TECHNICAL SPECIFICATIONS
KIDE MODULAR COLD ROOMS

EN-14509
AENOR
Producto Certificado
020/003294

QUALITY SYSTEM CERTIFIED ISO-9001 ER-0110/1993 IQNet ISO-14001 GA-1997/0017 MANAGEMENT SYSTEM ENVIRONMENTAL SYSTEM

Member of the following associations:

APIP'ÑA	Asociación de Fabricantes de Paneles de Poliuretano Inyectado de España
ANDIMAT	Asociación Nacional de Fabricantes de Materiales Aislantes
SNI	Syndicat National de l'Isolation
ANEFRYC	Asociación Nacional de Empresas de Maquinaria y Equipos para la producción de Frío y Climatización
AEC	Asociación Española de la Calidad
EOQ	European Organization for Quality

Standard EN-14509
Standard EN-ISO-9001
Standard EN-ISO-14001
EOTA-021

kide

HUMANITY AT WORK MONDRAGON

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1 Concept

1.1 Definition

The KIDE panels system is made up of Sandwich type, insulated with injected polyurethane insulation, according to standard EN-14509, and prefabricated in its factory.

The panels are joined together to make walls, floors and insulated roofs, thereby forming a Modular Cold Room.

The Modular Cold Rooms or enclosures should be protected by a dry shelter which forms the roof.

The supporting structure of the building is exterior.

In order to avoid problems due to the condensation:

– Those cavities between the ceiling and roof or premises must be ventilated effectively.

– It is recommended to isolate the floors of those cold rooms whose temperature is next to 0 + 5°C, when they go located on premises, etc.

1.2 Objective

The objective of this document is to define the minimum prescriptions for this product and its accessories in terms of conception, manufacture, packaging, assembly and maintenance, taking into account the professional experience of KIDE, the laws and the Standards in force at the moment and the safety demands, durability and comfort expected by the users.

1.3 Application

The KIDE system can be used in all the cases of cold room construction at positive and negative temperatures.

2 Description of the Final Product

The KIDE Modular Cold Rooms are available with its insulated Modular Panels, the door and the accessories, to assembly the Cold Room.

The exclusive design of such Cold Rooms is based on the fastening system of the Modular Panels, the joinings of different Vertical Panels, the Ceiling Panels and Floor Panels.

The modulation of the Cold Rooms is the same as of the Modular Panels, 190 mm.

The maximum inner Height of Cold Rooms is 3700 mm.

The Thickness range is 60, 75, 100, 120 and 150 mm to be chosen by the user for proper insulation.

3 Technical Specifications of the materials and components used

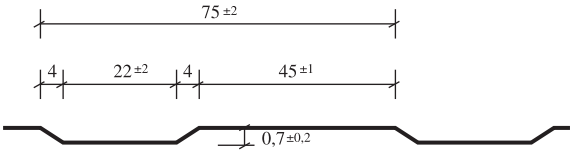
3.1 The covering materials:

– They act as resistant members of an element composed against tensile and compression forces.

– They serve as an impermeable protection against water and other agents.

– The finsh can be flat or slightly profiled *(Fig. 3.1)*:

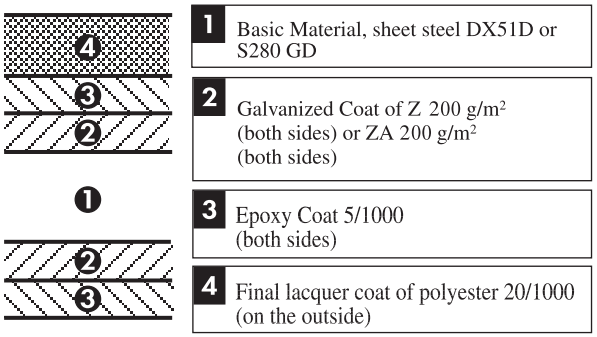
FIGURE 3.1



3.1.1 Standard Material

Pre-lacquered sheet steel according to standard EN 10169-1 made from:

FIGURE 3.2



- Food quality according to guideline CEE 90/128
- White Colour.
- Straightened under tension.
- On demand other types of sheet steel such as Stainless Steel AISI 304 according to EN-10088 and other types of coats such as plasticized sheet steel (film of 120 microns. PVC bonded on the steel sheet).
- The pre-lacquered sheet steel has a plastic coating on the outside face which protects it from scratchings and other mishaps that can take place whilst being handled.

3.1.2 Manufacturing Tolerance

- On thickness of materials used according to Standard EN 10143.

• On dimensional tolerances for sandwich panels according to Standard EN 14509 *(Table 3.1)*.

TABLE 3.1

DIMENSION	TOLERANCE (maximum permisible)
Thickness of the panel	D ≤ 100 mm ± 2 mm D > 100 mm ± 2 %
Deviation from flatness (according to the length of measurement L)	For L = 200 mm – Deviation from flatness 0,6 mm For L = 400 mm – Deviation from flatness1,0 mm For L > 700 mm – Deviation from flatness1,5 mm
Length of thel panel	L ≤ 3 m ± 5 mm L > 3 m ± 10 mm
Cover width of thel panel	W ± 2 mm
Deviation from squareness	0,006 x w (nominal cover width)
Deviation from straightness (on length)	1 mm per metre, maximum 5 mm
Bowing (curvature on length)	2 mm per metre, maximom 10 mm

3.2 Insulation

3.2.1 Basic components

Rigid polyurethane foam obtained by chemical reaction between:

– Polyoil
– Isocyanate
– Foaming agent
– Catalysts

3.2.2 Specific characteristics

• Insulation of closed cells.
• Average Density 40 Kg/m^3 (tolerance + 3 – 0 Kg/m^3)
• Thermal Conductivity (λ= 0,023 W/m°C).
• Average Thermal Transmission Coefficient "U" in relation to panel thickness.

THICKNESS in mm	60	75	100	120	150
U (W/m^2 °C)	0,38	0,31	0,23	0,19	0,15

3.2.3 Reaction to fire

The panel can be classified by their reaction to fire according to standard EN-13501-1.

