



Engineering
the energy saving

the
Passive
Cooling

The Shelter Innovation



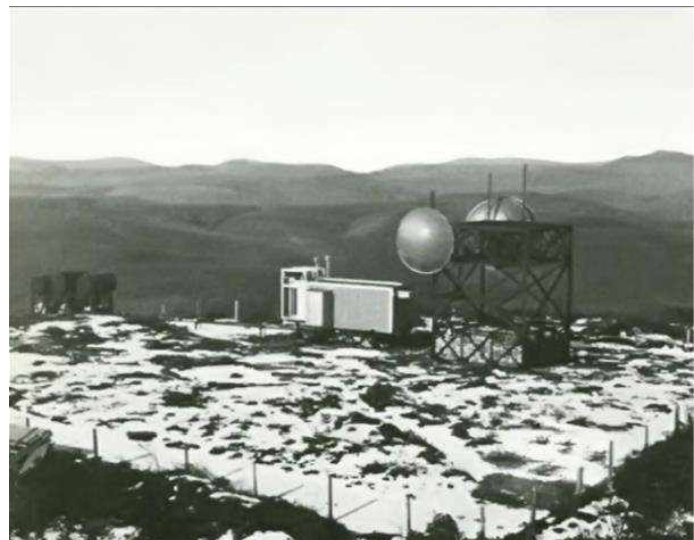
THE SHELTER INNOVATION SUMMARY

- Celantel History
- Shelter Portfolio
- Shelter Manufacturing Plant
 - Panel Manufacturing & Assembly Line
 - Shelter finishing line
 - Climatic Chamber and others factory activities
- GRP Unframed Shelter Body
 - Exclusive Tecnology
 - Sturdiness & Lightweight
 - Equipment Fixing
- Cable entry
- PASSIVE SHELTER
 - Elements
 - Operating Principle
 - On field
 - Annual temperature trends
- HYBRID SHELTER
- THE NEW TRADITIONAL ACTIVE SHELTER
- SPECIAL STRUCTURES
- CABINETS OVERVIEW
- Internal Fittings
- Markets and Applications
- Quality and Certifications
- From tradition to innovation in sheltering world
- Contacts

“A peculiar interest for the scientific research in chemistry, physics, engineering, and the idea drawn on the conversations with businessmen and researchers from different countries, have led me, since the seventies, to find suitable and innovative formulations of Shelter for telecommunication equipment and for the most different needs.”

Celantel S.r.l. was born in 2000 as a dream of Enzo Celant but, especially, as a bet started over forty years ago, focusing on the energy saving applied to telecommunications equipment housings and infrastructures.

This continuous path enabled Celantel to face the most various problems introducing innovative and completely new solutions, as the passive cooling, in order to complete the most challenging projects arising in the market, starting from BAM project USSR (arctic shelter) and Ford Project Morocco (desert shelter).



Celantel have developed a broad range of housing devices from small cabinets to big shelter .

These infrastructures, used to house any kind of equipment, represent Celantel's Core Business which includes:

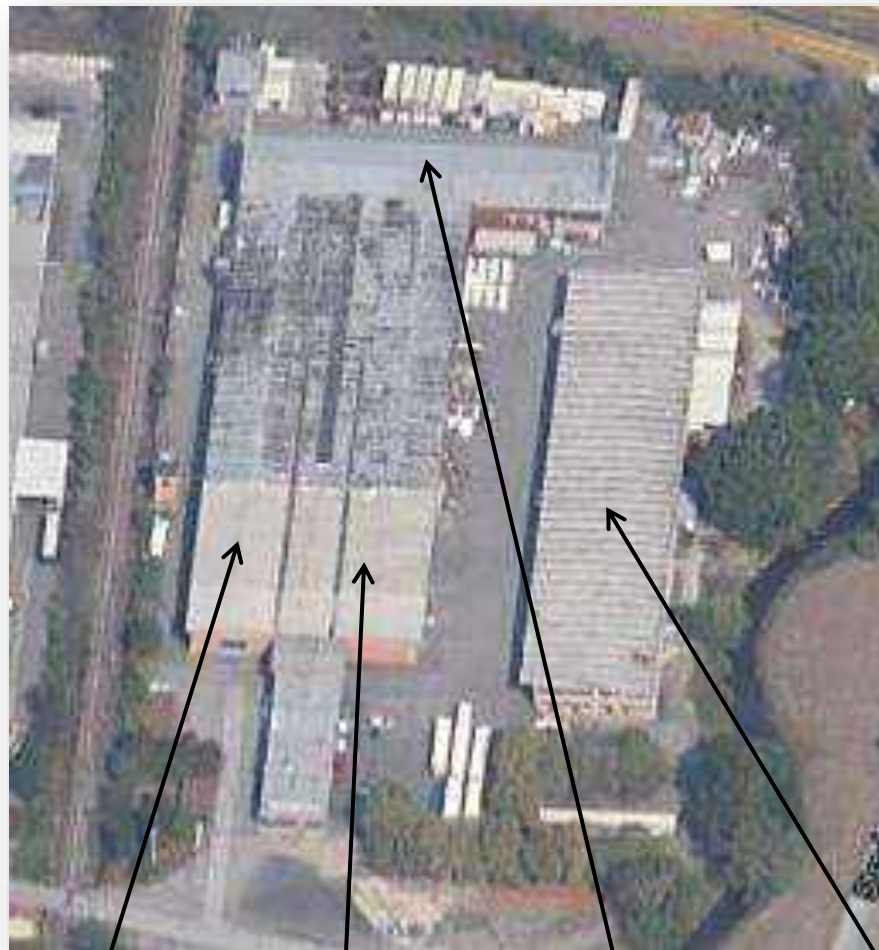
- Passive Shelters
- Active Shelters
- Hybrid Shelters
- Underground Shelters
- Passive Cabinets
- Active Cabinets
- Underground Cabinets
- Modular Shelters
- Containerized Buildings
- Frangible Shelters



The gained experience allows Celantels to completely satisfy the Client requirements tailoring the products with reliability and improvements.



