H+H Thin-Joint System

A Modern Method of Construction

Build with ease

Contents

Aircrete /aerkri:t/ noun., adj.

1. autoclaved, aerated concrete (AAC) 2. (cel)lular (con) crete (CELCON). One of the lightest forms of concrete with structural, thermal, sound, fire and freeze/thaw properties, extensively used in Europe where known as ‘gasbeton’. Used in the UK since the 1950s; today known as ‘aircrete’. Comprises pulverised fuel ash (PFA), sand, cement, aluminium powder, lime and water. Used as blocks in a range of thicknesses and face formats for internal and external walls above and below dpc and as infill in beam and block floors; used as a material for reinforced floor elements.

H+H Aircrete

H+H aircrete is used extensively in all types of construction including houses, apartments, commercial properties, multi-storey concrete, steel framed buildings and schools.

Aircrete's unique characteristics make it ideal for the construction of cavity external walls as well as internal separating walls, partitions and foundations.

With its combination of strength, resistance to moisture ingress and thermal insulation, it may also be used for external leaves and solid wall construction.

H+H aircrete combines superb thermal and sound insulation qualities, with impressive load bearing capabilities. Simple to work with, it has the additional benefits of being light weight with a high resistance to water penetration, fire, frost and sulfate attack.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 01/3816

LABC

For over 60 years H+H has been manufacturing aircrete using pulverised fuel ash (PFA) and has gained recognition from WRAP as a ‘recycled’ product. PFA accounts for up to 80% of the material used in the manufacture of H+H aircrete and is a by-product of coal-fired power stations, which would otherwise be sent for landfill.

H+H Aircrete – sustainable in manufacture, sustainable in use

H+H also uses raw materials of which 99% are sourced from the UK. Production plants are located strategically around the UK for ease of manufacture and transport. Waste aircrete from the process is recycled as an aggregate to avoid land fill.

The manufacturing process uses recycled energy to heat the factories and an advanced water management system capturing rainwater and recycling process water.

Due to its lightweight cellular construction, the CO_2 emissions created from transportation are reduced when compared to other commonly used building materials.

Despite its light weight, H+H aircrete also adds a useful contribution to the Thermal Mass of the building, which is now recognised as an important contribution to reducing energy use, by smoothing down the heating/cooling cycle and combating summer overheating.

The Building Research Establishment's (BRE) Green Guide to construction components bases its ranking system on Life Cycle Assessment of materials. With inherently low conductivities, aircrete enhances thermal performance within external walls enabling them to achieve a ranking of A+ within the Green Guide.

H+H aircrete has ISO 14001 Environmental Management Standard certification, as well as a plethora of other awards and recommendations for their commitment to sustainability. H+H is also certified to BRE's standard for responsible sourcing of construction products, BES 6001 obtaining a 'very good' performance rating over all products and manufacturing sites.

This provides the maximum credits within the materials section of the Code for Sustainable Homes.

breeam
responsible sourcing

H+H Thin-Joint System

Thin-Joint construction combines the use of large format, accurately dimensioned aircrete blocks and quick setting mortar to create a highly productive and cost-effective building system.

The system promotes the use of much larger blocks with 2mm joints, rather than the traditional 10mm joints and can be used for solid or cavity walls in all types of buildings, be it houses, apartments, commercial buildings, schools or offices.

Celfix Mortar

Designed to replace traditional sand:cement mortar, the key to the H+H Thin-Joint System is Celfix Mortar developed specifically for use with H+H aircrete. Celfix is cement-based and supplied as a dry, pre-mixed powder, in 25kg bags.

The Benefits of Thin-Joint

The Thin-Joint System, recognised as a modern method of construction (MMC), is an established build system in the UK construction industry which responds directly to Government initiatives for speeding up the supply of housing, whilst improving the quality of build and reducing its environmental impact. It allows construction times equivalent to an off site manufactured solution without the restrictive long lead-in times.

The system retains the flexibility of design that a traditional build enjoys, allowing adaptations on site for any issues that may have been overlooked at the design stage. It also simplifies any changes that are made to the building at a later date, such as extensions, conversions or conservatories.

Since air-tightness is now an integral part of achieving Building Regulation compliance, it has become an important factor in the design and construction of any building. Preventing warm air from escaping through uncontrolled ventilation and air leakage is a key component in controlling heat loss through the fabric of a building.

Tests undertaken by Building Services Research and Information Association (BSRIA) have shown that H+H aircrete achieved an air permeability of 0.12$m^3/hr/m^2$ measured at 50 pascals. Using H+H aircrete can therefore make a significant contribution to achieving low Design Air Permeability rates now commonly required for dwellings under Part L of the Building Regulations.

Although aircrete itself is virtually airtight (when Thin-Jointed with fully filled joints without finish, gives an air tightness performance of around 1$m^3/hr/m^2$), the overall air leakage of a building is very much dependent on the external fabric performance as a whole. It relies on good workmanship and detailing at junctions and service penetrations. Values of less than 5$m^3/hr/m^2$ have been regularly achieved with these systems.