The classifying of panel is Cs3dO

3.3 Various Accessories

– Extruded profiles in aluminium and in PVC.
– Stainless steel hook.
– Silicone Mastic.
– Polyurethane Mastic.
– Polyurethane foam reticulated with closed cells.
– Butyl Mastic.

4 Elements

4.1 Vertical panels

– The thickness of the panels will vary from 60 mm to 150 mm.
– The length of the panels are a maximum of 4 m.
– The edges of the panels are:

On the LONG SIDE

The steel sheet has a longitudinally formed section, where the polyethylene foam of 3x7 mm is bonded.

The polyurethane has a male-female format where the joining boxes are inserted in the foam.

On the SHORT SIDE

The steel sheet has a transversally formed section, where the polyethylene foam of 3x7 mm is bonded.

The polyurethane foam is raised up to fit in the joining boxes where the roof panels are joined.

4.2 Roof-Floor panels

The constitution and forming process will be identical on the long side of the vertical panels, except in the perimeter of the union of the roof-floor panels with the vertical panels. This union could be, on the roof-floor panel, on its four sides, three sides, two sides, one side or no side at all, depending on the dimensions of the enclosure or the refrigerating chamber.

4.3 Corner panels

These are panels injected from polyurethane foam and panels from steel sheet of the same nature as the other panels.

These panels are as long as the vertical panels such as the ones used in the cold room (up to 3 m. in one piece).

The elements of union as well as the polyurethane profiles match the corresponding vertical panels.

4.4 Union between panels

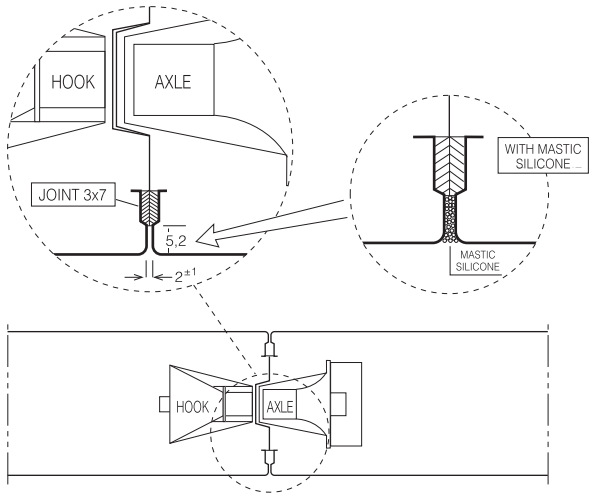
When the panels are properly assembled, the joint between the polyurethane and the two polyethylene foam seals, assure the insulation of the joint. *(Fig. 4.1)*

BREATHABILITY: "0,11" at 50 Pa (EN 12114)

WATERPROOFNESS: "A" at 1200 Pa (EN 12865)

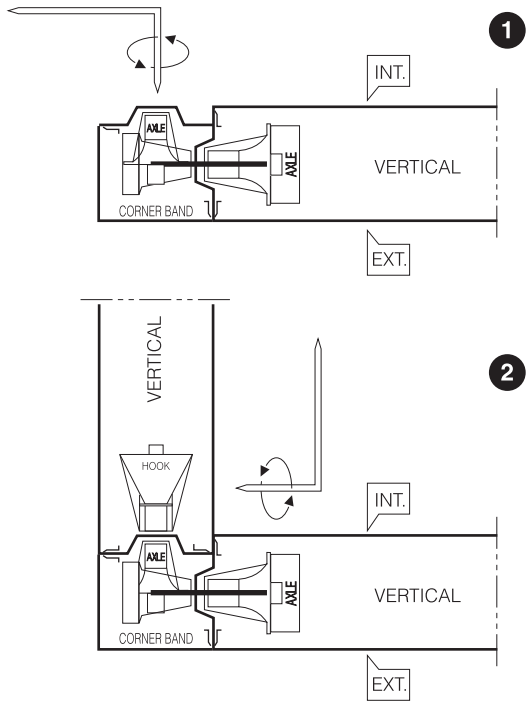
4.4.1 Between vertical and roof panels
(Fig. 4.1)

FIGURE 4.1



4.4.2 Between vertical and corner panels
(Fig. 4.2)

FIGURE 4.2



4.4.3 Between roof-floor and vertical panels
(Fig. 4.3)

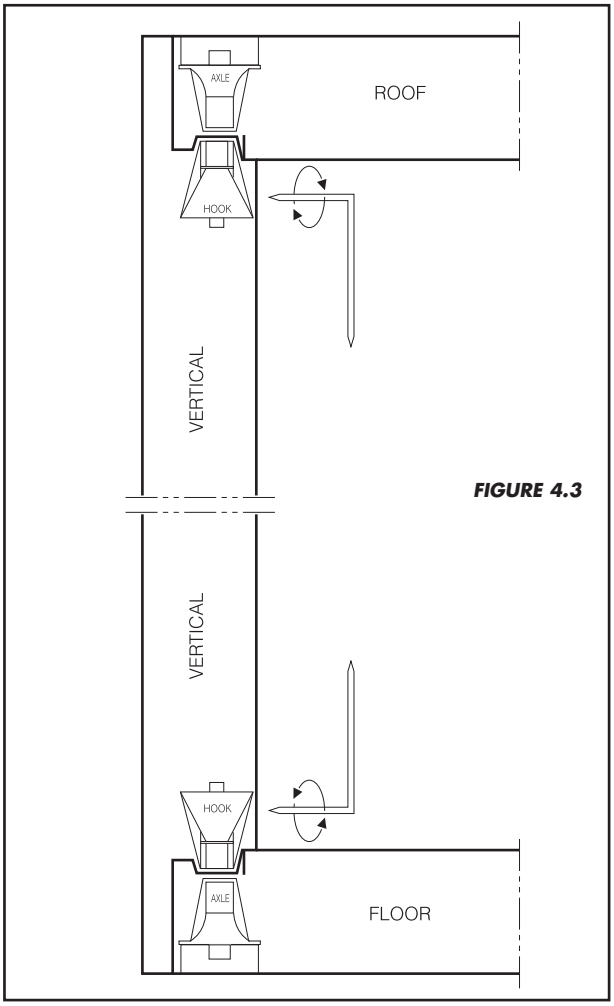


FIGURE 4.3

5 Manufacture and Control

KIDE is in possession of a COMPANY REGISTER CERTIFICATE certified by AENOR (member of IGNet) under the register ER-0110/1993, having a system for QUALITY ASSURANCE according to standard EN-ISO-9001 and the register GA-1997/0017 having an ENVIRONMENTAL MANAGEMENT CERTIFICATE according to standard EN- ISO-14001, whose scope is the design, development and production of commercial refrigeration equipment and insulating sandwich panels of polyurethane, polystyrene and mineral wool, and doors for cold and air-conditioned rooms and other enclosed facilities.

