

REEFERS: A SHIP MANAGERS PERSPECTIVE



AGENDA

- ❖ What is a reefer container?
- ❖ Sequence : farms and oceans – ships – supermarkets
- ❖ Reefer onboard- initial requirements
- ❖ What does the vessel need to do to ensure safe carriage?
- ❖ What are the common challenges?
- ❖ What steps are taken to mitigate the known risks?
- ❖ Safety



WHAT IS A REEFER CONTAINER?



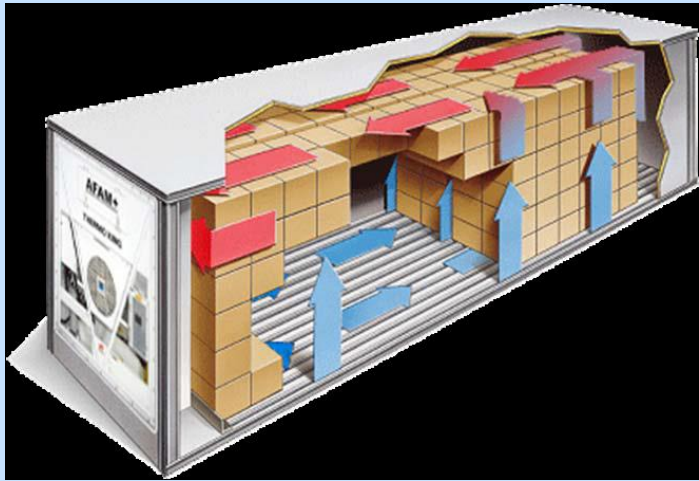
A refrigerated container is a shipping container used in intermodal freight transport that is refrigerated for the transportation of temperature sensitive cargo. Reefer containers usually have their own refrigeration unit, with an air or water cooled heat exchanger. They have their own data logger to record temperature.

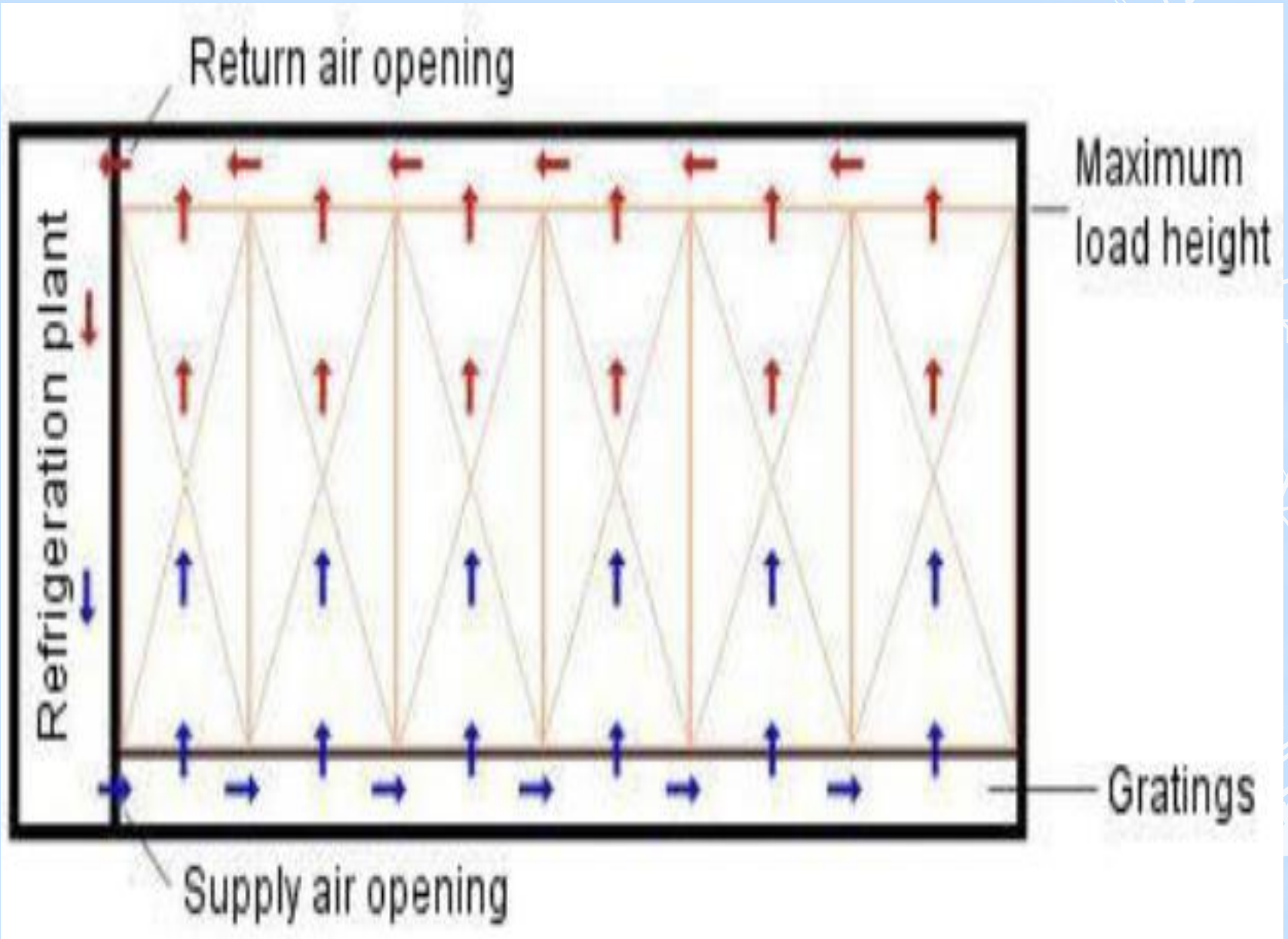
A reefer does have its own inbuilt refrigeration unit but has to depend on external power from the electrical points when on the quay or a container ship

