

Foundations costing Factsheet

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

calfordseaden

construction & property consultants

Celcon Foundation blocks have long been approved by the British Board of Agrément (BBA) for use below DPC and have been awarded type approval by Local Authority Building Control (LABC) for suitability of use.



Foundation Block
Standard Grade



Foundation Block
High Strength Grade

Celcon Foundation Blocks

Stronger, faster, easier foundations – It all builds up to as much as 26% 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
- 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 LABC Type Approved and 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

	Standard Grade	High Strength
Compressive Strength	3.6N/mm ²	7.3N/mm ²
Thermal Conductivity	0.24 W/mK [#]	0.30 W/mK [#]
Density	600 kg/m ³	730 kg/m ³

* Independent research by calfordseaden

Where used below ground



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calfordseaden 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 construction types listed below (by region) across the UK.

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 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 foundations to be compared:

Ref	Description
1A	275 mm Celcon Foundation Block (Standard Grade)
1B	300 mm Celcon Foundation Block (Standard Grade)
1C	350 mm Celcon Foundation Block (Standard Grade)
1D	275 mm Celcon Foundation Block (High Strength Grade)
1E	300 mm Celcon Foundation Block (High Strength Grade)
1F	350 mm Celcon Foundation Block (High Strength Grade)
2A	100 mm Celcon Block in cavity wall (Standard Grade)
2B	100 mm Celcon Block in cavity wall (High Strength Grade)
3A	Mass fill poured concrete (450 mm bucket size)
3B	Mass fill poured concrete (600 mm bucket size)
4A	Dense aggregate blocks 100 mm in cavity wall
5A	100 mm Celcon Block (Standard Grade) inner, common brick outer leaf
5B	100 mm Celcon Block (High Strength Grade) inner, common brick outer leaf
1G	325x215x300mm Celcon Foundation Block (Standard Grade)
1H	325x215x300mm Celcon Foundation Block (High Strength Grade)

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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 (except option 3A) are based on a 600mm wide trench
- All cavities are to be assumed as 100mm wide

2.2 Basis of pricing

1. The costs in this report are based on a notional housing development of 20 units.
2. The site within each region has been chosen as representative of that region but costs within each region may vary depending on distance from manufacturing works and local labour rates. For London, the site has been taken as an outer London borough.
3. Rates are based on labour and materials costs prevailing in 3rd quarter 2015.
4. 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.
5. 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.
6. Labour constants shown have been determined with reference to published price books, previous work undertaken for H+H UK and discussion with brick sub-contractors.
7. Costs include contractor's profit and overheads but no allowance for site specific preliminaries such as site supervision, welfare or storage facilities.
8. Contract rates used have been checked and verified against actual tenders received.
9. All materials, goods and workmanship will be in accordance with good building practice and the current British Standard Specifications or Codes of Practice.
10. All costs exclude V.A.T.

2.3 Assumptions

- 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. No allowance has been included for changes in direction, steps in foundations, movement joints, weep holes or damp proof courses.
- 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 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.

Contact details

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3. Comparative results

The costs per metre run for each foundation option in each region are summarised below.

H+H UK (Ltd) Foundation Cost Comparison Exercise									
Ref	Description	2015 Prices	South East	London	South West	Midlands	North	Scotland	Average
			0%	0%	-4%	-10%	-11%	-6%	
1A	275 mm Celcon Foundation Block (Standard Grade)	67.29	67.29	67.29	64.59	60.56	59.88	63.25	63.81
1B	300 mm Celcon Foundation Block (Standard Grade)	70.78	70.78	70.78	67.95	63.71	63.00	66.54	67.13
1C	350 mm Celcon Foundation Block (Standard Grade)	77.78	77.78	77.78	74.67	70.00	69.23	73.12	73.76
1D	275 mm Celcon Foundation Block (High Strength Grade)	74.55	74.55	74.55	71.56	67.09	66.35	70.07	70.69
1E	300 mm Celcon Foundation Block (High Strength Grade)	78.70	78.70	78.70	75.56	70.83	70.05	73.98	74.64
1F	350 mm Celcon Foundation Block (High Strength Grade)	87.02	87.02	87.02	83.54	78.32	77.45	81.80	82.53
2A	100 mm Celcon Block in cavity wall (Standard Grade)	67.98	67.98	67.98	65.26	61.18	60.50	63.90	64.47
2B	100 mm Celcon Block in cavity wall (High Strength Grade)	73.26	73.26	73.26	70.33	65.93	65.20	68.86	69.47
3A	Mass fill poured concrete (450 mm bucket size)	65.58	65.58	65.58	62.96	59.03	58.37	61.65	62.20
3B	Mass fill poured concrete (600 mm bucket size)	84.17	84.17	84.17	80.81	75.76	74.92	79.12	79.83
4A	Dense aggregate blocks 100 mm in cavity wall	95.18	95.18	95.18	91.37	85.66	84.71	89.47	90.26
5A	100 mm Celcon Block (Standard Grade) inner, common brick outer leaf	82.57	82.57	82.57	79.27	74.31	73.49	77.62	78.30
5B	100 mm Celcon Block (High Strength Grade) inner, common brick outer leaf	85.21	85.21	85.21	81.80	76.69	75.84	80.10	80.81
1G	325x215x300mm Celcon Foundation Block (Standard Grade)	74.28	74.28	74.28	71.31	66.86	66.11	69.83	70.45
1H	325x215x300mm Celcon Foundation Block (High Strength Grade)	82.86	82.86	82.86	79.55	74.58	73.75	77.89	78.58

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4. Analysis of Results

4.1 Blockwork foundations comparison

Where laying like for like 7.3N blockwork foundations, the results from the study highlight the benefits of laying a lighter Celcon Block.

	Average (£/m)	
Celcon High Strength Grade cavity foundation	69.47	23% SAVING
Dense aggregate block cavity foundation	90.26	

However, 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.

	Cost (£/m ²)	
Celcon Standard Grade 300mm solid foundation	67.13	26% SAVING
Dense aggregate block cavity foundation	90.26	

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 05/07, removing both the cost of the mortar and the associated labour cost.

In addition to the cost savings shown above there is also the health and safety benefits from handling lighter blocks and 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.

4.2 Mass fill comparison

For mass fill poured concrete foundations the beneficial cost comparison will be dependent on the width of the trench excavated. The figures quoted only allow for the trench to be a constant width from top to bottom. On-site this is unlikely to be the case as the sides of the trench are likely to collapse depending on the ground conditions and cause the trench to be 'V' shaped.

Where this is the case, to fill the trench with poured concrete to the top would become more expensive and in the main it is more cost effective to lay the last two courses using Celcon Foundation Blocks to keep construction cost to a minimum, whilst also enhancing the thermal efficiency of the floor due to Celcon Block beneficial thermal properties.

Where solid block foundations have been specified further cost savings can be achieved by being able to back-fill the foundations once the construction is complete, thus making further construction possible prior to that of mass filled foundation construction.

5. Conclusions

Celcon Foundation Blocks provide an overall 26% 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.