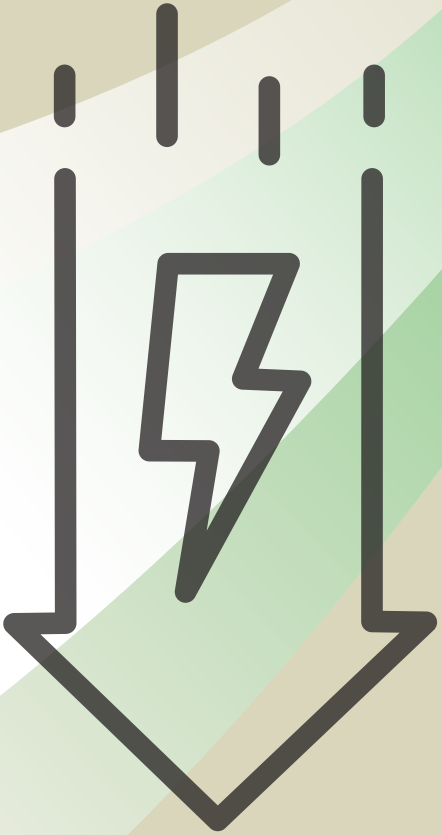
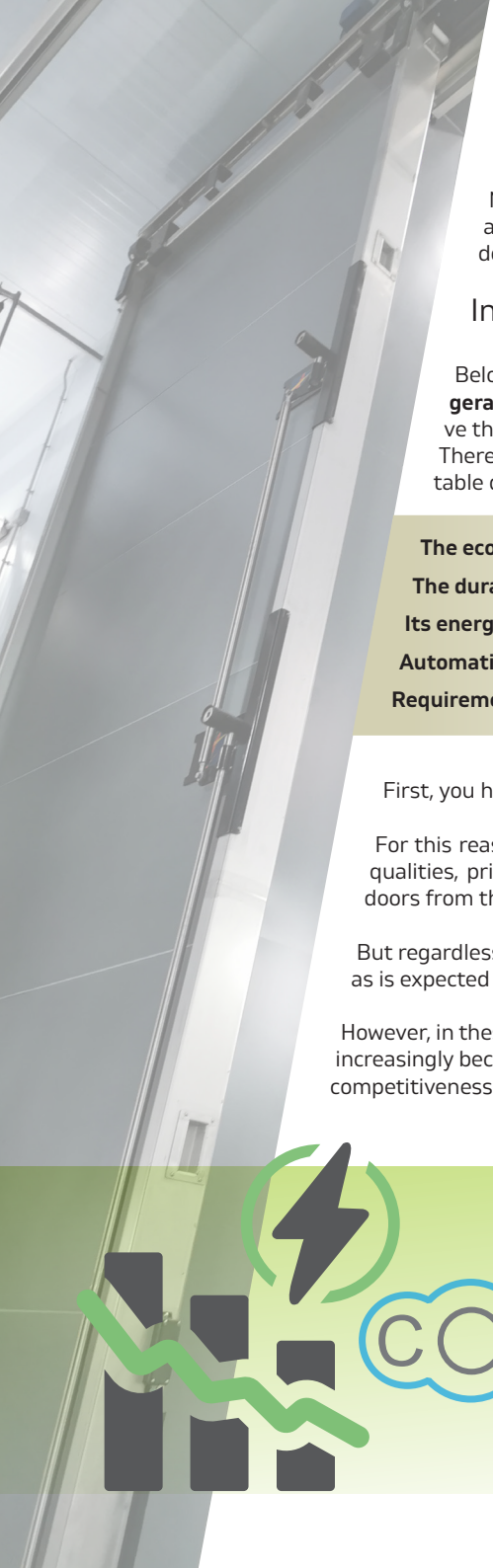
HOW TO IMPROVE THE ENERGY EFFICIENCY OF YOUR REFRIGERATED DOORS?





One of the most important decisions when installing a cold room is choosing the right door.
Not all cold storage doors are the same, and choosing an inexpensive door can be expensive in the long run if it does not meet the requirements for:

Insulation, safety, and durability.

Below, we indicate **11 tips and/or critical points for your refrigerated doors** that can help reduce energy costs and improve the sustainability of your facilities.
There are several aspects to consider when determining a suitable door:

The economic

The durability of the doors

Its energy efficiency and hermeticity

Automation

Requirements of sectorization against fire

First, you have to choose a door that suits your needs and budget.

