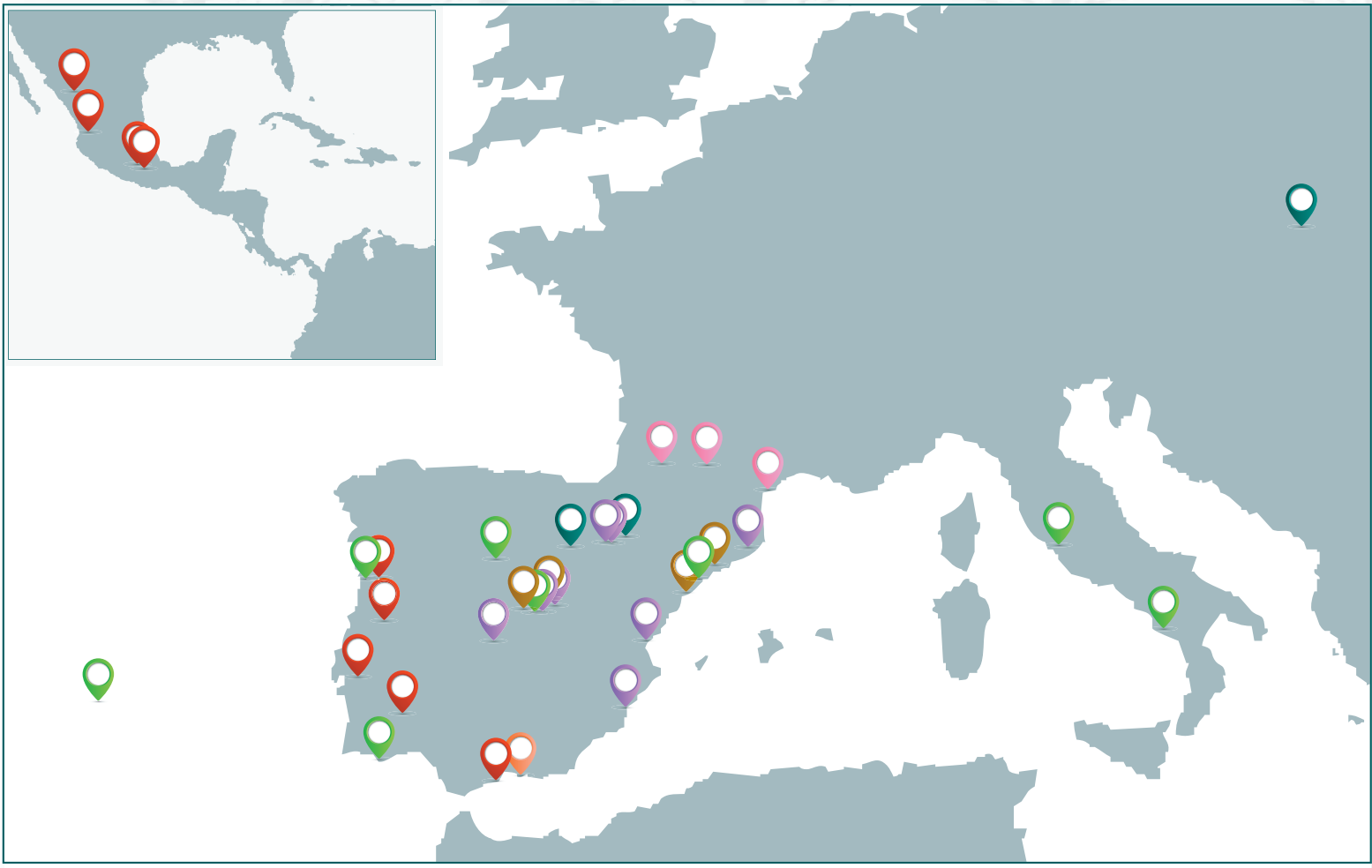
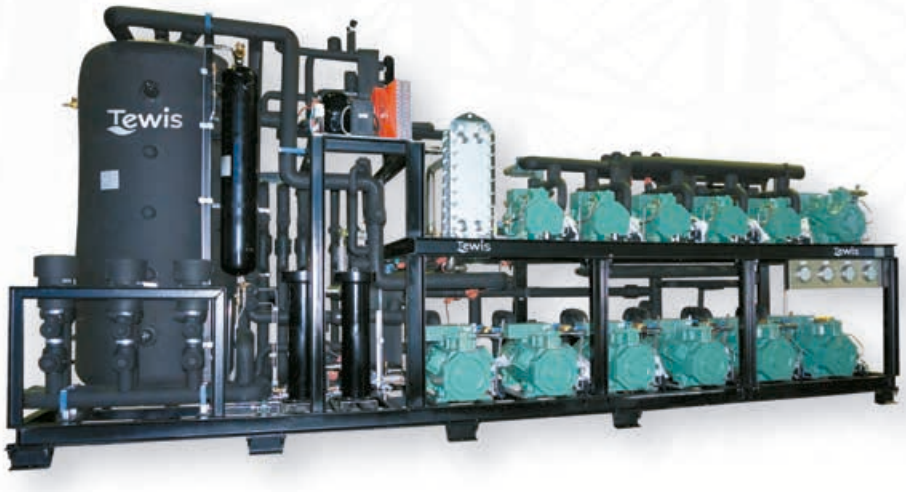
REFRIGERATION RANGE

INDUSTRIAL SOLUTIONS

RECENT INDUSTRIAL APPLICATIONS





- A. Chiller NH_3 glycol
- B. Chiller NH_3 + pumped CO_2
- C. Chiller NH_3 + CO_2 Dx
- D. Pumped NH_3
- E . RACK NH_3 + pumped CO_2
- F. Booster pumped CO_2
- G. Booster CO_2 Dx
- H. Cascade CO_2 pumped

INDUSTRIAL REFRIGERATION SOLUTIONS

TEWIS SMART SYSTEMS S.L.U. is a leader in energy consulting, specialising in integral solutions, the development of refrigeration and air-conditioning systems, and in DHW installations.

Since the beginning of 2018, he has been part of the Daikin group.

Tewis has a trained human team to meet the key needs of each project thanks to the **experience and know-how** in the areas of engineering, refrigeration, regulation and monitoring, **covering any plant or industrial process** within the dairy, wine, horticultural-fruit sector, petrochemical, meat, pharmaceutical, fishing and nautical.

We have our **own laboratories** where we can experiment with new technologies, allowing us to achieve greater installation efficiency and offer personalised solutions for each client.

Our laboratories also provide **training** for engineers, refrigeration installers and specialists, based on theoretical and practical study of the latest applied technologies.

Tewis proposals are different from those traditionally found in the sector, in that they allow for a substantial r**eduction in costs** in terms of investment and the installation process.