SHELTER MANUFACTURING PLANT (1/4)



FACTORY FACILITY:

PRODUCTION FLOOR:

15.000 sqm indoor (30000 sqm total)

WAREHOUSE:

1000 sqm

FAT AREA:

1000 sqm

PRODUCTION CAPACITY:

YEARLY CAPACITY IN NUMBERS OF UNITS:

400 yearly

CAPACITY IN SQM:

more than 4000 sqm

**PANELS
Manuf.**

**CLIMATIC
CHAMBER
(test)**

**ASSEMBLY
LINE**

**FINISHING
LINE**



from raw materials to sandwich panel



sandwich panel sizing and preparation



Automatic cutting machine



Body assembling

SHELTER FINISHING LINE (3/4)



Factory Finishing line



Shelter under completion



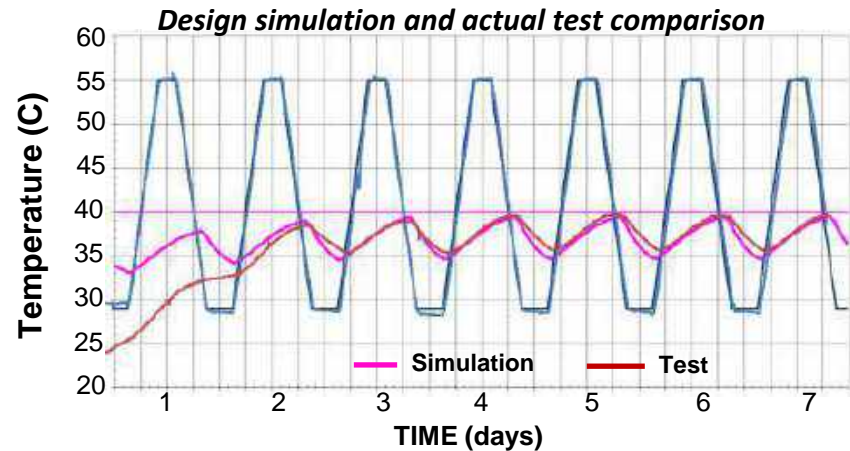
Shelter waiting for shipping



Packing and moving

Climatic Tests

Carried out in a certified thermal chamber, it allows the right evaluation of the device (Cabinet or Shelter) thermal behavior when installed at the final destination site



Mechanical Tests

- Floor load.
- Roof load.
- Wind resistance.
- Door resistance.
- Impermeability test.



Electrical Tests

- Electrical system test.
- Accessories functionality check.
- Air conditioning tests .
- Wiring insulation tests.
- Insulating panel electrical resistance measurement .





CELANTEL

UNFRAMED FRP BODY

The FRP shelter body is always made of one-piece structural panel walls that once assembled create a monolithic structure. The aspect shows net, smooth and robust surfaces with absence of any intermediate joins, protruding parts, bolts, rivets or screws.

NO MAINTENANCE & CORROSIONPROOF

Roof intrinsically waterproof



Single piece panel

NO Metal frame

STANDARD METAL BODY

Traditional shelter, having framework, requires the joining between structure and multiple panels and among panels as well, thus creating problems such as: materials compatibility, sealing, mechanical joining, different thermal expansions, external protection,

→ **CORROSION & MAINTENANCE !!!**

Roof with sunshade and slope



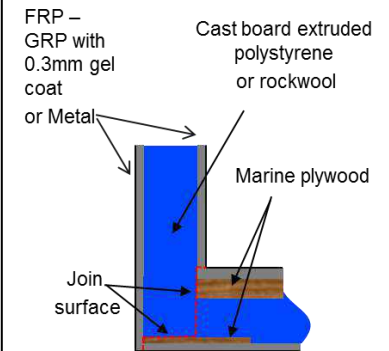
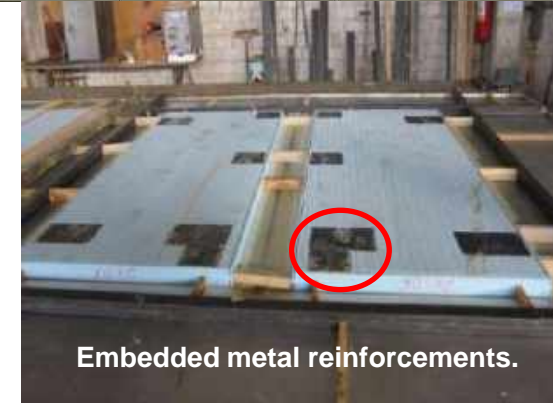
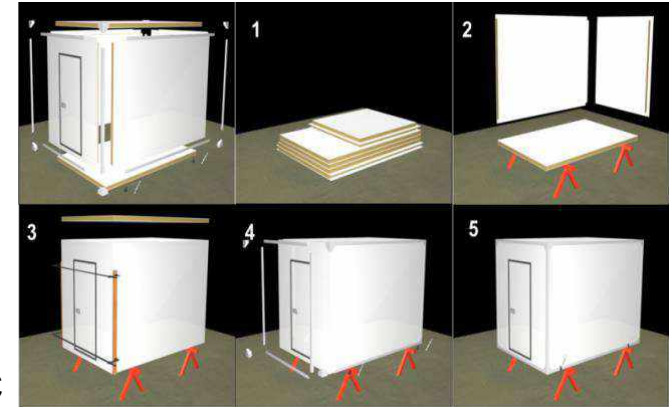
Metal frame

Intermediate joints

EXCLUSIVE TECHNOLOGY

Shelter Body is a monolithic structure without metal frame (no thermal bridges) made up of only six multilayer panels. Each one has two claddings of Fibre Reinforced Polyester (FRP) and a core of extruded panels made of expanded polystyrene and created through a pressing process with thermal control.

