

Clay Heave Protection

Cellcore by Cordek

Cellcore is a composite cellular EPS/polypropylene compressible-fill material. It can be used to prevent potential problems in foundations due to moisture movement in soils which contain a large proportion of mineral particles below 0.002mm ('clay heave'). The material can be used as permanent shuttering for cast in-situ reinforced concrete slabs, piled beams and rafts, reducing upward pressure due to ground heave.

Low loading for ultimate compression

Cellcore reaches ultimate compression at much lower loads than standard compressible fills. The fail load can be as low as 12kN/m² according to grade.

High loading capability

Cellcore can accommodate loads up to 55kN/m², without material compression.

Cost-effective

Cellcore provides a rapid, cost-effective solution to ground movement and clay-heave problems, and no specialised trades or equipment are required.

Choice of grades

Cellcore is available in a range of grades and facings, and in thicknesses from 100mm.

Permanent

Cellcore is rot-proof and durable and will withstand the conditions encountered below ground. It will not degrade in the presence of high levels of ground water or precipitation.

Easy to handle

Cellcore is manufactured from expanded polystyrene (EPS) with a laminated polypropylene top surface; it is lightweight and easy to handle.

Table 8. Deflection characteristics for Cellcore

Cellcore thickness (mm):	Type CC	Type CP	Minimum compression at fail load (mm)
100		150	55
150		200	85
175		225	100
200		250	125
250		300	150
300		350	200

Table 9. Cellcore loading performance grades

Grade	Safe load (kN/m ²)	Fail load (kN/m ²)	Type	Maximum concrete thickness (mm)*
8/12	8	12	CP	225
15/22	15	22	CC, CP	550
17/24	17	24	CC, CP	640
20/30	20	30	CC, CP	770

* The maximum concrete thickness includes an allowance of 1.5kN/m² live load.

Table 10. Thickness of Cellcore to comply with NHBC requirements

Soil Plasticity Index	Soil-heave potential	Depth of Cellcore Type CC (mm)
above 60*	Very high	300
40-60	High	250
20-40	Medium	175
10-20	Low	100

* This category has been recognised by BRE.

The use of Cellcore satisfies the recommendations of the Building Research Establishment (BRE), and the National House Building Council (NHBC) in using compressible materials below ground beams.

AVAILABILITY

Cellcore is a registered trademark of Cordek Ltd, and is a product developed and manufactured by Cordek Ltd. Further information is available from:

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Spring Copse Business Park,
Slinfold, West Sussex RH13 0SZ.

Tel: 01403 799600.
Fax: 01403 791718.