Speed

H+H's Thin-Joint System has some positive speed benefits:

- **Reduces the quantity of mortar used by approximately 80%**
- **Fast setting mortar allows continuous laying to storey height**
- **Ease of mixing and application of mortar**
- **Early installation of floors and roofs**
- **Early installation of internal block walls in frame buildings – not reliant on weathertight shell**
- **Very quickly provides solid robust walls**
- **Post fixing of cavity ties, enables outer leaf to be taken off critical path planning**
- **Simplicity of installing insulation**
- **Much less dependent on weather – can be laid at 0°C or above**
- **Joints are not washed out by sudden rain**

Quality

The Thin-Joint System results in some very specific benefits:

- **2mm joints and larger units reduces Thermal Bridging**
- **Reduction of site wastage**
- **Improved air tightness**
- **Improved build accuracy of finished walls**
- **Easy to extend or adapt during or after construction**
- **Allows the use of thin coat finishes (eg. spray plasters)**
- **Fixing location not reliant on studwork centres**
- **Allows retrofitted joist hangers, improving air tightness and sound control**

The H+H Thin-Joint Product Range

The perfect choice

Celcon Plus Blocks
Face size 630mm x 215mm

Celcon Plus Blocks are produced in various thicknesses. They are suitable for the construction of solid and cavity wall types and manufactured in Solar, Standard, High Strength and Super Strength Grades.

Jumbo Bloks
Face size 630mm x 250mm

Jumbo Blok is produced in 100mm thicknesses and above. They are suitable for the construction of cavity and partition walls. These blocks are manufactured in Solar, Standard, High Strength and Super Strength Grades.

Multi Plates
Face Size 630mm x 350mm

H+H Multi Plates are a new generation of aircrete products that build on the efficiency of thin layer construction and are available in 100mm thicknesses in Standard, High Strength and Super Strength Grades. At just under 2½ times the size of a traditional concrete block, Multi Plates and the Thin-Joint system will deliver significant savings in site productivity.

H+H's Thin-Joint range of aircrete products is made up from Celcon Plus Blocks, Jumbo Bloks and Multi Plates; manufactured in the UK using the latest manufacturing technology.

With a plain face and exceptional dimensional tolerances, they are specially made for use with Celfix Mortar. With larger face formats, these aircrete blocks can significantly increase the speed of construction and improve thermal performance, by reducing cold bridging through the mortar and significantly reducing the quantity of mortar required.

Solar Grade H+H aircrete

With very low thermal conductivity, Solar Grade is principally used where enhanced thermal performance is required. They are generally suitable for above and below DPC for buildings up to two storeys, but excluding separating walls between dwellings. They have a compressive strength of 2.9N/mm^2, density of 460kg/m^3 and a conductivity of 0.11W/m^{2}K.

Standard Grade H+H aircrete

H+H Standard Grade is extremely versatile and can be used below DPC, as well as above ground. Due to its all round performance, it is possible for a 100mm Standard Grade block to be used throughout a build including separating walls. They have a compressive strength of 3.6N/mm^2, density of 600kg/m^3 and a conductivity of 0.15W/m^{2}K.

Higher Strength Grade H+H aircrete

H+H High Strength Grade and Super Strength Grade are used principally where higher compressive strengths are required such as in foundations, the lower storeys of three or four storey buildings or piers under high vertical loads. They have compressive strengths of 7.3N/mm^2 and 8.7N/mm^2 respectively, density of 700kg/m^3 and a conductivity of 0.18W/m^{2}K.

Celfix Mortar

Celfix is supplied by H+H, dry in 25kg bags and should be added to water. Applied with either a scoop or sledge to maintain a consistent joint thickness of 2mm, it remains workable within the bucket for several hours.

With an initial bond time of around 15 minutes, storey height panels can be achieved in one lift and structurally loaded within 1-2 hours, enabling blockwork to be built extremely quickly and in the case of cavity wall construction, independently of the outer leaf.

Applications

- **Internal and external leaf in cavity walls**
- **Solid walls**
- **Separating / party walls**
- **Flanking walls**
- **Partitions**
- **Infill to framed buildings**
- **Fire walls**

Where to use Thin-Joint

The range of H+H large format blocks provides the designer with a wide choice of solutions for all applications. The closed cell structure of H+H aircrete is the key to the material's high thermal and acoustic performance as well as its resistance to water penetration.

Below DPC

H+H Celfix mortar can be used below DPC in ground sulfate conditions up to DS2. However, it is more common for below DPC blockwork to be built in traditional mortar, in which case H+H aircrete can be used in conditions up to and including DS4.

External Solid Walls

The H+H Thin-Joint System offers the architect a choice of solutions with the benefit of both strength and thermal insulation. The use of thin layer mortar techniques gives improved U-values when compared to conventional joints in solid external walls.

Externally, insulated renders are normally preferred, however the blockwork provides a sound substrate for mechanical fixing where cladding, tile hanging or brick slip is specified. Internally, plasters and dry lining systems are the usual finish, however, the inherent accuracy of the system can allow the use of thin layer projection plasters, or plasterboard fixed directly using nylon nails.

Cavity Wall, External

For the load-bearing inner leaf, there is a choice of strengths.

In two-storey housing, Standard and Solar Grade blocks are generally more than adequate to meet structural requirements.

For multi-storey construction, walls or piers under high vertical loads, the H+H High Strength blocks may be required.

As these blocks also have excellent thermal properties, less additional insulation will be required.

H+H aircrete can also be used for the construction of the outer leaf with an appropriate finish.

Separating Walls

Separating and flanking walls constructed with the H+H Thin-Joint System can satisfy the sound insulation requirements of National Building Regulations, allowing the building to benefit from the construction speed of the H+H Thin-Joint System whilst retaining a homogeneous build system.

Partitions

The excellent sound insulation and its high fire resistance makes H+H aircrete, when used with the Thin-Joint System, ideally suited for the construction of partition walls. With its inherent speed of build due to the mortar setting more quickly, it is possible for the walls to be plastered, or otherwise finished, without delay.

