

## ***National Disaster Housing Strategy*** **Public Comment Process**

1. Please use this form and follow the instructions below to submit comments on the draft *National Disaster Housing Strategy*, Docket ID FEMA-2008-0009.
2. Please submit a completed comment form electronically through <http://www.regulations.gov> no later than September 22, 2008.
3. Please use draft *National Disaster Housing Strategy* dated July 17, 2008, for your review. If you do not have this version of the document, it, along with supporting documents, public comments received, and a copy of this form are available at <http://www.regulations.gov> in Docket ID FEMA-2008-0009.
4. Regardless of the method used for submitting comments or material, all submissions will be posted, without change, to the Federal e-Rulemaking Portal at <http://www.regulations.gov>, and will include any personal information you provide. Therefore, submitting this information makes it public. You may wish to read the Privacy Act notice that is available on the Privacy and Use Notice link on the Administration Navigation Bar of [www.regulations.gov](http://www.regulations.gov).

5. Completing the Comment Form

- Organization**      Indicate the organization, if any, that you represent.
- Page**                Indicate the page number on which the change is required. If the target of your comments spans multiple pages, just indicate the starting page. For general comments that don't correspond to a specific page, leave this column blank.
- Line**                Indicate the number of the beginning line on which you are commenting.
- Category**            Indicate the type of comment; choices of categories include:  
**C – Critical** (issue of critical importance)  
**S – Substantive** (issue that is significant but not critical)  
**A – Administrative** (grammar, spelling, punctuation, style, word choice, etc.)
- Comment**            Type in your comment.
- Proposed Change**    If you are suggesting a specific change, insert the language you suggest here.

6. Submitting completed Comment Form via [regulations.gov](http://www.regulations.gov)

First go to Docket ID FEMA-2008-0009 and click on the Docket ID link (FEMA-2008-0009).

On the "Document Details" page, click on the yellow balloon symbol beside "Add Comments."

On the "Public Comment and Submission" webpage, fill in the required information and then attach your completed comment form document in the Attachments box and click "Add Attachments."



### National Disaster Housing Strategy Public Comment Process

SUBMITTER					Date Prepared
<u>Organization (if any)</u>	<u>Last Name</u>	<u>First Name</u>	<u>Phone Number</u>	<u>eMail</u>	
EDILSIDER US LLC 1054, 31th Street NW Washington, DC 20007-4492 USA  US Subsidiary of EDILSIDER SPA Via Lago Vecchio n. 3/7 23801 Calolziorte (LC) Italy	RAUGI MARCENARO	PIETRO ROBERTA	202 285 2474 202 285 2475	raugipietro@edilsider.com marcenaroroberta@edilsider.com	September 19, 2008

## National Disaster Housing Strategy Public Comment Process

<u>PAGE</u>	<u>LINE</u>	<u>CATEGORY</u> C=Critical S=Substantive A=Administrative	<u>COMMENT</u>	<u>PROPOSED CHANGE</u> (new language)
		C – S	<p>1) <b>EDILSIDER US LLC is the US subsidiary of EDILSIDER SPA.</b></p> <p>EDILSIDER SpA, is an Italian industry, the largest in Europe, producing modular pre-engineered steel buildings on an industrial basis and its capacity, besides the production, includes the design, management, logistic shipping and installation of the projects delivered on the turn key basis.</p> <p>Therefore, EDILSIDER acts as a producer and as a contractor providing a single source responsibility to the clients and operating all over the world.</p> <p>EDILSIDER 's buildings have been successfully tested all over the world from the hottest climates of Algeria, Sudan, Tunisia and Libya to those very cold of Siberia and Northern Kazakhstan and those tropical of Philippines, Nigeria and Ghana. United Nations is one of the main Clients.</p> <p>EDILSIDER production includes building's systems specifically designed for contingency and catastrophic applications, Shelters, Interim Housing and Permanent Housing are designed to resist a 130mph wind load.</p> <p>The Shelters and the Interim Housing are shipped on a flat pack configuration to the sites and easily and quickly assembled and are presenting a quality allowing them after the first application to be disassembled, re-installed and used several times.</p> <p>In consideration of its specific specialization EDILSIDER takes the advantage of the FEMA strategy Public Comment survey to submit a General Comment rather than answering and commenting the document per pages and lines.</p>	
			<p>2) <b>NATIONAL DISASTER HOUSING STRATEGY</b></p> <p><b>The concept of Alternative Housing for FEMA Applications.</b></p> <p>Are considered three different pre-engineered and pre-fabricated building typology for disasters applications:</p> <p><b>A) Shelters</b></p> <p><b>B) Interim Housing</b></p> <p><b>C) Permanent Housing</b></p> <p>And their main characteristics must be the following:</p>	



## National Disaster Housing Strategy Public Comment Process

		<p><b>A &amp; B) Shelters and Interim Housing</b></p> <p>Basically they must be considered temporary buildings. Since they have to be installed in the areas where the catastrophe is occurring they should be designed for resisting to the climate conditions which generated the catastrophe. Shelters, either for the workers release or for victims are generally located in a site within the area where the hurricane struck for helping victims temporarily. They should be designed according to the following specifications:</p> <ul style="list-style-type: none"><li>- <b>Wind load.</b> The required load is 130mph pressure.</li><li>- <b>Structural Sturdiness.</b> They should resist against severe weather conditions, wind, rain, ice, sands and allowing handling procedures such as assembling, disassembling loading and unloading and transportation.</li><li>- <b>Insulation.</b> According to local temperatures.</li><li>- <b>Liveability.</b> Comfort and functionality are compulsory for the victims, but housing must not be luxury or at the level of a normal houses to avoid the tendency of the victims to use them as permanent houses.</li><li>- <b>Transportation to the site and site conditions.</b> Transportation require to have shelters and housing shipped by a flat pack configuration. The areas where they are supposed to be installed are not easy to be reached because struck by the hurricane therefore is unthinkable to ship and load assembled housing.</li><li>- <b>Installation and procedures.</b> The construction system should allow an easy and rapid assembling and installation. Should not be required forklift or heavy equipments.</li><li>- <b>Disassembling after the use.</b> The system should allow to disassemble the basic components in order to have the housing again back to a flat pack configuration and then shipped to the storing areas.</li><li>- <b>The storing after the use.</b> The storing and the preservation of the housing till the next use represent a consistent cost portion of the Plan. The housing must remain on a flat pack configuration, stored into a covered area, warehouses, or even containerized.</li><li>- <b>Relocation.</b> The housing properly maintained must be ready to be re used for the next applications.</li></ul>	
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## National Disaster Housing Strategy Public Comment Process

		<p>- <b>Durability.</b> The life time of the housing must be definitely "long". Housing must have at least 6 life, that to say they must be assembled, used and disassembled six time. The purchasing of the housing is the initial investment and must be amortized by the six uses. Maintenance costs are services costs to be budgeted on a year basis.</p> <p>- <b>Maintenance.</b> Maintenance and its costs and procedures are affected by the design of the housing and its sturdiness.</p> <p><b>C) The Permanent Housing</b></p> <p>The Permanent Housing is supposed to be located in the area where the hurricane struck or nearby. But they can be located as well far away in a new area to avoid future risks and that upon a social consensus and upon a State's plan to re create the former social conditions. In this case the design of the permanent housing might not be the same of the temporary one. But that is a mere theoretic economic concept since the modern way to build a new housing allows to have almost the same costs for both a temporary housing and a permanent housing.</p>	
		<p><b>3) THE STRATEGY OF A NATIONAL PLAN</b></p> <p>The carousel of the Strategy includes:</p> <ul style="list-style-type: none"> <li>- <b>The preparedness and the housing system</b></li> <li>- <b>The logistic, Territory, Inventory Planning</b></li> <li>- <b>The Storing of the housing and maintenance management</b></li> </ul> <p><b>The Preparedness and the housing system</b></p> <p>The concept of preparedness is expressed by a Set-up Plan &amp; Strategy and the adoption of a Precise Basic Building System, although available in the market from producers and with differentiated solutions, but designed specifically for the disaster applications.</p> <p>Preparedness means prevention. <i>"Prevention means to go to the doctor before the illness appears."</i> That to say the Agency in charge of the National Disaster Housing Strategy must invest before the catastrophe is occurring. Not after. That means to buy ahead some quantities of the selected housing and create an inventory. That allows a prompt and functional deployment to help the victims. That means also a better and wise procurement and therefore a consistent saving in costs allowed by the normal market conditions not under the pressure of a critical market situation in the middle of a catastrophe still striking where the Buyer is purchasing everything is available in the market and under the sales</p>	



