apples at 25 °C were loaded into a reefer with the set point at 1 °C. What is wrong? (*Answer: A reefer is designed to maintain temperature, not to cool cargo; the apples were not pre-cooled.*)
2. Why does the red load line matter? (*Answer: If the cargo goes above it, cold air cannot return along the roof to the unit and the airflow is disrupted.*)
3. Which setting differs between frozen meat and fresh bananas? (*Answer: Fresh produce needs ventilation (fresh air exchange) and often a humidity setting; for frozen cargo ventilation is closed.*)

Frequently asked questions

Does a reefer container cool the cargo?

A reefer is designed to maintain the cargo's temperature; it does not have the capacity to cool warm cargo quickly. The cargo should be pre-cooled to the carrying temperature before it goes into the container.

What is a PTI?

A PTI (pre-trip inspection) is a test of the reefer's refrigeration unit, sensors and insulation before loading. Ask for a container with a valid PTI and check its date.

How does a reefer run on the road?

On board and at the terminal it is plugged into the power supply. On road and rail it is powered by a generator set (genset) fitted to the container or chassis. Power interruptions are one of the most common points where the cold chain breaks.

SOURCES

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