



Foundations costing Factsheet



Celcon Foundation blocks are used in a range of thicknesses below DPC level. Offering beneficial thermal performance, they are suitable for the support of cavity or solid walls, framed construction or suspended floors.

Celcon Foundation Blocks

Stronger, faster, easier foundations
– It all builds up to a significant cost saving*.

Celcon Foundation Blocks save time – and time is money:

Cost-effective

- Solid foundations cost less due to the speed of construction and the reduction in materials (wall ties, lean mix and perpendicular mortar joints)

Faster

- One Celcon Foundation Block replaces two 100mm concrete blocks which means that the laying rate is twice as fast as two skins of dense block
- Trenches can be back filled as soon as installation is complete

Stronger

- Impressive load-bearing capabilities can be achieved for multi-storey buildings when using 7.3N/mm² Foundation Blocks
- They are exceptionally resistant to freeze/thaw conditions
- They are resistant to sulfate attack up to DS4 below DPC
- They do not rot or decay

Easier

- They can be cut on-site for ease of use and to minimise wastage
- There is no need for either wall ties or lean mix nor for perpendicular mortar joints if butted together (as approved by BRE)
- They are BBA certified for ease of acceptance

Lighter

- They weigh a third of an equivalent dense aggregate block

Sustainable

- 80% of materials used for Celcon Block aircrete production are recycled
- 99% of raw materials are sourced within the UK

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Celcon Foundation Blocks have long been approved by the British Board of Agrément (BBA) for use below DPC.



Foundation Block
Standard Grade

	Standard Strength
Compressive Strength	3.6N/mm ²
Thermal Conductivity	0.24 W/mK#
Density	600 kg/m ³

* Independent research by calfordseaden # Where used below ground



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is a multi-disciplined construction and property consultancy working across the private and public sectors in the UK housing, building and construction industries.

As a multi-disciplinary Practice we provide a comprehensive range of services comprising chartered surveying, project management, architecture and master planning, civil and structural engineering, mechanical and electrical engineering and health and safety advice.

Innovation in Construction

calfordseaden have pioneered the use of modern methods of construction since the early 1990s. Over this period of time we have made considerable investments in the research and development of such methods, and have been involved in a number of significant initiatives.



The Research

With many other benefits, cost is a key issue when deciding on which foundation products to use, so H+H UK Limited commissioned calfordseaden to conduct a cost comparison to cover all aspects of the foundation construction between Celcon Foundation Blocks and other well-known foundation solutions.

1. Instructions

calfordseaden was commissioned to research the required data and report on the comparative costs including labour and materials of the products listed below.

Instructions were given by H+H UK Limited that calfordseaden must act independently in the completion of this project, and provide an unbiased, fair and independent report.

2. Rationale

Prices for labour and materials were to be established from a representative selection of current live jobs that met the criteria at calfordseaden's disposal as well as primary research from Builders Merchants and Contractors within the different regions.

The regions, which were chosen for the comparison, were:

- South East
- London
- South West
- Midlands
- North
- Scotland

The research highlighted the following types of products to be compared:

Ref	Description
1A	300mm Celcon Foundation Block (Standard Grade)
1B	355mm Celcon Foundation Block (Standard Grade)
2A	Dense aggregate blocks 100mm



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2.1 Specification

The costs are based on the following specification:

- The quantities relate to a site of 20 dwellings
- Each dwelling is assumed to be 8m by 6m, giving a perimeter length of 28m
- All foundations are to be 1m deep from ground level
- All foundations are based on a 600mm wide trench
- All cavities are to be assumed as 100mm and 150mm wide



2.2 Basis of pricing

1. The costs in this report are based on a notional housing development of 20, 3 bedroomed houses.
2. Rates are based on labour and materials costs prevailing in 1st quarter 2023.
3. Materials prices have been sourced from builders' merchants and represent trade prices applicable to the quantities involved. Prices represent full loads delivered direct to site.
4. Labour rates represent the cost to a contractor, whether directly employed with bonuses paid and including all employer's costs such as National Insurance, or based on self-employed labour.
5. Labour constants shown have been determined with reference to published price books, previous work undertaken for H+H UK and discussion with brick subcontractors.
6. Costs include contractor's profit and overheads including sundries, scaffolding and site welfare costs.
7. Contract rates used have been checked and verified against actual tenders received.
8. All materials, goods and workmanship will be in accordance with good building practice and the current British Standard Specifications or Codes of Practice.
9. All costs exclude V.A.T.