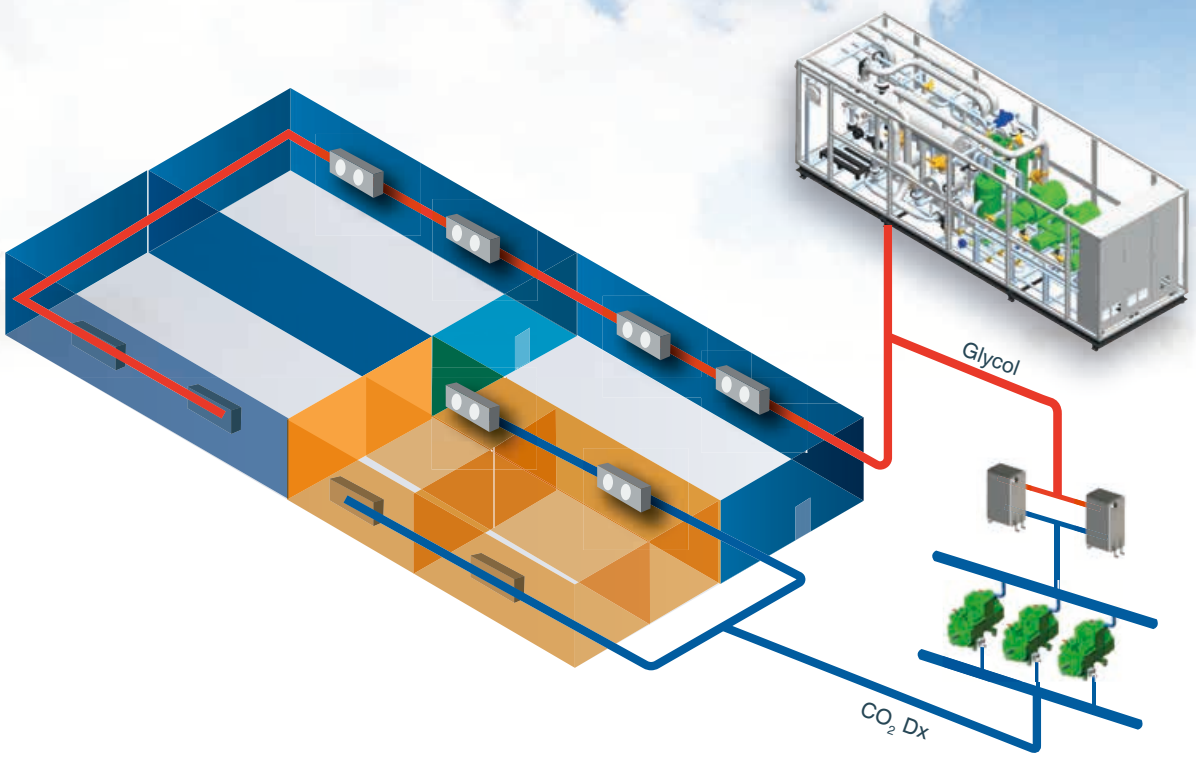
At Tewis we work with all types of refrigerants: NH_3, CO_2, HFCs and heat-transfer fluids, carrying out all of our installations with an optimal efficiency/ inversion / sustainability ratio.

TEWIS SOLUTIONS FOR INDUSTRIAL PLANTS

SOLUTION A

FRESH (75%) ▪ **FROZEN FOOD** (25%)

(RACK NH_3 + CHILLER) + RACK CO_2 Dx



ENERGY EFFICIENCY: A+

LATENT RISK: CO_2, NH_3

EASY PLUG & PLAY

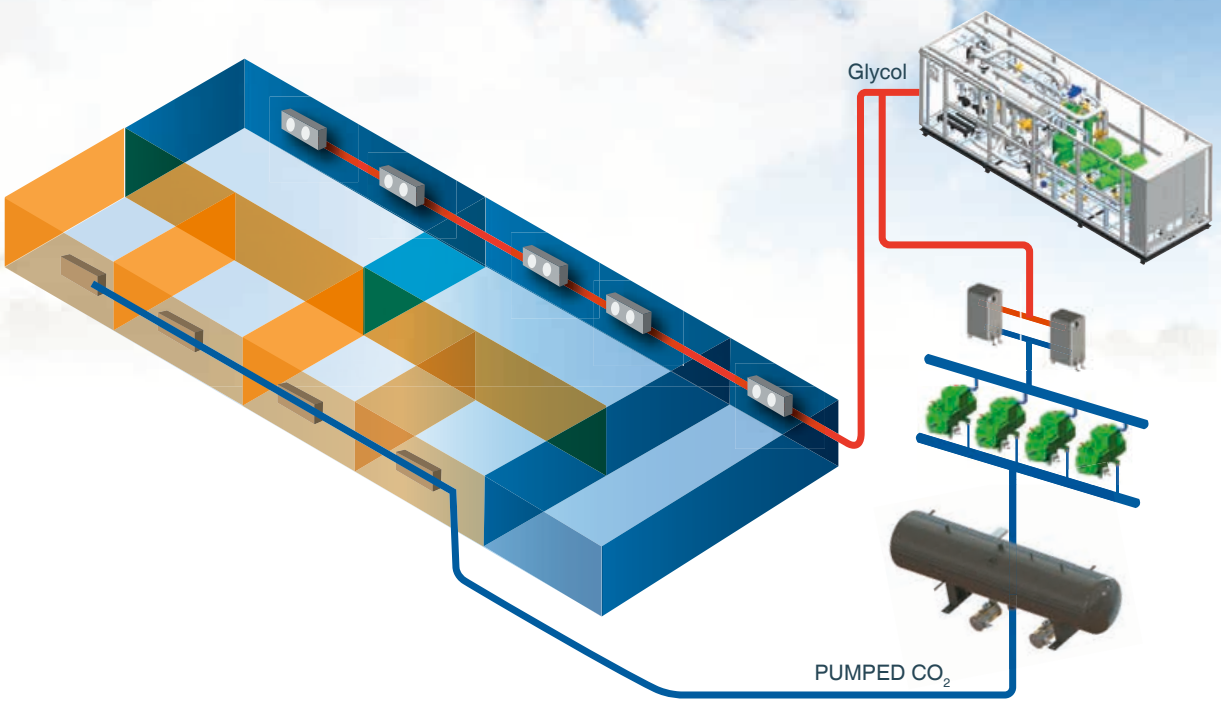
HARDWARE COST

KIND OF PRODUCT

SOLUTION B

FRESH (50%) ▪ **FROZEN FOOD** (≥ 50%)

(RACK NH_3 + CHILLER) + (RACK CO_2 + FLOODED PUMPED)