For this reason, in the range of refrigerated doors we have various qualities, prices and specifications, depending on whether they are doors from the economic, medium, or high-performance line.

But regardless of the chosen line, they will all be resistant and durable as is expected from a Tané door.

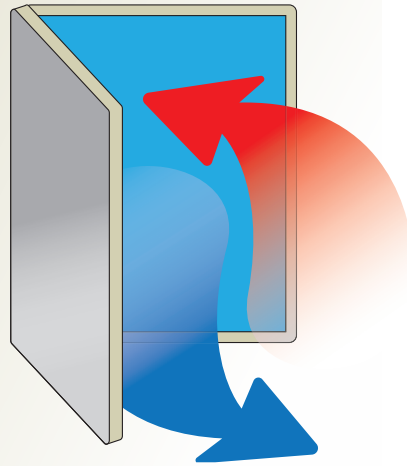
However, in these times of energy and climate crisis, energy efficiency is increasingly becoming a key factor for sustainable development and the competitiveness of companies.

Tané Hermetic products offer innovative and high-quality solutions to improve the thermal and acoustic insulation of buildings and thus reduce energy consumption and CO2 emissions.

Cold storage doors are a key element to guarantee the energy efficiency of cold rooms since they are responsible for preventing cold losses and maintaining the right temperature inside.

A quality cold storage door must have good thermal insulation, a hermetic closing system and, in the case of freezer room doors, an electrical resistance to prevent the formation of ice or condensation.

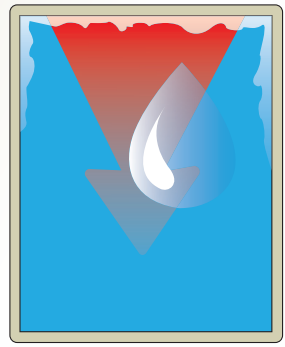
Energy efficiency. Hermeticity:



When we open our door, the following happens:

The cold and dense air inside the chamber escapes through the opening.

Cold air is replaced by warm, humid air (with high humidity).



This has the following consequences:

The hot air must be cooled to the chamber temperature.

Moisture in the air condenses and freezes.

Ice deposits on the evaporator and decreases refrigeration efficiency/performance.

It is necessary to remove ice periodically.

This creates high costs to operate the cold room and can affect the functionality of the door.