2.3 Assumptions

The costs are based on the following specification:

- Ground conditions are assumed to be good with no obstructions or ground water present
- Topsoil and reduced level excavation are assumed to already have occurred
- The rates shown in the table represent rates per metre run of straight length of foundation
- Rates include for disposal of surplus excavated material off site to a suitable place of disposal. If surplus excavated material is used on site, all rates will reduce slightly with the greatest effect applying to mass filled foundations
- Excavated material from foundations has been used as back-fill to trenches. If granular fill or hardcore is specified, the total rate for the foundations (excluding mass filled foundations) will increase



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3. Analysis of Results

3.1 Blockwork foundations comparison

	Cost (£/m ²)	
Celcon Standard Grade 300mm solid foundation	169.00	£15 per m² saving
Dense aggregate block cavity foundation	184.00	

	Cost (£/m ²)	
Celcon Standard Grade 355mm solid foundation	173.00	£11 per m² saving
Dense aggregate block cavity foundation	184.00	



This cost can be still further reduced by omitting the perpendicular mortar joints within the solid foundation construction as stated in the Building Research Establishments (BRE) IP 7/05 removing both the cost of the mortar and the associated labour cost.

In addition to the cost savings shown above, the practical advantages of the workability of H+H aircrete and the reduced wastage by reusing any off cuts. Where a solid block foundation has been specified further speed savings can be achieved by being able to back-fill the foundations as soon as once the construction is complete.

In most housing applications if they are solid foundations there is no need for a foundation to be 7.3N in strength, therefore, in many cases the 3.6N strength of a Celcon Block Standard Grade will be more than adequate to meet the structural requirements of the buildings foundations further reducing in cost outlay required.





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3.2 Approved Document L

The building fabric has to be constructed so that there are no reasonably avoidable thermal bridges in the insulation layers within the various elements or at junctions between elements such as walls and floors. The Approved Document specifically mentions that blockwork with higher thermal performance, such as H+H aircrete, should be used in the inner leaf of a cavity wall or both leaves of a party wall to help reduce thermal bridging. It goes on to encourage the use of aircrete Foundation blocks such as Celcon by stating "...wherever possible, blocks below the damp-proof course should be the same as those specified in the design for the above-ground main wall element...".

To limit thermal bridging and to help tackle the design versus as-built performance gap, the Approved Document also requires that drawings should be provided for junctions, an on-site audit should be undertaken to confirm the designed details have been constructed prior to elements being concealed over and that photographs of the details should be taken.

In anticipation of these requirements, H+H have drawn junction details in CAD or PDF format, compatible calculated thermal bridging ψ -values and site checklists (which are available for free download

from our website) specifically covering our Solar (2.9N/mm²), Standard (3.6N/mm²), High Strength (7.3 N/mm²) and Super Strength (8.7N/mm²) blocks. Variations cover their use in partial or full fill in cavity walls, in beam and block floors, separating walls or as Foundation blocks below DPC.

Using H+H Calculated ψ -values will result in a typical γ -value of around 0.03W/m²K compared to a figure of around 0.05W/m²K derived from the reference values used when setting the targets. Both of these figures rely on a high performance at the lintels, which will typically require independent inner and outer leaf cavity lintels or a lintel incorporating a thermal break.

4. Conclusions

Celcon Foundation Blocks provide a cost saving over aggregate block foundation.

Celcon Solid Foundation Blocks are easier to handle than dense aggregate blocks with less movements required.

Using Celcon Foundation Blocks eliminates the need for wall ties and lean mix fill, whilst saving the time required for the cavity wall mortar to cure prior to the lean mix being added.

Celcon Foundation Blocks offer enhanced thermal benefits which means the floors require less additional insulation to meet the required U-value.



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