

## Integrated reefer containers

Hamburg Süd has a large fleet of modern integrated reefer containers (reefers) with cooling facilities built into the container. They come in 20' and 40' sizes and are available on all our trade routes. The integrated container is especially suitable for door-to-door transport. Only electrical power is required.

Hamburg Süd's reefer containers are built to the highest possible technical standards. As a result, our equipment is regarded by the industry as state-of-the-art. The design reflects a combination of long experience, extensive research and testing programmes. Our Volumax® reefers provide an interior volume of 30 cubic metres in the 20' container and 70 cubic metres in the 40' High Cube container, giving them the highest interior volume available on the market today.

### Main technical features:

- Service temperature range -30°C to +30°C
- Magnum® -35°C to +30°C
- Fresh air exchange adjustable (0 to 285 cbm/h)
- Dehumidification range 50% to 95% maximum relative humidity
- Operating voltage 360 to 500 Volt/50 to 60 Hertz
- Unsurpassed internal volume to provide maximum cargo space
- High-tech, CFC-free insulation ensures minimum heat leakage
- Special "T-bar" floors to ensure optimum air circulation
- Temperature control through built-in microprocessor
- High-quality cooling machinery
- The use of environmentally friendly refrigerants

## Specifications



Size	20' x 8' x 8'6"	20' x 8' x 8'6"	40' x 8' x 9'6"
ISO Code	22R1	22R1	45R1*
Equipment Type	Integrated Reefer Container	Integrated Reefer Hanging Cargo	Integrated Reefer High Cube Container
Interior Dimensions (Length, Width, Height)	5,470 – 5,560 mm (L) 2,290 – 2,304 mm (W) 2,290 – 2,345 mm (H)	5,458 mm (L) 2,294 mm (W) 2,291 mm (H)	11,582 – 11,651 mm (L) 2,290 – 2,310 mm (W) 2,544 – 2,607 mm (H)
Door Opening (Width, Height)	2,290 – 2,300 mm (W) 2,271 – 2,344 mm (H)	2,296 mm (W) 2,290 mm (H)	2,288 – 2,310 mm (W) 2,490 – 2,576 mm (H)
Weights Gross	30,480 kg	30,480 kg	34,800 kg
Tare	2,500 kg – 3,160 kg	3,920 kg	4,260 kg – 4,900 kg
Payload	27,320 kg – 27,980 kg	26,530 kg	29,900 kg – 30,540 kg
Volume	29.20 – 30.00 cbm	28.70 cbm	67.50 – 70.00 cbm

\* Various equipment types are available (AFAM+, EverFresh)

## Pre-Trip Inspection (PTI) and container check

It is one of the highest priorities of Hamburg Süd to provide our customers with the most suitable container equipment for their needs at any time. Before one of our reefer containers is released to a customer, it must always pass through a "Pre-Trip Inspection" (PTI).

The Hamburg Süd PTI is a long and extensive check of the container and the operation of the reefer machinery. This ensures that only clean and undamaged containers with reefer machinery in perfect running order are made available to our customers.

