



**Engineering**  
the energy saving

the  
Passive  
Cooling

## ***PASSIVELY COOLED SHELTER for HIGHWAYS***



# The Passive Cooling Idea

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



No energy consumption, necessary for the air conditioning.



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.

→ **PATENTED**



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

**IP65 PROTECTION**



**ZERO EMISSIONS**



Passively Cooled Shelter

# The Operating Principle

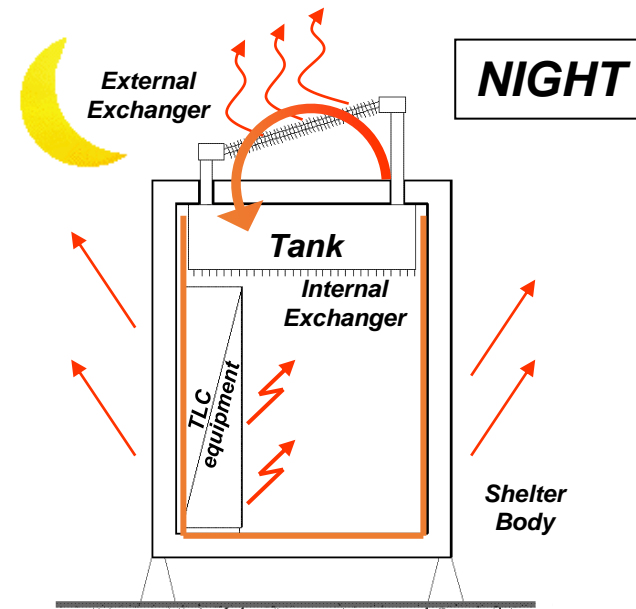
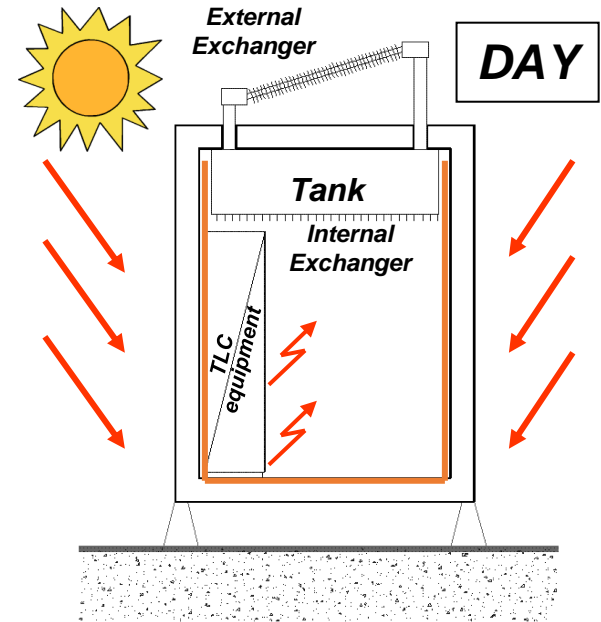
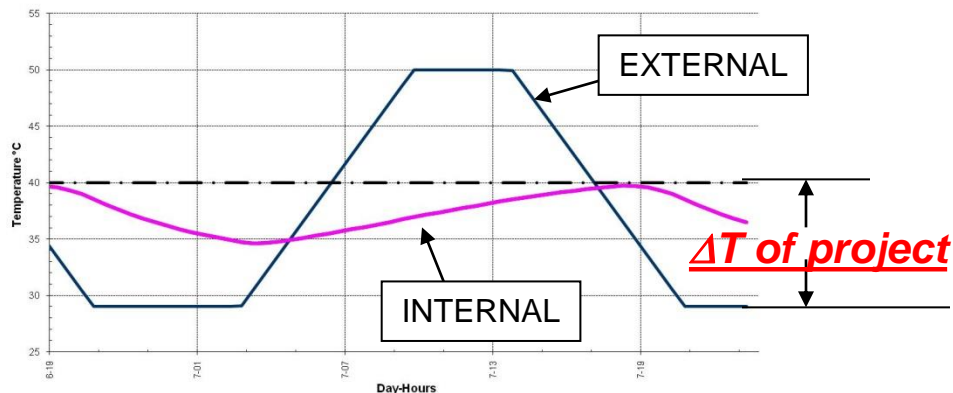
In a passive shelter the energy required to its conditioning is entirely given by the temperature range between the **minimum night** temperature and the **maximum one** allowed in it.

