

DMS House – Affordable Housing



The new DMS House, unique in the world of light structures, for its installation characteristics and materials

The DMS House are made of sandwich panels, which each also have a structural bearing function. The panels are installed on a system of steel tracks, fixed to the foundation, that enables a quick assembling process.

The DMS House combines all the advantages of a panel structure with the benefits that come from the

“box-like” design. This kind of design is optimal for structural reaction to horizontal loads, such as wind and earthquake.

The DMS House goes beyond the traditional structural idea of a bearing frame, introducing the concept of a bearing prefab sandwich panels structure.

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Graphic rendering of DMS House structure



DMS 30 sqm prototype house in Kampala, Uganda



DMS 80 sqm prototype house in Kampala, Uganda

Many different housing designs has been pre-designed – examples in addition to the prototypes are:

- **PAN 48** – structure characterized by 42 sqm of internal net surface, 48 sqm of total surface, including an entry lodge.
- **PAN 62** – structure characterized by 57 sqm of internal net surface, 62 sqm of total surface, including an entry lodge.
- **PAN 77** – structure characterized by 73 sqm of internal net surface, 77 sqm of total surface, including an entry lodge

Foundations

The foundations system of the DMS House buildings is composed by a preliminary casting of a concrete slab with thickness greater than or equal to 15 cm, depending on soil characteristics.

The building will be connected to the foundations through steel guide profiles, under the axes of the wall panels (external and internal), that are fixed to the slab with screws.

The presence of steel profile-guides and the use of slim thick steel plates, together with the use of silicone, allow to resolve the problem of possible imperfect planarity of the upper surface of the concrete slab.

Once the correct position of the profiles has been found, they will be connected laterally to the below guide-profiles with screws: in this way we obtain a flat support surface for the setting of the wall panels.



The foundation slab also has the function of hosting the sewage and drainage pipes of the future bathrooms and kitchen.

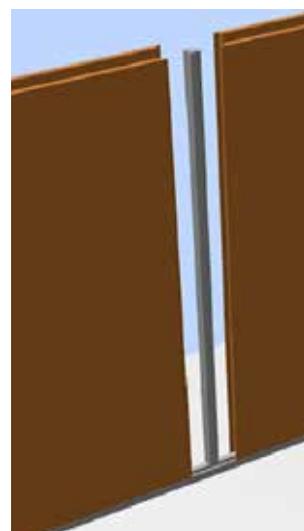
The structure

The DMS House is a building composed of load-bearing sandwich panels, with external magnesium fiber plates and mineral wool or EPS filling, reinforced by a welded steel profile frame.

The internally stiffened vertical wall panels, both external and internal, are fixed to the ground through guides made of metallic profiles that are also connected to the foundation concrete slab. These profiles have a “male” joint that enables the placing and fixing of the panels which have a “female” joint.

The vertical panels are connected one to another on the top by steel profiles, properly shaped to give support to the false ceiling panels, that also have the function of external eaves.

Of course all the panels are fixed to the metallic profiles and to each other with self-tapping screws.



Graphic rendering of assembling panels



Easy installing of the panels



The false ceiling/eaves system and the steel truss system

The two-pitch roof of the structure is designed with tile shaped foamed panels, supported by a simple steel truss system.

As the standard DMS House buildings have a gable roof, specifically shaped magnesium fiber plates are used to close the gables which are connected to the bottom wall panels through a joint, and to the roofing panels through the same system of metallic profiles.

The closure of the gables is carried out by part in magnesium fiber plates and by part in micro-perforated sheet or, in case, insect screen.



Roof panels disposition

That has the double function of preserving from the entrance of insects and the creation of a ventilated roof.

The presence of steel profiles on the top of the vertical panels, both internal and external and also on the corners, where dedicated angular steel elements have been placed, grants an effective “chaining “ to the roof level.

Such “chaining” between horizontal and vertical panels gives the structure a box behaviour, which is ideal for the reaction to seismic actions and also to horizontal actions like wind, for example.



Shear compression test on a sample portion of panel

The composing elements of the structure are mainly:

- Reinforced sandwich wall panels – external/load bearing, thickness 80mm
- Reinforced foamed wall panels – internal/load bearing, thickness 80mm
- Magnesium fiber plates for closing the gable, thickness 8 mm
- False ceiling sandwich horizontal panels, thickness 80 mm
- Tile shaped foamed roofing panels, thickness 20-30 mm
- Steel guide-profiles to be fixed to the panels, made of press folded steel S250 GD, thickness 15/10

Each one of the elements listed above has been tested by the University of Florence, Department of Civil and Environmental Engineering.

Because of the absence of specific international Standards and studies on structures made of sandwich panels, the DMS House system has been validated by the above mentioned Department of Civil and Environmental Engineering of the University of Florence.