- **COMPATIBILITY FOR HARSH (DESERT) ENVIROMENT**
 - Extended temperature range -50C to +85C
 - High scratches and dent resistance
- **HIGHLY ACCURATED THERMAL INSULATION VALUE**
 - Extruded polysterene
 - No metal frame
 - Single piece panels
- **HIGH EQUIPMENT PROTECTION**
 - Waterproof & Vaportigth panels
 - Overall IP65
- **HIGH STRUCTURAL RESISTANCE**
 - Advanced structural technolgy (Composite panel)
 - Self-supporting structure
 - Embedded metal reinforcements
 - Superior Floor & Roof load capacity
- **NO MAINTENANCE**
 - FRP claddings with embedded colour (no repaint needed)
 - No metal structural parts (no corrosion)
 - 30 years lifetime design



STURDINESS AND LIGHTWEIGHT

In the last decade of activeness Celant.Tel has supplied the Telecom market, Oil&Gas and Safety of Middle East and North Africa with **different hundreds of auto-conditioning shelter**.



ARAMCO K.S.A.

Rabigh, SAIPEM

The **biggest passive shelter of the world** with more than 20 metres of length in a double room.

The Celantel manufacturing technology allows to have very light structure for easy transportation on remote site i.e. through helicopter



EQUIPMENT FIXING

Celantel shelter can grant the maximum flexibility for any equipment fixing requirement wall or floor mounted.



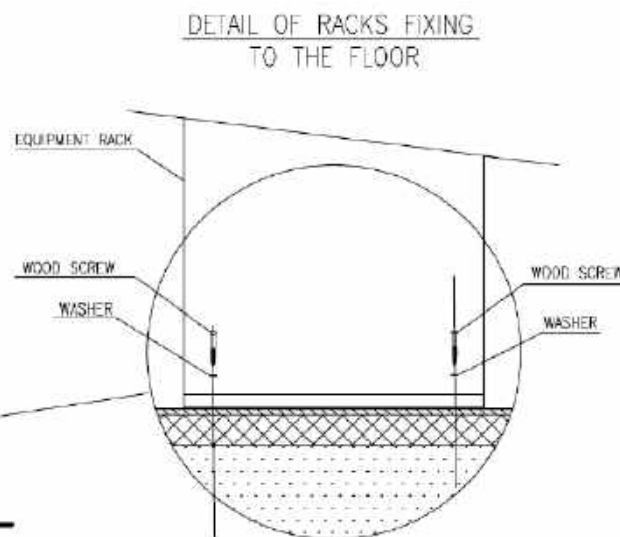
Wall mounted panels
(direct screwed on the wall)



Wall mounted **heavy** panels
(with embedded metal reinforcements)



Floor mounted Racks
(direct screwed on the floor)



Heavy batteries set (with rack)

CABLE ENTRY TYPOLOGY

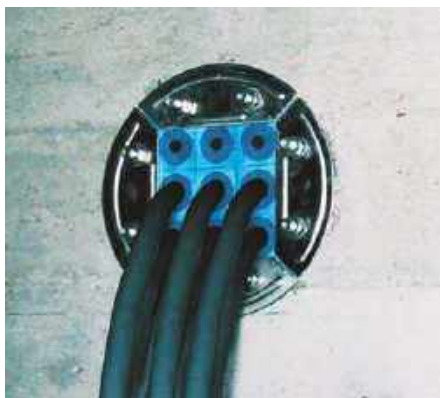
Depending on the final client requirements different cable entry approach can be applied



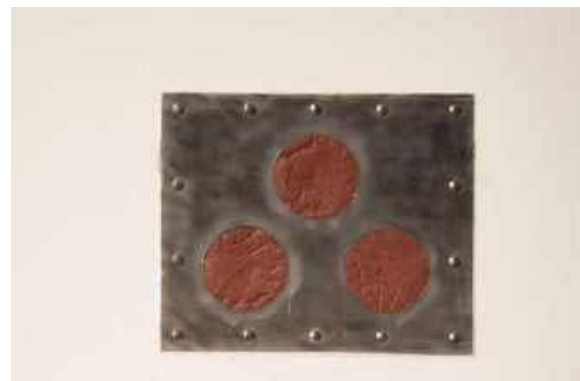
Foamed pipe / sleeve
(ARAMCO)



Cable glands on plate + foam
(SONATRACH)



MCT (i.e. Roxtec)
(ADCO – GASCO)



IBMO sponge system
(TOTAL NIGERIA)

Cable entries devices can be located on shelter wall or floor without limitations concerning the positioning, thanks to the Celantel monolitical panel construction technology.



Devices able to control the temperature without any energy consumption and maintenance



No energy consumption, necessary for the air conditioning, (or highly reduced).



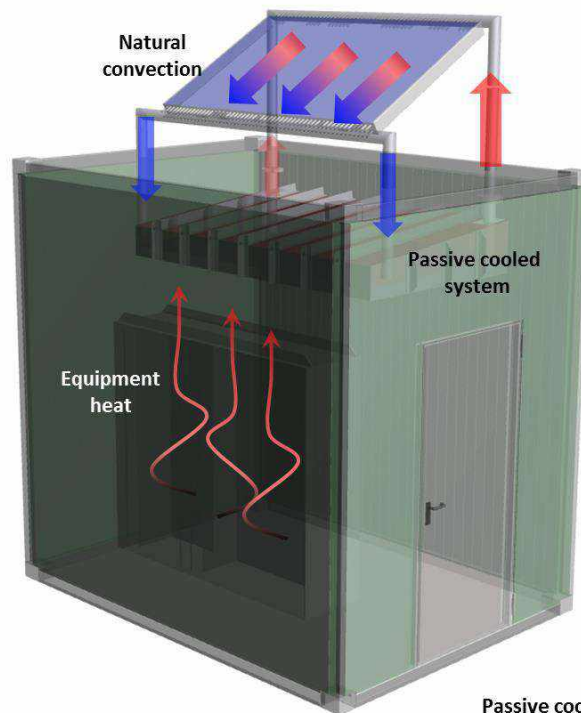
Considerable increase of the global reliability due to the absence of mechanical moving parts and fluids under pressure. No maintenance required thanks to the sealed and "elastic" hydraulic circuit, refills free.



The devices are housed in a room without direct air entrance and with a temperature control without sudden jumps.



ZERO EMISSIONS



Passive cooled shelter



Passive Cooled Cabinet

THE PASSIVE SHELTER : ELEMENTS

Shelter Body: structure of high thermal insulation that allow to reduce the intensity of external thermal contributions.



