Uniclass L68151:P7111	EPIC F841:X722
CI/SfB (23,9) Ln7 (P3)	

July 2005

ETHAFOAM 222-E

Impact noise control - floors

1. Introduction

This brochure describes how the acoustic performance standards required by the Building Regulations for separating floors may be achieved by using ETHAFOAM* 222-E as a resilient layer to isolate the screed from the structural slab on concrete floors.

2. The problem of intrusive noise

Intrusive noise from neighbouring dwellings affects at least 2.3 million households in the UK, many of those in multiple occupancy dwellings. In some cases the noise many only be a minor irritant, affecting the occupants quality of life, but in more severe cases the disruption from intrusive noise can cause sleep loss, stress and physical illness Building Regulations recognise the effects of intrusive sound and require walls and floors to provide reasonable resistance to the transmission of airborne and impact sound between dwellings and some adjoining rooms within dwellings.

Airborne sound transmission occurs when sound within a room reaches the bounding surfaces and sets up vibrations within the structure of the building. If there is sufficient energy those vibrations will produce sound on the other side of the structural element. Airborne sound transmission can be reduced by the use of massive structures which absorb the energy before it can produce sound.

Impact sound is generated by direct impacts upon building elements - for example footsteps or doors slamming - which cause the structure to vibrate and produce sound waves on both sides of the surface impacted (Figure 01). Because impact sound is transmitted directly through the structure the best ways of minimising transmission of through floors is to acoustically isolate the wearing surface from the floor slab, by inserting a resilient layer (Figure 02). The resilient layer limits the amount of vibration transmitted from the wearing surface, thus restricting the amount of sound heard in the room below.

The resilient layer must be able to withstand compression while maintaining an acoustic break.

3. Impact sound reduction and Building Regulations

Part E of the Building Regulations, Resistance to the passage of sound, requires floors to provide reasonable resistance to airborne and impact sound where they separate:

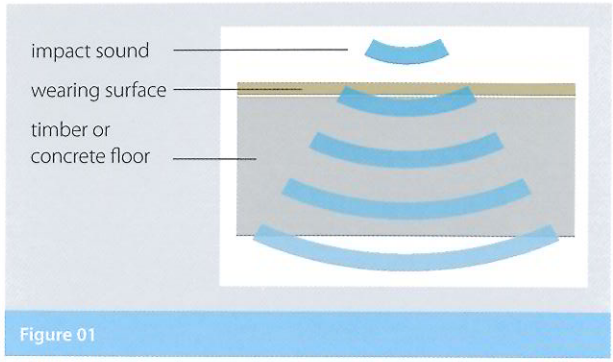


Figure 01

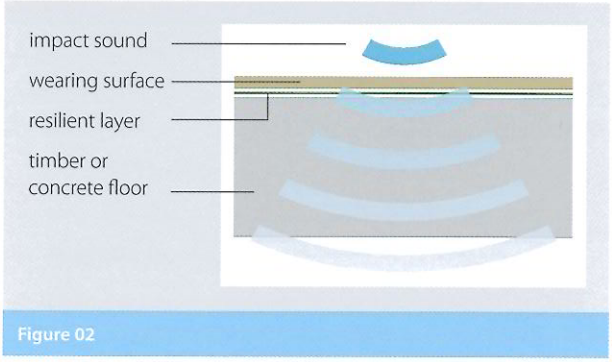


Figure 02

- adjoining dwellings (including flats);
- adjoining rooms for residential purpose;
- other parts of buildings from rooms for residential purpose;
- bedrooms in dwellings from other rooms.

The detailed requirements and means of compliance are described in Approved Document E (1 July 2003). The performance standards are set out in Table 01.

Location of floor	Airborne sound insulation $D_{nT,w} + C_{tr}$ (dB)	Impact sound insulation $L'_{nT,w}$ + (dB)
Purpose built houses, flats and rooms for residential purpose	≥ 45	≤ 62
Houses, flats and rooms for residential purpose formed by material change of use	≥ 43	≤ 64

$D_{nT,w}$ (weighted standardised sound level difference) – a measure of reduction of sound levels between one room and another. The C_{tr} weighting factor increases the influence of low frequency sounds upon the result.
$L'_{nT,w}$ (weighted standardised impact sound pressure level) – measures the level of impact sound transmission between rooms.