## National Disaster Housing Strategy Public Comment Process

		<p>conditions imposed by the Seller. A different perspective is the one that no one wise prefab housing producer can dare to produce ahead and create an inventory of some thousand of shelters, therefore investing consistent resources, then awaiting and hoping that a hurricane comes and furthermore hoping to be the contractor that sells the shelters. Anyway, that is not enough because the Plan requires also a Logistic strategy.</p> <p><b>The Logistic, Territory, Inventory Planning</b></p> <p>The Government Agency have available consolidated statistical information to know where the catastrophes are frequently and repeating happening and are informed timely of their formation and arrival. That means that if the Preparedness is really realized and the Shelters and Interim Housing are adopted and purchased ahead, it comes necessary to store a proper quantity of them somewhere. That to say to establish where the Inventory of housing should be located in the various areas nearby the hurricanes, as per example, are usually striking.</p> <p>An organized warehousing network has to be built and managed in a way that at the first call a minimum requirement of shelters is shipped out promptly to the sites. The functionality, effectiveness and promptness of the help to the victims is possible only by the right logistic plan but managing the shelters inventory availability and their location.</p> <p><b>The Storing and the housing maintenance management</b></p> <p>The Storing system is not supposed to be a huge area hosting thousands of Shelters and Housing standing and ready to be shipped to the sites or because are back there after their first application in the struck areas and used by the victims. It would represent of a small "city" where there are thousand of empty houses destined to be spoiled and deteriorated by the time, the weather and the simple fact that are not peopled. The maintenance of this huge not peopled compound would represent an unjustified investment for keeping them alive and ready for the next application. This is just the reason why the Shelters and Interim Housing must be modular, prefabricated and upon a concept design that is allowing them to be stored, shipped to the site on the flat pack configuration and easily assembled as well as easily dismantled and shipped back for the storing in a proper warehouse or even containerized.</p>	
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## ***National Disaster Housing Strategy*** **Public Comment Process**

		S	<p><b>THE USE OF THE PREFAB MODULAR BUILDING HOUSING PRODUCED BY EDILSIDER AND APPLIED FOR DISASTER APPLICATIONS</b></p> <p>The shelters and interim housing living system, could be realized using the standard and modular system called "501", "1001" and "2001", designed for catastrophic application. The permanent housing could be realized using the standard and modular system called "Sidermajor". Main characteristics of both systems are shown and described hereinafter.</p> <p>All the described housing system have a component's flexibility such to allows possible alternatives and options for finishings accordingly to the final and specific applications and victims requirements.</p>	
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## ***National Disaster Housing Strategy Public Comment Process***

### **SPECIFICATIONS OF SHELTERS TYPE "501"**

#### **1) INTRODUCTION**

The shelters series 501 are ideally suited for construction sites, construction camps and drilling camps, where they will be advantageously turned into offices, living accommodations, changing rooms and toilet facilities: all in all, the ultimate compromise between quality and price.

The shelters series 501 can be stacked to form a two-storey high structure at the most, or linked lengthwise (short and/or long side) to form various complexes in line with the customer's wishes.

The key feature of the shelters series 501 lies in the fact that the structure is entirely seamless and secured by mere fitting bolting; as a result, they can be delivered completely disassembled (basement and roof included) in order to be loaded onto 20 feet shipping containers.

The great simplicity of the system and the reduced weight of each component make it possible, firstly, to assemble the structure in a short time without using mechanical handling equipment, secondly, to have the building knocked down, shipped and relocated; this is an easy and low-cost operation.

If need be, the shelters series 501 can be delivered fully assembled and duly provided with all necessary fittings, cables and pipes, ready to be connected to the mains on site.



#### **2) DIMENSIONS**

Length: 1830mm – 2830mm – 3830mm – 4830mm – 5830mm - 9290mm

Width: 2400mm – 2890mm

Outside height: 2620mm – 2920mm

Inside height: 2400mm – 2700mm

Weight: 300 to 2310 kg

Other dimensions can be arranged to meet specific requirements expressed by the customer.

#### **3) FLOORING SYSTEM**

The basement is self-supporting and consists of an edge frame made of 150 mm high cold-drawn, galvanised steel C-channels, bolted to the four corner blocks, and transverse cross beams placed with a span which may vary according to live load requirements. The result is a durable and highly rigid structure upon which the floor stands.

#### **4) FLOOR**

Step floor is made of OSB panels, fixed to the sub-structure by drywall nails and covered by wall to wall 1,4 mm thick PVC layer of light grey colour.



## **National Disaster Housing Strategy Public Comment Process**

In toilet facilities, the step floor can be coated with chequered stainless steel sheets or aluminium upon request.  
Floor live load: 200 Kg/m<sup>2</sup> uniformly distributed.

### **5) ANCHORING SYSTEM AND BASE PLATE**

The whole structure is designed to resist against the 130 mph wind loads therefore the adopted foundations must be designed accordingly. The building is provided by the anchoring system and base plate for a proper anchorage.

### **6) EXTERNAL WALLS**

External walls consist of self-supporting sandwich type panels, having a total thickness of 50 mm. The insulation is ensured by a core of self-extinguishing polyurethane resins (density : 40 Kg/m<sup>3</sup>, thermal transmission coefficient : 0,461 W/m<sup>2</sup> K) fitted between two galvanised ridged metal sheets (standard). Finishing of wall panels consists of one coat of polyester based white/grey colour paint. Panels have waterproof and dustproof tongue-and-groove vertical joints and are fully interchangeable.

The roof and the basement are connected by means of 4 galvanised square tube corner posts, bolted to the blocks that are laid on both the roof section and the basement. As to 9,29 m long modules, 4 additional studs, equipped with crane lift bracket eyelets on the upper part, are embedded into the longitudinal walls.

### **7) ROOF**

The roof is constructed from self-supporting sandwich-type panels 30 mm thick (70 mm by the upper rib) with a pre-coated galvanised ribbed outer an inner metal sheet; the insulation is ensured by a core of self-extinguishing high density polyurethane resins (density: 40 Kg/m<sup>3</sup>, thermal transmission coefficient: 0,712 W/m<sup>2</sup> K). Finishes of both layers consist of one coat of polyester based white/grey colour paint. The above panels are anchored by self-threading screws, complete with cap and sealing gaskets.

Lifting is achieved by means of sturdy eyebolts mounted on the 4 upper corners of the roof.

Standard roof strength: 130 Kg/m<sup>2</sup> uniformly distributed.

Upon request, a second roof covering constructed from 6/10 mm thick galvanised corrugated steel sheets, slightly convex to better drain rainwater, can be arranged.

### **8) INTERNAL PARTITION WALLS**

Internal partition walls consist of self-supporting sandwich type panels, having a total thickness of 50 mm. The insulation is ensured by a core of self-extinguishing polyurethane resins (density : 40 Kg/m<sup>3</sup>, thermal transmission coefficient : 0,461 W/m<sup>2</sup> K) fitted between two galvanised ridged metal sheets. Finishing of wall panels consists of one coat of polyester based white/grey colour paint. Panels have waterproof and dustproof tongue-and-groove vertical joints and are fully interchangeable.

## **National Disaster Housing Strategy Public Comment Process**

### **9) DOORS AND WINDOWS**

Doors and window frames, made from silver anodised aluminium-based alloy profiles, are fitted into a partition wall. Standard windows are of the outward protruding type; they are supplied with a 4 mm thick float glass, inner handles and extendable/retractable arms that lock the sash once open. Dimensions are as follows: 970x970 mm. Toilet facilities are provided with 970 mm long x 400 mm high windows (wasistas type).