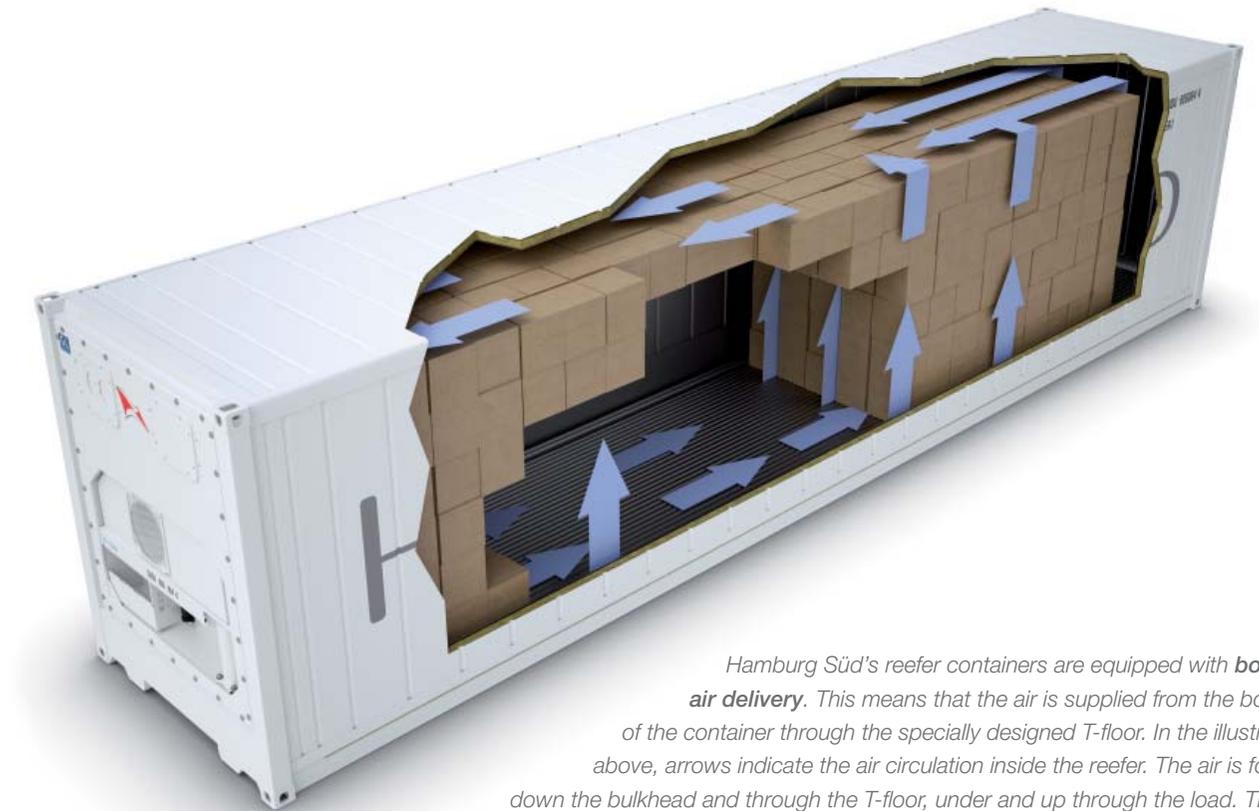


## Air circulation

Internal air circulation is essential for maintaining prescribed temperatures in reefer containers. Cold air is constantly circulated through the cargo space to dissipate transmitted heat.

Cold air flows through and around the goods in the container. This air is blown in at the bottom of the refrigeration unit through the gratings in the ducted floor and then drawn

off again below the container ceiling. The circulating fans then force the air through the air cooler, which also acts as the evaporator in the cold circuit, and back through the gratings into the cargo. The most common form of ducted floor is known as a T-bar floor (T-floor), taking its name from the T-shaped cross-section of aluminium extrusions that form the floor.



*Hamburg Süd's reefer containers are equipped with **bottom air delivery**. This means that the air is supplied from the bottom of the container through the specially designed T-floor. In the illustration above, arrows indicate the air circulation inside the reefer. The air is forced down the bulkhead and through the T-floor, under and up through the load. The air returns to the evaporator over the top of the load and through the top of the bulkhead.*

## Stuffing

Each commodity has different airflow requirements. Inside a reefer container the airflow is influenced by the type of packaging and the method of stuffing used. In the case of pre-cooled **frozen goods**, air only has to flow around the cargo, since no heat has to be dissipated from the goods themselves. Only the heat which penetrates the insulation from outside has to be removed. When transporting **chilled goods** such as fruit and vegetables, however, air also flows through the cargo, as it generates respiration heat internally which has to be dissipated.