The KIDE panels are manufactured in its own industrial factory at BERRIATUA (Bizkaia), Spain, taking into account the Standards and Systems:

EN-ISO-9001	Quality Control Systems. Model for the quality assurance in production, installation and associated services.
EN-ISO-14001	Managenet System for the Environment.
ERAIKIZ	Management System for the Prevention of Risks at work.
EN-14509	Self-supporting double skin metal face insulating panels.

5.1 Process and Product Control

- Control of the productive process by the quality control department by following the procedures and instructions established for the manufacture of the panel.
- Product control by the quality control department
  - Panel dimensions
  - Panel finish
  - Sheet steel thickness
  - Tensile and compressive strength
  - Tensile and compressive modulus
  - Shear strength
  - Dimensional stability at –20°C

5.2 Annual Control of the panel characteristics

These are carried out in well-known laboratories where it is verified if the panel complies with the standard EN 14509.

- Density
- Tensile strength
- Shear strength
- Compressive strength
- Tensile modulus
- Compressive modulus
- Shear modulus
- Fire reaction
- Coefficient of conductivity (λ)
- Panel identification

6 Assembly of Modular Cold Rooms

The requirements for standard EN-ISO-14001 will be taken into account (environmental management system), and ERAIKIZ (management system for the prevention of risks at work).

6.1 Assembly Organization

KIDE has its own assembly service and offers the following options:

- Carrying out Assembly itself.
- Allowing Assembly to be carried out by trusted exclusive subcontractors.
- Realization of the study and assembly plans and giving a service of technical assistance on site for its assembly to every company designated by the client.

6.2 Control of Work carried out

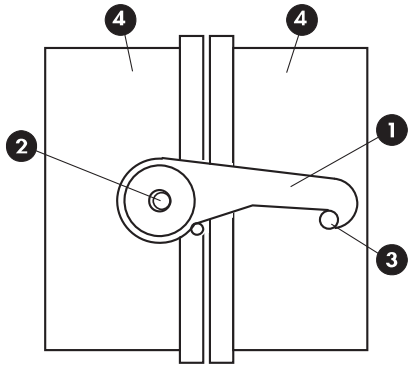
Work Inspectors control the quality of the work carried out by the KIDE assembly service and by the specialized subcontractors.

6.3 Joining Systems between panels

The system for joining is carried out by the coupling of an eccentric hook (1), which is turned through a square key joined to a metallic axle (3). The axle, as well as the hook (made from stainless steel), are contained in a plastic box (4), placed inside the Panel. *(Fig. 6.1)*

Once the panels are hooked, the access hole to the opening-closing is covered by pressure with a plastic stopper. The hook has two positions: the first one helps to pull and place in position, and the second one to tighten.

FIGURE 6.1



6.4 Floor preparation

In general terms and in all cases in the assembly of Cold Rooms, the floor should be totally levelled and smooth.

The way in which the Cold Room is going to be built and the use to which it will be put determines the different ways of preparing the floors for the asembly of the Cold Rooms.

6.4.1 Refrigeration Chambers

The Refrigerating Chamber can have a floor made from panels or one without them.

6.4.1.1 Refrigerating Chamber with panel floor

- **Refrig. Chamber on a smooth floor**. *(Fig. 6.2)* In this case the floor should be completely levelled and smooth.
- **Refrig. Chamber on an unfinished floor (cemented)**. *(Fig. 6.3)*. In this case the floor on which the floor panel should go should be completely levelled and smooth.