The number of windows and their dimensions are such as to ensure a 1/8 ventilation/lighting ratio with regard to the room useable area, as envisaged by sanitation regulations in relation to residential buildings.

Fittings available upon request include: sliding windows, double glass (3-12-3), armoured or opaque glass, Venetian blinds, rolling slat blinds, fly screens, bars.

External solid doors, made from a 22 mm thick polystyrene insulation board, are equipped with 3 hinges, heavy-duty plastic handles and a lock. Dimensions are as follows : 970xh2100 mm (swinging door) or 1970xh2100 mm (swinging in pair).

Fittings available upon request include: anti-panic bars, upper/lower safety glass (3+3 mm), door closers.

Internal doors are formed by a fir wood door frame, the inside is covered in polystyrene and both sides are coated with a 3,2 mm thick white lacquered medium density fibreboard; doors are fitted with 2 hinges, brass handles and a lock.

Toilet doors feature a 1600 mm high aluminium frame designed to give a clear opening, both on the upper and lower side, for proper air motion, complete of 2 hinges and a bolt lock.

In addition, heavy-duty plastic folding doors, that can be folded back to make the most of the available space, are also provided.

In addition, heavy-duty plastic folding doors, that can be folded back to make the most of the available space, are also provided.

### **10) ELECTRICAL INSTALLATION**

In accordance with currently enforceable IEC regulations and Italian law n° 46/90, the electrical installation is constructed from IMQ quality label materials. The power supply is 220V 50Hz single-phase. A waterproof junction box is mounted on the outside of the building, while the inside houses a self-extinguishing PVC electric panel which accommodates differential switches and thermal magnetic circuit breakers.

Power transmission is ensured by flush-mounted, self-extinguishing PVC pipes, duly fastened by plastic clamps. Both the distribution boxes and the enclosures which house the appliances are in self-extinguishing plastic.

N07-VK, fire arresting, IMQ quality label cables are used: in compliance with the IEC 20.22 standard, their section is compatible with the installed appliances.

10A/16A shuttered socket outlets, widely used in Italy, are positioned in a manner such as to match the various installed appliances.

According to its intended use, indoor lighting inside each building can be achieved either by means of glass fibre reinforced polyester ceiling fixtures and a methacrylate diffusing screen, complete with two 36W fluorescent lamps, or by means of ceiling fixtures made up of an aluminium housing and a tempered glass screen, complete with one 75W incandescent lamp. There is a sufficient number of lighting fixtures to ensure the level of illumination, expressed in lux, required under applicable legislation.

In toilet facilities, the electrical equipment is waterproof, and custom connectors, treated to prevent penetration of the shell by water, are supplied.

Every electrical appliance in place, including domestic outlets, is connected by an appropriate YG cable to the grounding network which refers to a single point inside the main electric panel.

## **National Disaster Housing Strategy Public Comment Process**

### **11) SANITARY INSTALLATION**

The supply ducts are of butylenes complete with fittings and fixtures for hot and cold water. Maximum water supply pressure is 3 atm. External connection to the mains is provided by a threaded connection of appropriate diameter.

Sewage pipes are of heavy PVC, securely fixed to modules and led to the designed exit point for connection to the external sewerage mains.

Plumbing fixtures are engineered for time effectiveness and easy maintenance: interior piping is fitted above the floor level, with the possibility of being inspected from the inside.

Water closets consist typically of a white ceramic bowl with toilet seat and plastic cover, low-down flush tanks.

Hot sanitary water is heated by wall-hung and floor-standing electric boilers with suitable capacity. Gas-fired boilers can also be supplied, but only upon a specific request from a customer.

### **12) HEATING AND AIR CONDITIONING SYSTEMS**

The heating system, if any, consists of wall mount, electric convector heaters with temperature controller. Rating from 600 to 2000 W.

As to possible air conditioning, window type air conditioners or split air conditioners – from 7000 to 18000 BTU/h - coming in cool-only versions or reversible heat pump configurations, are available.

### **13) ASSEMBLY KIT**

EDILSIDER has pioneered a unique and innovating system whose aim is to reduce shipping volumes; the shelter series 501, delivered in knock-down configuration, as an assembly kit.

All components are packed so as to occupy approximately a 5 m<sup>3</sup> volume (dimensions: 1250x5900xH700 mm). Consequently, 6 self-contained packaged buildings at most can be loaded onto a shipping container 20 feet long.

Each kit, supplied with appropriate assembly instructions, comprises the following components :

Cladding sandwich panels

Roofing sandwich panels

Floor wood panels

Basement galvanised rolled steel sections

Roof pre-coated rolled steel sections

Galvanised steel square studs

Pre-coated steel flashings

Floor covering PVC roll

N. 1 970xh2100 mm external door

N. 1 970xh970 mm awning window

Electrical installation

Bolting and fittings

## National Disaster Housing Strategy Public Comment Process

### SPECIFICATIONS OF SHELTERS TYPE "1001"

#### 1) INTRODUCTION

The shelters series 1001 have been designed to take as little space as possible during shipping: as a matter of fact, they can be flat-packed into 650 mm high modules (maximum) so that four units can fit into the space usually needed for a single shelter.

Each block housing the above modules is rigid and stable enough to be handled and lifted through a crane anchored to the corner blocks that are laid on both the roof and the basement. The assembly of the shelters series 1001 requires no skilled labour: interchangeable cladding panels are tied together by male-female connections, the basement and the roof are entirely pre-assembled, the electrical equipment is factory pre-wired and tested.

Another key feature of the shelters series 1001 is the roof self ventilation system: the air space between the suspended ceiling and the external sheet protects the building from intense heat during hot season and prevents moisture from condensing during the cold season.

All metal sections used in the structure are subjected to a hot galvanising process (min. 275 g/m<sup>2</sup>). Units can be stacked to form a two-storey high housing unit and a four-storey high warehousing facility. Furthermore, they can be linked on all four sides.



#### 2) TECHNICAL DATA

##### Dimensions

Modules are of the following standard dimensions:

Length:	2.990 or 6.055 or 9.125 or 12.190 mm
Width:	2.438 or 2.900 mm
Inner height:	2.240 or 2.500 or 2.700 mm
Overall height:	2.590 or 2.850 or 3.050 mm

Other dimensions can be provided upon request.

##### Design loads

Roof load:	150 Kg/sqm
Floor load:	250 Kg/sqm
Wind load:	210 Km/h (130 mph)

Other working loads according to the specific Customer's requirements.

## ***National Disaster Housing Strategy*** **Public Comment Process**

### **Thermal and acoustical insulation**

Floor thermal insulation:	$K < 0,38 \text{ W/sqmK}$
Roof thermal insulation:	$K < 0,35 \text{ W/sqmK}$
Wall thermal insulation:	$K < 0,38 \text{ W/sqmK}$

### **Materials**

Hot rolled steel profiles:	Fe 37b
Cold rolled steel profiles:	Fe E320 G
Steel sheets:	Fe 320 G
Nuts and bolts:	Class 5d

### **3) FLOORING SYSTEM**

The flooring system is self-supporting and made in cold rolled zinc-plated steel profiles, forming the edge frame, with transverse cross beams, all welded and fitted with corner support blocks. Edge frame is fitted with a guide for the insertion of wall panels.

Step floor is made of plywood panels fixed to the sub-structure by self-threading screws and covered by PVC layer.

Upon request floor plate can be insulated with a layer of compressed glass wool, protected by a zinc-plated steel sheet.

For modules subject to high humidity, we can provide covering panels in special execution which are guaranteed against penetration for 20 years. The step coverings can be supplied upon request in stainless steel, aluminium or PVC.

Other types of finishes can be provided for special uses.