There are two standard loading patterns for perishable products in reefer containers:

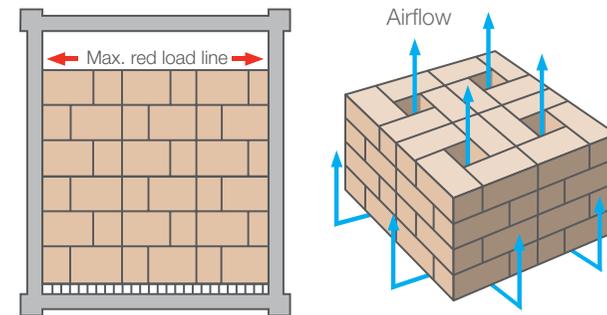
- A** block stow of break bulk cargo (e.g. loose cartons), and
- B** palletised cargo stowage (e.g. cartons on a pallet).

With both stuffing patterns, cargo must cover the entire T-floor to ensure proper distribution of refrigerated air. This is possible in most cases when, for example, loose cartons are stuffed into the reefer container. However, not all palletised cargo or, say, drums, can be stuffed in this way. In that case, when the cargo does not cover the entire T-floor, heavy cardboard or dunnage must be placed where no cargo is stuffed. This will **avoid short-circuiting** the circulating air and ensure proper refrigerated air distribution in reefer containers with bottom air supply. Improper stuffing, and thus respective by-passing of the circulating air, initiates a larger spread of different temperatures within the cargo and can lead to severe cargo damage.

The height of the cargo must not exceed the **red cargo load line**, which shows maximum allowed cargo height, so that ample free space is left above the stow to ensure proper air circulation around the load.