FIGURE 6.2

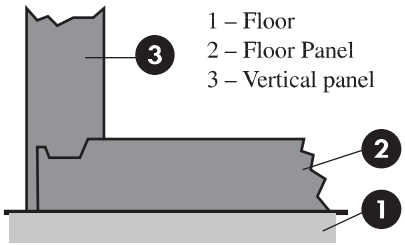


FIGURE 6.4

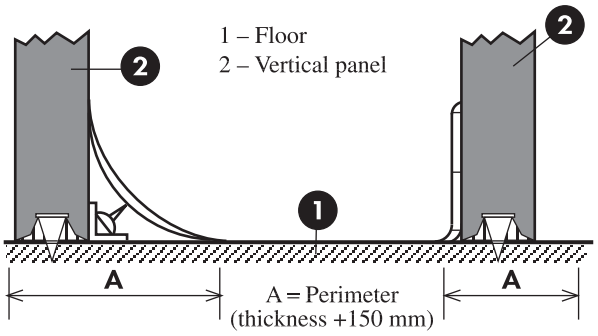


FIGURE 6.3

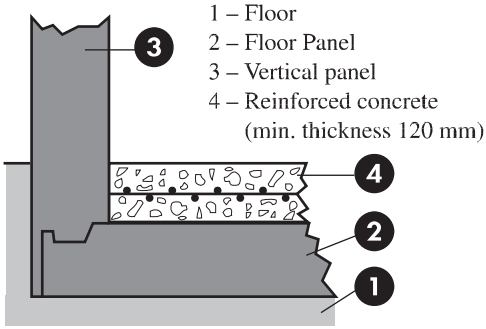


FIGURE 6.5

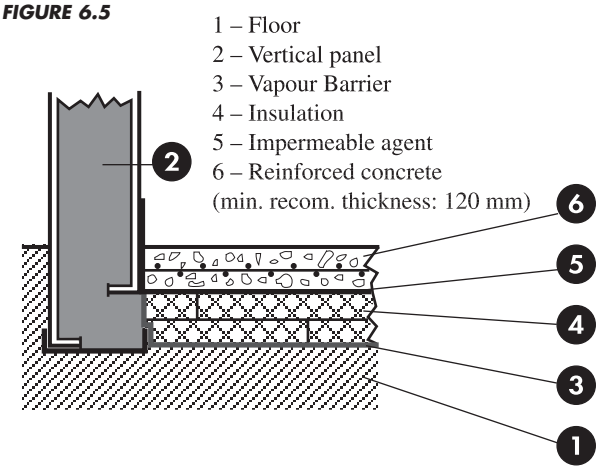
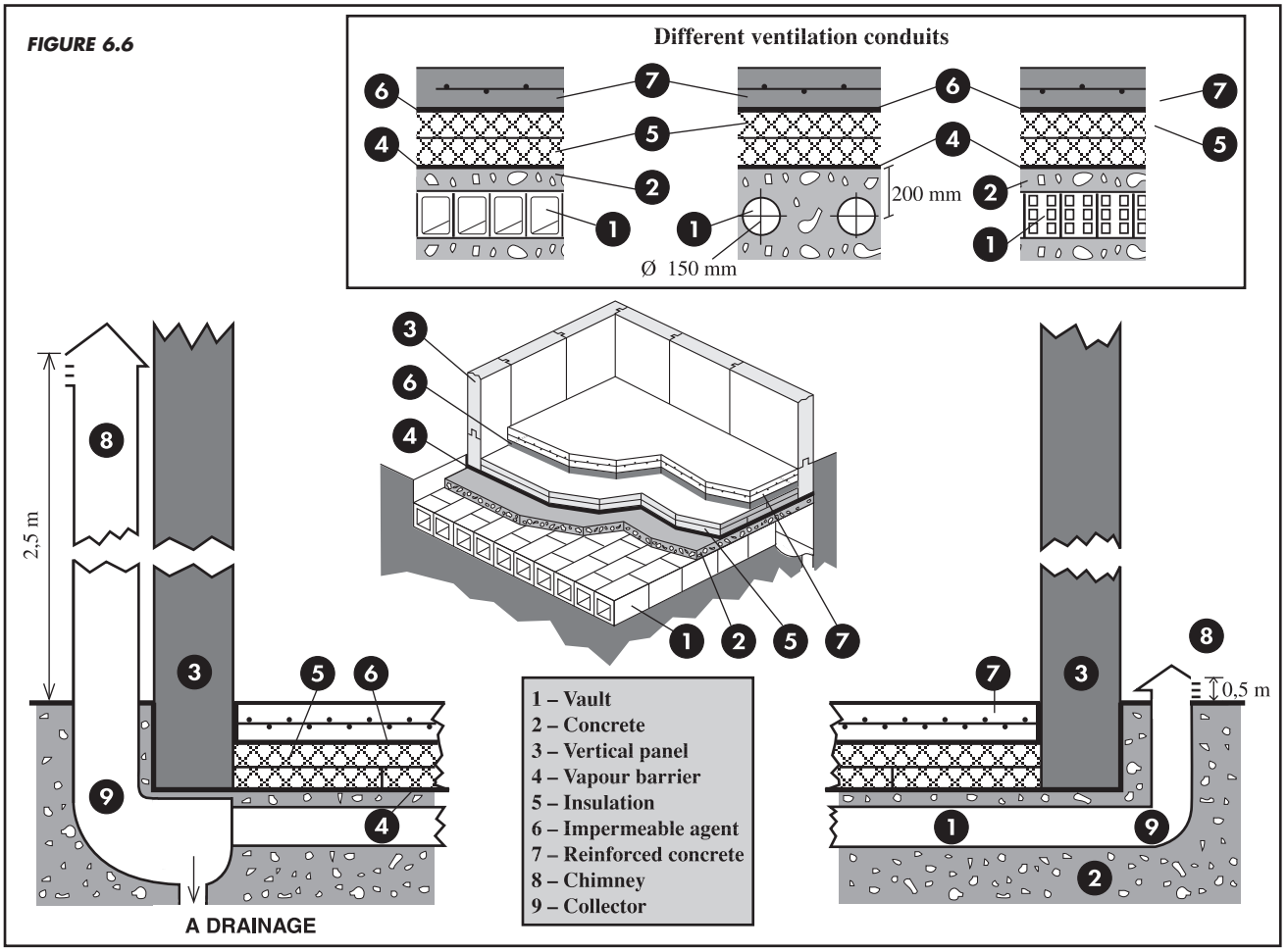


FIGURE 6.6



6.4.1.2 Refrigerating Chamber without panel floor

- **Refrig. Chamber without floor insulation (more general use)**
  In this case, at the very least the perimeter where the vertical Panels will be placed should be completely levelled and smooth. *(Fig. 6.4)*
- **Refrig. Chamber with insulating floor**
  In this case, it will be a hollow space, in which the floor insulation will be put, which has to be levelled and smoothened. *(Fig. 6.5)*

6.4.2 Freezing Chambers

Just as in the case of the refrigerating Chambers, these can have a floor made from panels or one without them. (always with insulation).

What is different from the refrigerating Chambers is that there is a need to take precautions to avoid freezing the Chamber Floor.

The most usual ways of protecting the floor against freezing are:

– Channelling the air (natural or forced)

– Electric Resistance

– Tubes with glycol water

6.4.2.1 Preparation of the floor against freezing

A) Natural Ventilation *(Fig. 6.6)*

It is the system most recommended by KIDE. In this system air circulates under the floor insulation thereby obtaining a temperature greater than 0°C and thus avoiding the freezing of the floor.

This ventilation will be from the vault or tube. In both cases, the vault or the tube will make it flow into 2 collectors which in turn will have an entrance and an outlet of air through chimneys of 2,5 and 0,5 m height respectively, which are the ones which make the air flow.

One of the collectors will have a connection to the general network for draining water which may be formed. It is convenient to have the conduit slightly inclined (minimum 2%) towards the drainage pipe.

Another variation is to avoid the chimney and install fans to force air circulation and in very cold areas to add electrical resistances controlled by thermostat which ensure that the air temperature never goes below 0°C.

B) Electrical Resistance

An electrical Resistance is installed below the insulation with a power of 10 to 20 W/m^2.

It is convenient to install 2 sets of resistances (1 as a reserve), as it is installed under the ground. In case of a failure the reserve can be used.