### **4) VERTICAL STRUCTURE**

The vertical structure is constructed in cold rolled zinc-plated steel angles at corners and tooled to fit in the corner blocks of the base and roof plates. The upright posts are capable of withstanding complete loads when the units are installed in modular blocks stacked one on top of the other.

### **5) ANCHORING SYSTEM AND BASE PLATE**

The whole structure is designed to resist against the 130 mph wind loads therefore the adopted foundations must be designed accordingly. The building is provided by the anchoring system and base plate for a proper anchorage.

### **6) PERIMETRAL WALLS**

The perimetral walls are made of sandwich type panels. The insulation is ensured by a core of self-extinguishing high density (40 Kg/cu.m) polyurethane resins (PUR). The insulation is fitted between two galvanised ribbed metal sheets. Finishes of wall panels consist of one coat of polyester based white colour paint. Panels have tongue-and-groove vertical joints and are fully interchangeable.

## **National Disaster Housing Strategy Public Comment Process**

### **7) ROOF**

The roof is made in cold rolled zinc-plated steel profiles, forming the edge frame with transverse cross beams, all welded and fitted with corner blocks which meet the ISO TL-104 specifications. External covering consists of pressed and bent zinc-plated steel sheets fitted to be slightly convex (slope 2%) to allow for efficient drainage. The water is brought down into a side member made of zinc-plated steel profile used as a gutter, in one piece only, and then to the base of the module by means of heavy duty PVC pipes running through the inside of the four corner posts. This prevents the build-up of back-water and any replacement of the sheets turns out to be an easy and economical operation.

The roof is ventilated. The ceiling is made of special chipboard and insulated by a mattress of glass wool. This avoids the over-heating of the containers in the hottest season and the build-up of condense under coldest climate conditions.

### **8) INNER PARTITIONS**

The inner partitions are made of two panels of chipboard (E1), one side finished with PVC sheet, with a gap for the soundproofing.

The said panels are secured into the partition guides without any cuts or holes on the structure, therefore with the possibility of positioning as required.

### **9) DOORS AND WINDOWS**

Moving and fixed frames of both windows and external doors are fabricated with anodised aluminium silver colour. Joints between moving and fixed frames are provided with wind and waterproof rubber gaskets.

Windows can have different dimensions (100xh100 cm, 100xh120 cm, 200xh120 cm) and they can be of the protruding or sliding type with 4 mm clear float glass or double glazing (4+9+4 mm).

Upon request we can supply windows of other type and equipped with various fittings.

Windows type "wasistas" are also available for the bathrooms (or as required) and have variable dimensions (50xh40 cm, 100xh40 cm, 200xh40 cm).

The external doors can be blind in plastic laminate with polystyrene core for thermo-acoustical insulation or fully or partially glazed and have different dimensions (100xh210 cm, 200xh210 cm) and are provided with handles both sides and "Yale" lock. All types of external doors can be fitted with anti-panic hardware and overhead mounted hydraulic closers .

The internal doors are of single or double wing type, made of wood with PVC coating (sizes 80xh210 cm, 90xh210 cm, 160xh210 cm). Folding doors of strong plastics are also available to permit a more rational use of the rooms. All types of doors are provided with locks.

### **10) ELECTRIC INSTALLATION**

The electric installation is completely embedded within the gap between internal and external walls and the wiring for the socket outlets is flush-mounted. External power supply is provided by one waterproof box on the outside of each module. Module is fitted with a main control panel in moulded self-extinguishing PVC mounted indoors, including thermo-magnetic differential circuit breakers and thermo-magnetic switch-fuses. All wiring/cabling are in flexible multi-strand copper wires with flame retardant insulation type "FROR" 450/750 (CEI 2022 2035 IMQ). Upon request the metallic structure of module is fitted with an external connector for grounding, firmly secured or welded on to the base framework.

The manufacture and the materials used comply to the Standards of the European Union.

## ***National Disaster Housing Strategy*** **Public Comment Process**

### **11) SANITARY INSTALLATION**

The sanitary installation is designed to permit a quick and easy maintenance. Exterior connection to mains is provided by one threaded male connection. Interior piping is fitted inside the module above the floor level, with possibility of inspection from the inside. Sewage pipes are of heavy PVC, securely fixed to modules and led to the designed exit point for connection to the exterior sewerage mains. The water heating is ensured by electric boilers of various capacities. Other types of water heating are available only upon specific Customer's request.

### **12) HEATING**

The heating is electric, provided by radiating plates wall mounted type. Other types of heating are available only upon specific customer's requirement.

### **13) AIR CONDITIONING**

If air conditioning is required, we can provide wall mounted type air conditioners of 7800 to 18500 BTU for either cooling only or heating/cooling with heat pump. As an alternative we can provide air conditioners of "split" type. Units are delivered complete of all necessary hardware for installation and the appropriate 16A power socket with automatic switch for operation is included.

In addition special air-conditioning units can be supplied to meet specific Customer's requirements.

### **14) FIRE PROTECTION**

Upon specific request modules can be fitted with independent ceiling mounted smoke detectors fed by 9V long life type batteries. As an alternative, they can be linked to a master fire alarm panel. Emergency light fittings can be provided to ensure a minimum level of lighting to the escape routes.

### **15) GUARANTEES**

The period of guarantee against perforating rust is 5 years. The guarantee period does not apply to fragile materials such as glass, plastics and lighting equipment. The guarantee will not apply to any damages caused by an improper use of the product or damages caused by chemical agents, non rainy water or insufficient maintenance.

For the internal and external components the guarantee applicable shall be that of 12 months.

## **National Disaster Housing Strategy Public Comment Process**

### **SPECIFICATION OF 2001 SHELTERS**

#### **1) GENERAL DESCRIPTION**

The shelter series 2001 was the very first to roll off the EDILSIDER manufacturing line and it is the result of more than 40 years of experience. With over 15000 manufactured units, this shelter is marketed to accommodate an extremely broad range of requirements over the world, from the hot desert of Algeria, to the humid forests of Nigeria and the cold climate of Siberia, Iceland and North Kazakhstan.

Improved over the years, it currently comes as a shelter suitable for usage even under harsh field conditions, while being exceptionally comfortable, easy to move and handle, able to maintain adequate performance in time and requiring low maintenance.

The main highlight of the shelters series 2001 is the self-ventilation system devised for the walls and the roof. It consists of upward airflows that the heat creates in the external wall claddings and the roof: cold air sweeps in through appropriate grooves at the base of the panels, while hot air is exhausted through the roof gutter. In this way, the shelter is naturally cooled during the hot season and moisture condensing is prevented during the cold season.

All metal sections used in the structure are subjected to an hot galvanising process (min. 275 g/m<sup>2</sup>). Units can be stacked to form a three-storey high housing complex and can be linked on all four sides.



#### **2) TECHNICAL DATA**

##### **Dimensions**

Modules are of the following standard dimensions:

Length:	2.990 or 6.055 or 9.125 or 12.190 mm
Width:	2.438 or 2.900 mm
Inner height:	2.190 or 2.500 or 2.700 mm
Overall height:	2.590 or 2.890 or 3.090 mm

Other dimensions can be provided upon request.

##### **Design loads**

Roof load:	150 Kg/sqm
Floor load:	250 Kg/sqm
Wind load:	210 Km/h (130 mph)

Other working loads according to the specific Customer's requirements.



## **National Disaster Housing Strategy Public Comment Process**

### **Thermal and acoustical insulation**

Roof coefficient of heat transfer:  $K < 0,35 \text{ W/sqm}^\circ\text{K}$   
Floor coefficient of heat transfer:  $K < 0,41 \text{ W/sqm}^\circ\text{K}$   
Wall coefficient of heat transfer:  $K < 0,43 \text{ W/sqm}^\circ\text{K}$

Reduction of noise level on external walls:  $R_w = 39,5 \text{ dB}$

### **Materials**

Hot rolled steel profiles: Fe 37b  
Cold rolled steel profiles: Fe E320 G  
Steel sheets: Fe 320 G  
Nuts and bolts: Class 5d

### **3) FLOORING SYSTEM**

The basement is self-supporting and consists of an edge frame made of 150 mm high 2,5 mm thick cold-drawn, galvanised steel C-channels, welded to the four ISO TL 104-compliant corner blocks, and transverse cross beams placed with a span variable according to live load requirements. The result is a durable and highly rigid structure upon which the floor stands.