Tank/ Internal heat exchanger: integrated in a single system made of SLHDPE allows the transference and the collection of thermal energy from the internal environment to the water inside it and viceversa.

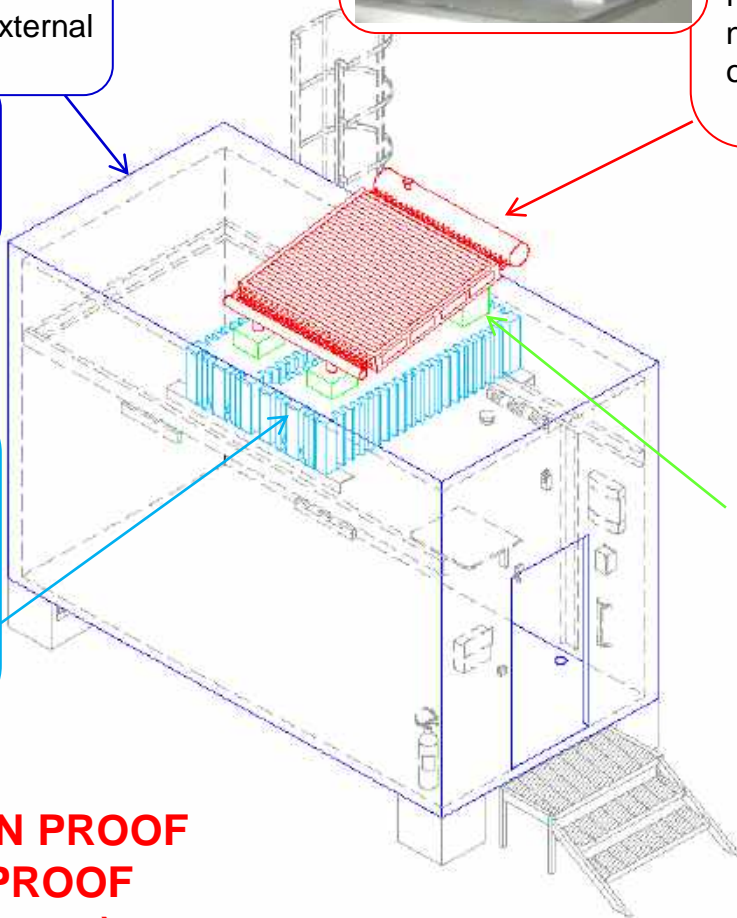


**CORROSION PROOF
LEAKAGE PROOF
(no maintenance)**



External heat exchanger: it integrates the collector and the expansion vase in AISI 316. Optimized to guarantee high performances and to maximize the radiation to the open space. During the night it allows the regeneration (cooling) of the accumulated liquid.

**NO AIR BREATHER
NO EVAPORATION
NO WATER REFILL
(no maintenance)**



Vertical Pipings: connection elements between the tank/internal exchanger and the external one. They are made of heavy polystyrene or SS316L and protected by provided sabot.



THE OPERATING PRINCIPLE

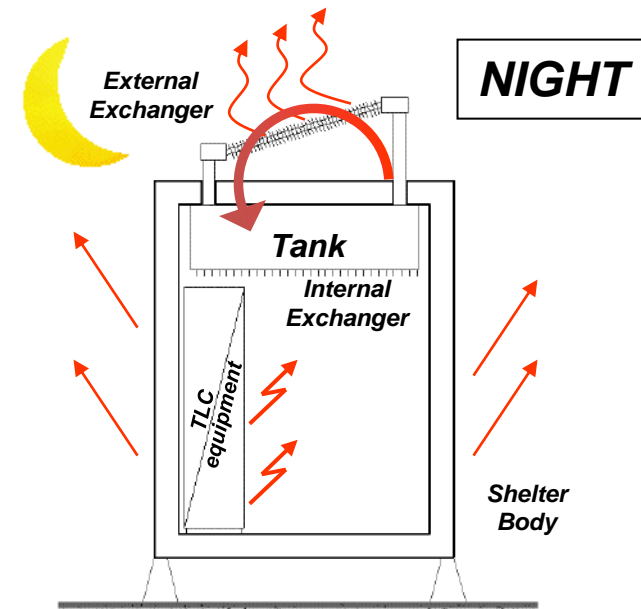
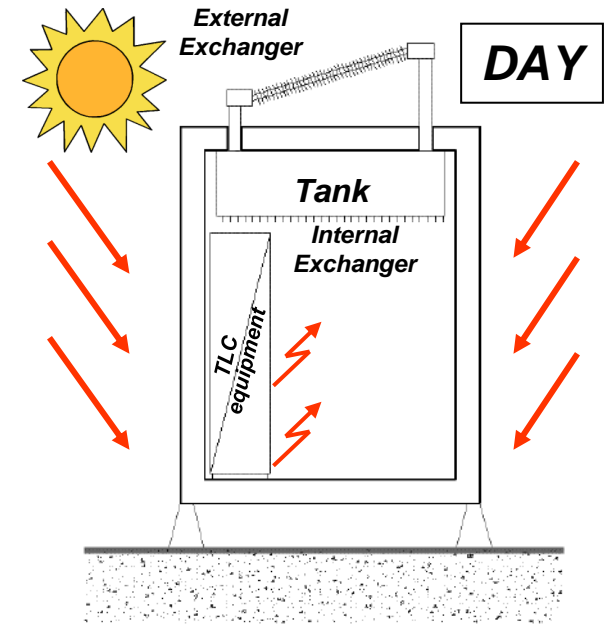
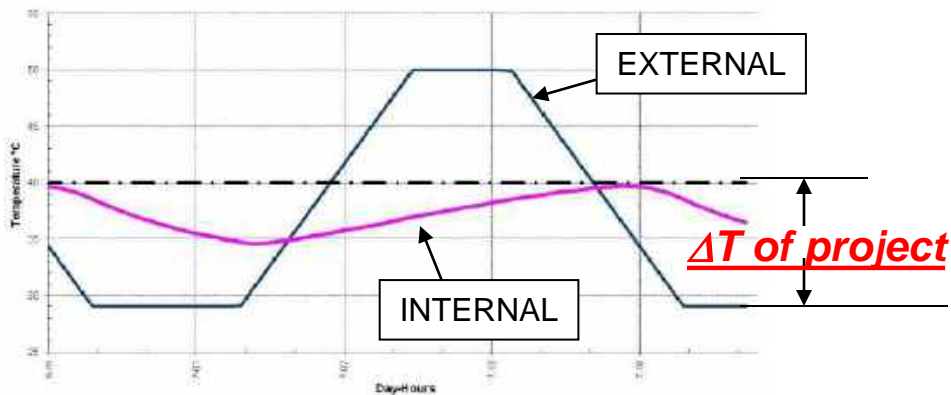
In a passive shelter the energy required to its conditioning is entirely given by the temperature range between the **minimum night** temperature and the **maximum one** allowed in it.