ENERGY EFFICIENCY: A+

LATENT RISK: CO_2, NH_3

EASY PLUG & PLAY

HARDWARE COST

KIND OF PRODUCT

SOLUTION C

FRESH (75%) ▪ **FROZEN FOOD** (≤ 25%)

(RACK NH_3 + CHILLER) + COND. UNIT CO_2 Dx

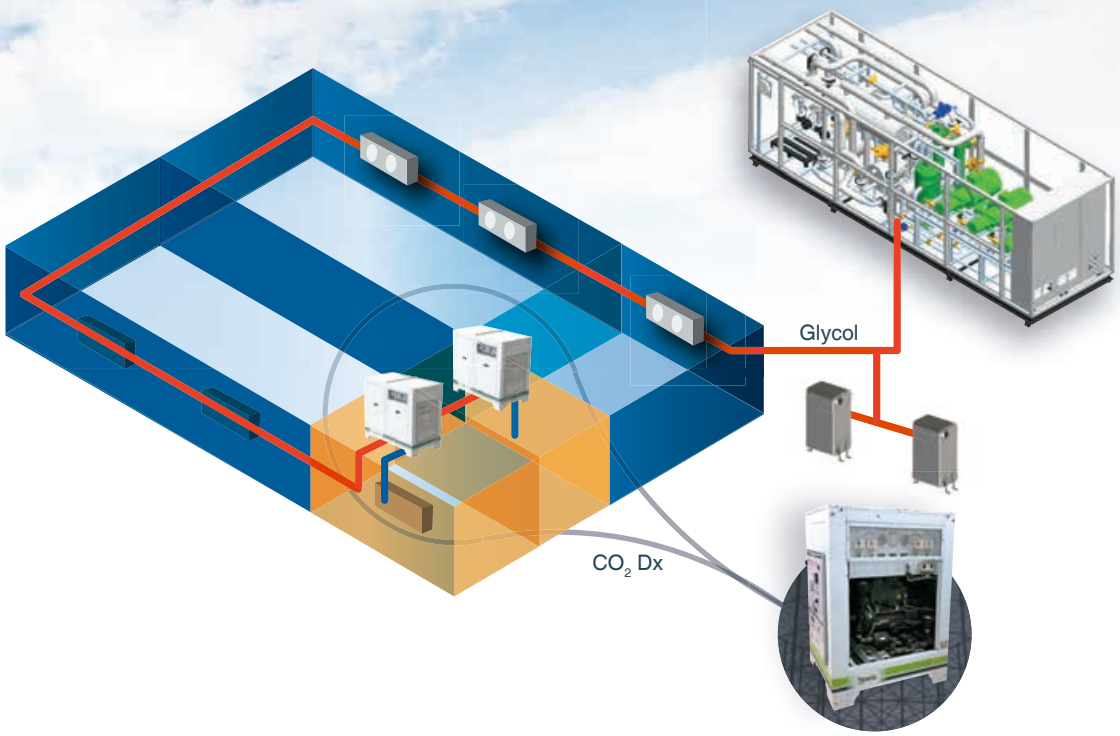
ENERGY EFFICIENCY: A+

LATENT RISK: CO_2, NH_3

EASY PLUG & PLAY

HARDWARE COST

KIND OF PRODUCT



INSTALLATION WITH CO_2 CONDENSING UNITS

SOLUTION D [CONVENTIONAL]

FRESH ▪ **FROZEN FOOD**

(RACK NH_3 + FLOODED PUMPED) + (RACK NH_3 LOW TEMP. + FLOODED PUMPED)