Some reefers are equipped with a water cooling system, which can be used if the reefer is stored below deck on a vessel without adequate ventilation to remove the heat generated.

Water cooling systems are expensive, so modern vessels rely more on ventilation to remove heat from cargo holds, and the use of water cooling systems is declining.

Additional "support" equipment : Ventilation fans , cooling pumps, piping , hoses



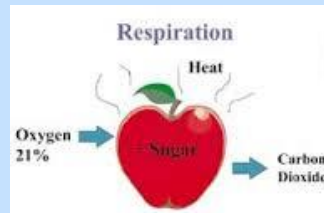


In general, refrigerated commodities may be divided into two distinct categories;

- a) Chilled**
- b) Frozen**



Many chilled cargoes (e.g. fruit) are regarded as a "Live" cargo since they continue to respire post harvest and as such are susceptible to desiccation (wilting and shriveling).

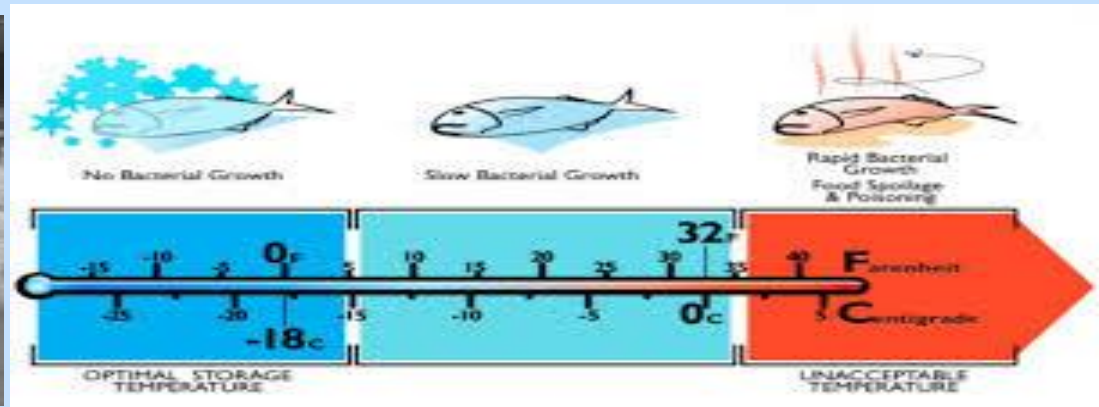


This is not the case with commodities such as chilled meat or cheese.