DIURNAL PHASE

The heat given by the internal systems, add to the contribution due to the environmental stress, is accumulated in the tank through the internal exchanger, warming in this way the water in it .

NOCTURNAL PHASE

The water in the external exchanger cools down starting the process of circulation in the closed circuit (natural convention) till its complete regeneration.



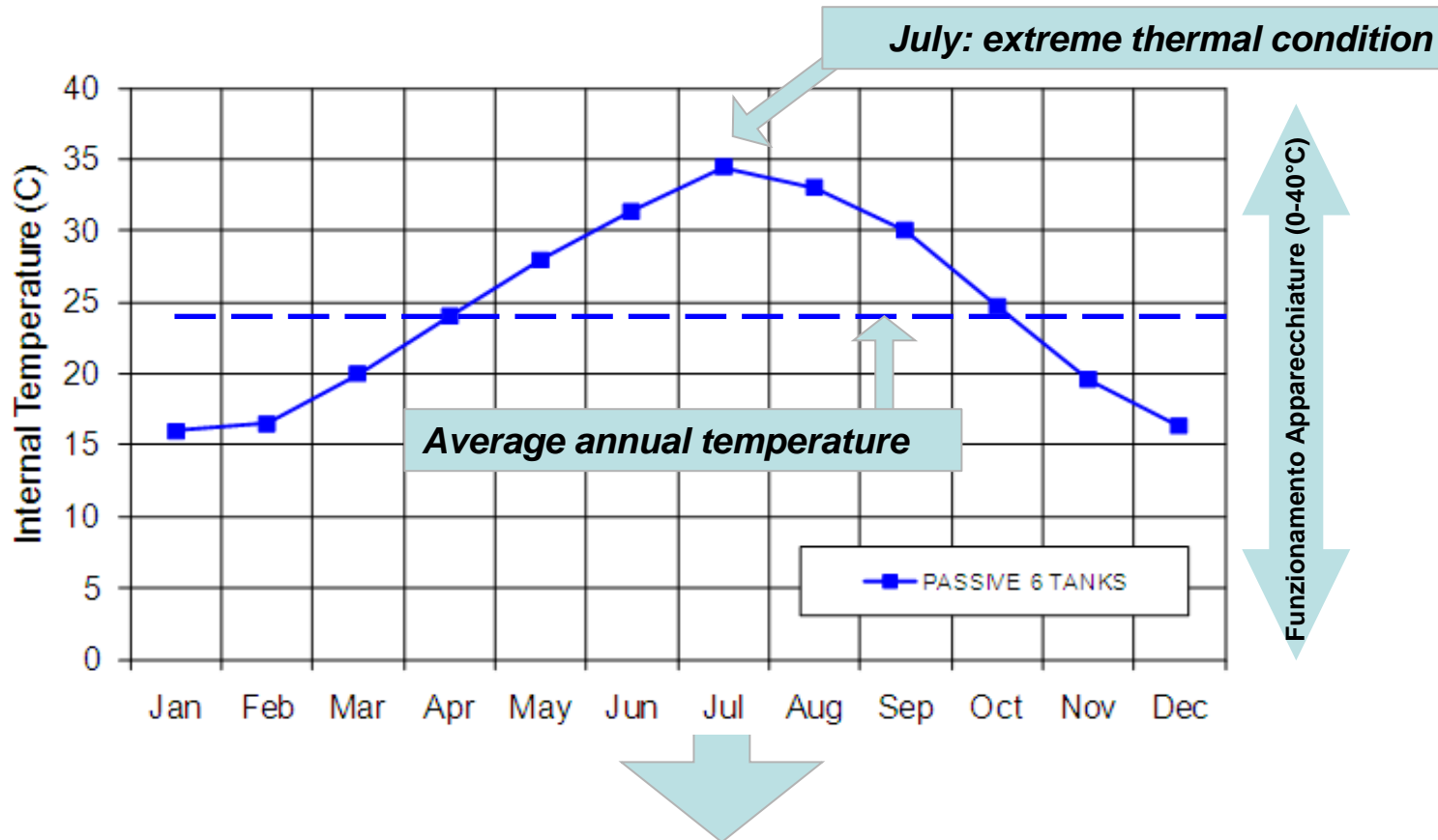
Passive cooled Shelter



Passive cooled cabinet

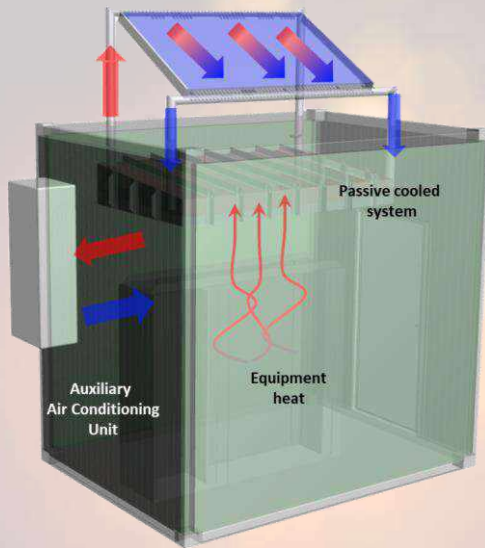


PASSIVE COOLING – TEMPERATURE ANNUAL TREND



The shelter thermal design is based on the “extreme thermal condition” that is the hottest period of the year. Extending the study to the whole solar year, when the minimum nocturnal temperature diminishes also the maximum inside one does, directly depending on it. In this way the annual average temperature is much lower than the project one.