The H+H Thin-Joint System also allows greater flexibility and choice for applied finishes (see Page 23).

Structural Design

Walls constructed using the H+H Thin-Joint System can be designed in accordance with BS5628: Part 1 which states that when determining the characteristic compressive (fk) and flexural (fkx) strengths for walls built using thin layer mortars, values given for mortar class M12 (designation (i)) should be used.

In addition, the larger face format of our Jumbo Bloks (250mm high) and Multi Plates (350mm high) can further improve the fk value of a wall (see Table below).

As an example, a 140mm thick wall designed with 10.4N/mm² concrete blocks in traditional designation (iii) mortar will have an fk of 6.8N/mm². This can be compared to 6.3N/mm² with High Strength (7.3N/mm²) Jumbo Bloks or 7.1N/mm² with Super Strength (8.7N/mm²) blockwork (both taking into account the face size and Celfix mortar).

The structural benefits can be further enhanced when using High Strength and Super Strength blocks as they are manufactured to a special category of manufacturing control (i.e. Category I), which permits a reduced material partial safety factor to be used in design calculations. Furthermore, the Celfix thin layer mortar is factory produced to BS EN 998-2, which enables the utilisation of special category of construction control.

These two factors combined means that a reduced partial safety factor of 2.5 (gamma m, BS 5628:Pt1 Table 4) may be used for both compression and flexure. This can be equivalent to an additional improvement of at least 20% to wall strength when compared to the safety factors of 3.1 or 3.5 as normally assumed.

Alternatively EC6, the Structural Eurocode for masonry BS EN 1996.1.1 (2005) may also be used. This standard also recognises the improved performance of thin layer mortar joints relative to traditional mortar. A basic difference between the EC6 approach and that of BS5628 is that EC6 uses a formula to calculate the characteristic compressive strength of masonry (and takes into account mortar mixes, different sizes and strengths of units) where as BS5628:Pt1 is based on tabulated values.

Characteristic compressive strength, f_k, of masonry (to BS5628:Pt1) for H+H blocks

Block			Celfix thin layer mortar Block type (declared compressive strength)				Designation (iii) / M4 mortar
Thickness	Height	H/t	Solar (2.9)	Standard (3.6)	High Strength (7.3)	Super Strength (8.7)	Aggregate Block (10.4)
100mm	215mm	2.15	2.8	3.5	6.8	7.7	8.2
	250mm	2.50	2.8	3.5	6.8	7.7	
	350mm	3.50	2.8	3.5	6.8	7.7	
140mm	215mm	1.54	2.3	2.9	5.7	6.4	6.8
	250mm	1.79	2.6	3.2	6.3	7.1	
200mm	215mm	1.08	1.9	2.3	4.6	5.2	
215mm	140mm	0.65	1.5	1.8	3.5	4.0	5.3

Acoustic Design

Sound insulation of any masonry construction depends to a large extent on the density and porosity of the material used. However, the structure of aircrete consisting of a vast number of non-interconnecting air cells gives it a high resistance to airborne sound relative to its density. Therefore the normally accepted mass law relationship is considerably improved.

H+H products can easily achieve the requirements of Part E of the Building Regulations for separating (party) and internal walls as well as for flanking elements.

Separating Walls

Compliance can be achieved for separating walls either by the use of a Robust Detail (RD) or by Pre-Completion testing (PCT).

Dwellings

For new build dwellings – there are four potentially suitable Robust Details, E-WM-10, E-WM-13, E-WM-23 and E-WM-24. All four of these Robust Details utilise a cavity blockwork construction where either H+H Standard or High Strength grade blockwork may be used with Celfix Thin Layer Mortar.

E-WM-10 and E-WM-13 require a minimum cavity width of 75mm between the leaves of blockwork – finished with a nominal 8mm parge coat and an 8kg/m^2 plasterboard on dabs, applied each side. Whereas both E-WM-23 and E-WM-24 require a minimum cavity width of 100mm cavity filled with either Superglass Party Wall Roll (E-WM-23) or Isover Party Wall Roll (E-WM-24). A nominal 8 kg/m^2 plasterboard on dabs finish is needed each side (no parge).

It should be noted that E-WM-13 is an untied construction and its suitability should be assessed by a structural engineer. For Robust Details E-WM-10, E-WM-23 or E-WM-24, 2 tie types are suitable, one of which is the Ancon HRT-4 (shown).

For enhanced acoustic performance, E-WM-13, E-WM-23 and E-WM-24 may be used and these constructions are currently recognised under the Code for Sustainable Homes as offering 3 credits or 4 credits for Eco Homes.

For apartments, RD separating floors E-FC-4,5,8,9 and 10 may be used in conjunction with aircrete separating walls, enabling compliance to be shown via the RD route. Other RD concrete floor solutions may also be used and compliance would need to be shown by PCT of the floors only (providing walls are registered as RDs).

Although not RD compliant, a plaster finish may be applied to separating walls (in lieu of dry lining). This form of construction should easily exceed the Building Regulations requirement with compliance via the PCT route.

Rooms for Residential purposes or material change of use

Separating walls in houses or flats formed by material change of use or separating walls between 'rooms for residential purposes' are not covered by Robust Details; therefore PCT will be required for all forms of construction. However the previously given new build solutions will be suitable.

In addition, a solid wall consisting of a minimum 215mm leaf of Standard Grade or Higher Strength Grades with a 13mm plaster finish to both room faces, will also satisfy the 43dB $D_{nt,w}$ +C_{tr} requirement.