## 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.

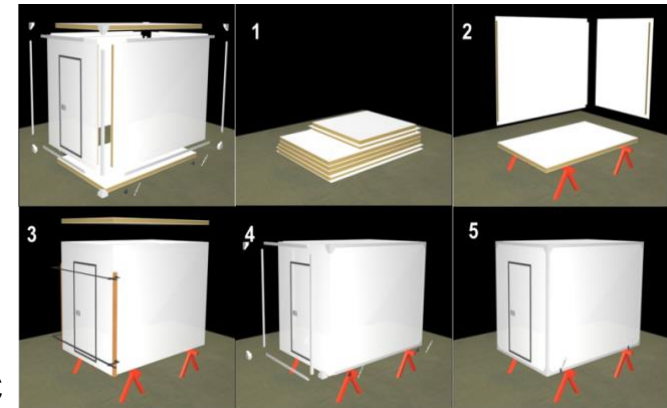


# Celantel Body Shelter

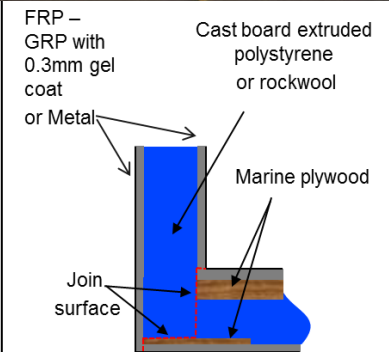
## EXCLUSIVE TECHNOLOGY– NO METAL FRAME

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

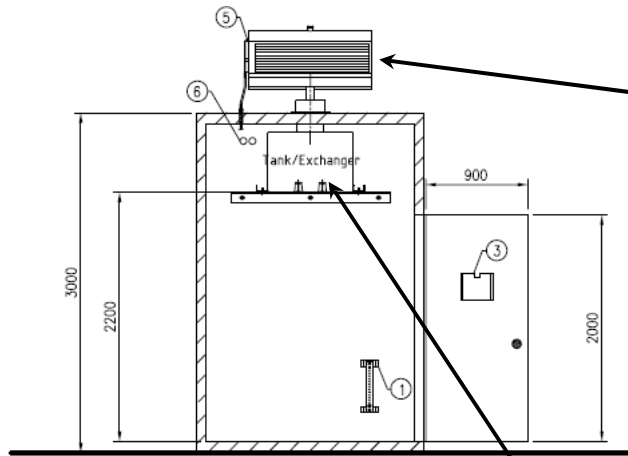


Embedded metal reinforcements.





# Celantel Passive Cooling System- *PATENTED*

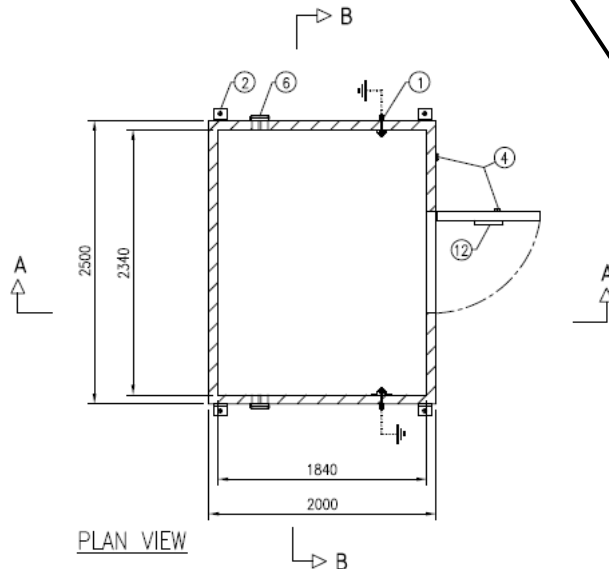


SECTION A-A



## 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.



PLAN VIEW

## PATENTED



## 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.

The use of an elastic material allows to compensate the volume variation of the sealed circuit.

→ **CORROSION / LEAKAGE PROOF**

→ **NO MAINTENANCE**

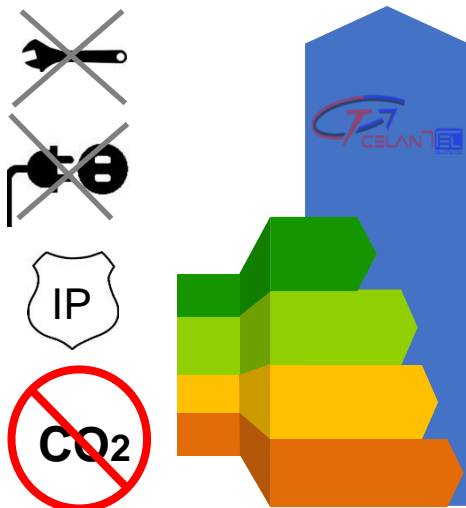
In addition, **Modularity** allows to increase the cooling capacity after installation on field.

→ **MODULAR / EXTENSIBLE**

# Examples of Installation



**On field, with photovoltaic array and wind turbine. Energy is required only for the signalling equipment**



Fast fixing and grounding device



Stainless steel handle



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