Table 01 >> Performance standards for separating floors

Two methods of compliance are available:

a) Pre-completion testing (see page 3)

b) Robust details (see page 4)

*Trademark of The Dow Chemical Company

4. Achieving compliance using ETHAFOAM 222-E

a) Pre-completion testing

The requirements are set out in Section 1 of Approved Document E. Guidance on wall and floor constructions which, if correctly built, would meet the necessary performance standards is given in Sections 2 to 6. Other construction types and materials can also be used, but all elements must be tested on-site (pre-completion) to demonstrate compliance with the performance criteria in Table 01.

The details given here are intended as a guide to designers and acousticians and are not guaranteed of themselves to satisfy the regulations.

Designers should bear in mind that the performance of acoustic systems can be adversely affected by poor detailing and workmanship.

The floor construction shown in Figure 03 has the potential to meet the performance criteria for Approved Document E - see Table 01. Flanking transmission (the unwanted passage of sound through adjoining walls, ducts and pipework) can reduce the acoustic performance of the floor. The simplest way to isolate the screed from perimeter walls and other structures is to turn the edge of the ETHAFOAM up the wall to finish above the screed; alternatively, a suitable edge strip may be used.

Service pipes and ducts must be isolated from the structural floor and the floating screed and all penetrations adequately sealed. Further guidance on detailing to prevent flanking transmission is given in Approved Document E.

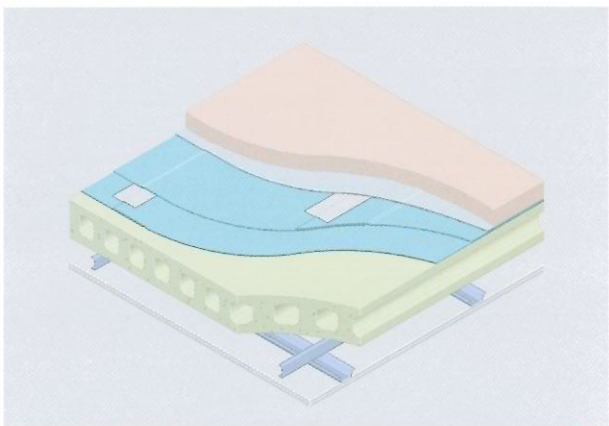
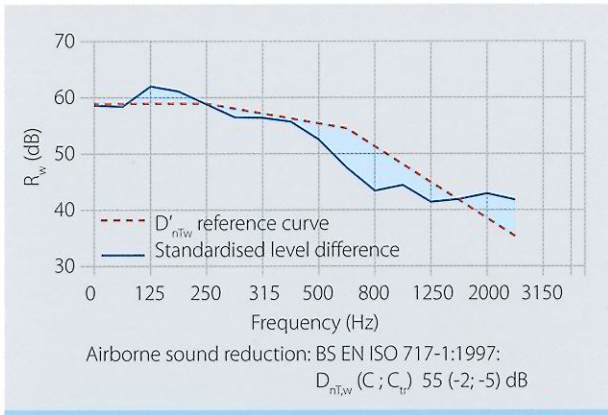


Figure 03

Construction:

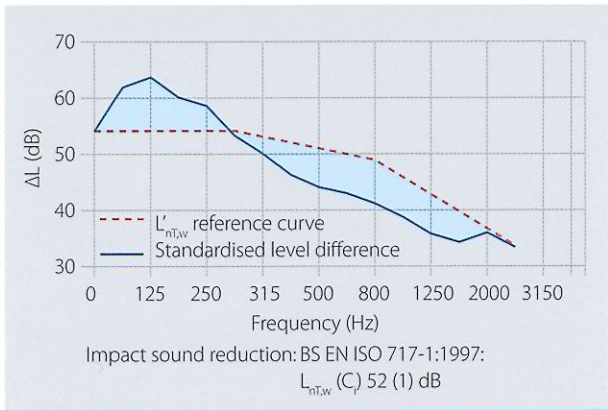
- 40mm Lafarge Gyvlon[¥] screed. Perimeter strip
- Polyethylene slip sheet (500 gauge)
- 2 layers of 5mm ETHAFOAM 222-E (butt jointed and taped)
- Hollow precast concrete floor slab (150mm thick, 300kg/m²)
- MF suspended ceiling - 75mm cavity
- 1 layer of 12.5mm Lafarge dBcheck[¥] plasterboard (11.3kg/m²)

The results for airborne and impact sound reduction are shown in Figures 04 and 05.