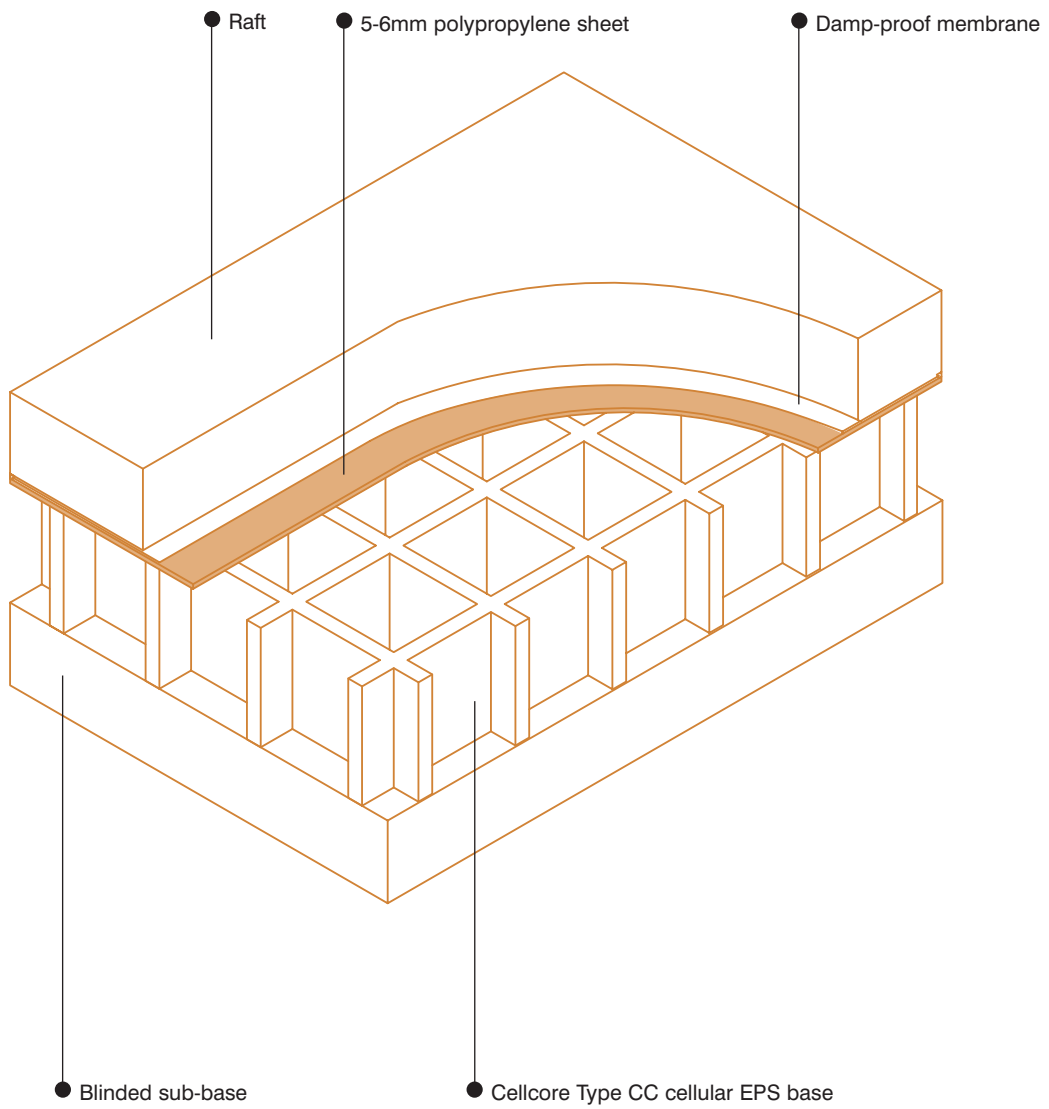
APPROVALS

There are no specific requirements in the Building Regulations for the use of compressible-fill materials. However, there is a general requirement (Regulation A2) which states that 'buildings shall be constructed so that ground movement caused by swelling, (or) shrinkage ...of the subsoil... will not impair the stability of any part of the building'.

Cellcore has been assessed by the British Board of Agrément according to Regulation A2, and found to reduce the effects of the expansion of clay soils which might impair the stability of a building. It has been approved for use under ground beams and suspended,

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Figure 44.
Cellcore Type CC



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in-situ, reinforced ground-floor slabs; Certificate number 93/2869.

Cellcore has been granted UK Patent numbers 2.241.976 and 2.206.637.

TYPE

Cellcore is available in a range of Types to suit various loadings.

Cellcore is produced as Types CC and CP; both types consist of a honeycomb cellular structure of interlocking EPS sections with a factory-bonded facing. Cellcore Type CC has a facing of heavy-duty polypropylene, 5-8mm thick (1250g/m²); Type CP has a factory-bonded facing of 53mm-thick EPS protected by a 2mm-thick layer of polypropylene (300g/m²).

Type CC should be used under piled beams and rafts, or beneath very heavy slabs where the Cellcore will be protected by a layer of 50mm blinding; Type CP should be used under reinforced ground-floor slabs where the EPS board provides sufficient protection to obviate the need for blinding.

DIMENSIONS

Standard size, 2440 x 1220mm. Total thickness including facing: Type CC, 100-300mm; Type CP, 150-350mm.

Beams; manufactured to suit standard beam widths.

ACCESSORIES

Spacing blocks and/or spreader plates to ensure correct cover to steel reinforcement must be of a type and quantity to prevent penetration into the surface of the Cellcore.

FIRE

When properly installed, Cellcore is fully protected by the concrete foundations and will have no adverse effect on the fire performance of the structure.

MECHANICAL PROPERTIES

The expansion of clay soil is a long-term phenomenon and it is necessary for the compressible fill to react in the same timescale. When ground movement occurs, Cellcore is designed to collapse when a predetermined load has been applied. This is known as the 'fail load'.

DESIGN

Table 8 gives the minimum deflection characteristics for a range of different thicknesses of Cellcore.

Table 9 lists the safe and fail loads for standard performance grades of Cellcore. Other grades are available subject to discussion with Cordek Ltd; the maximum loading which has been accommodated is 55kN/m² safe load, and 75kN/m² fail load.

The safe load should be taken as the weight of the concrete slab, including any blinding, with a 1.5kN/m² allowance for imposed loads. The slab must be designed to take an upward load equal to the difference between the fail load and the self-weight of the slab, including any blinding, increased by a suitable factor for safety.