Fork pockets may be provided upon request (dimensions: 125x345x8 mm, centre distance: 2050 mm).

Step floor is made in 18,5 mm thick marine plywood boards, fixed to the sub-structure by drywall nails and covered by wall to wall 1,4 mm thick heavy duty PVC layer of light grey colour, secured with extra-strong glue.

The floor is insulated with 60 mm glass wool mattresses (density:  $15 \text{ Kg/m}^3$ ), the bottom side of which is protected by applying a 4/10 mm thick galvanised corrugated sheet, spot-welded to adjacent structural members. Average thermal transmittance for the floor is less than  $0,40 \text{ W/m}^2 \text{ K}$ . Standard floor live load:  $250 \text{ Kg/m}^2$  uniformly distributed.

Upon request and in shelters used as toilet facilities, food preparation, washing room, kitchen and laundry room, step floor can be made of solid plastic boards 30 mm thick finished with "wall to wall" 10/10 mm thick chequered stainless steel AISI 304 sheets slip resistant, up-turned minimum 50 mm high all around that prevents water from seeping in.

One full length floor drain canal, including 2 floor drains at least and metal grate, with minimum dimensions 150xh30 mm, is provided to drain spilled or wash waters at the center.

### **4) ANCHORING SYSTEM AND BASE PLATE**

The whole structure is designed to resist against the 130 mph wind loads therefore the adopted foundations must be designed accordingly. The building is provided by the anchoring system and base plate for a proper anchorage.

## **National Disaster Housing Strategy Public Comment Process**

### **5) EXTERNAL WALLS**

Cladding consists of 8/10 mm thick hot galvanised ribbed steel panels, 400 mm pitch and 55 mm depth, set down on the base structure and spot-welded to it and to the profiles of the roof frame.

Insulation is achieved by 60 mm thick mineral wool mattresses wrapped in polyethylene bags, density 15 Kg/m<sup>3</sup>, reaction to fire: class 0.

The inside panelling of living shelters is constructed from 8 mm thick chipboard panels with the inner face finished with a white PVC sheet (fire reaction: class 1). The above panels are secured to a wooden frame to form a rigid framework, fastened together by means of PVC H-sections, and riveted to the outside structure by suitable spacers of galvanised steel in order to avoid possible thermal bridges. A perfectly stable, washable and water repellent wall is thus obtained.

When the external wall starts getting too hot, the air space between the cladding and the internal partition wall creates an upward airflow that sweeps in through appropriate grooves at the base of the panels, before ascending and being exhausted through specifically made openings by the gutter. The aim is to prevent the internal partition wall from getting too hot; in addition to possible air conditioning saving benefits, it offers good internal living comfort. The resulting overall wall thickness is 110 mm.

Average thermal transmittance for the external wall is less than 0,40 W/m<sup>2</sup> K. In regions noted for the severity of their winters, insulation shall be increased and ventilation suppressed.

The average noise abatement of external walls is 39,5 dB (CSI test report n°016/A/93 dated 03/08/93).

In shelters used as toilet facilities, laundry room, food preparation, washing room, kitchen, as well as in technical modules, the inside panelling consists of self-supporting sandwich type panels, having a total thickness of 50 mm. The insulation is ensured by a core of self-extinguishing polyurethane resins (density : 40 Kg/m<sup>3</sup>, thermal transmission coefficient : 0,461 W/m<sup>2</sup> K) fitted between two galvanised ridged metal sheets 0,4 mm thick (standard). Finishing of wall panels consists of one coat of polyester based white/grey colour paint. Panels have waterproof and dustproof tongue-and-groove vertical joints and are fully interchangeable.

A stainless steel interior finish may be provided upon request.

The roof and the basement are connected by means of 4 corner posts, made up of 25/10 mm thick galvanised rolled steel sections, either welded or bolted to the corner blocks that are laid on both the roof and the basement. Shelters whose length is 30' or 40' are provided with 4 central studs, embedded into the longitudinal walls, realized with cold rolled galvanized steel profiles 2,5 mm thick with crane lift bracket eyelets welded on the upper part.

Finishing between walls and floor is achieved by PVC skirting fitted into the guide of wall panels. Finishing between wall panels at corners is realized with flashings in pre-coated steel sheet fixed by screws or rivets.

Insulation of the corner pillars is achieved by filling the gap between the drain pipes and the pillar walls with glass wool.

### **6) ROOF**

The roof is made in cold rolled hot dip galvanised steel profiles 1,5 mm thick, forming the edge frame, welded to the four corner support blocks, with measures complying with ISO TL 104, and transverse cross beams supporting the ridge beam.

Shelters can be lifted and moved by the corner blocks on the roof or by the crane lift bracket eyelets in central position (available only on trailers longer than 20 feet).

## **National Disaster Housing Strategy Public Comment Process**

External covering consists of corrugated galvanised steel sheets 6/10 mm thick fitted to be slightly convex (slope 2%) to allow for efficient drainage. The water is brought down into the side gutter profile and then to the base of the shelter by means of heavy duty PVC pipes diam. 63 mm running through the inside of the four corner posts.

The suspended ceiling of living shelters is made of 8 mm thick chipboard panels with the inner face finished with a white PVC sheet (similarly to internal partition walls and claddings).

Insulation is achieved by 60 mm thick resin-bonded glass wool mattresses wrapped in polyethylene bags, placed above the suspended ceiling panels (density: 15 Kg/m<sup>3</sup>, reaction to fire: class 0).

The scope of the air space between the suspended ceiling and the corrugated sheet is firstly to protect the shelter from intense heat during the hot season, and secondly to prevent moisture from condensing during the cold season.

Average thermal transmittance for the roof is less than 0,40 W/m<sup>2</sup> K. Standard roof live load: 150 Kg/m<sup>2</sup> uniformly distributed.

In shelters used as toilet facilities, laundry room, food preparation, washing room, kitchen, as well as in technical modules, the suspended ceiling consists of sandwich type panels, having a total thickness of 30 mm with a core of self-extinguishing high density (40 Kg/m<sup>3</sup>) polyurethane resins fitted between two galvanised ridged metal sheets 0,4 mm thick. Finishing of ceiling panel consists of one coat of polyester based white/grey colour paint.

A stainless steel interior finish may be provided upon request.

### **7) INTERNAL PARTITION WALLS**

Internal partition walls of living shelters are composed of two panels of chipboard 8 mm thick one-side finished with white PVC sheet; a 40 mm gap for the soundproofing is provided. The overall thickness of the wall is 56 mm.

The above panels are secured into the partition guides without any cuts or holes on the structure, therefore with the possibility of positioning as required, and are fastened together by means of PVC H-sections.

The average noise abatement of internal partition walls is 36,5 dB (CSI test report n°018/A/93 dated 03/08/93).

Upon request, a mineral wool mattress can be inserted between the two chipboard panels to improve insulation properties.

In shelters used as toilet facilities, laundry room, food preparation, washing room, kitchen, as well as in technical modules, the internal partitions consist of self-supporting sandwich type panels, having a total thickness of 50 mm. The insulation is ensured by a core of self-extinguishing polyurethane resins (density : 40 Kg/m<sup>3</sup>, thermal transmission coefficient : 0,461 W/m<sup>2</sup> K) fitted between two galvanised ridged metal sheets 0,4 mm thick (standard). Finishing of wall panels consists of one coat of polyester based white/grey colour paint. Panels have waterproof and dustproof tongue-and-groove vertical joints and are fully interchangeable.

A stainless steel interior finish may be provided upon request.

### **8) DOORS AND WINDOWS**

Doors and window frames, made from silver anodised aluminium-based alloy profiles, are fitted into a partition wall. On the outside, fittings are protected by a metal profile installed above the door and window frames to redirect rain water that trickles down the roof, so that it can weep down along the wall.