Flanking Walls

Flanking walls to separating walls may be 100mm (min) Solar Grade, Standard Grade, High Strength Grade or Super Strength Grade with either 13mm plaster or nominal 8kg/m² plasterboard finishes. When used in conjunction with separating floors, reference should be made to the relevant 'robust' detail which may specify a particular grade block.

Further details of junctions between the separating walls and external (flanking) walls, ground/upper floor junctions and roof may be found in the relevant detail section of the RD Handbook.

Internal Partitions

Dwellings

A wall which separates a bedroom or w.c. from other rooms in dwellings is required to provide a sound insulation value of 40dB R_w. This can be achieved by a single 100mm leaf of Standard or High Strength Grade or Super Strength Grade with any finish.

Buildings other than dwellings

The acoustic performance of partitions in buildings other than dwellings, eg. schools, will normally be determined by an acoustic consultant and specified in dB R_w. Typical values for H+H Thin-Joint System walls are given in the table below.

Separating Walls in Framed Buildings

The cavity separating wall options given previously normally require the cavity to be continuous from below ground up to roof level, making them ideal for loadbearing masonry constructions. By their nature, framed buildings will have continuous floor slabs which will bridge the cavity at the bottom or head of the walls. In such cases, isolation of the structure from the wall can be achieved using Icopal Bridgestop, enabling Thin-Joint solutions to be adopted for multi-storey developments. As these types of construction do not conform to RDs, PCT will be required.

Predicted weighted sound reduction index R_w (dB)

	Unfinished Surfaces			Finished both sides with 13mm					
				Lightweight Plaster			Dense Plaster		
Block Thickness (mm)	Solar	Standard	High Strength	Solar	Standard	High Strength	Solar	Standard	High Strength
100	37.0	39.6	41.8	40.6	42.6	44.4	44.4	45.8	47.2
140	41.1	43.6	46.0	43.8	45.8	47.8	46.7	48.4	50.0
215	46.2	48.8	51.0	48.1	50.3	52.2	50.2	52.1	53.8
275	49.2	51.7	54.0	50.6	52.9	55.0	52.4	54.4	56.2
300	50.2	52.8	55.0	51.6	53.9	55.9	53.2	55.3	57.1

Rå Build

Rå Build is a method that capitalises on the benefits of the Thin-Joint System.

The Rå Build method of construction offers good value through cost savings as well as a fast, efficient and sustainable construction. The Rå (pronounced 'raw') Build method is an evolutionary approach to building that utilises some of the most innovative building materials and processes available to produce cutting-edge, eco-friendly buildings.

Using robust aircrete masonry, Rå Build delivers cost-effective, superior quality without the delays and logistical problems often associated with other types of construction. Low on waste, the system saves time and money by combining H+H's Thin-Joint System, a recognised Modern Method of Construction, with the impressive benefits of H+H Aircrete.

Rå Build has been utilised with equal success on both small and large developments, offering great productivity benefits.

The structure of a Rå Build is constructed using a range of large format blocks using the Thin-Joint System. Designed to meet our own exacting quality standards, our blocks achieve dimensional tolerances in line with EN771-4 Thin Layer Mortar category A which exceed those of general purpose mortar blocks. Consistent quality is ensured through BS EN 9001.

Rå Build provides a masonry frame, with floors installed before the external brickwork. The result is a predictable and enduring level of performance that meets all the relevant standards and Building Regulations, including the latest requirements for acoustic sound regulations.

Dependability

The products used in the Rå Build method are widely adopted as preferred methods of construction. Thin-Joint or thin layer construction makes up the majority of aircrete construction in Germany, Poland and Scandinavia and is now widely used in the UK.

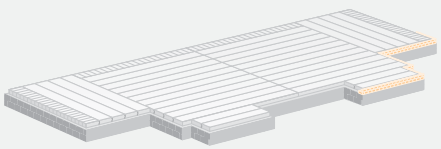
The solutions meet all relevant Building Regulations (thermal, sound, structure and fire). Delivering a robust masonry shell construction, Rå Build offers 'maximum life expectancy' for completed units with a reduction in any maintenance required.

Well Chosen

The Rå Build method enables you to deliver the masonry construction end-users prefer, in the time it would normally take to build a framed construction. The efficiency of the method minimises wastage on site and reduces the reliance of the construction programme on weather, thereby maximising cost-effectiveness. The H+H Thin-Joint System uses sustainable products. H+H Aircrete is manufactured from up to 80% recycled material, 99% of which is sourced from the UK. Rå Build comfortably satisfies all areas of the Building Regulations and has been used in constructions achieving all of the highest levels of the Code for Sustainable Homes (levels 3, 4, 5 & 6).

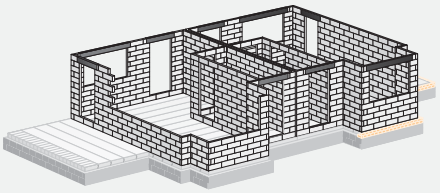
01

Starting with the ground works complete, the contractor takes responsibility for the site to build a weather-tight masonry shell.



02

The thin joint walls are initially bedded on a levelling course of traditional mortar. Once this first course is complete the build progresses without delay, quickly building the internal leaf of the external walls and any required partition walls to first lift. With the workability of H+H Aircrete, any openings are easily formed for windows or doors.



Recommended Contractor Scheme

H+H UK Ltd runs a nationwide recommended contractor scheme for Thin-Joint and Rå Build contractors. All of our recommended contractors are experienced in the use of H+H Thin-Joint System and undergo continual on site monitoring to ensure standards are maintained. The recommended contractors' experience combined with H+H's scheme support ensures that maximum benefits are achieved during a project.