C) Glycol Water

In the same way that the resistances are installed, some tubes are installed in which glycol water circulates. Also the water circulation is controlled thermostatically.

6.4.2.2 freezing Chamber with panel floor

A) Chamber on smooth floor

The floor should be completely smooth and levelled. The ventilation is carried out by installing some wooden strips of at least 40 mm height and separating them by 300 mm. *(Fig. 6.7)*

(This system should be used in refrigerating chambers which are in humid climates or places).

B) Chamber on an unfinished floor (cemented)

The cast where the vault or basic concrete will go should be levelled and smooth. *(Fig. 6.8)*

FIGURE 6.7

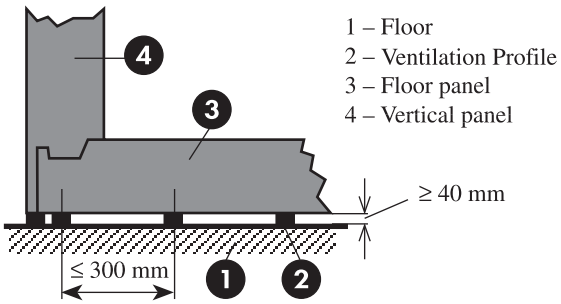
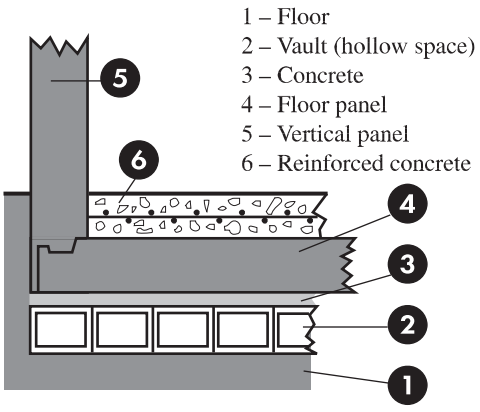


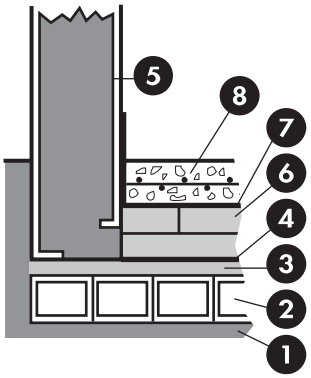
FIGURE 6.8



6.4.2.3 Chambers without panel flooring

The cast where the base concrete will go, should be levelled and completely smooth. *(Figs. 6.6 and 6.9)*

FIGURE 6.9



1 – Floor
2 – Vault (hollow space)
3 – Concrete
4 – Vapour barrier
5 – Vertical panel
6 – Insulation
7 – Impermeating agent
8 – Reinforced concrete (minimum thickness: 120 mm)

6.4.3 Chambers installed between 2 floor levels

In these cases, the lower level is considered as a vault (consider that the lower structure will be able to support the weight of the Chamber).

All the Chambers should have floor insulation.

It is indispensable to install the vapour barrier before the insulation.

6.4.4 Floor Preparation. General Aspects

(Fig. 6.10)

1 –Hollow Vault or brick, tube, etc...

2 –Concrete filling.

3 –Vapour Barrier which will be a bituminous lamina (blade) hot-soldered with an armature of aluminium interior.

4 –Insulating plates interposed.

5 –Impermeable Agent which could be polyethylene of 0,2 mm, with the objective of protecting against the per meation of water which the concrete may have.

6 –Reinforced Concrete with a characteristic resistance of 200 Kg/cm^2, forming a layer of at least 120 mm thick.The armature will be of electrically soldered gra ting formed by rods of 5 mm diametre each 150 mm.

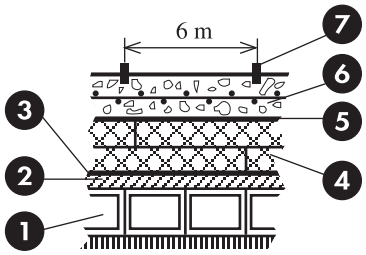
7 –The retracting seal should be of thickness between 5 and 10 mm and a depth of 1/3 of the thickness of the reinforced concrete forming a square of 6 m side.

In this kind of installation, the most important factor is the screen or anti-vapour barrier.

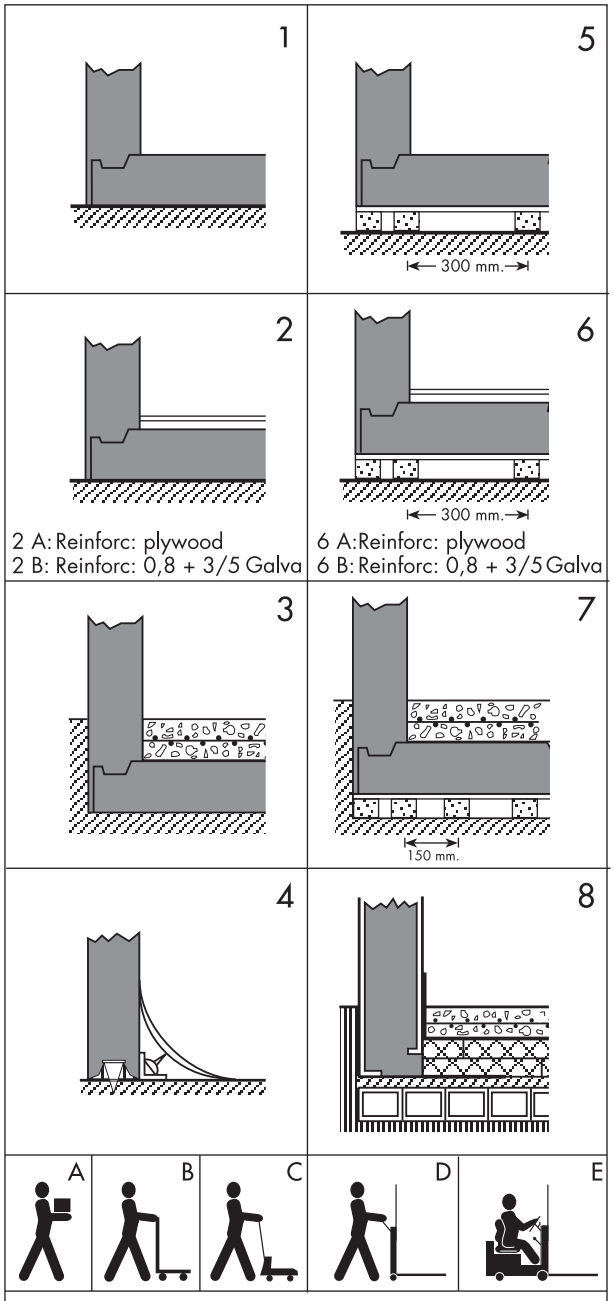
If this barrier is not correctly installed, there will be a flow of water vapour from the outside into the inside.