Standard windows are of the outward protruding type; they are supplied with a 4 mm thick float glass, inner handles and extendable/retractable arms that lock the sash once open. Dimensions are as follows: 760xh400 mm or 760xh1130 mm or 1560xh1130 mm.

## **National Disaster Housing Strategy Public Comment Process**

Alternatively, double-sashed window, one opening inward and one with a swinging outward awning, may be provided, with an air space to provide superior soundproofing and insulation properties.

Other types of windows can be made available upon request: for instance, sliding windows or one- or two-casement windows.

The number of windows and their dimensions are such as to ensure a 1/8 ventilation/lighting ratio with regard to the room useable area, as envisaged by sanitation regulations in relation to residential buildings.

Fittings available upon request include: sliding windows, double glass (3-12-3), armoured or opaque glass, Venetian blinds, rolling slat blinds, fly screens, bars.

External solid doors, made from a 22mm thick polystyrene insulation board, are equipped with 3 hinges, heavy-duty plastic handles and a lock. Dimensions are as follows: 760xh2100 mm (swinging door) or 1560xh2100 mm (swinging in pair).

Fittings available upon request include: anti-panic bars, upper/lower safety glass (3+3 mm), door closers.

Internal doors are formed by a fir wood door frame, the inside is covered in polystyrene and both sides are coated with a 3,2 mm thick white lacquered medium density fibreboard; doors are fitted with 2 hinges, brass handles and a lock.

Toilet doors feature a 1600 mm high aluminium frame designed to give a clear opening, both on the upper and lower side, for proper air motion, complete of 2 hinges and a bolt lock.

A wide variety of additional door and window fittings may be provided upon a specific request from a customer.

### **9) ELECTRICAL INSTALLATION**

In accordance with currently enforceable IEC regulations and Italian law n° 46/90, the electrical installation is constructed from IMQ quality label materials. Electric supply system is mono phase, 220V 2P+G or three phases, 380V 3P+N+G 50 Hz. A waterproof junction box is mounted on the outside of the shelter, while the inside houses a self-extinguishing PVC electric panel which accommodates differential switches and thermal magnetic circuit breakers.

In shelters used as accommodation, the wiring system is laid above the suspended ceiling, from where backbone cables are brought out to provide power to the various building appliances. All drop lines are embedded into the air space between the cladding and the internal partition wall, and include recessed enclosures used to protect outlets and switches.

Multicore, fire arresting cables are used: provided with copper stranded conductors and covered in a HEPR FG70R4 rubber sheathing, their section is compatible with appliances in place, as recommended by IEC 20-11, IEC 20-34, IEC 20-13, IEC 20-22, IEC 20-52 standards.

In shelters used as toilet facilities, laundry room, food preparation, washing room, kitchen, as well as in technical modules, power distribution is ensured by flush-mounted, self-extinguishing PVC pipes, duly fastened by plastic clamps. Both the distribution boxes and the enclosures which house the appliances are in self-extinguishing plastic. N07-VK, fire arresting, IMQ quality label cables are used: in compliance with the IEC 20.22 standard, their section is compatible with appliances in place.

10A/16A shuttered socket outlets, widely used in Italy, are positioned in a manner such as to match the various appliances in place.

According to its intended use, indoor lighting inside each building can be achieved either by means of glass fibre reinforced polyester ceiling fixtures and a methacrylate diffusing screen, complete with two 36W fluorescent lamps, or by means of ceiling fixtures made up of an aluminium housing and a tempered glass screen, complete with one 75W incandescent lamp. There is a sufficient number of lighting fixtures to ensure the level of illumination, expressed in lux, required under applicable legislation.

In toilet facilities, the electrical equipment is waterproof, and custom connectors, treated to prevent penetration of the shell by water, are supplied.

## ***National Disaster Housing Strategy*** **Public Comment Process**

Every electrical appliance in place, including domestic outlets, is connected by an appropriate YG cable to the grounding network which refers to a single point inside the main electric panel.

### **10) SANITARY INSTALLATION**

The supply ducts are of butylenes complete with fittings and fixtures for hot and cold water. Maximum water supply pressure is 3 atm. External connection to the mains is provided by a threaded connection of appropriate diameter.

Sewage pipes are of heavy PVC, securely fixed to modules and led to the designed exit point for connection to the external sewerage mains.

Plumbing fixtures are engineered for time effectiveness and easy maintenance: interior piping is fitted above the floor level, with the possibility of being inspected from the inside.

Water closets consist typically of a white ceramic bowl with toilet seat and plastic cover, low-down flush tanks.

Turkish-type closets are from either white methacrylate or stainless steel, complete with high-up flush tanks. Pedestal washbasins and bidets are in white ceramic with hot/cold water supply. Lavatories are from white methacrylate with hot/cold water supply. Shower basins are from white methacrylate, equipped with a plastic curtain and hot/cold water supply. Tapware is of chromium-plated brass, with external hot/cold water mixers.

Hot sanitary water is heated by wall-hung and floor-standing electric boilers with suitable capacity. Gas-fired boilers can also be supplied, but only upon a specific request from a customer.

Reinforced plastic bathroom fittings (mirrors, shelves, soap tray, toilet paper holder, towel bars, etc.) may be provided upon request.

### **11) HEATING AND AIR CONDITIONING SYSTEMS**

The heating system, if any, consists of wall mount, electric convector heaters with temperature controller. Rating from 600 to 2000 W.

As to possible air conditioning, window type air conditioners or split air conditioners – from 7000 to 18000 BTU/h - coming in cool-only versions or reversible heat pump configurations, are available.

### **12) PAINTING**

The outside finish is applied once the prefabricated building is fully assembled, according to the following cycle :

Washing of steel sheets with an appropriate deterging solution to remove zinc salts from the surface.

Applying a coat of white epoxy paint (RAL 9010) devised for galvanised steel sheets. Overall thickness: 60 microns.

The above protective cycle can be modified to meet specific requirements expressed by the customer and the environment in which the prefabricated building will be erected.

## **National Disaster Housing Strategy Public Comment Process**

### **SPECIFICATIONS OF PREFABRICATED BUILDING « SIDERMAJOR »**

#### **1) INTRODUCTION**

The "Sidermajor" insulated prefabricated modular buildings have been designed and tested by EDILSIDER over 40 years of experience around the world, from the hot climate of the Arab Emirates to the colder climate of Siberia, Iceland and North Kazakhstan.

All structures are self-supporting and only require perimeter concrete foundations for erection.

Owing to their ease of installation and a wide variety of intended use, the "Sidermajor" prefabricated buildings are definitely suitable for the construction of tourist resorts, construction camps (dining halls, dormitories, office space, services, clubs, hospitals, first-aid rooms, laundry rooms, schools, etc.) or versatile housing solutions one or two storeys high.

The "Sidermajor" prefabricated buildings offer cost-effective alternatives, both in terms of purchase and assembly, to traditional construction methods, while providing all the comfort of brick homes.



Uniquely designed, the "Sidermajor" prefabricated buildings provide three main features :

**Patented panellised system.** The "Sidermajor" system relies both on the modularity of the panels which form the framed structure and the patented panellised system which uses pins and wedges.

All members constituting the structure, as well as faces, are constructed from cold-drawn and/or press-bent sheet. The limited use of bolts, screws and silicon, the great simplicity of the system and the reduced weight of each component make it possible, firstly, to assemble the structure in a short time with just a small mobile crane, secondly, to have the building knocked down, shipped and joined in the field; this is an easy, low-cost operation, as the whole structure provides for multiple relocation.

**Use of recyclable and non-toxic materials.** Water-based coatings are applied to the external walls, inside panelling is made from chipboard and/or gypsum boards, insulation is achieved by fire-retardant, non-toxic mineral fibres. **The use of polyurethane foam insulation panels is out of the question**, as such material releases highly toxic and lethal acids in the event of fire.