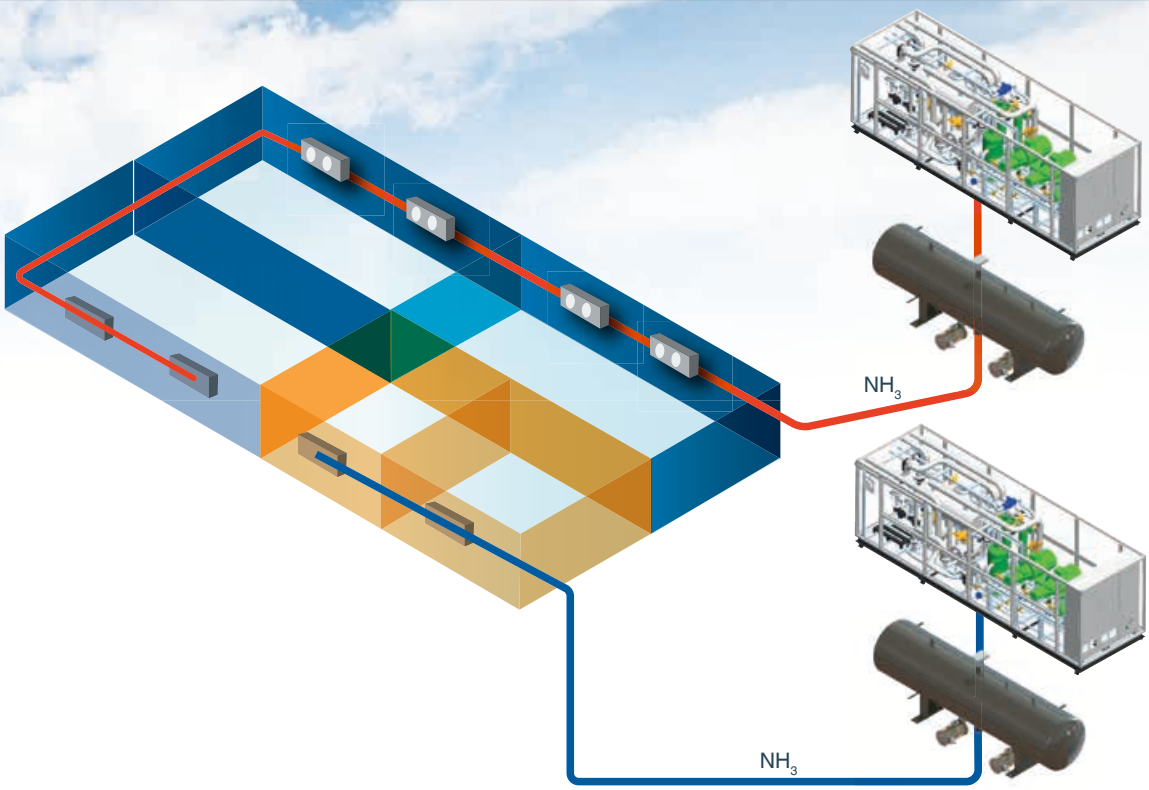
ENERGY EFFICIENCY: A+

LATENT RISK: NH_3

EASY PLUG & PLAY

HARDWARE COST

KIND OF PRODUCT

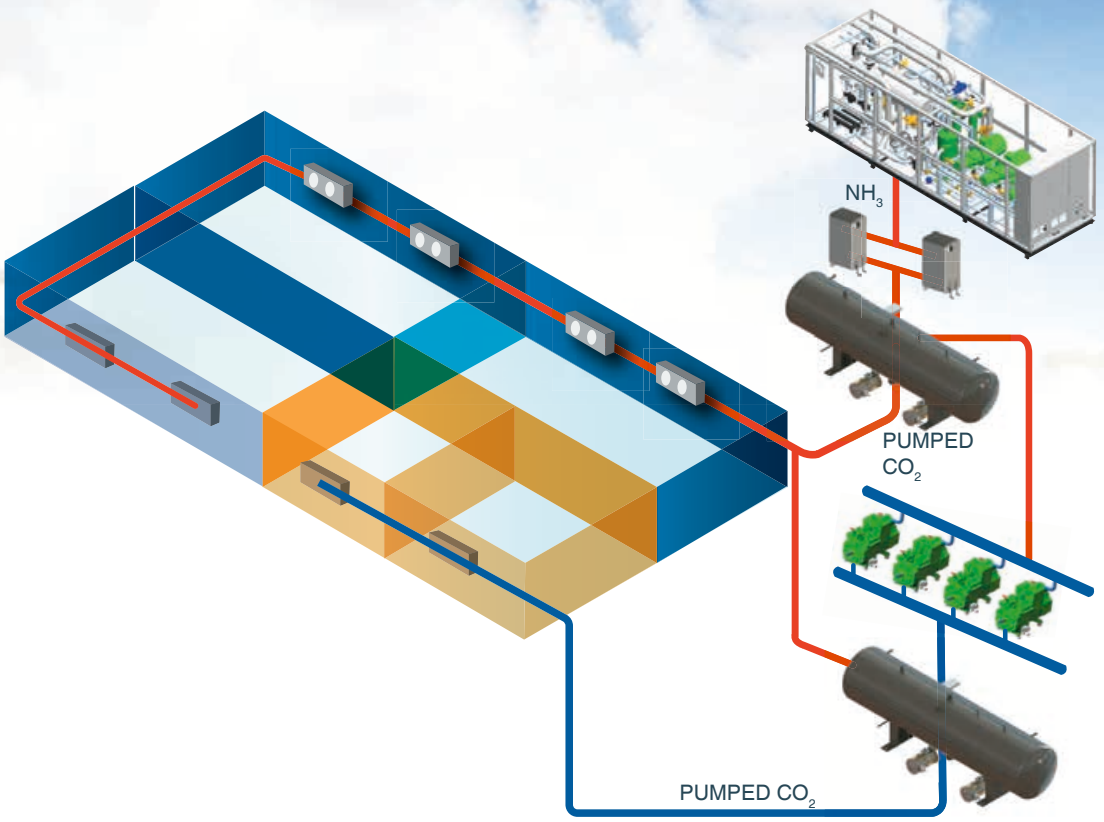


TEWIS SOLUTIONS FOR INDUSTRIAL PLANTS

SOLUTION E

FRESH ▪ FROZEN FOOD

(RACK NH_3 + FLOODED CO_2 PUMPED) + (RACK CO_2 + FLOODED CO_2 PUMPED)



ENERGY EFFICIENCY: A+

LATENT RISK: CO_2, NH_3

EASY PLUG & PLAY

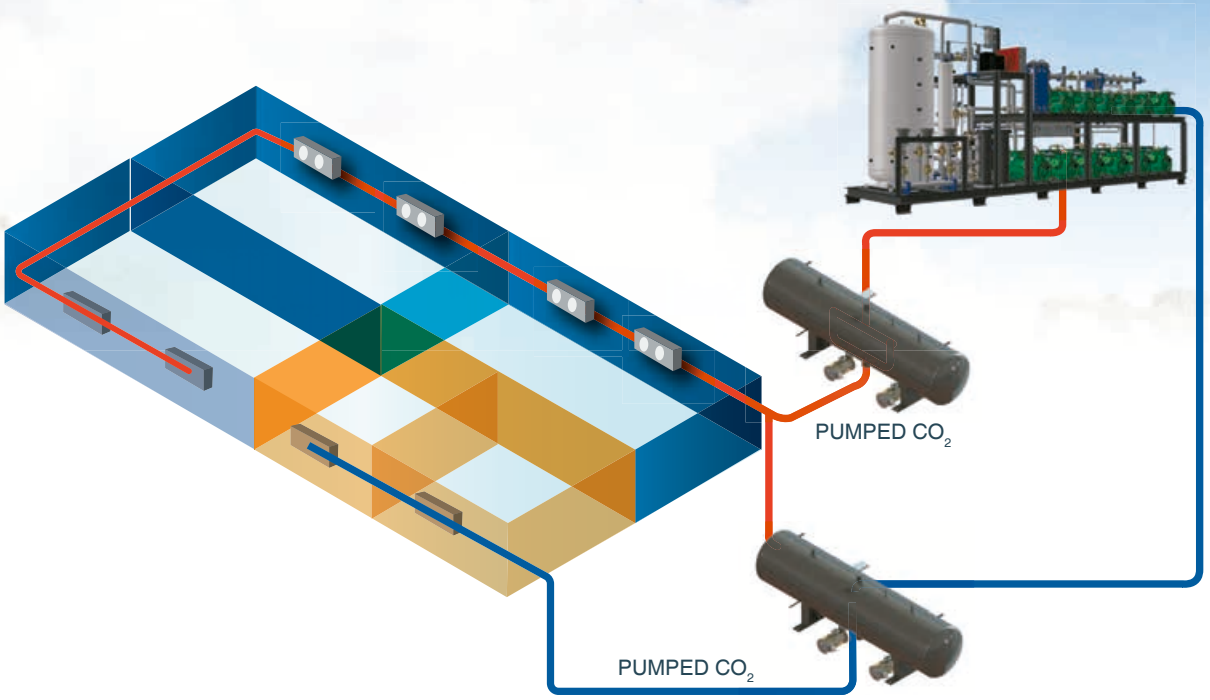
HARDWARE COST

KIND OF PRODUCT

SOLUTION F BOOSTER

FRESH ▪ FROZEN FOOD

(RACK CO_2 + FLOODED CO_2 PUMPED)



ENERGY EFFICIENCY: A+

LATENT RISK: CO_2

EASY PLUG & PLAY

HARDWARE COST

KIND OF PRODUCT

SOLUTION G BOOSTER Dx

RACK CO_2 Dx + RACK CO_2 DIRECT EXP.