Passive cooling system is supported by an auxiliary air conditioner or chiller, activated only during the warmer months of the year.



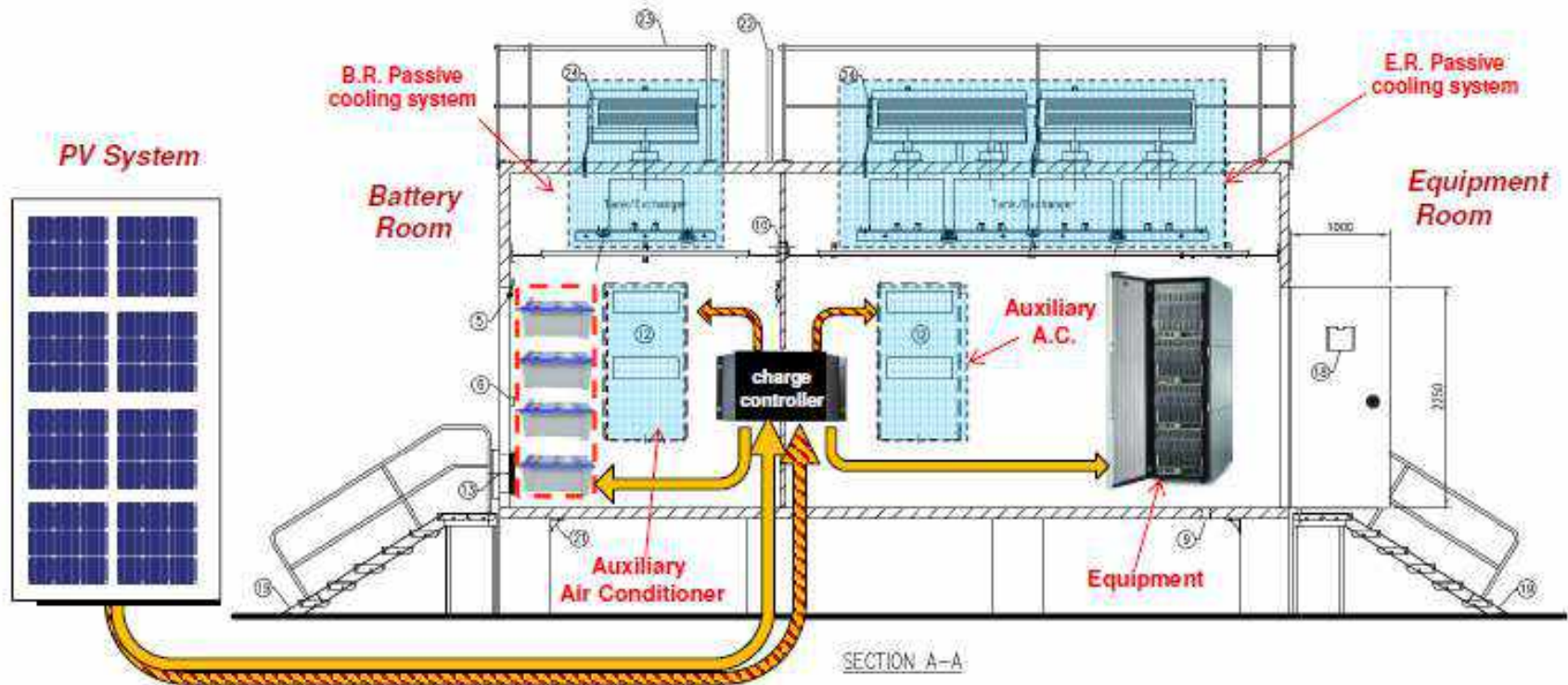
ADVANTAGES OF HYBRID COOLING:

- LOWER CO2 EMISSION THAN ACTIVE SHELTER
- LESS MAINTENANCE SERVICE WITH CONSEQUENT OPeX (Operational Expense) REDUCTION
- LONGER LIFE OF THE AC UNIT
- HIGHER RELIABILITY THAN ACTIVE SHELTER
- BACK-UP COOLING GRANTED IN CASE OF AC FAILURE
- PERFECT MATCHING WITH OFF-GRID PV GENERATION