**Self ventilation.** Exclusive feature of the "Sidermajor" prefabricated buildings, self ventilation consists of upward airflows sweeping in the external wall claddings through appropriate grooves at the base of the panels and in the attic space. Because this process prevents the walls from getting too hot and allows moisture to evaporate, the atmosphere inside the building remains healthy and comfortable.

#### **2) FRAMED STRUCTURE**

The bearing structure consists of cold-drawn sections and steel tubular cross-members whose appropriate section has been assessed to accommodate size and live load requirements. As regards materials, design and dimensions, bearing structures comply with currently applicable Italian and international regulations.

## **National Disaster Housing Strategy Public Comment Process**

### **3) DIMENSIONS**

Basic structure length:	2,80 m
Width:	4,30 - 5,10 - 5,90 - 6,70 - 7,50 - 8,30 - 9,10 - 9,90 - 11,50 m
Inside height:	2,70 - 3,00 m

### **4) ROOF**

The covering framework consists of a ridge roof with a 15 degree slope. The bearing structure is made up of a main framework, composed in turn of as many trusses as the basic structure. Trusses consist of intersecting diagonal cold-drawn sections and steel tubular cross-members whose appropriate section has been assessed to accommodate size and live load requirements. Once fully assembled, they are painted by going through a process of immersion.

The secondary framework is composed of hot galvanised steel section purlins, shaped either like C-channels or hat sections, secured to the trusses by cleats.

The gutter is formed by a single hot galvanised steel section projecting over the external wall by approximately 65 cm. Plastic weather checks (Ø 80mm) are incorporated into the gutter every 2,80 m.

The roof cladding is constructed from 6/10 mm thick galvanised corrugated sheets, covered on site in a special water-soluble coating whose colour can be chosen by the customer. A vapour barrier made of polyethylene film has been laid underneath to prevent moisture from condensing.

### **5) EXTERNAL WALLS**

The vertical structural frame consists of 25/10 mm thick hot galvanised rolled steel sections which form a continuous line with the external wall cladding.

The external wall has an overall thickness of 150 mm ; starting from the outside, its structure comprises the following elements :

Hot galvanised sheet-steel (6-8/10 mm thick) reinforced by ribs for greater stability and major resistance, painted on site in a colour possibly chosen by the customer. Upon request, a briquetted type of deep-drawn sheet facing can be supplied.

50 mm thick air space between the cladding and the internal partition wall: when the external wall starts getting too hot, it creates an upward airflow that sweeps in through appropriate grooves at the base of the panels, before ascending and being exhausted through specifically made openings by the gutter. The aim is to prevent the internal partition wall from getting too hot; in addition to possible air conditioning saving benefits, it offers all the amenities of home and provides extra comfort with respect to traditional construction methods.

Thermal insulation and soundproofing are achieved by a 60 mm thick non-combustible, resin-bonded mineral wool mattress wrapped in a polyethylene bag to preserve its properties over the years (density: 15 Kg/m<sup>3</sup>, reaction to fire : class 0).

Inside panelling constructed from 8 mm thick chipboard panels with the inner face finished with a white PVC sheet (fire reaction: class 1). The above panels are secured to a wooden frame to form a rigid framework, fastened together by means of PVC H-sections, and riveted to the outside structure by suitable spacers of galvanised steel in order to avoid possible thermal bridges.

Buildings have been constructed so as to meet the requirements set forth by Italian law n°10/91 in relation to energy saving solutions. Average thermal transmittance for the external wall cladding is less than 0,407 W/m<sup>2</sup> K.

Treatments applied to walls have produced an average 39,5 dB noise abatement (CSI test report n°016/A/93 dated 03/08/93).

## **National Disaster Housing Strategy Public Comment Process**

As to reaction to fire, the external wall is REI15-classified (Giordano Institute test report n° 166365/2451RF dated 27/11/02).

Alternatively, inside panelling can be constructed from 15 mm thick gypsum boards, secured to a 0,6 mm hot galvanised rolled steel section framework, consisting in turn of both C-shaped studs, arranged to form a 600 mm centre distance, and U bend channels. The boards are spiked to the metal framework by drywall screws. In between the boards, joints are sealed with metal strips. Joints, corners and screw heads will be filled on site to give a level surface, ready to receive the topcoat.

Subsequently, claddings can be coated with a thermal blanket composed of the following elements :

40 mm thick polystyrene insulation boards, density: 25 Kg/m<sup>3</sup>

Glass fibre glued net

External plaster

### **6) INTERNAL PARTITION WALLS**

Internal partition walls are composed of two 8 mm thick chipboard panels, balanced at the rear, where the outer face is lined with a white PVC sheet; also, a 40 mm soundproofing plywood board has been provided. The overall sidewall thickness is 56 mm.

The above panels are embedded into the runners, with no cuts or holes made in the structure for greater guidance of the piece that slides in the groove, and fastened together by means of custom PVC H sections.

Treatments applied to internal partition walls have produced an average 36,5 dB noise abatement (CSI test report n°018/A/93 dated 03/08/93).

Upon a specific request from a customer, a mineral wool mattress can be inserted between the two chipboard panels to improve insulation properties.

Alternatively, internal partition walls can be built with 15 mm thick gypsum boards, riveted by drywall screws to both sides of a metal framework which consists of 0,6 mm thick galvanised rolled steel sections. The air space houses a 60 mm thick rigid rock wool mattress. The overall sidewall thickness is 100 mm.

### **7) SUSPENDED CEILING**

The suspended ceiling is composed of 600x1200x8 mm thick chipboard panels, balanced at the rear, where the outer ply is lined with a white PVC sheet (similarly to internal partition walls and claddings).

The panels are reclined against an flush-mounted metal framework, supported by vertical members made of steel wire.

Insulation is achieved by 60 mm thick resin-bonded glass wool mattresses wrapped in polyethylene bags, placed above the suspended ceiling panels (density: 15 Kg/m<sup>3</sup>, reaction to fire: class 0).

Average thermal transmittance for the suspended ceiling is less than 0,407 W/m<sup>2</sup> K. Effective depth inside the buildings: 2,70/3,00 m, according to their intended use.

Upon specific request, the suspended ceiling can be fitted either with 600x600 x15 mm mineral fibre panels (fire resistance : class 1) or with 600x600x8/9,5 mm gypsum boards, where the outer face is pre-coated with a layer of acrylic resin paint in water dispersion (reaction to fire : class 1, fire resistance : REI 90/120).



## **National Disaster Housing Strategy Public Comment Process**

### **8) BASEMENT AND FLOORS**

Basements are made up of reinforced concrete foundations; the customer is responsible for their construction that will be undertaken following our plans on which any information possibly needed to gather proper dimensions, according to both the soil upon which prefab buildings will be erected and the load to be transmitted, are reported.

The floor system can be executed by using any of the systems frequently associated with traditional buildings : concrete slab coated with a ceramic tile, linoleum or carpet floor covering (at the customer's expense).

Upon request, a prefabricated floor system, easy to assemble and 100% reusable, can be supplied in two versions. Floor live load: 200 Kg/m<sup>2</sup>

The 100 mm high floor version comprises the following elements :

Main and secondary framework composed of 100 mm hot galvanised steel C-channels, with a 800x1600 mm mesh.

28 mm thick water repellent, chipboard panels.

1,4 mm thick glued PVC panel floor finish.

Upon request, this type of floor can be insulated with glass wool mattresses, the bottom side of which is protected by applying polyethylene sheets. Other floor coverings are available upon request.

On the other hand, the 400 mm high version comprises the following elements :

Main framework composed of 250 mm C-channels and secondary framework formed by 150 mm C-channels, painted through a process of immersion, with a 800x2800mm mesh.

28 mm thick water repellent, chipboard panels.

1,4 mm thick glued PVC panel floor finish.

Upon request, this type of floor can be insulated with glass wool mattresses, the bottom side of which is protected by applying a 6/10 mm thick galvanised ribbed sheet. Other floor covering available upon request.