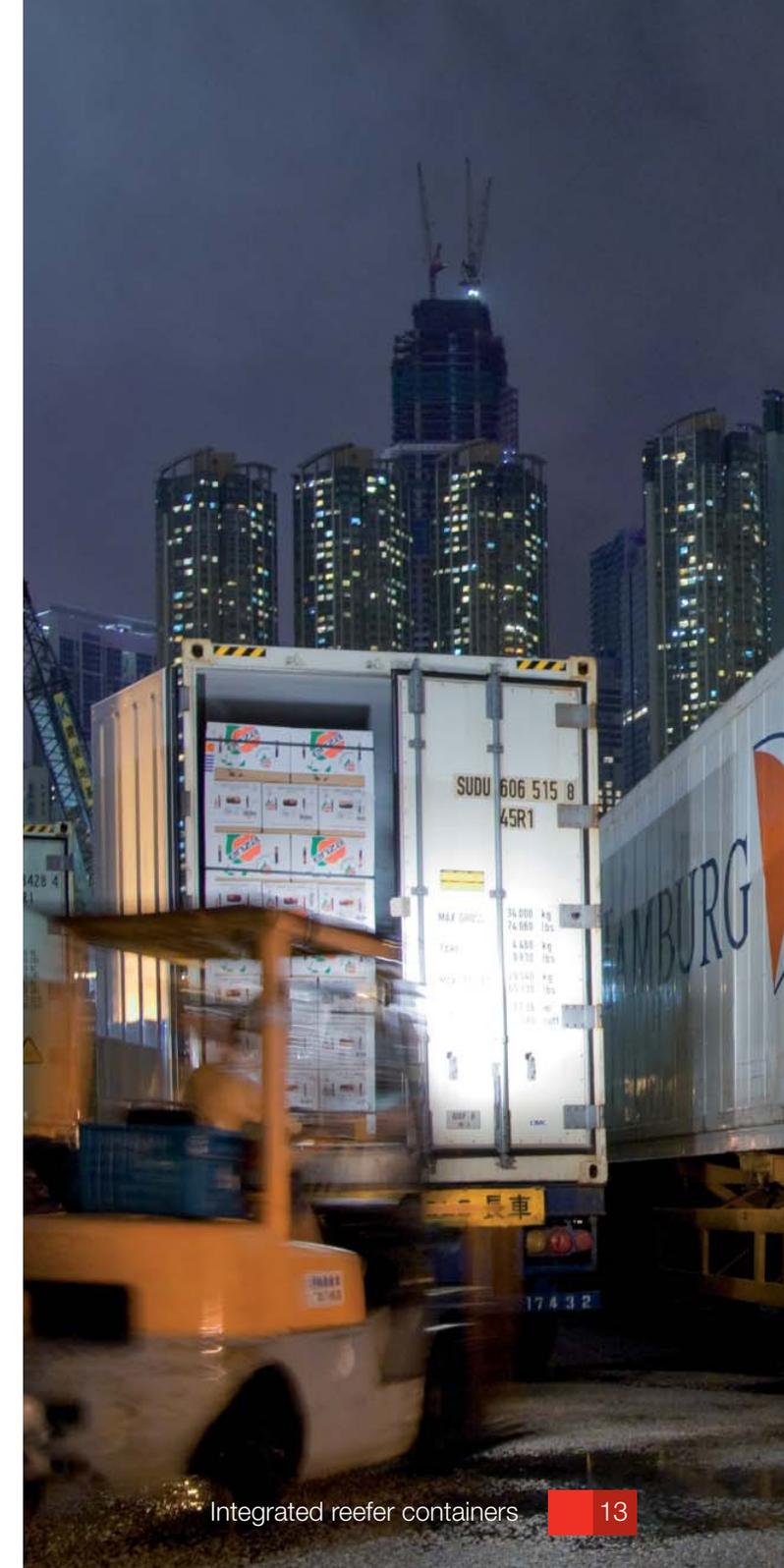
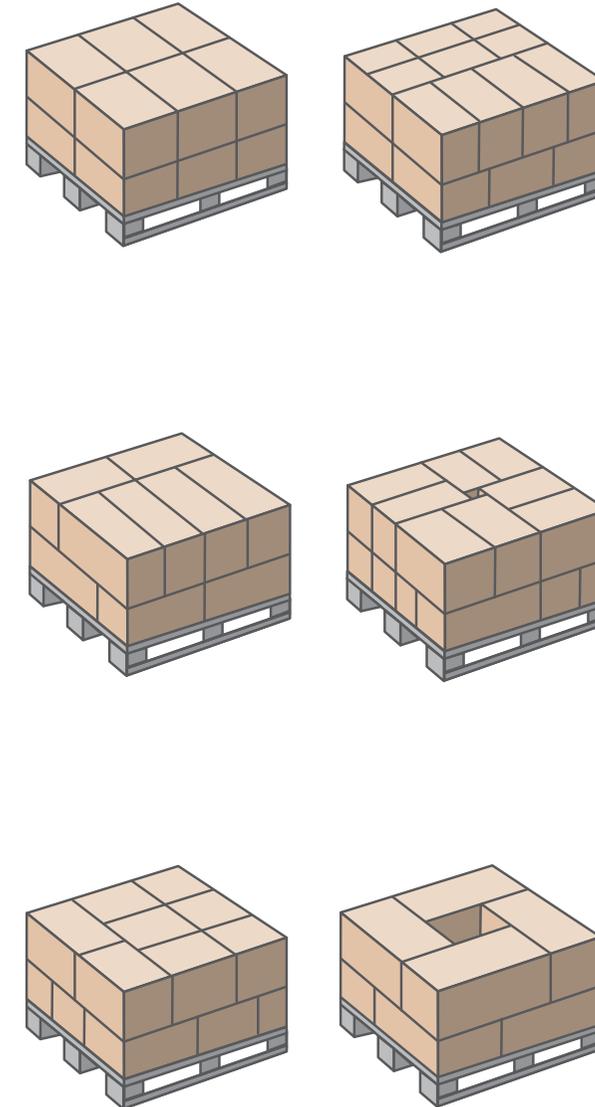
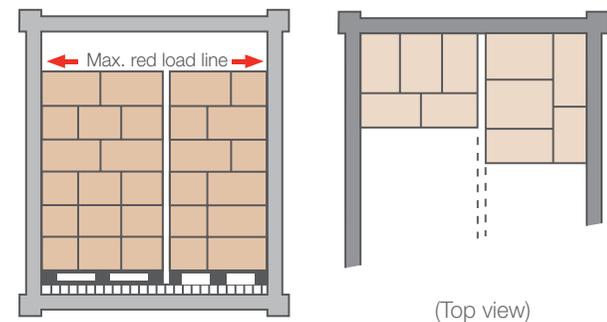
### **A** Block stow of break bulk cargo