The maximum likely ground movement due to clay heave depends on the Plasticity Index of the soil, and should be determined from site investigations; the actual depth of Cellcore required will depend on the anticipated ground movement at the fail load.

NHBC REQUIREMENTS

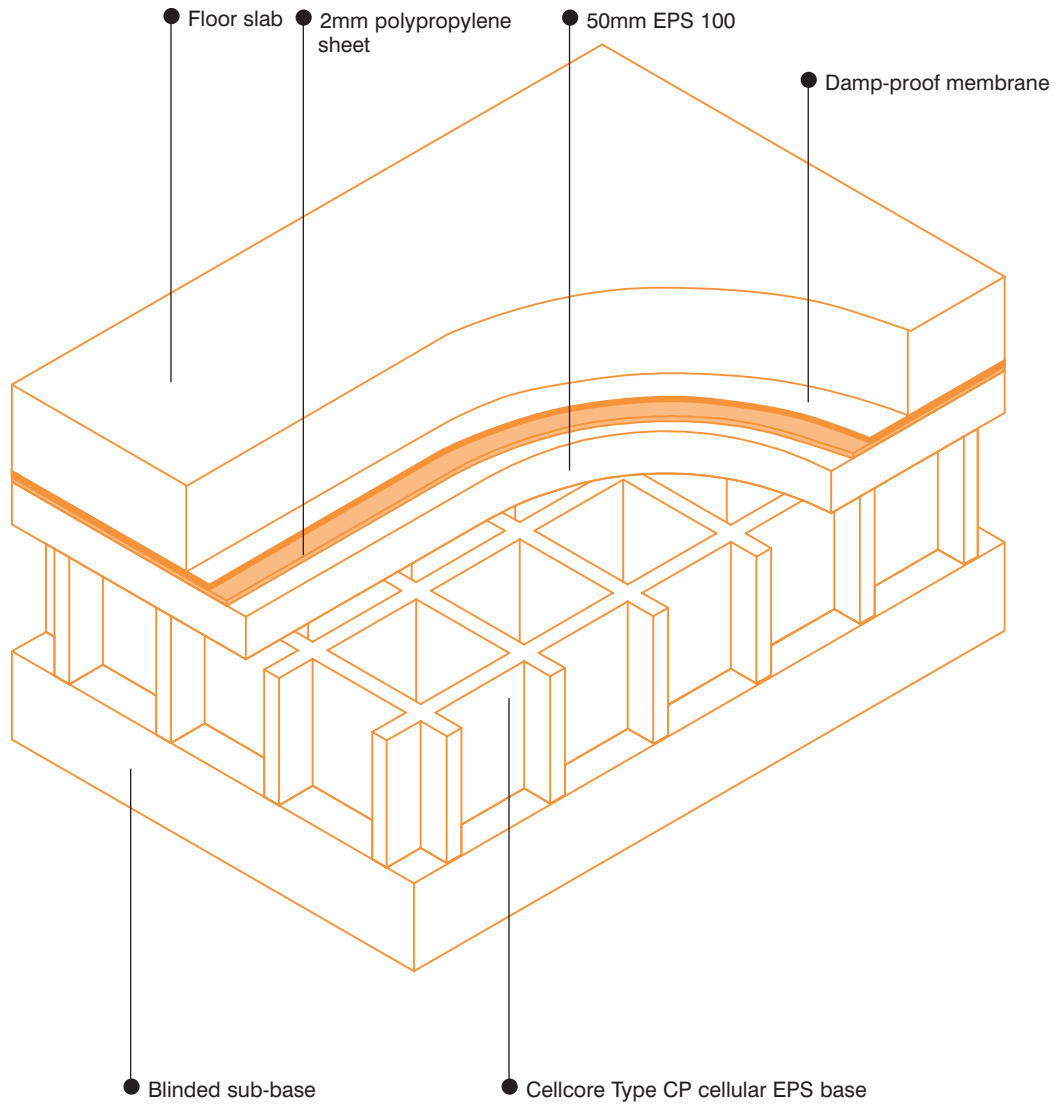
In order to comply with the NHBC requirements for building near trees, the thickness of Cellcore Type CC shown in Table 10 should be provided on the underside of ground beams which are likely to be subject to soil heave.

Claymaster (see pages 52-57) is used to protect the vertical side of ground beams.

The design of beams, foundations and associated details should be in accordance with the requirements of the NHBC as set out in their relevant Standards.

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Figure 45.
Cellcore Type CP



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When designing ground beams which will support the weight of the building, care should be taken in areas of low load, for example under patio doors, to prevent excessive local deflection of the beam. Cellcore must not be used under ground-floor slabs which are not designed to accommodate the expected pressures.