Two-storey buildings accommodate a pre-cast slab formed by a joist work of steel C-channels to which a 28 mm thick floor, made up of water repellent, chipboard panels, is riveted by screws. The trampling surface consists of 1,4 mm thick glued PVC panels. Other floor finishes are available upon request.

The lower area of the slab houses the suspended ceiling.

### **9) STAIRWAYS**

Only equipped in two-storey prefabricated buildings, stairs, arranged outside or inside, comprise flights and steps/landings either made from gridded or anti-slip steel sheets or lined with rubber (indoor). Side protective devices of tubular sections and balustrades surmounted by a handrail are also provided.

### **10) DOORS AND WINDOWS**

External windows consist of silver anodised aluminium-based alloy profiles; alternatively, they can be pre-coated with a white RAL 9010 finish (upon request).

The above windows are fastened to a pre-coated steel frame.

Several window types have been arranged to accommodate customer requirements :

## **National Disaster Housing Strategy Public Comment Process**

Single-sashed window opening outward (protruding window)

Double-sashed window, one opening inward and one with a swinging outward awning, plus air space to provide superior soundproofing and insulation properties

Sliding windows

One or two-casement sashes

Single or double-sashed oscillating window

Fixed windows

The following fittings may be provided upon request :

PVC or aluminium outside shutters

Aluminium bars

Venetian blinds (inside)

Rolling slat blinds

Rolling or fixed fly screens

Double glass (3-12-3 mm), safety glass windows (3+3 mm), anti-vandal windows.

Dimensions are as follows: 360xh400 mm, 760xh400 mm, 760xh1130 mm, 760xh1520 mm (with shutter), 1560xh1130 mm, 1560xh1520 mm (with shutter). The number of windows and their dimensions are such as to ensure a 1/8 ventilation/lighting ratio with regard to the room useable area, as envisaged by sanitation regulations in relation to residential buildings.

External solid doors, made from a 22mm thick polystyrene insulation board, are equipped with 3 hinges, heavy-duty plastic handles and a lock. Dimensions are as follows : 760xh2100 mm, 960xh2100 mm (swinging door) or 1560xh2100 mm (swinging in pair).

Fittings available upon request include: push bars, safety glass windows (3+3 mm) for upper and lower openings, pneumatically-driven device to automatically shut the doors.

Internal doors are formed by a fir wood door frame, the inside is covered in polystyrene and both sides are coated with a 3,2 mm thick white lacquered medium density fibreboard; doors are fitted with 2 hinges, brass handles and a lock.

Dimensions are as follows : 800xh2100 mm, 900xh2100 mm (swinging door) or 1600xh2100 mm (swinging in pair).

A wide variety of additional door and window fittings may be provided upon a specific request from a customer.

### **11) ELECTRICAL INSTALLATION**

In accordance with currently enforceable IEC regulations and Italian law n° 46/90, the electrical installation is constructed from IMQ quality label materials. The power supply is 230/400V 3F+N 50Hz three-phase.

## ***National Disaster Housing Strategy*** **Public Comment Process**

Each prefabricated building is fitted with a main electric panel which accommodates master switches, thermal magnetic circuit breakers and differential switches, all duly calibrated to protect separate power and lighting circuits.

The wiring system is laid above the suspended ceiling, from where backbone cables are brought out to provide power to the various building appliances. All drop lines are embedded into air spaces situated between the cladding and the internal partition wall, and include recessed enclosures used to protect outlets and switches.

Multicore, fire arresting cables are used : provided with copper stranded conductors and covered in a HEPR FG70R4 rubber sheathing, their section is compatible with appliances in place, as recommended by IEC 20-11, IEC 20-34, IEC 20-13, IEC 20-22, IEC 20-52 standards.

10A/16A shuttered socket outlets, widely used in Italy, are positioned in a manner such as to match the various appliances in place.

According to its intended use, indoor lighting inside each building can be achieved either by means of glass fibre reinforced polyester ceiling fixtures and a methacrylate diffusing screen, complete with two 36W fluorescent lamps, or by means of ceiling fixtures made up of an aluminium housing and a tempered glass screen, complete with one 75W incandescent lamp. Offices in which computers are provided for shall be supplied with "dark" light fluorescent lamps featuring anti-glare optical glass. There is a sufficient number of lighting fixtures to ensure the level of illumination, expressed in lux, required under applicable legislation.

Emergency lighting, that will remain lighted in case of power failure, is also available to ensure proper illumination along escape routes (2 lux) and above emergency exits (5 lux).

In toilet facilities, the electrical equipment is waterproof, and custom connectors, treated to prevent penetration of the shell by water, are supplied.

Every electrical appliance in place, including domestic outlets, is connected by an appropriate YG cable to the grounding network which refers to a single point inside the main electric panel.

### **12) SANITARY INSTALLATION**

The supply ducts are of butylenes complete with fittings and fixtures for hot and cold water. Maximum water supply pressure is 3 atm. External connection to the mains is provided by a threaded connection of appropriate diameter.

Sewage pipes are of heavy PVC, securely fixed to modules and led to the designed exit point for connection to the external sewerage mains.

Plumbing fixtures are engineered for time effectiveness and easy maintenance: interior piping is fitted above the floor level, with the possibility of being inspected from the inside.

Water closets consist typically of a white ceramic bowl with toilet seat and plastic cover, low-down flush tanks. Turkish-type closets are from white ceramic, methacrylate or stainless steel, complete with high-up flush tanks. Pedestal washbasins and bidets are in white ceramic with hot/cold water supply.

Lavatories are from either white methacrylate or stainless steel with hot/cold water supply. Shower basins are from white ceramic, methacrylate or stainless steel, equipped with a plastic curtain and hot/cold water supply. Tapware is of chromium-plated brass, with external hot/cold water mixers.

Hot sanitary water is heated by wall-hung and floor-standing electric boilers with suitable capacity. Gas-fired boilers can also be supplied, but only upon a specific request from a customer.

Reinforced plastic bathroom fittings (mirrors, shelves, soap tray, toilet paper holder, towel bars, etc.) may be provided upon request.

### **13) HEATING AND AIR CONDITIONING SYSTEMS**

Several heating and air conditioning systems can be engineered to cope with a wide range of climate requirements and customer needs.

## ***National Disaster Housing Strategy*** **Public Comment Process**

Generally speaking, a standard solution consists of wall mount electric convector heaters and a cooling system operated by window type of air conditioners or split air conditioners - two components connected with copper hoses, whereby the first one comprises the remotely mounted condensing unit and the other the wall mount evaporative cooler, secured in the top section of the room. Operation is remotely controlled. Air conditioning units come in cool-only versions or reversible heat pump configurations.

Alternatively, a central heating system can be supplied, complete with wall mount boilers or floor standing methane- or LPG-fired boilers with forced draught burners; also, the cooling system will comprise electricity-powered refrigeration units placed outside. Prefabricated buildings accommodate temperature controlled-fan convectors or aluminium heating elements. Heating/cooling fluid discharge and return pipes are from insulated copper and refer to a single incoming point located on the outer edge of the building.

A venting system composed of ceiling-mounted propeller fans can be provided upon request.

### Realized by:

*Eng. Riccardo Paccati, Design technical office, EDILSIDER S.P.A., Calolziocorte (LC), Tel. ++39 (0)341 630063, Fax ++39 (0)341 641165*

*Roberta Marcenaro, under PHD in Engineering, University of Brescia, Genoa branch, "Sites and temporal dimensions of urban areas and territory"*

### Checked by:

*Spada Carlo, Chief Executive Officer of EDILSIDER S.P.A., Calolziocorte (LC), Tel. ++39 (0)341 630063, Fax ++39 (0)341 641165*

*Giorgio Cattani, Sales manager of EDILSIDER S.P.A., Calolziocorte (LC), Tel. ++39 (0)341 630063, Fax ++39 (0)341 641165*

*Pietro Raugi, Vice-President of EDILSIDER LLC, Washington, D.C. 20007-4492, cell. +1 202 285 2474, off. +1 202 333 1344*