FRESH ▪ FROZEN FOOD

ENERGY EFFICIENCY

A+

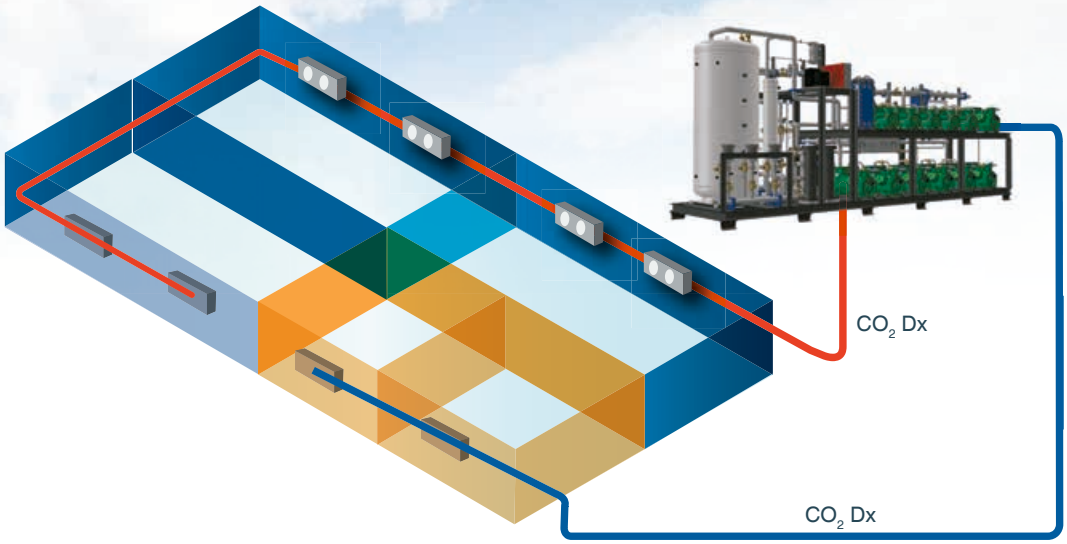
LATENT RISK

CO_2

EASY PLUG & PLAY

HARDWARE COST

KIND OF PRODUCT



SOLUTION H CASCADE

RACK HFC + (RACK CO_2 Dx + FLOODED CO_2 PUMPED)

FRESH ▪ FROZEN FOOD

ENERGY EFFICIENCY

A+

LATENT RISK

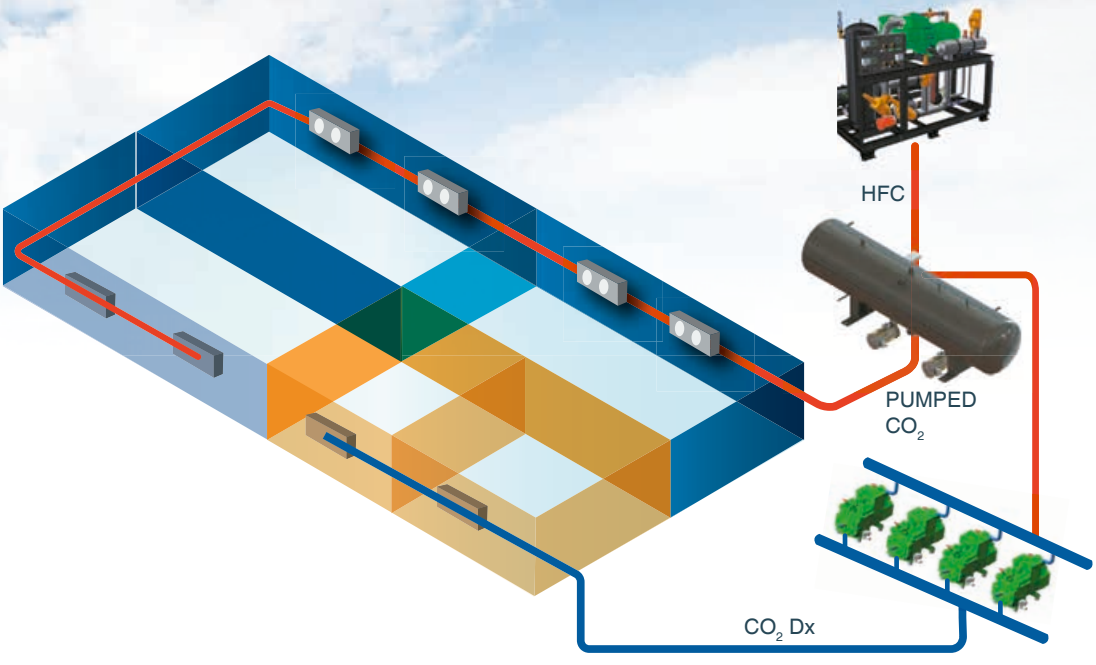
CO_2

HFC

EASY PLUG & PLAY

HARDWARE COST

KIND OF PRODUCT



INSTALLATIONS

SOLUTION A

FRESH (75%) ▪ FROZEN FOOD (25%)

NH_3 Chiller Unit that provides Glycol at -8°C to the fresh products services and in turn is used for the condensation of the **subcritical CO_2** refrigeration unit serving the frozen products services. Both the Chiller and the CO_2 rack are **fully finished equipment, ready to connect and provide service**.

SOLUTION C

FRESH (75%) ▪ FROZEN FOOD (≤ 25%)

NH_3 chiller unit producing **glycol at -8°C** for fresh produce as well as condensation of **subcritical CO_2** condensation units used for frozen food.

These systems generally have very few areas for preserving frozen food: **two units installed per area,** each running on **70%** power to ensure service.

Both **chiller and CO_2 units** are fully finished systems, **ready for connection and operation.**

SOLUTION B

FRESH (50%) ▪ FROZEN FOOD (≥ 50%)

NH_3 chiller unit producing **glycol at -8°C** for fresh products as well as **condensation** in **subcritical CO_2** refrigeration system operating on particle separator, from which **CO_2 is pumped** to frozen food units.

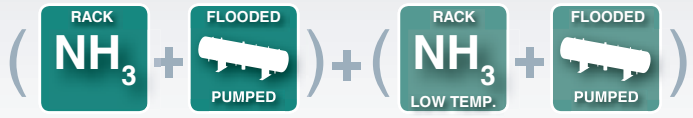
Requires high degree of professional expertise.

Greater efficiency for frozen food than with direct expansion system, yet higher cost of machinery and installation.

Increased risk, due to large amount of CO_2 stored.

SOLUTION D

FRESH ▪ FROZEN FOOD



NH_3 compressor racks for both fresh and frozen food. These units operate on particle separators, from which **NH_3 is pumped to evaporators.**

Require **high degree of professional expertise.**

Maximum efficiency due to a**voidance of intermediate exchanges.**

Machinery and installation cost higher than with than other systems, and **greater risk due to high amount of NH_3 stored.**

Not recommended for unpackaged products.