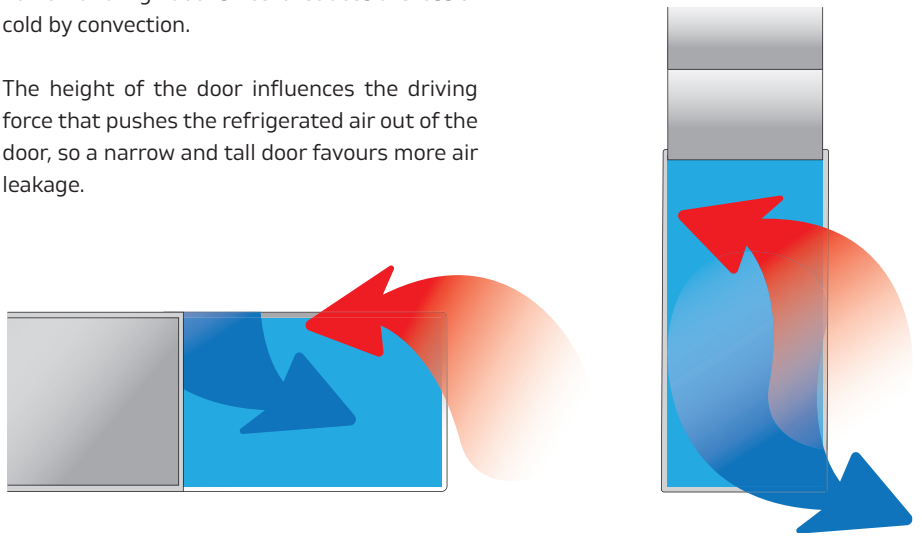
Tip 1 Right size

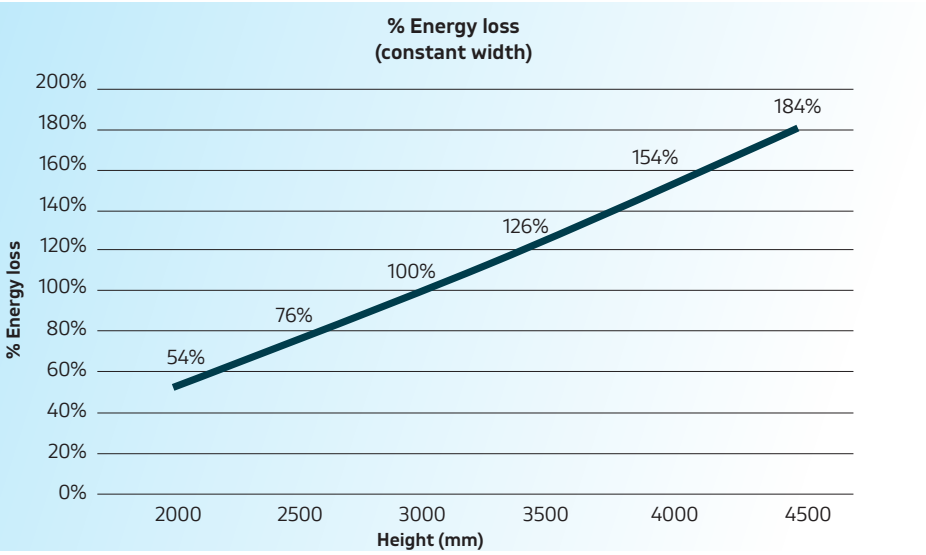
To optimize the energy performance of a refrigeration system, it is important to determine the right size of the door to the strict necessary.

A wide and low door is a better solution than a narrow and high door since it reduces the loss of cold by convection.

The height of the door influences the driving force that pushes the refrigerated air out of the door, so a narrow and tall door favours more air leakage.

Therefore, as can be seen in the graph, it is recommended to choose a door with **a size that fits the strictly necessary**, preferably with a reduced height to minimize the energy consumption of the refrigeration system.





Tip 2 Two doors of different sizes

The option of accessing refrigerated warehouses through two independent doors reduces cold losses by preventing the large door from being opened when only one person needs to access the room, minimizing the size of the opening through which air enters or leaves the room.

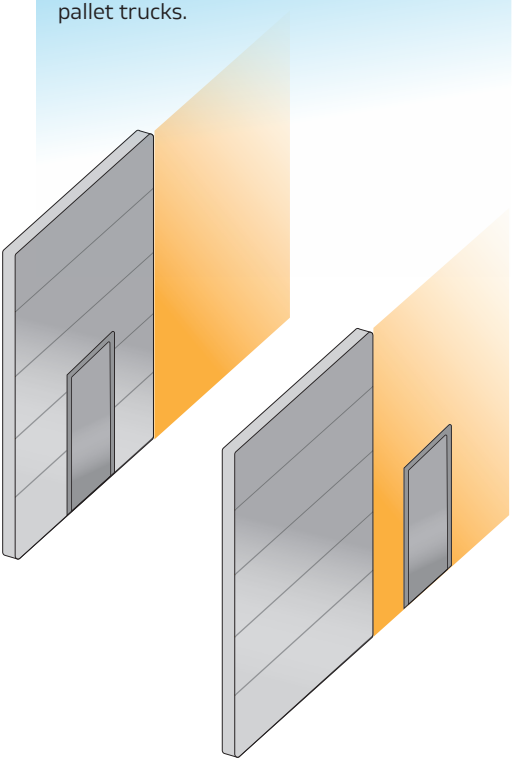
Evaluate the use of 2 doors in 1!

A large door with an integrated personnel door.

Evaluate the use of 2 independent doors!

A large door for occasional use.

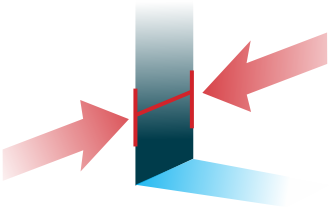
A reduced size door for personnel passage or pallet trucks.



Tip 3 Adequate door leaf thickness

The proper thickness of a cold room door depends on several factors such as the temperature of the room and the internal/external temperature differential.

In our range of cold room doors, the thickness of the door leaf can vary between **75 - 90 - 120 - 160 and 200 mm** depending on the model.