Airborne sound reduction: BS EN ISO 717-1:1997:
$D_{nT,w}$ (C ; C_{tr}) 55 (-2; -5) dB

Figure 04



Impact sound reduction: BS EN ISO 717-1:1997:
$L_{nT,w}$ (C_I) 52 (1) dB

Figure 05

Test organisation: Sound Research Laboratories Ltd.
Test method: EN ISO 140-8
Certificate: C/03/5L/0837 [¥¥]
If this floor system were to be used on site with an equivalent construction and build quality similar results would be expected. Full details of testing are available from Dow.

[¥] Trademark of Lafarge
[¥¥] Certificate C/03/5L/0837 - prepared for Lafarge Gyvlon Ltd, 221 Europa Boulevard, Westbrook, Warrington WA5 7TN.

b) Robust Details†

This method removes the need for pre-completion testing. Each of the Robust Details has been designed, developed and tested to ensure that it provides the appropriate level of sound insulation. This is in fact higher than that shown in Table 01 so as to ensure a performance margin against variations in standards of site work - see Table 02.

Robust Detail E-FC-3† will give the required level of sound control for separating floors of pre-cast concrete planks with screed. Sound attenuation is provided by two resilient layers; a 5mm layer of ETHAFOAM and 25mm rigid board insulation such as FLOORMATE*.

The ETHAFOAM may be installed above or below the boards, but must be turned up at perimeters and penetrations to isolate the screed from the walls and skirting. The ceiling must be acoustically isolated from the structural floor using one of the approved ceiling constructions - see Figure 06.

To prevent problems with flanking sound transmission the perimeter of the floating floor must be isolated from the walls and skirting by an isolating strip: flanking and separating walls must be designed in accordance with the guidance for Robust Detail E-FC-3 - see Figure 07.

	Individual value	Mean value
Airborne sound $D_{nT,w}$ + Ctr	≥47 dB	≥50 dB
Impact sound $L'_{nT,w}$	≤60 dB	≤57 dB

Note: tests must be carried out for 30 structures

Table 02 >> Sound insulation of separating floors

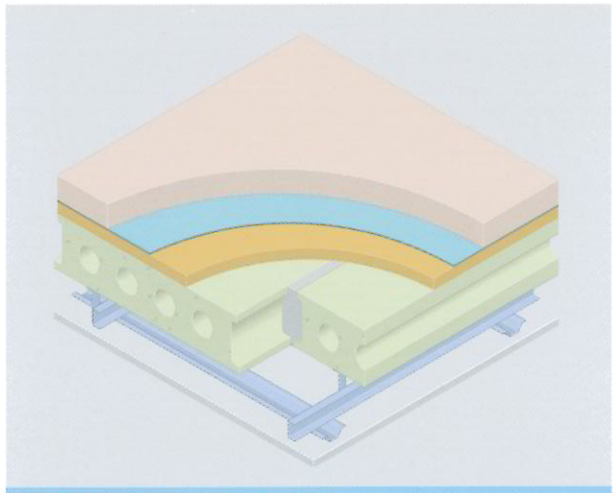


Figure 06 - Robust Detail E-FC-3

Construction:

- 65mm sand:cement screed or 40mm proprietary screed, min. 80kg/m²
- 1 layer of 5mm ETHAFOAM 222-E
- 1 layer of 25mm FLOORMATE insulation
- 150mm min. precast concrete floor plank, min. 300kg/m²
- Ceiling treatment - see Section 3 of Robust Details Guidance for E-FC-3
- 1 layer of 12.5mm Gypsum plasterboard