INSTALLATIONS

SOLUTION E

FRESH ▪ FROZEN FOOD

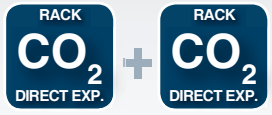
NH_3 multicompressor racks to condense CO_2 and store it in a particle separator from which it pumps the liquid CO_2 to the MV evaporators. The **CO_2 rack serves the BT** services that are downloaded in the separator.

This installation requires a **high professionalization**. Its efficiency is maximum since it avoids intermediate exchanges. The cost of machinery and installation as well as **the risk of storing large amounts of CO_2 are superior** to all the previous ones.

This technology requires special attention due to the risk associated with the generation of ammonium carbonate in case of communication between circuits.

SOLUTION G BOOSTER Dx

FRESH ▪ FROZEN FOOD



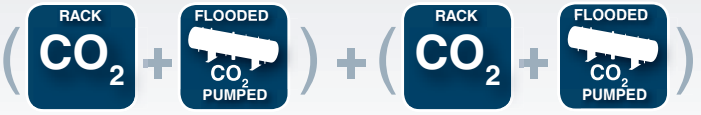
CO_2 compressor units by direct expansion (Dx) to serve both Fresh MT and BT Frozen food.

The start-up and maintenance of this installation requires an **average professionalization** of the technicians. Its efficiency ratio - cost of machinery and installation is quite competitive and its risk **for storage of CO_2, minimum.**

These plants are suitable for any type of food product, packed or not.

SOLUTION F BOOSTER

FRESH ▪ FROZEN FOOD



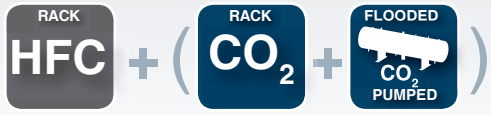
CO_2 compressor racks to serve both Fresh and Frozen Food. These units work on separators of medium and low temperature particles, from which **CO_2 is pumped** to the evaporators.

This installation requires a **high professionalization**. Its efficiency is maximum since **it prevents overheating** when using flooded systems. The cost of machinery and installation as well as the **risk of storing large amounts of CO_2 is high**.

Recommended for any type of food product, packaged or not.

SOLUTION H CASCADE

FRESH ▪ FROZEN FOOD



Multicompressor HFC units to condense CO_2 and store it in a particle separator from which it pumps the liquid **CO_2** to the MV evaporators. T**he CO_2 rack serves the BT** services and works in the Booster format by unloading the compressors in the MV separator.

This installation requires an **average professionalization** and its efficiency is optimal.

TEWIS INDUSTRIAL INSTALLATIONS ADVANTAGES

MODULARITY AND PHASES

Tewis equipment has a design that allows modular adaptation, very useful in case of reform of an existing installation, or for the planning by phases of growth of an industry.

This modularity is a very important advantage over the traditional solutions of large compressors and machine rooms that hinder the reforms and limit, either by initial overinvestment or by space, the extensions in the facilities.

QUALITY OF THE EXECUTIONS

Machine room
As these are factory-finished products, the standard of quality certified during fabrication is maintained and installed machinery is fully guaranteed.

Electrical installation
On-board electrical switchboard guarantees that units can be delivered, tested and fully connected.

Installation
Tewis systems greatly simplify installation, making it much easier to control quality and time.

CI-BOX:
INDUSTRIAL MACHINE ROOM

Alarm box and NH_3 extraction

CONTROL

Cost savings

Our technology partners, specialists in HVAC and refrigeration control, produces controllers especially designed for industrial facilities with highly competitive price and easy market access.

Standardisation

In-house software development department standardises different solutions and simplifies unit programming, making our solutions less expensive than others.

Monitoring and remote management

Eliwell has over 5,000 remote management and monitoring systems installed throughout Spain, providing high-quality services which are easy to implement and operate.

COSTS SAVINGS

Machine room

The unit with the CI-Box bodywork is installed outdoors, so a traditional machine room is not required, achieving an economical saving and a larger area available for other uses. It is a Plug & Play system..

Electrical installation

The electrical panel is mounted and wired to the central refrigeration, avoiding expensive electrical installations.

Installation

The costs of the installation are controlled and reduced in terms of time, materials, employees and contingencies.

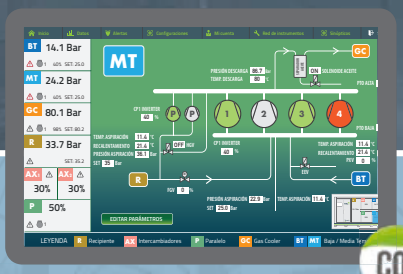
MACHINERY ROOM SOFTWARE

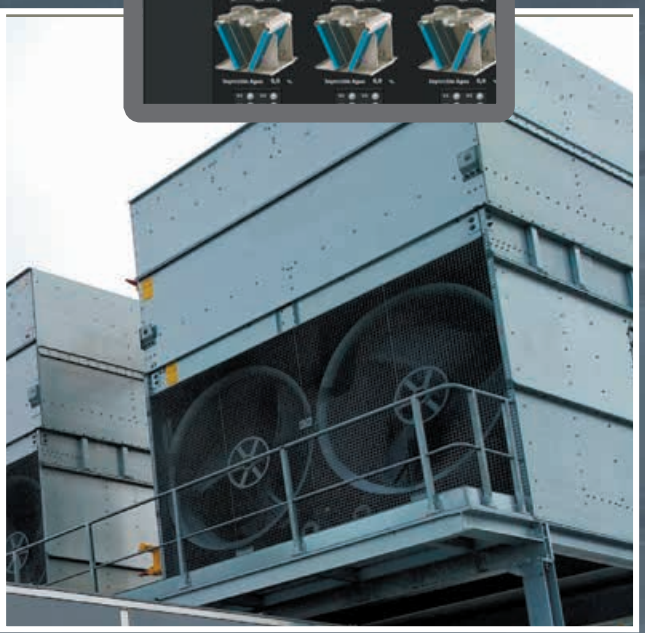
GENERAL CHARACTERISTICS

- Control for multi-compressor units of semi-hermetic, open and compact screw compressors.
- Control of the evaporative condenser or cooling tower.
- Management of the suction separator and pumping group in CO_2 and NH_3 flooded systems.
- Control for chillers.
- Hydraulic group management of the chiller with possibility of Modbus management of the pumps (consult with the commercial department).
- Two programmable controllers for cascade systems and management between them by digital inputs and outputs.
- Condensation control by glycol for cascade systems or direct expansion by electronic regulator.
- It incorporates algorithms for oil cooler or gas cooler.