We choose to refrigerate commodities such as fruits and vegetables because we want to prolong their "practical shelf life" – the time from harvest until the product loses its commercial value

The minimum fruit carriage temperature is usually no lower than -1.1 degree C (30degreeF).

Frozen cargo is regarded as "inert" and is normally carried at or below -18 degree C (0 degree F).



However, both categories are highly perishable and require care in handling to ensure arrival in optimum condition.

Reefer containers are built to maintain temperatures, not to lower them, and these cargoes should therefore be pre-cooled to the optimal carrying temperature.

The Master should not, however, accept carriage instructions that the vessel will not be able to comply with



REEFER UNIT VOYAGE CYCLE



Reefer Container onboard...what should we do?



Reefer containers require special care after they are loaded on board.

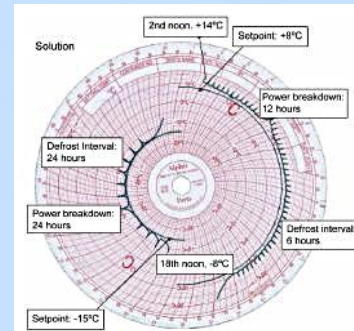
1. Need to be supplied with power



- ❖ **Reefer containers shall be plugged in and supplied with ships power as soon as practicable after loading - Ship staff or shore staff? Must be checked by Ship staff in any case**
- ❖ **Where applicable, cooling water shall be connected and valves opened. This is usually in case of water cooled reefer container units loaded under deck.**
- ❖ **Reefer remote monitoring cables shall also be connected whenever equipped and compatible.**

2. Monitored closely for proper function

- Set temperature compare with manifest temperature
- Present actual temperature on Partlow chart and digital indicator
- Ventilator percentage open or closed, compare with manifest
- Container seal record seal number (e.g.: JJJ 345821 etc)
- Any alarms displayed on the digital indicator
- Control box door firmly tightened to prevent any water damage
- Any abnormal noise or vibration from the refrigerating equipment



3. Repaired as required in case of malfunction.

In case of a malfunctioning unit, the local agent must be informed and reefer technician arranged for inspection and repair. If the unit cannot be satisfactorily repaired within the duration of port stay, it must be off loaded



Temperature and alarm monitoring equipment

Reefer container monitoring systems are widely used on board as a centralized station for having an overview of the reefers onboard. This enables an operator to automatically monitor and control hundreds of reefer containers through a single computer system and provides following functions:

- Monitors alarm and temperature conditions, and notifies the user of any alarms generated by the container controller.
- Registers the history of each container, recording all important parameters and storing the data in accurate, detailed log files.
- Interfaces with the vessel's load calculator for automatically transferring reefer container data and locations.
- Optionally send commands, such as "defrost" and "change of set point", to the containers directly from the central system on board.

Failure of the monitoring equipment, would directly lead to increased workload on the ships crew with a risk of human error being more pronounced.



Set sail for next port!

- ***Spare parts and manuals for reefer containers shall be maintained on board as required***
- ***All reefer containers shall be monitored by checking physically at least twice daily (weather permitting).***
- ***Data for each reefer container on board shall be entered in a reefer monitoring log The reefer remote monitoring system where fitted and operational shall be used whenever possible. Alarms generated on this system shall be attended to promptly and condition of the concerned reefer container confirmed***
- ***In case of a reefer container malfunction, the facts must be reported without delay to concerned parties***
- ***Repair work on the malfunctioning reefer container must be undertaken with best efforts after consulting manuals/drawings and instructions from concerned lines technical department. It is an obligation upon the carrier (and ships crew) to exercise due diligence in preventing any cargo damage.***
- ***Subsequent technical reports shall be sent to concerned parties in line with voyage instructions, until the reefer container is repaired or discharged at the next port.***

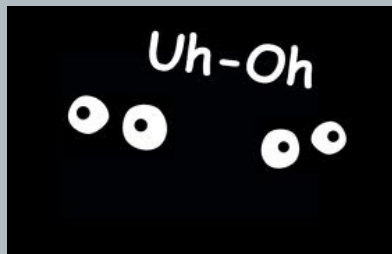




Incorrect shipment: what are the possible reasons?