It is observed that with an adequate thickness of the door and depending on the conditions of the chamber, energy savings (conductivity) can be obtained up to:

160 mm <-> 90 mm : 78%

120 mm <-> 90 mm : 33%

160 mm <-> 120 mm : 33%

HINGED DOORS	INSULATION OF THE LEAF IN mm	RECOMMENDED MINIMAL INTERIOR TEMPERATURE	RECOMMENDED MAXIMAL INTERIOR/EXTERIOR TEMPERATURE
Chill	75	0ºC	+/-30ºC
Chill	90	0ºC	+/-35ºC
Freezer	75	-22ºC	+/-30ºC
Freezer	90	-25ºC	+/-35ºC
Freezer	120	-25ºC	+/-50ºC
Freezer	160	-40ºC	+/-65ºC
Freezer	200	-60ºC	+/-80ºC

SLIDING DOORS	INSULATION OF THE LEAF IN mm	RECOMMENDED MINIMAL INTERIOR TEMPERATURE	RECOMMENDED MAXIMAL INTERIOR/EXTERIOR TEMPERATURE
Chill	90	0ºC	+/-35ºC
Freezer	90	-25ºC	+/-35ºC
Freezer	120	-30ºC	+/-50ºC
Freezer	160	-40ºC	+/-65ºC
Freezer	200	-60ºC	+/-80ºC

Tip 4 Frames with 1 or 2 thermal bridges

Cold storage door frames are an important element to guarantee the quality and safety of the products stored in your cold room.

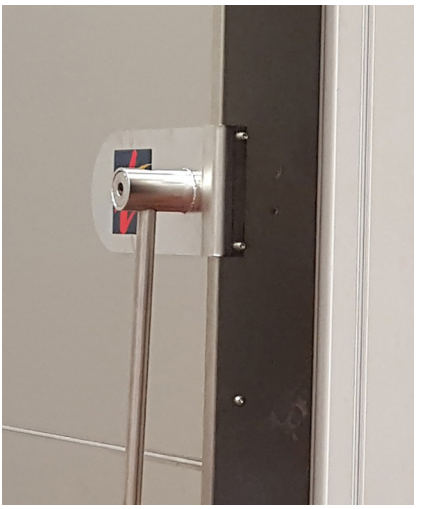
There are different designs and use of materials such as aluminium, stainless steel according to the needs of each sector.

Aluminium frames are cheaper and easier to install compared to stainless steel frames that have greater durability and resistance, but they are also more expensive, heavier, and difficult to handle.

Tané aluminium frames are classified into two types:

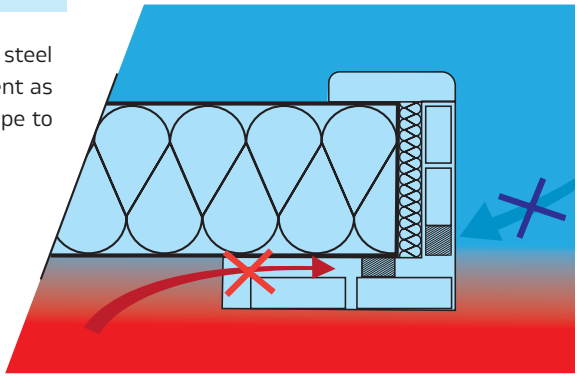
- The **commercial/medium line** has an aluminium frame with a thermal bridge that internally separates the exterior area from the interior area of the chamber, avoiding surface condensation.
- The **high-performance line** has a reinforced aluminium frame with a double thermal bridge that further insulates the outer area from the area with the heating tape and which isolates said area again with the interior area of the chamber.

In the case of freezer doors, stainless steel frames are somewhat less energy efficient as they require a more powerful heating tape to prevent ice formation.



For this reason, for freezing tunnels it is recommended to always use the reinforced aluminium door frame of the high-performance line and for ultra-low freezer rooms use a door leaf thickness of up to 200 mm, which guarantees optimal insulation.

Therefore, regarding the door frame, it is necessary to find a balance between ease of assembly, energy efficiency and durability.