Please contact H+H Internal Object Team on 01732 880111 for more information regarding our recommended contractors.

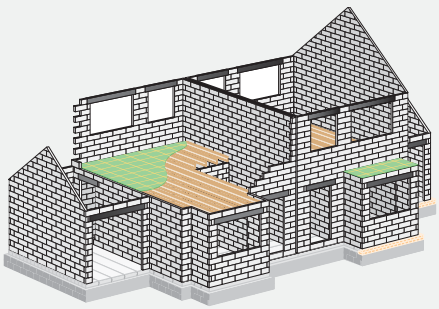
Secure Build

The Rå Build method achieves a weather-tight masonry shell with none of the delays and logistical problems associated with conventional building techniques.

As well as matching the speed of timber frame construction, the system eliminates the lead times which are associated with frame manufacture. Rå Build increases efficiency through continuous working processes that allow labour to be concentrated in fewer plots at a time, while minimising wastage of materials and benefiting the environment.

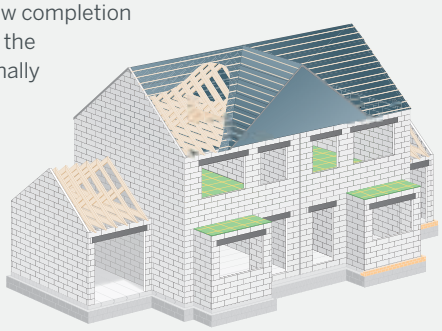
03

With the first lift complete, the floors are installed typically using engineered joists, either built in to the walls or on joist hangers finished with weather deck or similar products.



04

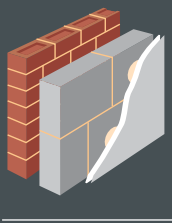
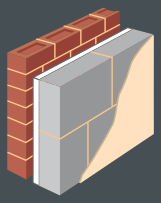
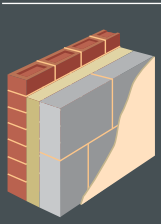
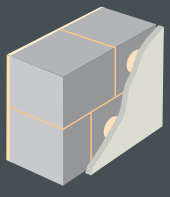
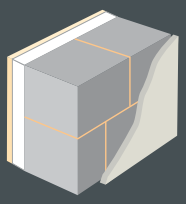
The build then continues quickly, with the second lift soon complete, with any gable ends built or spandrel panels positioned. The roof trusses are installed with felt and fly battens completing the Rå Build structure and providing the weather-tight masonry shell; to allow completion of the external leaf of the envelope whilst internally the first fix can start.



Thermal Design

Given the excellent thermal properties inherent with H+H aircrete, the H+H Thin-Joint System can offer enhanced benefits. National Building Regulations require heat loss through mortar joints be taken into consideration when calculating U-values for walls.

The use of H+H Thin-Joint blockwork minimises these effects by reducing the relative area of mortar per m^2 of wall. The actual performance of the wall, with regard to heat loss, will be better than similar walls constructed using traditional mortar with normal format blocks.

	0.30W/m²K	0.25W/m²K	0.20W/m²K	0.18W/m²K
	**Clear Cavity** Brick outer leaf Clear cavity 100mm Standard Grade 47.5mm Kingspan Kooltherm K18 **0.29W/m²K**	**Clear Cavity** Brick outer leaf Clear cavity 100mm Standard Grade 57.5mm Kingspan Kooltherm K18 **0.25W/m²K**	**Clear Cavity** Brick outer leaf Clear cavity 100mm Standard Grade 82.5mm Kingspan Kooltherm K18 **0.19W/m²K**	**Clear Cavity** Brick outer leaf Clear cavity 100mm Solar Grade 87.5mm Kingspan Kooltherm K18 **0.18W/m²K**
	**Partial Fill Cavity** Brick outer leaf Clear cavity 40mm Kingspan TW50 100mm Standard Grade Any finish* **0.29W/m²K**	**Partial Fill Cavity** Brick outer leaf Clear cavity 50mm Kingspan TW50 100mm Standard Grade Plasterboard on dabs **0.25W/m²K**	**Partial Fill Cavity** Brick outer leaf Clear cavity 75mm Kingspan TW50 100mm Standard Grade Plasterboard on dabs **0.20W/m²K**	**Partial Fill Cavity** Brick outer leaf Clear cavity 90mm Kingspan TW50 100mm Standard Grade Any finish* **0.18W/m²K**
	**Fully Filled Cavity** Brick outer leaf 75mm Dritherm 32 100mm Standard Grade Any finish* **0.30W/m²K**	**Fully Filled Cavity** Brick outer leaf 100mm Dritherm 32 100mm Standard Grade Any finish* **0.25W/m²K**	**Fully Filled Cavity** Brick outer leaf 150mm Dritherm 37 100mm Standard Grade Plasterboard on dabs **0.20W/m²K**	**Fully Filled Cavity** Brick outer leaf 100mm XtraTherm Cavity Therm 100mm Standard Grade Any finish* **0.18W/m²K**
	**Solid Wall – Internal Insulation** Render finish* 200mm Standard Grade 47.5mm Kingspan K18 **0.30W/m²K**	**Solid Wall – Internal Insulation** Render finish* 200mm Standard Grade 62.5mm Kingspan K18 **0.24W/m²K**	**Solid Wall – Internal Insulation** Render finish* 200mm Standard Grade 82.5mm Kingspan K18 **0.19W/m²K**	**Solid Wall – Internal Insulation** Render finish 200mm Standard Grade 92.5mm Kingspan Kooltherm K18 **0.18W/m²K**
	**Solid Wall – External Insulation** Render or cladding finish 200mm Standard Grade 75mm EPS OR 40mm Kingspan K5 Any finish* **0.29W/m²K**	**Solid Wall – External Insulation** Render or cladding finish 200mm Standard Grade 95mm EPS OR 50mm Kingspan K5 Any finish* **0.25W/m²K**	**Solid Wall – External Insulation** Render or cladding finish 200mm Standard Grade 140mm EPS OR 75mm Kingspan K5 Any finish* **0.20W/m²K**	**Solid Wall – External Insulation** Render or cladding finish 200mm Standard Grade 160mm EPS OR 85mm Kingspan K5 Any finish* **0.18W/m²K**