The vapour barrier ought to be continuous, in both smooth surfaces and in joints, and should be placed in such a way that although there may be movements, it will not break. The vapour barrier once installed should not leave any hollow space. It should be completely insulated.

FIGURE 6.10



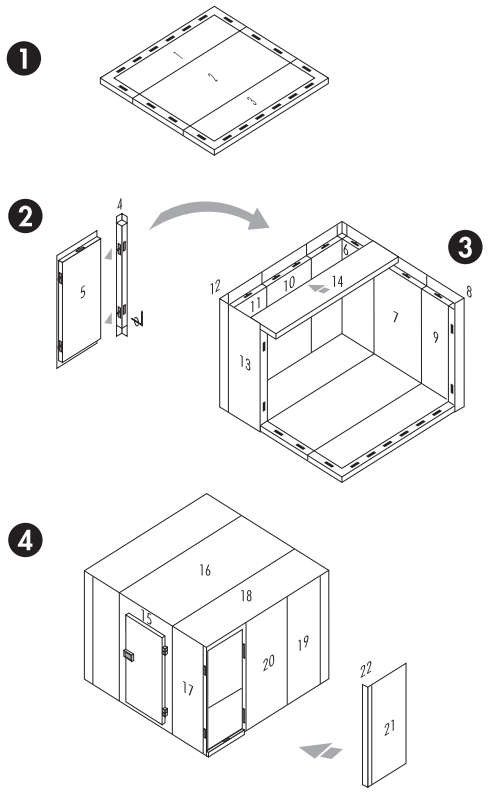
6.5 Resistance of cold room floor according to type of floor



CASES	1	2A	2B	3	4	5	6A	6B	7	8
Maintenance method	A	A B	AD B C	AD BE C	AD BE C	A	A B C	A B C	AD BE C	AD BE C
Temperature Limit	-5	-5	-5	-5	0	-40	-40	-40	-40	-40
Static Load Kg/m^2 uniformly spread	2.000	4.000	6.000	CEMENT	CEMENT	1.000	1.500	1.500	CEMENT	CEMENT
Dynamic Load on 4 wheels in Kg.	NO	400	1.000			NO	400	400		
	sheet 0,8	Reinforc. Plywood	Reinforc. 0,8 + 3/5			sheet 0,8	Reinforc. Plywood	Reinforc. 0,8 + 3/5		

6.6 Assembly instructions

ASSEMBLY INSTRUCTIONS



1st STAGE Assemble a set of floor panels (1,2,3)

2nd STAGE With any vertical panel, assemble the vertical corner joining firstly the corner panel TYPE 1 to the vertical one, reaching the box hook with the assembly key through the polyurethane panels (4, 5).

3rd STAGE Follow this method with the other vertical panels (6,7) upto the other corner. To assemble the vertical corner of this side, first join the corner panel TYPE 2 to the vertical panels (8, 9) before joining the panels 7 and 9. Continue with the extension of the vertical panels on the other side (10, 11). Assemble the vertical corner, joining the corner panel TYPE 2 to the vertical panels (12, 13) before joining the panels 11 and 12. Close the loop with the roof panel (14).

4th STAGE Follow through the assembly with vertical-roof loops (panels 15, 16, 17, 18). Close the perimeter with the vertical panels (19, 20), leaving to the end the vertical corner, joining the corner panel TYPE 1 to the vertical panels (21, 22) an then assemblying it to finish the cold room.

NOTE It is very important to observe at each corner, that the corner panel is first joined to the vertical one and **NEVER** the other way around.

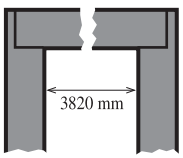
6.6 Fastening of the roof panel

In order to deal with the fastening of the roof panel we could cite 3 cases:

A) Chamber with 1 module. Maximum length: 4 m

In this case there is no need for any kind of fastening of the roof panel, as the rooms are fastened to the vertical panel by the edges. *(Fig. 6.11)*

FIGURE 6.11



***Note**: The cold elements and other ones, cannot be suspended from the roof; in any case an independent fastening should be used.*

B) Chambers with more than 1 module. Chamber upto 6 m length

The roof panels are fastened to an omega (sheet metal piece bent into omega shape) which in turn is supported on a rectangular profile. *(Fig. 6.12)*

Once the module of the chamber is assembled, the props are placed from the inside, which become supports for the roof panels (1).

The rectangular profile (2) whose axe coincides with the joint of the roof panels (1) is placed on these panels.

The necessary omegas (3) are placed on the rectangular profile (2) in such a way to take the edges of the roof panels (1), attached by 8 screws (4) to these panels - 2 for each roof panel.

C) Chamber greater than 6 m

In this case the roof panels, should either be fastened to the roof of the building or be supported by interior or exterior porticos (arcades). *(Fig. 6.13)* In the latter case, the one with the porticos, this system is used when it is not possible to fasten it to the roof of the building. Of the 2 possibilities, interior or exterior, the use of the latter is advisable.

The system is the same as the one in case B with the addition of a tensor to the rectangular profile. The tensor is fastened to the roof.

The rectangular profile (2) is fastened to the Roof Panel (1) through omegas (3) and screws (4) as indicated in section B.

The steel cable (5) is passed through the rectangular profile (2) and one of its ends hides it with two prisoners (6).

The other end is attached to the tensor (7) fastening it with two prisoners (6').

It is installed in the Roof (9) -if it is of concrete- using a steel eye-bolt receptor (female) M-10, an eye-bolt (male) (8).