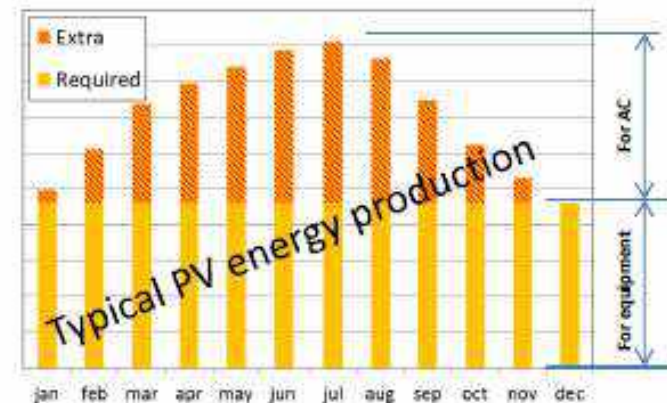
ARAMCO HYBRID COOLED SHELTER

THE HYBRID SHELTER WITH PV GENERATION

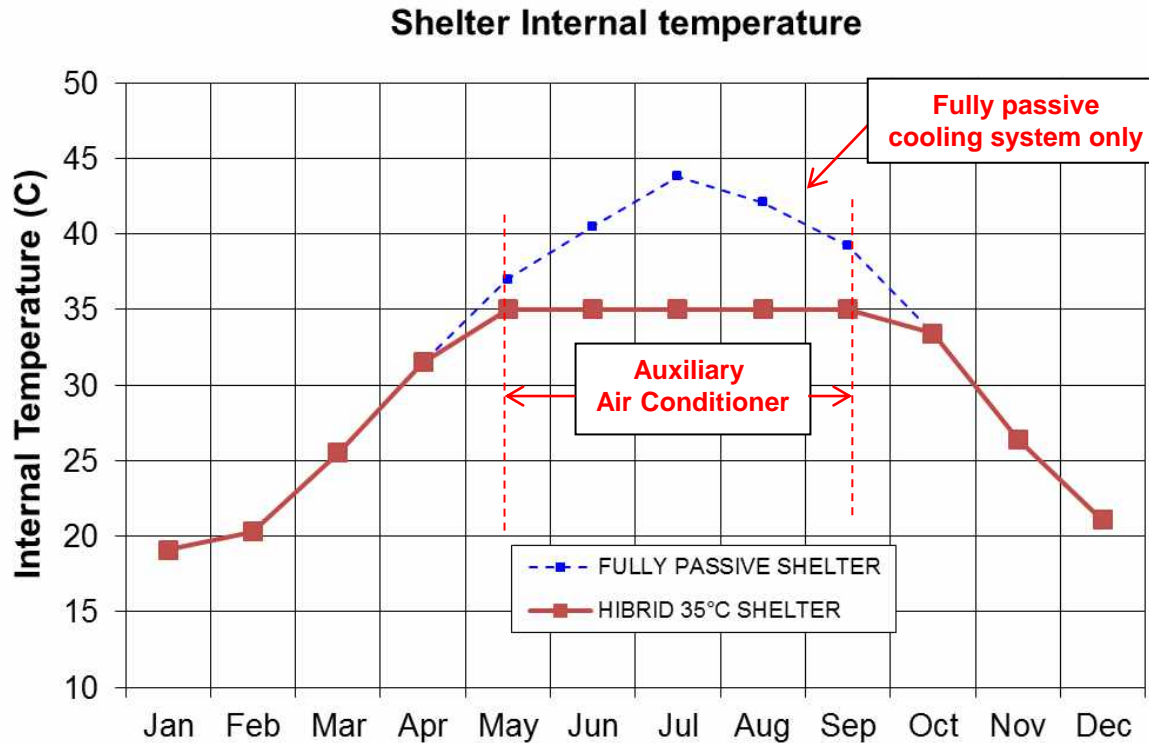


→ The PV system is sized to provide energy to equipment even in the worst case (winter)

→ The auxiliary air conditioning shall be powered only with the **SUMMER EXTRA ENERGY PRODUCTION OF THE PHOTOVOLTAIC SYSTEM**



HYBRID SHELTER BEHAVIOUR EXAMPLE



EXAMPLE

- In this case hybrid cooling the shelter internal temperature will be always **lower than 35°C (set point of the A.C.)**
- The ***Auxiliary Air Condition unit will run only from May to September***, in the balance months the passive cooling will manage the internal temperature
- ***IMPROVED RELIABILITY compared to Active shelter:*** in case of AC fault the B.R. passive cooling system will limit the temperature (dashed blue line)

THE NEW TRADITIONAL ACTIVE SHELTER

When the air conditioning uses electrically activated systems and/or devices allowing the air inlet / outlet. It is characterized by:

- Temperature control fully managed by an air conditioning.
- Ventilation with direct air input.
- It allows split units installation, integrated or roof type.



GRP Active Shelter in Algeria

Manufactured with unframed composite panels shelter body (Fiberglass - GRP or Aluminum) or with framed container type steel structures.

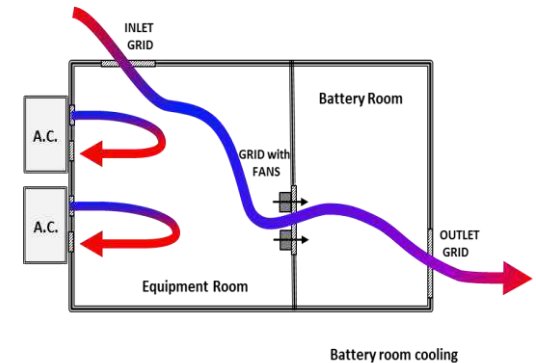


Aluminum Shelter in IRAQ



*Skid mounted
GRP battery shelter*

Cooling Transfer Configuration



**ORIGINAL DESIGN FOR COST
AND ENERGY SAVING**



GRP EI120 Fire Resistant

SPECIAL SHELTER STRUCTURES

Celantel is able to satisfy any housing need with state of art structures.

GRP MODULAR CABINS



12x3m monotich modules

UNDERGROUND SHELTER



Squared underground shelter

**FULLY WELDED
CONTAINERIZED BUILDING**



Containerized building completion



"Surgical" interior thanks to GRP



Cylindrical underground shelter



On delivery

CABINETS OVERVIEW

Nowadays, the no walk-in cabinets are the broadcasting equipment housings increasingly used thanks to their **reduced dimensions and energy consumption**. These infrastructures involve easy installation with reduced environmental impact and easy maintenance as well.



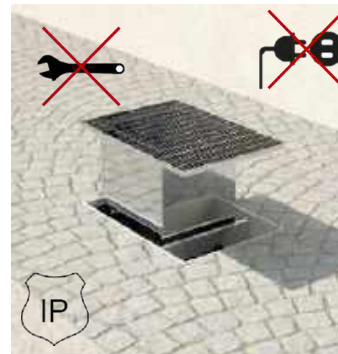
GRP Double-bay Passive cooled cabinet



ATEX Passive Cabinet



Active Cooled Cabinet



Passive Underground Cabinet (P.U.C.)
For Smart Road and Smart Cities Applications

Passive air conditioning offers significant advantages in terms of noise, maintenance and energy-saving.

INTERNAL FITTINGS

The Celantel engineering draws, sets up, and supplies the product, according to the project specification, complete with:

- Customized electrical system.
- Internal and external lights system .
- Distribution panel for services and/or customer devices.
- Continuous power supply system (UPS).
- Sealed cables passage and special wiring.