- Containers off power and therefore off refrigeration for extended times
- Wrong settings caused by incorrect information
- Failure to monitor properly and correct faults or wrong settings
- Poorly pre-cooled or overcooled cargo
- Cargoes with insufficient PSL (practical shelf life)
- Badly stowed containers impeding air flow –many with low quality packaging
- Excess fresh air ventilation for live cargoes thereby causing evaporators to ice up
- Incorrect defrost interval where this has to be set manually
- Incorrectly booked cargo leading to operational and commercial problems





Required power interrupted

- **The power supply used must be either 380 volts/50 Hz or 440volts/60Hz.**
- **The power cables used are fitted with ISO standard CEE-17 plugs**
- **One of the most common causes of power interruption to refrigerated containers is due to malfunction of one or more of the ships diesel generators.**
- **If any one of the generators is out of order, the remaining generators shall supply at least seagoing conditions and all certified refrigerated container sockets including cargo hold fans**
- **Inefficient or poorly maintained generators are not capable of taking full rated load**
- **Direct impact on power management onboard the vessel.**
- **Direct commercial impact**

Mitigating actions:



- Ensuring crew competence
- 24x7 shore technical support
- Sufficient stock of spares and consumables onboard for maintenance, both routine and breakdown (based on historical trends).
- Following makers recommended overhaul intervals strictly, thereby improving reliability and efficiency.
- Proper planning and execution of maintenance, normally carried out on light legs.
- Risk assessment and management.





Failure of other components in the power supply chain, like cables, transformers, circuit breakers, and even switchboards interrupt continuous power supply to the reefers onboard.



Preventive actions:

- **All vessels are built to classification society requirements but the choice of equipment at the new building stage can have a telling impact through the life of a ship. Hence choose wisely!**
- **Utilization of high quality hardware : approved and rated for the intended use**
- **Sufficient replacement material onboard**
- **Proper care of standby equipment**
- **Planned maintenance to be carried out to avoid surprises**
- **Trained personnel onboard to carry out necessary repairs**
- **Supplementing ships crew with highly skilled shore personnel if required.**



Some of the other reasons that can cause power interruption to the refrigerated containers are

- **Failure of reefer socket receptacle or terminal board.**
- **Drop in Voltage**
- **Reefer not plugged in (yes it happens!)**

A number of reefer extension leads should be carried as a precaution against the failure of individual plugs

Good shipboard maintenance and house keeping practices,

Thorough vessel inspections by attending technical superintendents.

Well trained and competent crew that carry out careful checks during loading /unloading operations



Other factors - direct impact on optimal reefer performance and shipment

- Failure of cargo hold ventilation fans
- Failure of cooling water pumps and /or hoses
- Air ducting and air distribution
- Access for monitoring and repairs
- Failure of alarm monitoring
- Running out of refrigerant
- Reefer loading lists given to a ship by the terminal aren't checked against the bay plans to make sure the container is in its correct position, or at the correct temperature. It's very easy, in this situation, for the crew not to notice the problem.
- Many reefer containers losses have arisen from confusion between Fahrenheit and Celsius temperature scales and also between plus and minus temperatures

° F ° C



SAFETY

- Short port stays and quick turn around
- Safety arrangements are in some ports poor and the work frequently has to be performed in the dark, under windy and rainy or sometimes icy conditions.
- Increased risk of electrocution
- Increased chances of "slips and trips"
- Exposure to refrigerants
- Working in areas with limited access areas
- Increase fire hazard
- Exposure to High-voltage systems



Thank
You