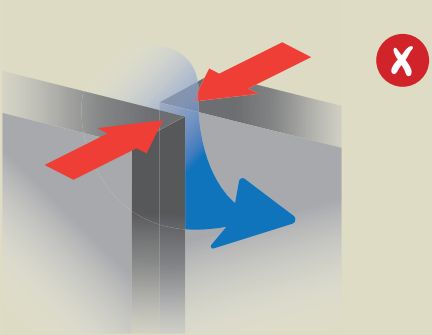


Tip 5 Air tightness

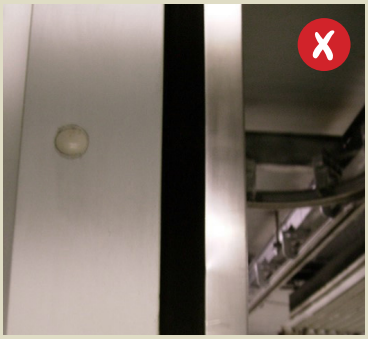
Airtightness and energy efficiency are two key aspects in door design.

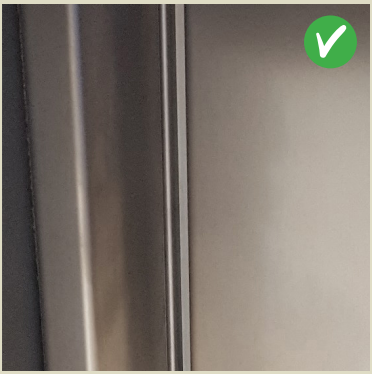
One of the most important areas to guarantee these properties is the joint or gasket between the frame and the door leaf, which makes it a critical point where air and heat leaks can occur.

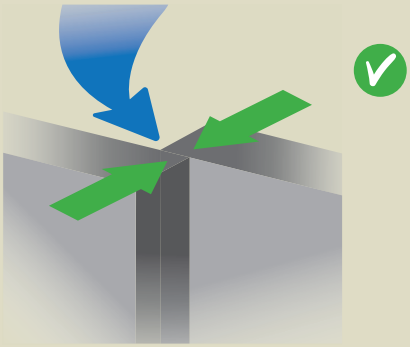
In the event of freezing, a poor seal can result in the formation of ice and make the door difficult to use.



Too large gaskets







Gasket well squashed

To improve the performance of the joint, it is recommended to **minimize the width of the gasket**, to reduce the surface exposed to the outside and improve thermal and acoustic insulation.

Good airtightness can mean energy savings of up to 60% in cooling consumption.

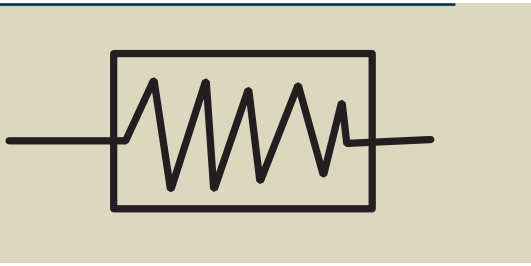
Tip 6 Heating tape

The heating cable of the door must be suitable for the use that will be given to the door and should only be necessary for freezer doors.

The power of the heating tape can vary between 25 W/m, 40 W/m or 60 W/m, depending on the needs.

A heating tape should not be used to avoid condensation on door frames if they are not well designed for the application.

This would mean **unnecessary energy consumption** and a **higher cost throughout the life of the door**.



For example, a 2x6 meter door for a drying room (not freezing) that requires a resistance due to having an inadequate frame which generates condensation, would consume 25 W/m per hour, which is an equivalent to about 9.6 KW/day, or about 3,500 KWh per door per year (an expense of about €450/year).

Tip 7 Temperature regulator of the electrical resistance

To improve the energy efficiency and sustainability of the Tané doors, the cold storage doors for freezing and deep-freezing applications are equipped by default or as an option, with a device which regulates the thermal resistance of the frame.

This device automatically regulates the thermal power of the frame resistance in real time so that it does not generate ice on the frame and adapts itself directly to temperature variations when the doors are opened.

By regulating the temperature to the minimum necessary, significant energy savings are achieved, which can reach up to 70% depending on the use of the door.

This also prevents overheating of the heater tape if the cold within the chamber has been deactivated, or that said resistance works without need, thus maximizing its useful life.

This regulator is easy to configure and compatible with different models of newer freezer doors or doors prior to the introduction of this controller.