COMPRESSOR REGULATION

- Capacity regulation with a compressor variator. Possibility that the first one is governed by a frequency inverter or a differentiated version.
- Possibility of management of compressors of different types; screws, semi-hermetic, open and compact.
- Rotation for hours of operation and monitoring in case of operation in manual mode.
- Management of compressors by neutral zone or by proportional band according to parameter.
- Regulation by suction pressure (central), by impulsion or return temperature in case of probe error with automatic offset (Chiller).
- Control of operating limits by pressure and discharge temperature.
- Load blocking and discharge alarm by temperature or discharge pressure.
- Monitoring of pressure and temperature of suction and oil injection to compressors.





SEPARATOR IN PUMPED SYSTEMS

- Management of 2 pumps with possibility of frequency variator. Rotation for hours of operation and with digital input of differential pressure switch with delay for priming confirmation. With retry management and attempt counter display.
- Minimum and maximum level.
- Work level ON and work level OFF.
- Regulation by request of cold.

EXCHANGER / CHILLER

- Level of minimum, medium, maximum and high level.
- Work level ON and work level OFF.
- Regulation by number of compressors on.
- Management of up to 3 pumps per Modbus RTU.
- Possibility of management by differential pressure, impulsion pressure or return.
- Rotation of the pumps for hours of operation and in case of failure.
- Up to a maximum of 2 pumps in operation and one in reserve.

CONDENSATION MANAGEMENT

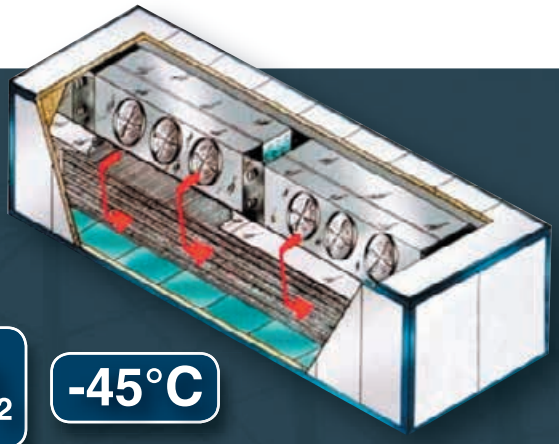
Condenser and evaporative tower

- 1 stage of water pump.
- 2 stages of fans.
- 1 entry of minimum level of water raft.
- Management of fans by frequency inverter.
- Regulation by discharge pressure and regulation by proportional band.
- Floating condensation.

Glycol condensation

- Up to 2 control pumps with variable frequency controlled by pressure or by glycol temperature and management by request of services.

APLICATION: FREEZING TUNNELS



R23 -70°C

Solution that allows freezing the product at lower temperatures, with a **higher quality freezing process**.

The **R23** is used as a refrigerant in a **cascade system**.

An HFC's or NH_3 unit is therefore required for its condensation.

It is used in installations of **individual tunnels**.

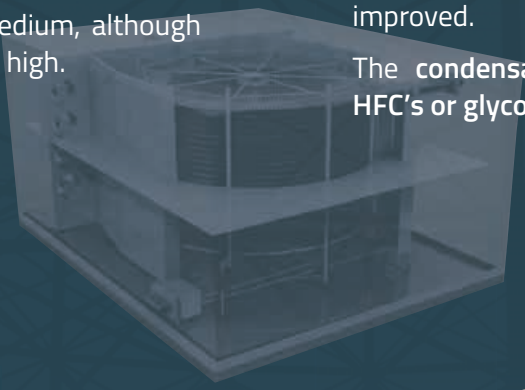
Its level of complexity is medium, although the cost of the installation is high.

CO_2 -45°C

It is a very good solution in **freezing tunnels**. It is a **subcritical CO_2 cascade installation**.

It allows **installation by direct expansion** or by means of a flooded system, the latter being a more expensive solution and with higher professionalism and safety requirements, although efficiency is improved.

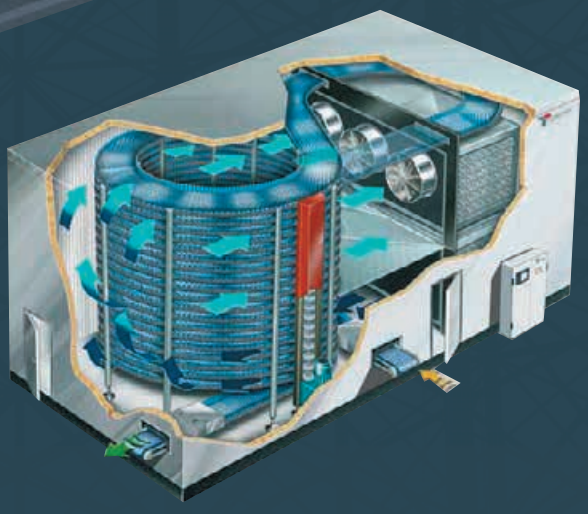
The **condensation** can be done through **HFC's or glycol cooled by HFC's or NH_3**.