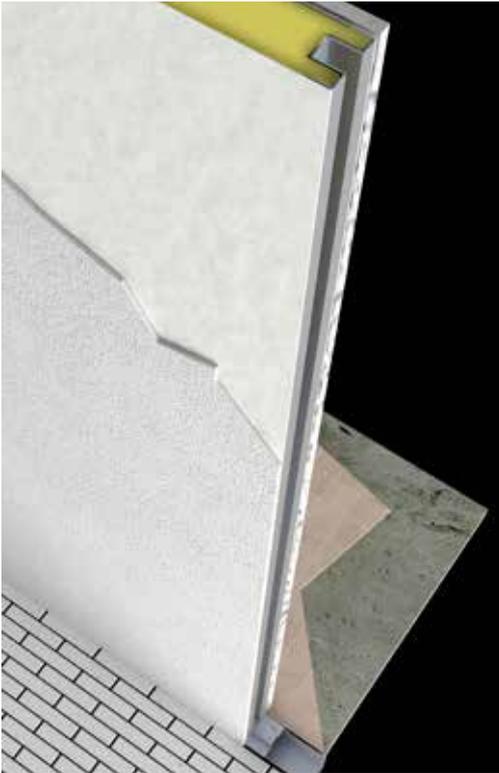
The laboratory tests are both carried out for the stiffness and resistance of the sandwich panels’ materials (that is, the behaviour of the magnesium fiber plate – mineral wool or EPS composed bearing element) and on the stiffness and resistance of the panels in real scale.

Thermal-acoustic behaviour

The DMS House buildings grant a high thermal and acoustic insulation.

The panels actually cover the steel guide-profiles completely thus reducing all possible problems deriving from thermal bridge effects.

Another essential factor for an optimal thermal be-



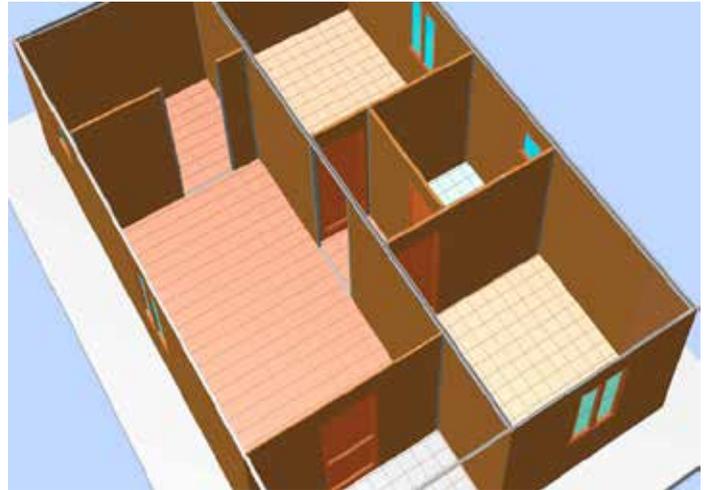
Panel section

haviour of the building is the possibility to create a ventilated roofing. The DMS House features a gable roof with false ceiling and micro-perforated panels for closing the gable: in this way we get a free ventilated space which is anyway protected from the possible entry of grains of sand or insects.

Due to the design we can surely state that the roof of DMS House represents a real ventilated roofing.

Architectural composition

The houses can be adapted dependent on the customer's aesthetic preferences, as the design is flexible.



Panhouse interiors

Quality of finishings

Every type of panel of the DMS House can have a different finish depending on the customer's taste.

Below are some possible solutions:

External panels:

- External coating with shaved surface, with plaster effect
- External coating with composite material surface with printed brickwork effect
- External ventilated coating, made with high quality tiles like, for example, cotto tiles.



Coating with brickwork effect

Internal panels:

- Plasterboard coating
- Coating with composite material surface, with printed brickwork effect
- Flooring:
- Coating with ceramic tiles on pre-assembled panels
- PVC coating

Advantages of the panhouse system

To summarize what has been explained above, the advantages deriving from the **DMS HOUSE** are:

- **Box behaviour** of the building, ideal to react to seismic and horizontal actions in general
- **Easy and quick installation** of the building, thanks to the simplicity of the design
- **Easy leveling** of the building through steel guide-profiles, in order to solve the problem of the

- imperfections of the concrete slab surface
- Possibility to create a “**Do it yourself**” Kit for the assembling of the building
- **Easy connections** between the vertical and horizontal panels (and also roofing panels)
- **Excellent thermal-acoustic insulation**, both lateral and horizontal
- **Thermal bridge effects almost reduced to zero**
- Possibility to build a **Ventilated roofing**
- Possibility to have **different kinds of architectural compositions** for the residential units.
- The panels are already pre-set for the installing of the **electrical, hydric and sanitary equipments**, so that every kind of cable can be passed **inside** the panel
- The electrical equipment can be placed in the skirting board

- Possibility to obtain walls with **different chromatic effects** and with high quality finishings (ceramic, cotto...)
- Possibility to have an internal flooring with **ceramic** tiles

Possible solutions

The versatility of DMS House technology allows to build houses with different shapes and sizes, depending on customer's needs.

Just as examples we mention here below some possible DMS House solutions:



Single family house
 Total surface (incl.porch): 48sqm
 Internal net surface: 42sqm





Two family house
 Total surface (incl.porch): 62 sqm
 Internal net surface: 53 sqm



Single family house
 Total surface (incl.porch): 77 sqm
 Internal net surface: 72 sqm



Single family house
 Total surface (incl.porch): 77 sqm
 Internal net surface: 72 sqm