For loose cartons, two stuffing patterns are recommended: a weave block stow or a chimney block stow. Which pattern is chosen depends on the type of cartons and the commodity involved.



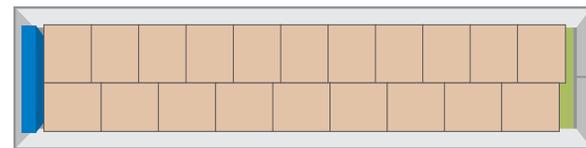
### **B** Palletised cargo stowage

For palletised loads, the stuffing patterns shown below and right are recommended (examples).

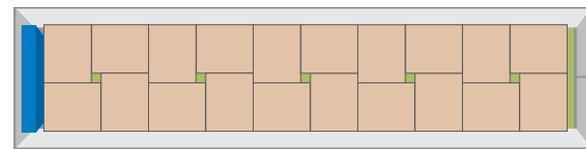


## Reefer container stuffing – top view

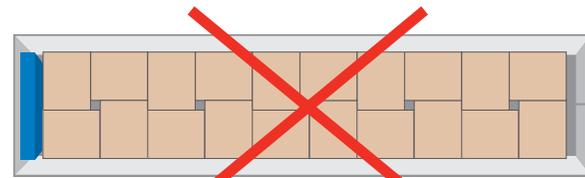
Air always takes the path of least resistance. In order to force air up and through the cargo and to avoid short-circuiting of the circulating air the container T-floor needs to be occupied entirely. Where the cargo does not cover the T-floor, some type of filler (dunnage, cardboard, etc.) should be used. This applies, among other things, to so-called „chimney“ stuffing patterns and free space on the „centre-line“. In case of pallet stuffing the front face of the last pallet(s) at the door should be blocked or covered as this increases the pressure to force air up and through the cargo. At the door end, the container must not be loaded past the end of the T-floor with cargo or filler.