Notes:
* Any internal finish assumes dense plaster as worst case. Lightweight plaster or Plasterboard on dabs may also be used.
Cavity walls based on use of 250mm high Jumbo Bloks. Solid walls based on 215mm high Plus Blocks.
Above U-values are not exhaustive, please contact our Technical Department for other constructions or grades of block not shown.

Fire Resistance Design

H+H aircrete has excellent resistance to fire. Extensive use has proved its capability in fire-break walls and as protective cladding for other forms of construction, such as steel frames. BBA Certificate No. 01/3816 confirms that all H+H aircrete products are non-combustible as defined in the national Building Regulations and have a reaction to fire of Class A1 to BS EN 13501-1:2002.

0.15W/m²K

Clear Cavity
Brick outer leaf
Clear cavity
100mm Standard Grade
112.5mm Kingspan
Kooltherm K18
0.15W/m²K

Partial Fill Cavity
Brick outer leaf
Clear cavity
100mm Kingspan
Kooltherm K8
100mm Solar Grade
Lightweight Plaster
0.15W/m²K

Fully Filled Cavity
Brick outer leaf
125mm XtraTherm
Cavity Therm
100mm Standard Grade
Any finish*
0.15W/m²K

Solid Wall – Internal Insulation
Render finish
200mm Standard Grade
112.5mm Kingspan
Kooltherm K18
0.15W/m²K

Solid Wall – External Insulation
Render finish
200mm Standard Grade
205mm EPS OR
110mm Kingspan K5
Any finish*
0.15W/m²K

Under fire exposure conditions, walls are required to comply with mechanical resistance, integrity, insulation and mechanical impact criteria, defined in BS EN 1996-1-2 as follows:

- **Loadbearing only – criterion R**
- **Separating only – criteria EI**
- **Separating and Loadbearing – criteria REI**
- **Loadbearing, Separating and Mechanical Impact – criteria REI-M**
- **Separating and Mechanical Impact – criteria EI-M**

The fire resistance figures given in the table below have been taken from the UK National Annex to BS EN 1996-1-2.

Fire Resistance table (hours)				
Block Thickness (mm)	**(Criteria)**	**100**	**140**	**215**
Solar Grade				
Non-loadbearing	(EI)	4	4	4
Loadbearing	(REI)	1	2	4
Standard, High and Super Strength Grades				
Non-loadbearing	(EI)	4	4	6
Loadbearing	(REI)	2	3	6

Building with the Thin-Joint System

Building with the H+H Thin-Joint System is a fast and simple process.

Provided the initial stages are followed, the quality and speed of the Thin-Joint System allows continual building. With the brickwork taken off the critical path this allows the first lift to be easily achievable in one day and building to roof plate within 2-3 days.

Specific tools required

Although Thin-Joint is quick and easy to build, specific tools and equipment are recommended for using Thin-joint mortar.
These include: Scoop, Sanding boards, Rasp, Whisk, Tie Driver and Block Saw. Some tools are available from H+H UK. For prices and availability please contact our Sales Office on 01732 886444

Build with ease in 4 simple steps

01

The first course of blocks should be bedded normally using a conventional designation (iii) mortar. Conventional mortar is required to accommodate any irregularities in the supporting structure and to incorporate the DPC.

The perpend joints on the first course should be made with Celfix Mortar, giving a more rigid base in a shorter time.

It is essential that the blocks are laid accurately, true to level (±1mm) and vertical (many builders use a simple laser level for speed and accuracy).

02

Supplied dry and pre-mixed in bags, Celfix Mortar should be added to water in a clean bucket (full guidance is given on the bag). Mixing using a power tool with whisk attachment, set at a low speed, achieves the thick smooth consistency required. Celfix is workable for several hours whilst in the bucket. Celfix Mortar should be applied using a scoop (or a sledge for solid walls) to suit the block thickness in order to provide a consistent joint thickness.

03

Should any irregularities or imperfections occur on the bed course, surfaces should be sanded down using the sanding board or rasp. Jointing faces should be clean and free from dust and if necessary, cleaned using a stiff brush.

04

As laying proceeds, blocks should be pressed firmly against the mortared vertical face of the adjacent block whilst lowered onto the mortared bed below, ensuring the joints are fully filled.

Blocks can be cut with traditional hand tools. However, on larger sites mechanical tools, should be considered a necessity.

Visit the H+H YouTube page to view our Thin-Joint System demonstration videos: www.youtube.com/hplushuk

Building with the Thin-Joint System continued

Cutting Blocks

There are a number of ways that H+H aircrete products can be cut. The traditional method is to use a hand saw. However, depending on the size of the project and particularly when cutting larger blocks, more efficiency can be gained by using mechanical tools such as reciprocating hand saws, circular and band saws.

Mechanical saws are particularly useful for repeated cuts at soffit or plate level.

