H+H MMC Build Solution: offsite with aircrete

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The speed of offsite
with the familiarity of a traditional build

Celcon Vertical Wall Panels are storey-high aircrete panels - fabricated offsite and craned into place for a fast, panelised building system with the reassuring characteristics of a high-performance, durable, masonry structure.

Celcon Vertical Wall Panels are intended for the construction of domestic houses of up to two storey with room in the roof. Three storeys may also be considered subject to an engineering appraisal. They replace the structure of the inner leaf of external cavity walls, separating walls and internal partition walls.

When combined with prefabricated timber floors and even a prefabricated roof system, Celcon Vertical Wall Panels provide a system-build solution that can construct the superstructure of a house from foundation to roof within five days on site.

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Standard design – **with flexibility**

Celcon
Vertical Wall Panels

Dimensions (mm) (LxHxT)	600 x 2325 x 100
Strength* (N/mm²)	4.0
Density (kg/m³)	575
Thermal Conductivity (W/mK)	0.17

Celcon Vertical Wall Panels are manufactured in a range of heights with a width of 600mm and a thickness of 100mm.

Vertical Wall Panels are craned into place onto a bed of H+H element mortar – a fast-setting and very strong thin-layer mortar developed especially for use with the panels.

Underneath the mortar is a sub-structure consisting of standard foundations and ground floor constructions. The vertical joints are also filled with H+H Vertical Wall Panels mortar which forms a 2mm airtight joint.

As aircrete can be cut on site, it is easy to accommodate window and door openings while providing infill sections as appropriate. This also gives the flexibility needed to adjust the Vertical Wall Panels to cope with site tolerances and onsite modifications Vertical Wall Panels utilisation is an important factor in the design process to help minimise any waste on site.

Design variations and detailing can be accommodated and, if required, Celcon Vertical Wall Panels can be used in combination with thin-joint large format blockwork. However, it is anticipated that the most significant speed advantages will be gained during the construction in volume of standard house designs.

Celcon Vertical Wall Panels are also lightly reinforced to facilitate handling and transportation without damaging the product. With the outer leaf off the critical path, cavity insulation can be installed to the complete façade, enabling it to be visually inspected for damage or gaps before the outer leaf is applied.

Separating walls are constructed as two leaves of Celcon Vertical Wall Panels with a minimum 100mm full fill insulated cavity between. This, with effective edge sealing, will provide a zero heat loss party wall. Site acoustic testing has demonstrated that high levels of sound insulation can be achieved and this is reflected by H+H's proprietary acoustic Robust Detail E-WM-31.

- Reduce site labour requirement
- Increased speed of build
- Follow on trades on site in one week
- Established MMC – widely used in Europe
- Ideal for house design
- Proven technical performance

Proving the case **for Vertical Wall Panels**

H+H has been manufacturing Vertical Wall Panels in Europe for decades and building with these modular aircrete panels is a widely accepted standard method of build.

Before site trials in the UK could commence, H+H had to provide evidence that the 600mm wide and 100mm thick Celcon Vertical Wall Panels would provide the structural stability necessary for typical housing in order for the system to be accepted by Building Control, the NHBC and mortgage lenders.

The chief variation to European building processes was the combination of Celcon Vertical Wall Panels with timber floors at first-floor level. Combining the Wall Panels with prefabricated timber floors and roofs provides a self-contained system-build comparable to other off site methods and matching the speed of such methods.

Working with Kingston University Department of Construction and Surveying, and later with Lucideon materials testing centre in Stoke-On-Trent, full size panels were built and tested to destruction in order to determine design parameters and structural performance.

This work concluded with the publication by Lucideon of Special Publication 152: Technical Report and Design Guidance for the use of H+H Aircrete Vertical Wall Panels in the UK, a copy of which is available on request.

This testing process was followed by site trials with two housebuilders and following successful completion, Robust Details were agreed for acoustic performance in party walls. The modular system was also accredited under the Build Offsite Property Assurance Scheme with one particular contractor which, amongst other characteristics, supports a 60-year lifespan.

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A compelling **case for aircrete**

Celcon Vertical Wall Panels allows aircrete to compete with any offsite construction method for housebuilding in terms of **speed of build**.

When used as part of a whole-house system, Celcon Vertical Wall Panels provide a watertight and airtight shell for follow on trades to move in to. The superstructure of a house can typically be completed within a week. It is a very rapid build system that takes the construction of the outer leaf of a cavity wall off the critical path.

Just as importantly, the aircrete material itself is widely understood in terms of structural and thermal performance and its durability is also well proven. Follow-on trades are familiar with aircrete too, and no additional training is required for site workers.

Collaborating for a system-build approach

Maximum benefit is achieved when Celcon Vertical Wall Panels are used as part of a panelised build system, typically including prefabricated timber floors and roofs and potentially also including window and door frames and external insulation.

Using this model, a single site team will be responsible for the entire superstructure (excluding outer leaf) build package, maximising the time savings and increasing transparent accountability. The site team, using cranes to install the wall panels, will typically consist of just three people – significantly reducing the manpower requirements on site.

H+H has proved the effectiveness of the build process with both contractors and housebuilders. One such collaboration has resulted in the I-House package available through Roofspace Solutions.

Industry recognition

Initial constructions using Celcon Vertical Wall Panels as part of the I-House solution won the Housebuilder Product of the Year Award in 2017 and was also shortlisted in the British Construction Industry Awards, Constructing Excellence Awards and the Offsite Awards in the same year.

Key benefits

- Rapid Build
- Cost certainty
- Proven durability
- Traditional materials and familiar build
- High acoustic, thermal and airtight performance

About H+H

H+H is the largest manufacturer of aircrete products for the housebuilding industry. Manufacturing in the UK since 1959, its three factories are supported by a further 10 across mainland Europe, providing a range of aircrete components to meet the needs of the housebuilding industry in each region.

The UK business provides not only product manufacturing, but is supported by a team of technical and design experts who can advise on specification and performance issues for all customers from SME contractors to volume housebuilders.

The company's track record of innovation, partnerships and technical support is the embodiment of the H+H International Group position as Partners In Wall Building.

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