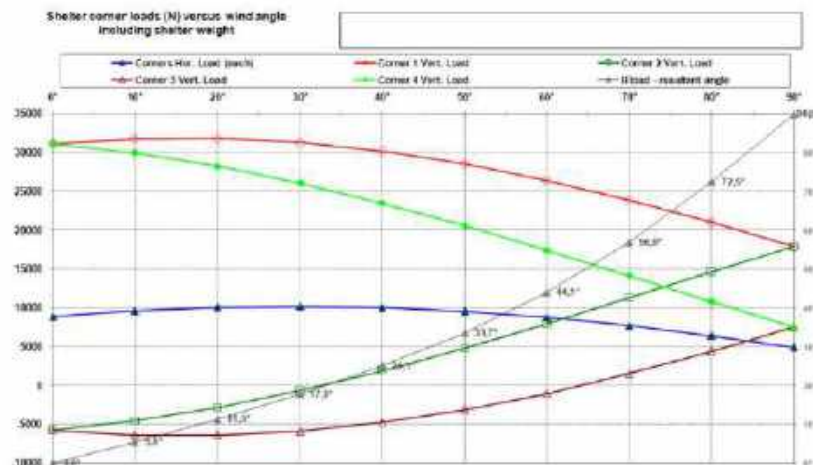
- Photovoltaic and Aeolian systems.
- Redundancies and ventilation management.
- Management logics development.

Safety

- Smoke/fire detection system.
- H₂ or other explosive gas detection system.
- Monitoring and alarm recording systems (door, temperature, etc.)
- Active or passive air conditioning monitoring system.
- Alarm signals systems.
- Automatic fire extinguishing systems.

Services

- Active or passive shelter thermal calculations.
- Structural calculations.
- Loads foundation calculations.
- Integrated formulations consultancy.
- Turnkey infrastructures supply.





OIL & GAS ON SHORE – Rabigh SAIPEM – World Biggest PCS



FRANGIBLE Active shelter for NAVAIDS



TLC Helicopter Transportable



Offshore Passive Cabinet



CONTROL ROOMS - Modular GRP Active Shelter

MARKETS & APPLICATION EXAMPLES - II



RAILWAYS PASSIVE SHELTER



HIGHWAYS PASSIVE SHELTER



BORDERS CONTROL PASSIVE SHELTER



ENERGY STORAGE PASSIVE SHELTER

Since 2008 the CELANTEL's Quality Management system has met the requirements of the international standard UNI EN ISO 9001, the most famous quality improvement standard.





CERTIFICATO N. QI/419/20

Si certifica che il Sistema di Gestione per la Qualità di:

CELANT.TEL S.R.L.

Sede Legale: VIA VIGO PELLIZZARI, 28 - 20871 VIMERCATE (MB)
Sede Operativa: VIA VIGO PELLIZZARI, 28 - 20871 VIMERCATE (MB)

è conforme ai requisiti della normativa

UNI EN ISO 9001:2015

per il/i seguente/i campo/i di applicazione:

**Progettazione e realizzazione
di infrastrutture per l'alloggiamento
di apparati e dispositivi industriali.**

Settore IAF: 19

Attestato di Sistema Gestione Qualità dell'ingegneria certificata per attività di ingegneria e sviluppo di software e servizi correlati alla gestione della qualità

La validità del presente certificato è subordinata alla presenza dei sigilli conservanti
l'esito positivo delle verifiche contro la data prevista.

Prima Emissione (*) 12/11/2007	Scadenza Certificato 11/11/2022	 23/11/2020	 Entro 07/09/2020	Sigillo Sigillo Secondo Sviluppo Entro 07/09/2021
---	--	--	--	--

(*) Data di Emissione e di Validità del Certificato. La data di Prima Emissione riguarda la prima emissione del Certificato. La data di Validità del Certificato è la data di scadenza del Certificato.



**BODIA FIDELIS
SOCIETÀ PER AZIONI**



Riccardo Romano
Direttore Tecnico

Per informazioni puntuali e aggiornate circa eventuali variazioni intervenute nella validità del presente certificato, di propria iniziativa, rivolgetevi a:
Q AID INSPECTION S.r.l.
 Sede Operativa: Via VIGO PELLIZZARI, 28 - 20871 Vimercate (MB) Tel. 039/2111701 - fax 039/2111702 - e-mail: info@qaid.it - PEC: qaid@qaid.it

MORE THAN 40 YEARS OF CONTINUOUS AND GROWING EFFORTS AND FULFILLMENTS IN THE EQUIPMENT HOUSING FIELD ALLOWED CELANTEL TO GUARANTEE:

A product portfolio to satisfy any project requirement and application with Shelter and Cabinet .

- **Passive, Semi-passive, Water-based, PCM-based, Active, Vented and Conductive, Framed Container Type**
- **Reinforced Fiberglass (FRP or GRP), Metallic, Overground & Underground, NavAid (frangible).**
- **Fire retardant , Fire resistant, Atex, Soundproof, Pressurized.**
- **Battery housing.**
- **Different configurations of indoor and outdoor server rack (19", ventilated, etc.)**

An integrated turnkey product (complete package) according to the customer specifications (MR) and contractual documentation.

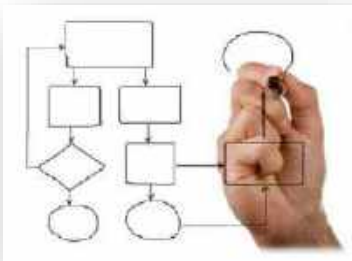
Customer support in all the stages of the supply, from the technical inspection to the engineering design by means of detailed drawings in Autocad.

30'000 m² of manufacturing site, 15.000 m² indoor, with Climatic chamber for thermal tests up to +60°C.

A continuous production process optimized to coop with the most demanding delivery requests.

Air conditioning Consultancy Service and custom prototypes development.

Installation and commissioning field assistance.



Engineering, Project management and manufacturing

From small cabinet to big shelter



Engineering
the energy saving



for more informations:

Celant.Tel srl

Via Pellizzari 28 20871 Vimercate (MB) - ITALY

Ph. +39 0396084217 Fax +39 0396084213

info@celantel.com

www.celantel.com