Cavity Insulation

To maximise the productivity advantage of the H+H Thin-Joint System the inner leaf can be built first. In addition to achieving an immediate weathertight structure, this also allows easy inspection of the cavity side of the blockwork and permits the use of partial fill or full fill insulation. When using partial fill insulation as there are no mortar runs and ties are yet to be installed, longer boards can be fixed with nylon anchors and perfectly abutted. The insulation cannot then become loose during construction and the risk of rain penetration is significantly reduced. Helical wall ties are later driven in through insulation as the external brickwork is installed. The whole process is easily inspected.

Movement Control

As with all masonry walls, the accommodation of drying, shrinkage and movement should be considered at the design stage. BS5628 Part 3 and PD6697 gives the following general recommendations.

- **Walls in excess of 6m long should be of panels separated by movement joints at not more than 6m centres**
- **The position of the first joint from the corner should be designed to be within 3m of a corner or fixed end**
- **It is also advisable to incorporate a movement joint where blockwork abuts other structural elements, such as concrete or steel**

Bed Joint Reinforcement

As the strength of mortar is a contributory factor for the accommodation of movement, H+H advise the incorporation of a crack control mesh or reinforcement in all Thin-Joint blockwork.

As a minimum this should be incorporated into every other course throughout. Where reinforcement has been incorporated, the above movement joint spacing's may be increased by up to 50% for internal walls.

Where a floor, which is itself subject to deflection, supports a wall, the first two courses of the wall should be reinforced. For this purpose, H+H recommends the use of appropriate 'steel' bed joint reinforcement which is compatible with thin layer mortar. For general crack control, proprietary GRP mesh may be used where wet finishes are not to be directly applied to the blockwork. Our Technical Services Department will be pleased to give recommendations for specific projects.

Construction of Movement Joints

Straight, unbonded vertical joints are the most common form of movement joint. They should be formed by leaving a nominal gap filled with fibreboard/polyethylene foam. The internal surface of the movement joint should be sealed with a flexible sealant in order to maintain air tightness.

Movement joints should normally be continued through all wet finishes using stop beads (at one or both edges of the joint). Alternatively, a proprietary cover strip or an architrave pinned to one edge of the joint can be used.

Where lateral stability demands continuity across the joint, proprietary ties should be set in at 450mm maximum vertical centres (i.e., every course for Jumbo Bloks and Multi Plates and every second course for Plus Bloks).

Building with the Thin-Joint System continued

Once the initial blocks are laid and building commences, the Thin-Joint System is a simple to follow process. Detailed here are elements of that process which should be taken into consideration along with suggested materials and methods, to produce successful thin joint buildings.

Detailing around Openings

When forming window openings, full height blockwork is laid and then cut blocks are used to infill up to the required sill level. Similarly, full height blocks should be built beyond the window/door head and lintel bearings cut to suit.

Lintels

The Thin-Joint System can be used with most types of proprietary lintels. For cavity walls, whether they are of block/block or brick/block construction, independent lintels are recommended. If using a combined lintel, propping will be required until the outer leaf is brought up to support the lintel and prevent it rotating. For solid wall construction, up to 215mm thick, proprietary solid wall lintels may be used. Lintels should be bedded on a traditional cement:sand mortar bed incorporating a DPC slip plane at one end, to allow for differential movement.

Cavity Wall Ties

Traditional Mortar Outer Leaf

Generally the most effective cavity wall ties are the helical type. These are driven directly into the face of the thin joint blockwork as the external traditional masonry leaf is constructed, using a support driver to prevent bending the tie during insertion and to control the depth of penetration. It may be necessary to drill a small pilot hole to achieve this when fixing into High Strength and Super Strength blocks. Alternatively, power drivers are available for use with SDS drills set at hammer action only.

The ties should be installed as required for traditional blockwork and in accordance with the manufacturer's guidelines. The normal spacing of 2.5 ties/m^2 (900mm horizontally x 450mm vertically) will generally be adequate within the UK. However, the density may need to be increased depending upon exposure conditions. For cavities greater than 125mm, with Solar or Standard Grade blocks, the distribution should be increased to 3.7 ties/m^2 (450 x 600mm).

Thin Joint Outer Leaf

Proprietary thin joint to thin joint cavity ties are available to build in as work proceeds. However, the preferred option is to retrospectively tie across the cavity with a helical tie, which is driven through one leaf and in to the other, either by hand or with an SDS drill set to hammer action (longer ties will be required).

Cavity Separating Walls

Specific wall ties are required for cavity separating walls, to achieve minimum levels of acoustic performance (see separating walls on page 12). Tie spacing can be amended to suit the block height, but should not be greater than 2.5 ties/m^2 (acoustic implications) or less than 2.0 ties/m^2 (structural implications).

Example spacings are:

Plus Blocks (215mm high)
434 (every 2nd course) x 1000mm centres gives 2.3 ties/m^2

Jumbo Bloks (250mm high)
504 (every 2nd course) x 900mm centres gives 2.2 ties/m^2

Multi Plates (350mm high)
704 (every 2nd course) x 630mm centres gives 2.2 ties/m^2

Multi Plates (350mm high)
352 (every course) x 1260mm centres gives 2.3 ties/m^2

Ties should be staggered and evenly distributed.

Wall Junctions

External walls should normally be bonded at corners or returns unless a movement joint is required. When a section of wall is constructed after other work, bonding can be replaced by a straight joint, providing proprietary flat strip shear ties are built in across the joint or helical ties driven in during construction. A movement joint should be provided where differential movement is likely to occur (eg. where sections of wall are built up from different types of foundation). Where an inner leaf is built prior to the outer leaf, helical ties can be driven through the inner leaf into the internal partition. These ties can be positioned irrespective of coursing.