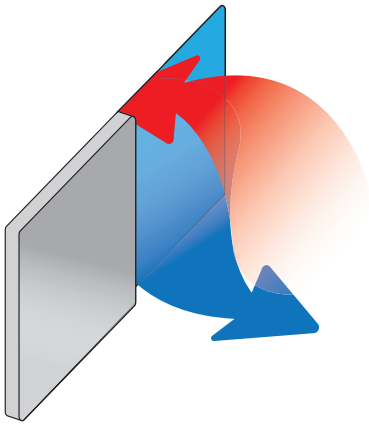
Tip 8 Opening time

The energy efficiency of a cold room also depends on the time that the door remains open.

When the door is opened, cold air escapes and warm air enters, increasing the thermal load on the system.

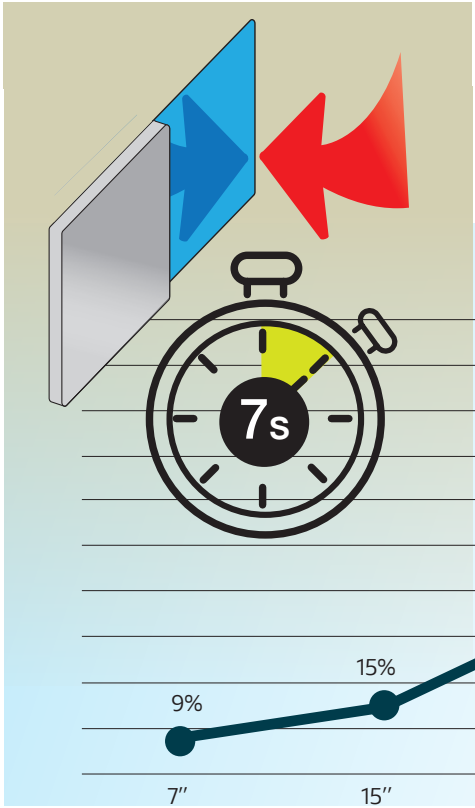
To minimize this effect, it is recommended to reduce the door opening time to less than 7 to 10 seconds.

According to a study, the first 7 seconds are the most critical, since the air accelerates from a zero speed to a constant speed that determines the loss of heat.



After 7 seconds, the heat loss remains fixed but is greater than the initial loss.

Therefore, closing the door as soon as possible can have huge benefits in terms of energy savings and food preservation.



Tip 9 Automatization

The best way to ensure the uniform use of a door is by automating the door through a control system that allows adjusting the opening and closing parameters, its speed, waiting time, etc. according to the needs of each area.

These parameters allow the door to be adapted to the type of traffic that occurs, be it people or forklifts.

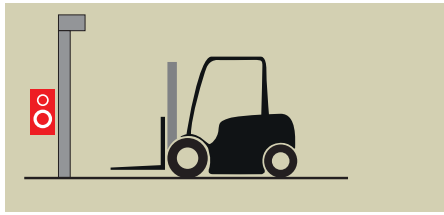
For example, a fast opening and a slow closing can be programmed to avoid impacts or damage to the door, or a partial or complete opening to facilitate the passage of pedestrians or pallet trucks/forklifts respectively.

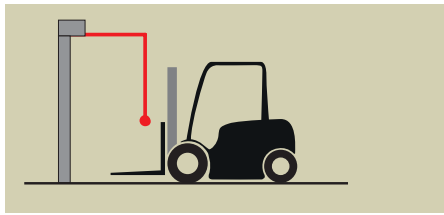
Likewise, an automatic closing can be programmed to minimize the energy loss due to the open door.

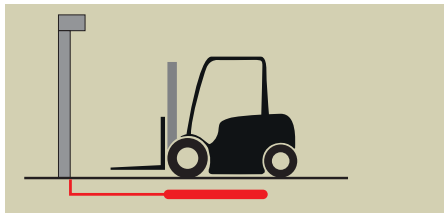
There are different control system options to automate a door.

A preferred option is the use of a ceiling pull cord switch or a button panel next to the door, since they oblige to reduce speed when passing through the door, which improves safety when moving around the door.

Another option is the use of a remote control, a magnetic field, or a radar to detect the presence of objects or people and thus activate the opening, but they can reduce the energy efficiency of a door if they cause too many unnecessary openings in the corridors when the sensors are not well calibrated in detecting traffic through the door.