The steel cable (5') is passed through the eye-bolt (8) or through the beam (10), if there is no eye-bolt (8), and one of its ends is hidden with a prisoner (6'').

The other end is attached to the tensor (7) fastening it to the prisoners (6''').

Finally the tensor (7) is tensed.

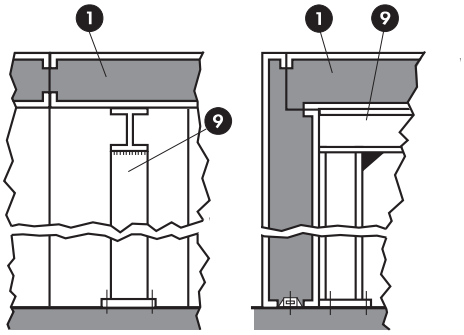
Note: *One important aspect is that the distance between the tensors on the same profile should be 2 m maximum. If it is not possible to fasten it to the roof, some porticos (arcades) are prepared. These could be interior or exterior types.*

1– Interior Portico *(Figure 6.14)*

– Porticos (9) are installed with the necessary beams according to the weight needed to support and length required. This is calculated in such a way that the joint of the roof panels (1) DOES NOT COINCIDE with the axle of the portico in order to be able to hook the roof panels.

– The Chamber is assembled in such a way that the roof panels (1) are supported by the portico (9).

FIGURE 6.14



2 –Exterior Portico *(Fig. 6.15)*

– Porticos (9') are installed with the necessary structure according to the weight needed to support and the necessary length. This is calculated in such a way that the joints of the roof panels (1) coincide with theportico axle.

FIGURE 6.12

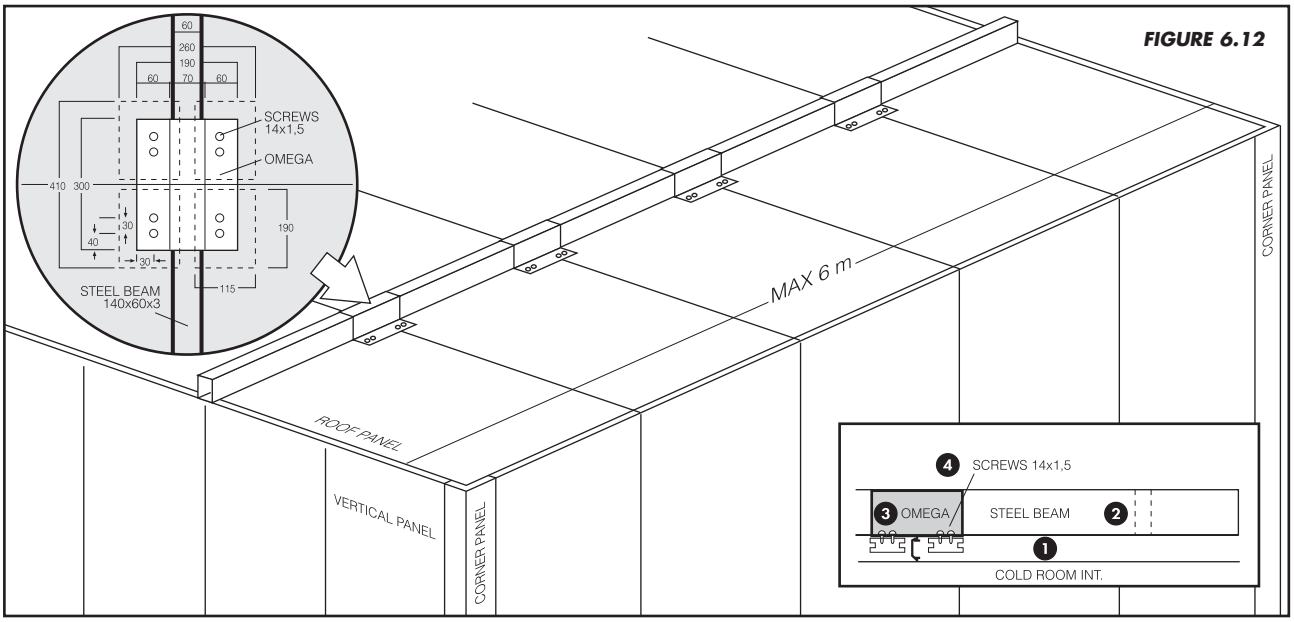
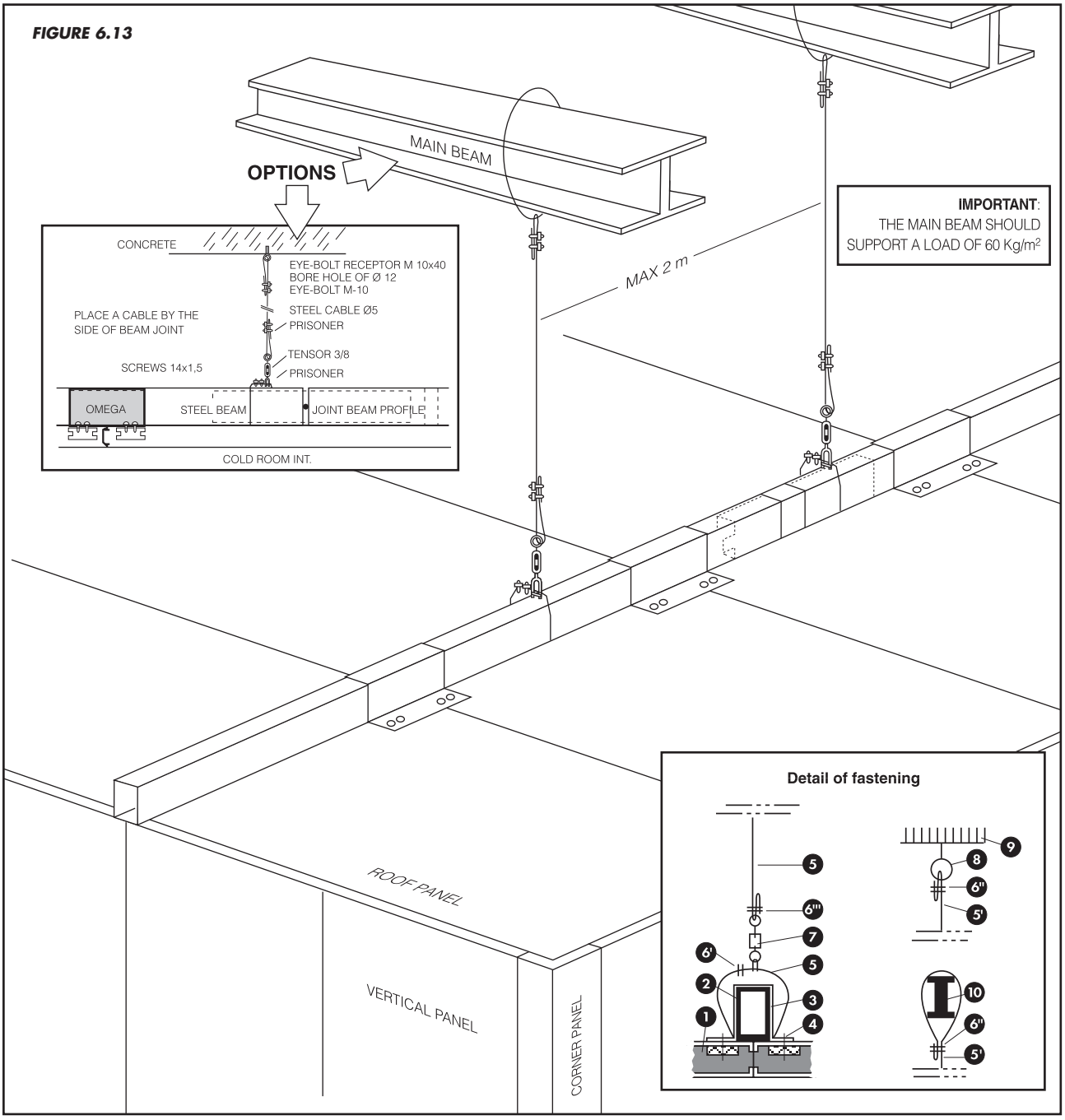
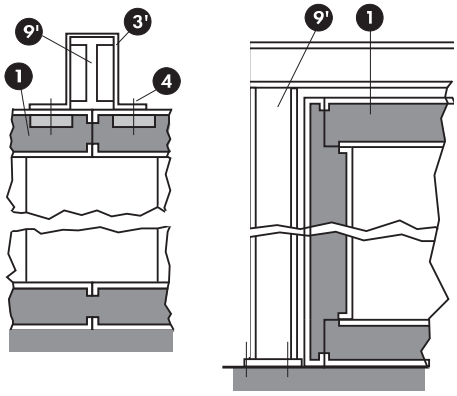