Blockwork to Blockwork Junction

For blockwork to blockwork junctions, proprietary ties are available which are suitable for bedding in a thin layer mortar bed. Alternatively, helical ties may be driven from the exposed end. Where movement joints are also required, the proprietary ties are supplied with a bend to allow for movement (see photos).

For separating walls the flanking wall should either be block bonded with, or abutted and tied to the separating wall.

Blockwork to Structural Frame

Proprietary ties are available (see photos) (head and end restraint).

Building with the Thin-Joint System continued

Stability

During construction it may be necessary to temporarily prop walls, particularly due to site or weather conditions. Care should be taken at the design stage to accommodate this possibility. Internal partition walls and partially completed external walls can be vulnerable, particularly in housing developments, where they may be subject to adverse temporary loadings; eg. exceptionally windy conditions.

Scaffolding Systems

If full advantage is to be taken with the Thin-Joint System, an important aspect is the scaffolding – especially with the Rå Build method and cavity walls.

Taking a simple pair of two storey semis as an example, the build needs to be treated as a frame construction, with standards set at a minimum of three boards away from the thin jointed inner leaf. Tube & clip or system scaffolding are both suitable and should be independent using buttressing/through ties if necessary for stability as the build progresses. The first lift is set at lintel height and the second as close to plate as practicable.

The thin joint blockwork is laid mainly from inside the building – from slab for first lift and then from crash decks with the external scaffold used for load out, fall arrest and later for the external brick or block work.

Although quite possible to erect the external scaffold complete to second lift, if preferred it may be delayed until the first lift is complete to allow free access at slab level.

Telescopic transoms greatly improve scaffold adaptability as they are readily adjusted. As the external brick or block work is installed, the transom extensions are simply retracted to allow drop down brackets to provide a working platform, with the benefit that the main lifts may require no adaption.

Further installation guidance is available.

Finishes

Traditional cement:sand render can be applied as an external finish to thin joint blockwork. However, as it is not practicable to recess joints to provide a render key, it is recommended that either a stipple bonding coat is applied first or a metal lath reinforced render is used. Similarly, when applying traditional cement:sand plaster internally, a PVA bonding coat should be applied in accordance with the manufacturers recommendations (typically a stipple bonding coat will be recommended). For lightweight plasters PVA may be applied diluted in two coats, with the first acting as a primer (which is allowed to dry) and the plaster is applied to the second coat whilst it is still tacky.

One of the benefits of the H+H Thin-Joint System is that, due to greater build accuracy, alternative finishes, not suited to traditional mortar joints, such as thin coat spray systems, may be considered.

Contact the H+H Technical Services Department for further information.

Spray Plaster

Applied direct to blockwork with a total thickness of 3-4mm, the use of spray plaster can greatly reduce the time taken to apply an internal finish, in particular drying times are reduced. It therefore complements the inherent speed of the H+H Thin-Joint System.

Insulating Render and Brick Slip/Cladding Systems

Brick Slip and insulated render systems can be applied on to solid walls, to provide the most cost effective solutions for low U-values with minimal wall thicknesses.

Design Guidelines

The H+H Thin-Joint System should be used following the general recommendations of BS 8000 Part 3:2005 and BS 5628-3:2001 and BBA certificate 01/3816. The inherent properties of aircrete masonry apply equally to Thin-Joint masonry.

Celfix Mortar

Celfix Mortar is easily mixed on site by adding the appropriate quantities of water and applied with a proprietary scoop or sledge, which will create a consistent joint thickness of 2-3mm.

The shelf-life of Celfix Mortar is 12 months and mortar should be used by the date stamped on each bag. When working in winter conditions, it may be possible to lay Celfix mortar in temperatures of 0°C and above. Please contact H+H Technical Services for advice and information.

The table below indicates typical yields on site per 25kg bag of Celfix Mortar.

Approximate yield per 25kg bag – 2mm joints, no allowance made for site wastage				
Block Type	**Block Thickness (mm)**	**100**	**140**	**215**
Plus Block 630 x 215mm	m² blockwork	6.86	4.90	3.19
	no. blocks	50	35.7	23.2
Jumbo Blok 630 x 250mm	m² blockwork	7.65	5.46	-
	no. blocks	48	34.2	-
Multi Plates 630 x 350mm	m² blockwork	9.6	-	-
	no. blocks	43.1	-	-

Case Study

simple solutions to **meet demands**

Parker Meadows, Hampshire

Park Meadow is a Care Home wjich has been built using the H+H thin joint aircrete construction method, with Jumbo Bloks and Celfix Mortar. Various different sized blocks were used depending on the structural loads.

Highwood Group used H+H's Thin Joint System of large format aircrete blocks and quick-drying Celfix Mortar to meet a tight construction programme for the construction of a 3-storey, 80 bedroom specialist care home and six assisted living bungalows.

Thin Joint blocks were used to construct the load-bearing inner skin of the external walls. The thin joint enabled the hollowcore, precast concrete floor planks that form the building's intermediate floors to be installed directly onto the thin joint inner walls ahead of construction of the building's external brick skin; a technique not possible using traditional blockwork construction.

"There was a benefit to using Thin Joint: it did go up relatively quickly but the biggest bonus in terms of programme was taking the external brickwork off the project's critical path"

Steven Matthews, Site Manager for Highwood Group

DESIGNED BY TGV. LIT0115

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Fax: 01732 887013

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