Tip 10 Humidity

Mastering the regulation of side-to-side airflow is important to maintaining the proper temperature and humidity in an enclosed space.

The air flow will also depend on the pressure difference between the zones, which can be modified with heating or cooling systems.

A factor that influences the regulation of the air flow is the temperature of the air that is generated.

It is not the same to generate air at -30ºC than at +5ºC, since cold air is denser and heavier than hot air, and therefore tends to descend and displace hot air upwards, creating convection currents.

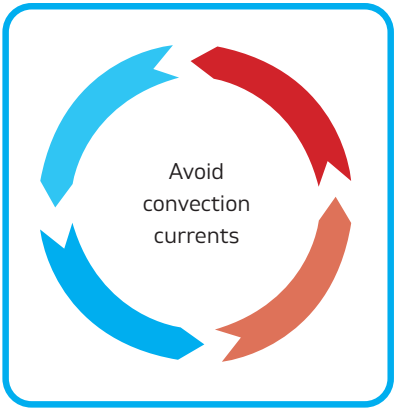
To maintain optimal humidity control inside and outside a cold room, it is important to have a refrigeration system that can regulate temperature and humidity efficiently and accurately, as well as having a thermal insulation that prevents cold losses and condensation.

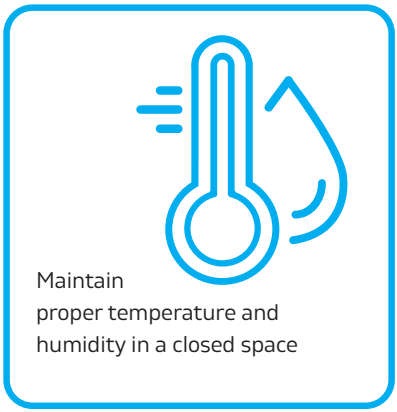
One way to reduce the exchange of air and moisture between the inside and outside of the chamber is to use a **combination of a cold door with a high-speed door.**

The cold storage door opens only when needed, and the high-speed door closes automatically after each step.

In this way, the exposure time to the outside environment is minimized and the air flow is cut off.

Combination of a cold door with a high-speed door.





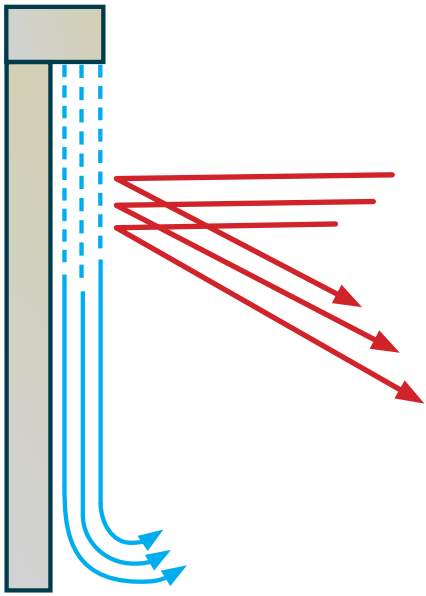
When there is no prolonged traffic through the doors, the cold storage door closes and prevents energy losses in closed position.

Another option to prevent the entry of air and moisture from the outside is to **combine the refrigerator door with an air curtain.**

The air curtain is mounted over the refrigerator door, which generates an invisible barrier of pressurized air that reduces or eliminates the passage of air.

This solution also helps to save energy by reducing the thermal load of the room, but it should be noted that the humidity control of an air curtain or high-speed door with a built-in air curtain may result in a higher energy consumption than the system of dehumidifying the air in the cold room itself.

For this reason, it is necessary to evaluate the cost-benefit of each measure and find the balance between the energy saving of the overall installation and the energy consumption of the measures put in the installation.



Tip 11 Sectorisation

In every industry the risk of fire is present every day as reflected by construction regulations, preventive measures, and the growing need to sectorize the different work areas in industries.

Cold stores are no exception and to protect the products stored in cold rooms and prevent the spread of fires, it is currently recommended to install fire-rated cold storage in the areas where they are part of the sectorization against fire.

The refrigerated-fire door combines several characteristics in one door:

- Sectorizing areas with low temperatures
- Preventing the spread of fire in the event of a fire
- By optimizing the space required since, instead of 2 doors, one is enough.
- These doors have CE marking certificates, tested in accordance with the **EN1634-1** procedure, obtaining a fire resistance of EI1 and **EI_2 60 minutes** or **EI_1** and **EI_2 120 minutes** respectively.