INSTALLATION

The trench or over-site area should be excavated as normal but taking account of the thickness of Cellcore to be used. The bottom of trenches etc should be flat and even in order to support the cell walls correctly. If necessary, a layer of granular fill and/or cement blinding should be used.

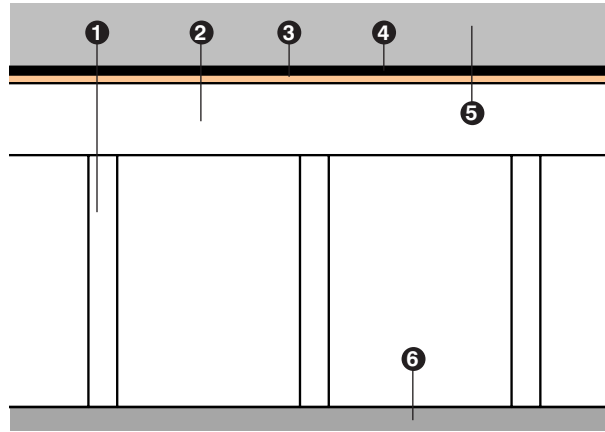
Cellcore should be laid on a firm level surface, ensuring that the panels are butted tightly together; joints between panels should be sealed with formwork tape.

Reinforcement should be placed in position using Cordek's galvanised-steel spreader plates or big-foot plastic spacers to ensure that the correct depth of cover is achieved and that the load of the reinforcement is distributed evenly across Cellcore; see 'ACCESSORIES', above.

Care should be taken that Cellcore is not overloaded with steel or surcharged with concrete during pouring.

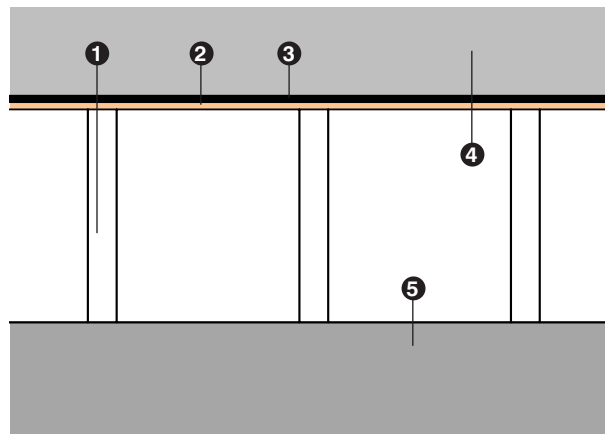
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Figure 46.
Cellcore Type CP



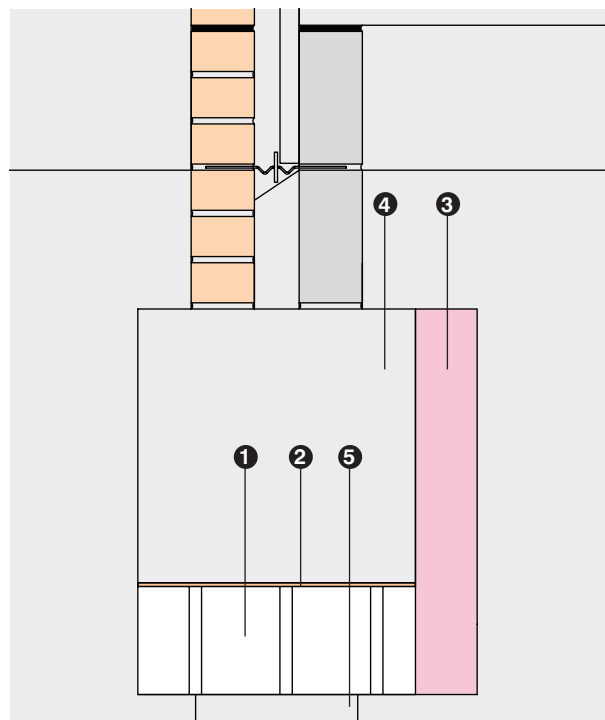
1. Cellcore EPS Type CP
2. 50mm EPS 100
3. 2mm polypropylene sheet
4. Damp-proof membrane
5. Reinforced ground floor slab
6. Blinded sub-base

Figure 47.
Cellcore Type CC



1. Cellcore EPS Type CC
2. 5-6mm polypropylene sheet
3. Damp-proof membrane
4. Concrete raft
5. Blinded sub-base

Figure 48.
Cellcore Type CC under
ground beam



1. Cellcore EPS Type CC
2. 5-6mm polypropylene sheet
3. Claymaster
4. Ground beam
5. Pile