Note: The ETHAFOAM can be laid either over or under the FLOORMATE layer

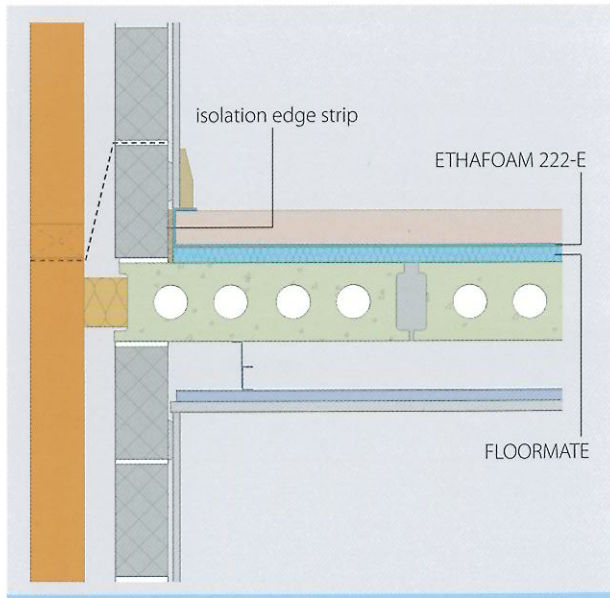


Figure 07 - CTO type ceiling

† The use of a Robust Detail as a means of demonstrating compliance with Part E requires registration of each plot with Robust Details Ltd. To ensure the details are installed and completed correctly will require on-site monitoring together with the completion and submission of a checklist at key points in the construction process. Further information is available from **www.robustdetails.com**.

*Trademark of The Dow Chemical Company

5. Sitework

Handling and storage

ETHAFOAM is supplied in polyethylene wrapped rolls. Store the rolls on end in a dry place out of direct sunlight. Although the rolls are not heavy, weighing less than 20kg, they are bulky: take care when handling.

Installation sequence

1 Fit an isolation strip around the perimeter. Lay the layer of FLOORMATE boards across the whole floor.

2 Lay ETHAFOAM. At perimeters turn ETHAFOAM at least 100mm up the wall.

3 Form butt joints between adjacent runs of ETHAFOAM. Ensure that there are no gaps. Seal with self adhesive acoustic tape tape. Alternatively lay ETHAFOAM with 100mm laps taped to limit movement during screeding and to prevent screed from creeping between the layers.

4 Apply the screed. If a free flowing screed is used then overlap ETHAFOAM with polyethylene sheet (500 gauge) taping all joints and lapping it up around the perimeter by 150mm.

5 When lining the wall, turn ETHAFOAM down under the skirting. Trim off excess.

6 Fit floor finish

7 Install the suspended ceiling.

Key points

››› The structural concrete should be as flat and level as possible and clear of debris. If necessary apply a levelling screed and ensure gaps between planks, beams, etc. are filled.

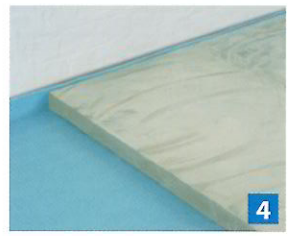
››› Ensure joints in ETHAFOAM do not coincide with joints in the lower resilient layer.

››› Ensure the screed does not touch the structural concrete, wall or any wall treatment (e.g. skirting) at any point.

Fit isolation strip around floor perimeter and lay FLOORMATE boards across the whole floor.

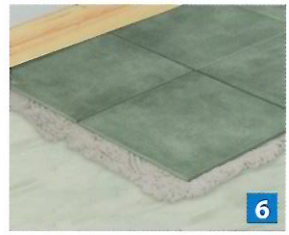
Lay ETHAFOAM, turn up 100mm at perimeters.

Seal joints of ETHAFOAM with self adhesive acoustic tape. Lay polyethylene sheet as necessary.



Apply the screed.

Turn ETHAFOAM down under skirting.



Fit floor finish, such as slate or quarry tiles on a bed of adhesive.

ETHAFOAM 222-E

ETHAFOAM is an extruded polyethylene foam with closed cell structure. ETHAFOAM is:

- an effective acoustic break;
- resilient under loading;
- moisture and rot resistant;
- robust and easy to install.

Technical description

Properties	Standard	ETHAFOAM 222-E
Thickness (mm)	BS EN 12431	5
Length (m)	-	75
Width (m)	-	1,5
Roll area (m^2)	-	112,5
Roll diameter (m)	-	0,75
Roll weight (kg)	-	18

Compressive strength (kPa) 10% 25	BS EN 826	 10 30
Impact sound insulation (ΔL_w) single layer (dB) double layer (dB)	BS EN ISO 140-8 BS EN ISO 717-2	 18†† 21†††
Water vapour resistance (MN.s/g)	BS EN 12086	100
Thermal conductivity (W/mK)	ISO 8301	0,04
Dynamic stiffness (MN/m^3)	BS EN 29052-1	70

†† certified CSTB France AC99-166
Full details of testing are available from Dow.
††† estimated

Distributor

Easy Screed & Ethafoam Sound Mat

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