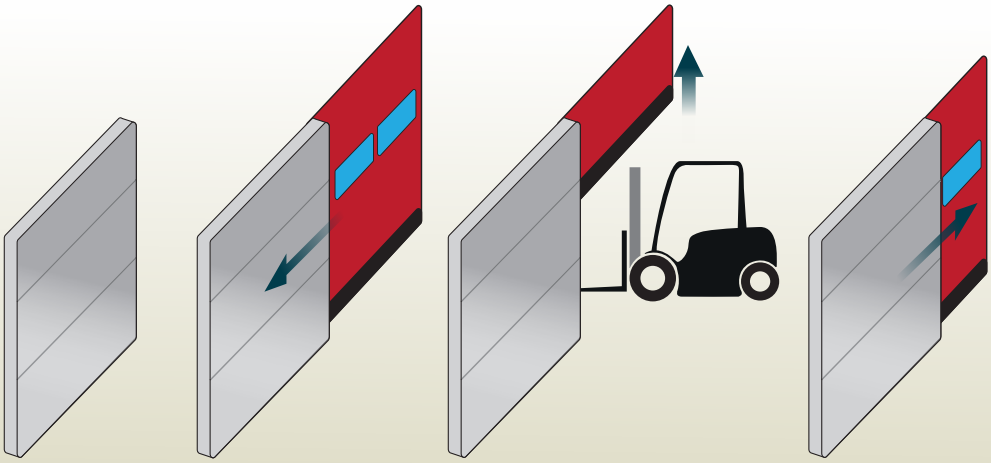
They have a capacity to maintain an internal temperature of up to **-20ºC to -25ºC** depending on the differential of the internal/external temperature.

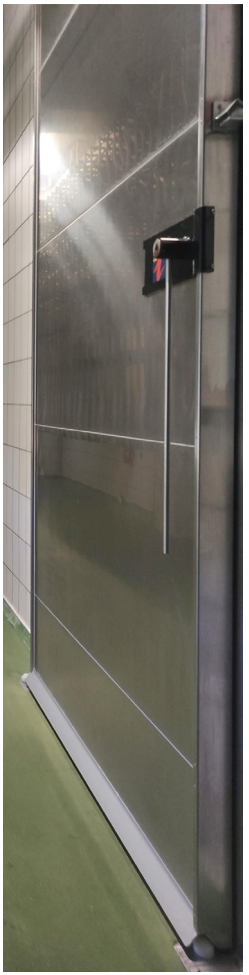
They have an automatic closing system in case of detecting a fire alarm, by means of an electromechanical device.

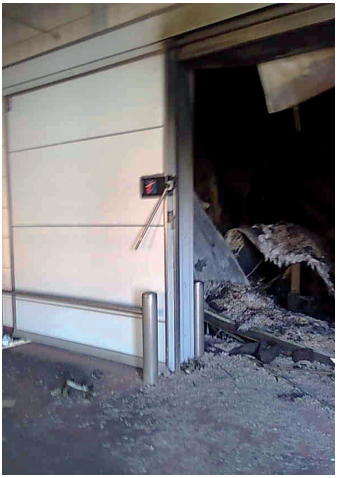
Very often they are equipped in automatic intelligent refrigerated warehouses where they are combined with high-speed doors to regulate the flow of boxes or pallets completely automatically.

When goods arrive, the fire-rated cold storage door opens, the high-speed door takes the works and after a certain time without goods passing through the doors, the fire-rated cold storage door closes to avoid energy losses through the doors.

In the event of a fire alarm, the supply of goods stops outside the passage area of the doors, and the fire-rated cold storage door closes and automatically sectors the warehouse.

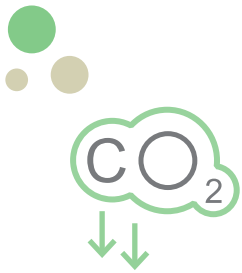






All these tips make it possible to reduce energy consumption and operating costs, as well as improve the preservation of stored products and food safety.

In addition, an efficient cold storage door contributes to reducing greenhouse gas emissions and the environmental impact of cold rooms.



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