FIGURE 6.13



– The Chamber is assembled it being supported from the interior by the props. When 2 modules are assembled and joined together, the roof panels (1) will be attached to the portico (9) through omegas (3') screwed by screws (4) to the roof panel (1).

FIGURE 6.15



Points to bear in mind when attaching to the roof of the building or support of the modular Rooms:

1.- The roof panels - their own weight *(Table 6-1)*

Table 6-1

THICKNESS IN MM.	WEIGHT IN KG/M^2
60	11
75	12
100	13
120	14
150	15

2.- Working Loads:

a) Depression/overpressure, caused by the refrigerating installation working. Data to be supplied by the refrigerating plant fitter (Estimated: 10 kg/m^2).

b) Current Loads:
- Safety Load: 10 Kg/m^2
- Maintenance Personnel. One person with his tool box.

c) • Climatic Aspects (Effect of wind and snow):
Outside Pannels: take into account building standards.

d) • Thermal Loads

Note: *The cold elements and other instalations, can not be fixed or hung from coldroom roof, but must have its own structure or being fixed to.*
The roofs should not be used as areas for temporary or permanent storage.
The roofs are not areas for moving about. However, the occassional use by a person with a tool box is acceptable. The continuous use over the same area could provoke, due to elastic deformation of the panel, the removal of the foam and weaken the strength of the panel.
It is advisable to instal walkways for the repetitive moving around of the maintenance and assembling staff.

7 Packing. Maintenance

7.1 Panel Labelling

A label is placed on each panel which shows:
– The type of the panel.
– The order number which assures its traceability.

7.2 Accessories

• Standard Packing

The panels, together with the doors, are stacked to form a compact package. The whole package is wrapped in a plastic protective sheet.

• Sea-worthy Packing

The panels are stacked in the same way as above, but are introduced into complete wooden cases, built according to international standards.

7.3 Points of Consideration

- Stacking the panels in a horizontal manner in the original pallet.
- Never stack on unlevelled or humid floor where flooding is possible.
- Store the panels preferably in a dry place, protected against humidity and heat.
- If the panels have to be stored outdoors, protect the panels with wool or plastic allowing air flow.
- The storing conditions may alter the transparent plastic protection of the Panels and make its removal difficult. The time for removing this protective sheet is:
  – 15 days for storage under the sun and outdoors without protection.
  – 2 months for storage outdoors but covered by opaque canvas.
  – 6 months for storage protected against heat and humidity.

7.4 Maintenance

The estatement and tension of the ceiling fastening must be checked, as well as the cleaning of the ceiling panels, every six months at least.

Washed with running water and neutral agent, followed by rinsing with running water and dried.

Repairs: The original coat can serve as a primary one, clea-ning with running water with an active detergent, rinsed well and dried, followed by slight sand-papering and powder removal, before giving it a new coat.

In order not to lower the quality of the coat with cleaning agents, it is advisable:
– To respect the dose (frequently from 1 to 3% and the PH value between 5 and 9)
– To dilute in warm water (around 20°C, but always below 40°C)
– To respect the application temperature (ideal 30°C, up to a **maximum of 50°C** to eliminate fats)
– To respect the pressures of application (**máximum 50 bars)**
– Not to go over the application time (**máximum 30 min**.)
– To clear up with abundant clear water (maximum pressure 50 bars at a temperature of less than 30°C)
– The areas with a temperature lower than or equal to 0°C should be cleaned with a lot of water.

For persistent stains, rub with a sponge which has been soaked in the appropriate cleaning agent, without modifying the aspect of the finish, and clear up rapidly with abundant clear water.

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Notes