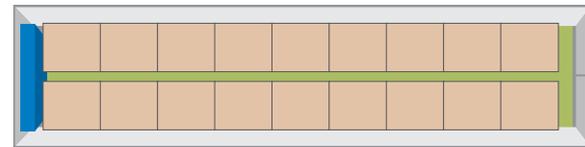
Top 1



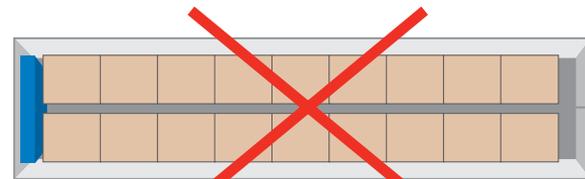
Top 2



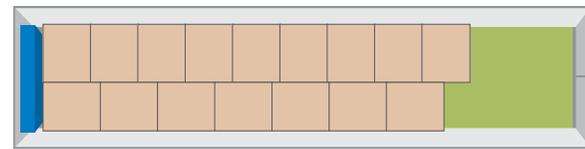
Top 3



Top 4



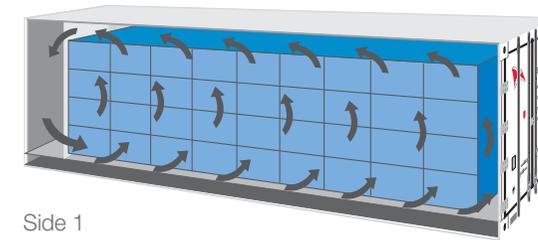
Top 5



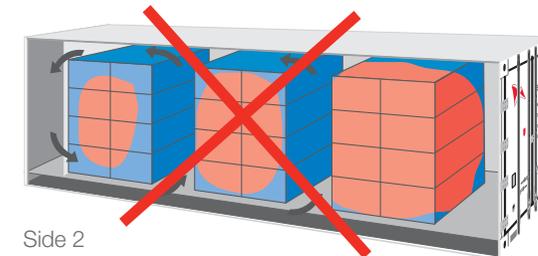
Top 6 (not completely loaded)

■ Refrigeration unit    
 ■ Pallet    
 ■ Filler    
 ✗ Wrong stuffing

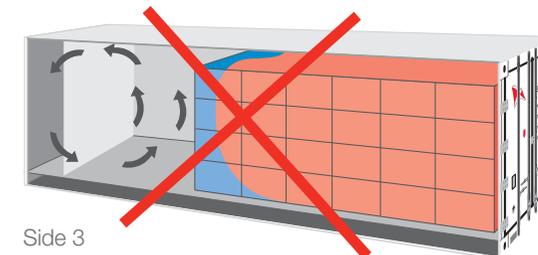
## Reefer container stuffing – side view



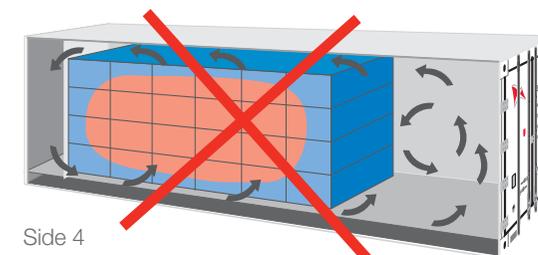
Side 1



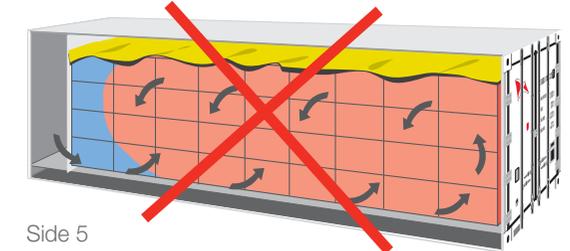
Side 2



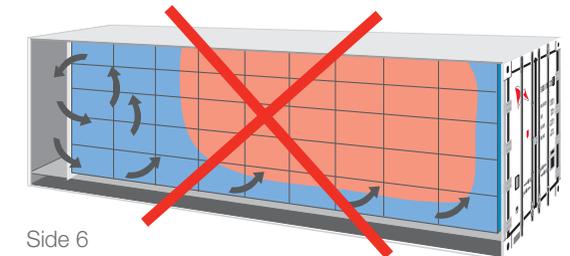
Side 3



Side 4



Side 5



Side 6

**Side 1** above shows a correctly stuffed reefer container (refrigeration unit left, doors right). **Sides 2 to 6** illustrate improperly loaded reefer cargo. In three of these cases (**Sides 2 to 4**), air tends to “short circuit” or flows past the cartons/product rather than through them. If air gaps or chimneys are left in a stow, they provide an easier route for airflow than that through the cargo. Air that does not go through the cargo cannot remove respiratory heat, and air moving through chimneys near the air distribution area cannot reach further parts of the cargo. So gaps and chimneys can reduce the ability to maintain temperature. Note: Properly pre-cooled (“pre-frozen”) frozen cargo may be transported as illustrated in **Side 4**. However, cargo would require bracing (not shown). **Sides 5 and 6** illustrate restricted airflow scenarios due to plastic covering on top of the load and stuffing above the maximum red load line respectively.

■ Cold    
 ■ Hot    
 ■ Plastic covering    
 ↻ Airflow    
 ✗ Wrong stuffing