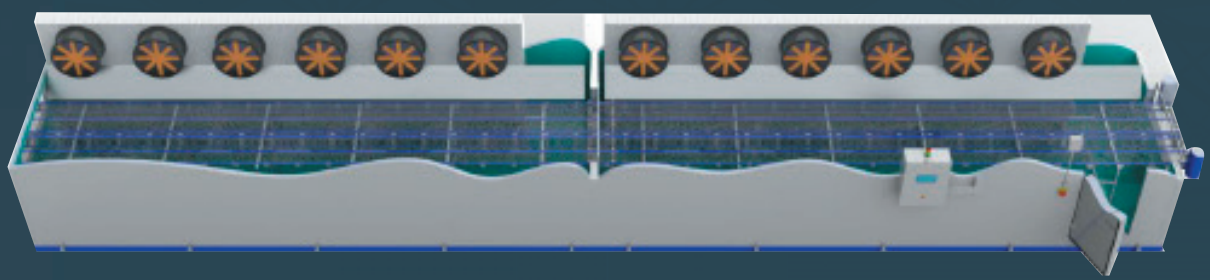


NH_3 -40°C

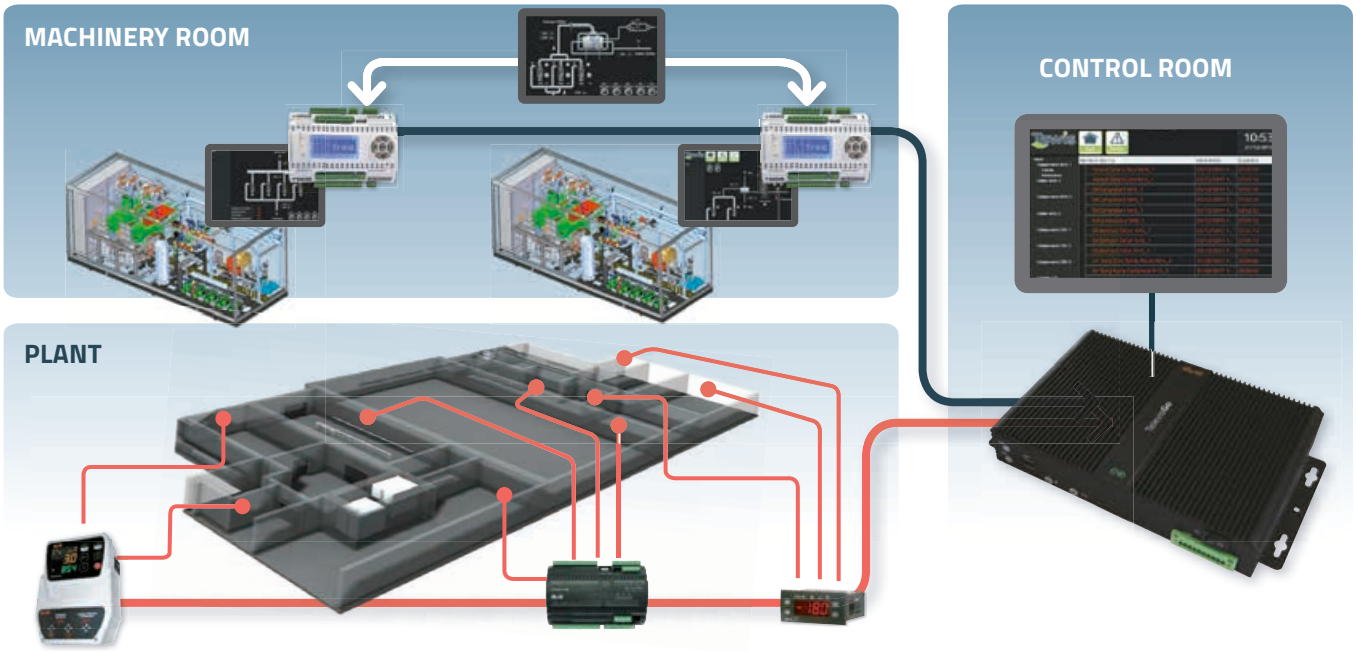
It is a **traditional solution**, less efficient and more limited than the solution with CO_2 that can evaporate up to -45°C.

The tunnels with NH_3 can be of two types, the NH_3 system by gravity or the NH_3 system pumped.

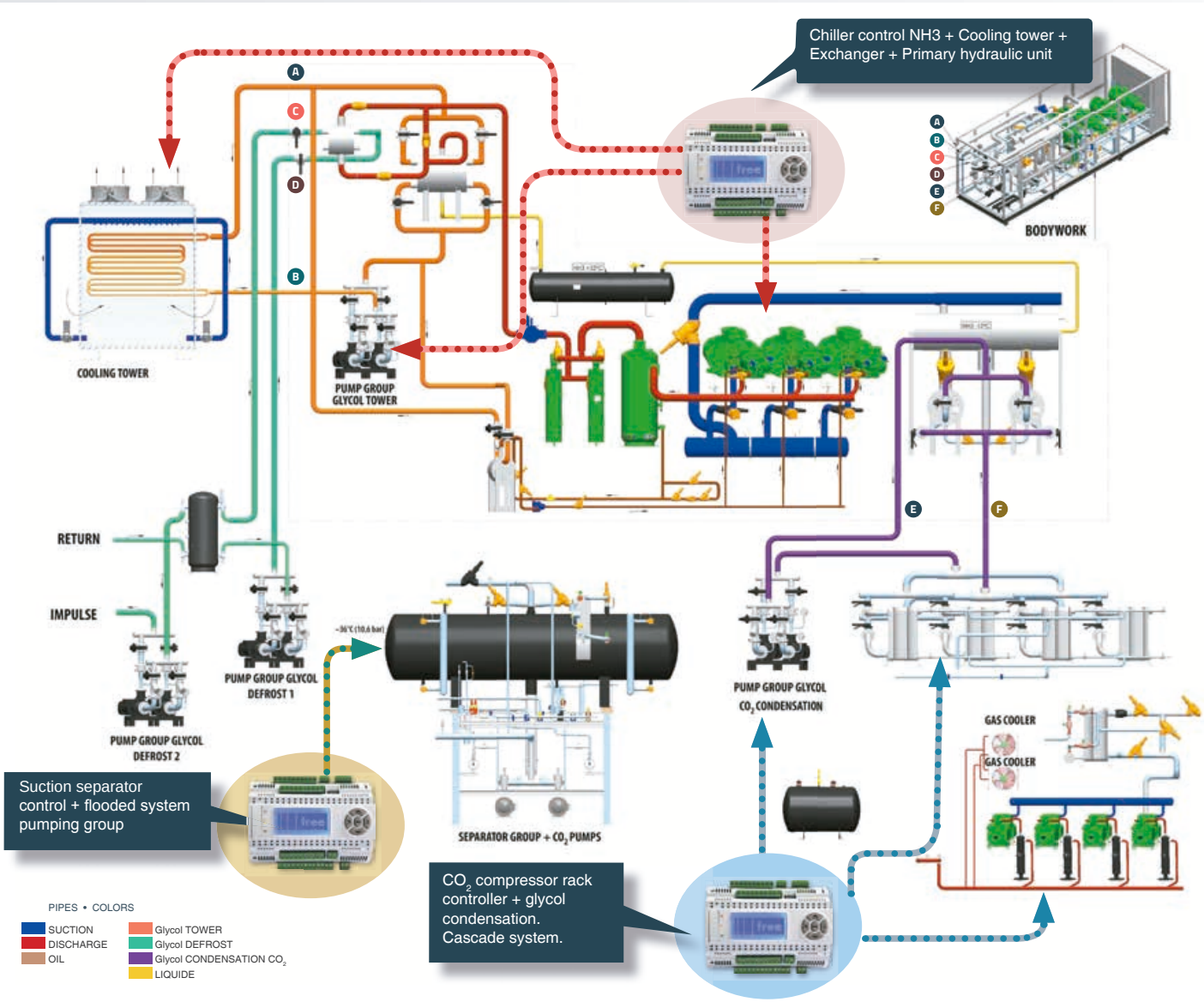




MONITORING



EXAMPLE: GLYCOL COOLING INSTALLATION + PUMPED CO_2



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Certificaciones

2006/42 CE
2014/30 UE
2014/35 UE
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