

### Schools and Educational Facilities

### Feature

## Sound solutions for acoustic conditions in schools

Approved Document E is known for providing sound insulation and acoustics guidance for residential dwellings and rooms. However, since 2003, schools have come within the scope of Building Control, previous acoustic standards for schools having been poorly understood and rarely enforced. The inclusion of schools meant, therefore, that there could be no excuse for ignoring DfES acoustics recommendations.

DfES guidance also took account of SENDA (Special Educational Needs and Disability Act 2001), which aimed to integrate special needs' students into mainstream education. It stressed the need for those with hearing impairment to receive similar consideration to those with mobility difficulties. **New Requirement E4 Acoustic conditions in schools**

This requires "every room or space in a building to be designed and constructed to provide acoustic conditions and insulation against disturbance by noise appropriate to intended use". **Building Bulletin 93** As in all Approved Documents, guidance is provided on one way of satisfying the relevant Requirement. With E4, "the normal way of doing so is to meet sound insulation, reverberation time and internal ambient noise values given in Building Bulletin 93; Section 1, Acoustic Design of Schools".

Clearly, BB 93 is a key document for designers seeking to provide acoustic learning conditions which enable clear oral communication to take place and conditions which do not interfere with study activities.

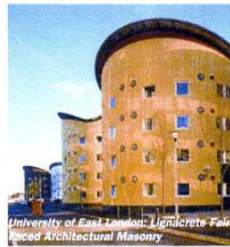
E4, however, only applies to teaching and learning spaces, even though BB 93 contains guidance for administration and ancillary areas. Since E4 refers to the "intended use" of rooms and spaces, BB 93 includes detailed tables of standards for all types of school room.

#### Section 1 performance standards include:

- Indoor ambient noise levels
- Airborne sound insulation between spaces
- Impact sound insulation of floors
- Reverberation in teaching and study spaces
- Speech intelligibility in open-plan spaces

#### Ambient noise levels

There are now maximum indoor ambient noise levels for each room type, classifying according to level of 'activity' noise in the room when it is the source, and 'tolerance' to that received. Since sound generation and noise susceptibility differ between room types, classification is crucial in determining airborne sound insulation requirements.



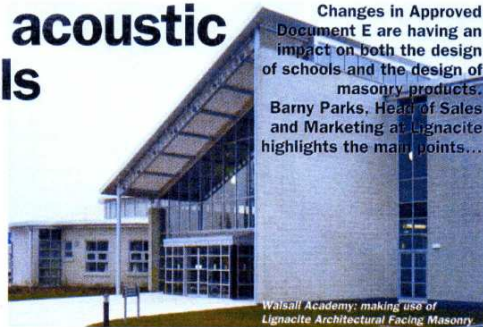
#### Airborne sound insulation between activity spaces

New airborne sound insulation figures between rooms indicate performance values between 30 and 60 decibels, depending on the combination of room types. At one extreme, 60dB would cover a wall between a music classroom (very high 'activity' noise) and a drama studio (very low noise 'tolerance'). Another, between a small lecture room (average 'activity' noise) and a study room (low noise 'tolerance'), needs an airborne sound reduction of 45dB, roughly equivalent to walls between dwellings. Unlike dwellings, however, these values relate to walls which may have doors or glazing, which must be reflected in acoustic design and form of construction.

#### Sound insulation in circulation and teaching spaces

BB 93 includes airborne sound between circulation and teaching spaces and gives minimum laboratory-measured values (Rw) in dB, for walls including glazing, doorsets and ventilators. For music room walls including glazing or ventilators this is 45dB, with a door set alone 35dB. Otherwise, values are 40dB for walls including glazing, 30dB with door sets alone, and 39dB with ventilators alone.

A special design exercise is recommended for music rooms, while ventilators must be avoided between music rooms and corridors.



Changes in Approved Document E are having an impact on both the design of schools and the design of masonry products. **Barny Parks, Head of Sales and Marketing at Lignacite highlights the main points...**

Walsall Academy: making use of Lignacite Architectural Facing Masonry

#### Impact sound insulation

The new maximum impact sound pressure levels for floors above all room classifications, assuming they are the receiving room range from 55 to 65dB; 55dB being typical for music and drama rooms and 65dB for sports halls.

#### Reverberation times in teaching and study spaces

Designers now have maximum mid-frequency reverberation times for finished, but unoccupied and unfurnished rooms. This is to help ensure a suitable acoustic environment for music, performance and clear oral communication.

#### Corridors, entrance halls and stairwells

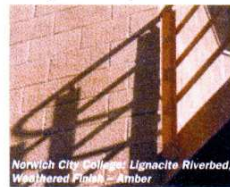
Sound should be absorbed in such areas so as not to interfere with teaching and study activities in adjacent rooms. BB 93 recommends that the sound absorption should be calculated according to Approved Document E, Section 7.

#### Sound quality in open spaces

Noise from pupils working in groups in the same space significantly increases background noise levels, affecting speech intelligibility. Table 1.6 in BB 93 sets requirements for a Speech Transmission Index (STI) in such areas greater than 0.60 in . It is calculated from the overall noise level (considered as the background noise level). The calculated value should be between 0.60 and 1.00, giving either a 'good' or 'excellent' STI rating.

#### On-site acoustic testing?

The preferred method for demonstrating Part E compliance in



Norwich City College: Lignacite Riverbed, Washherd Finish - Amber

schools includes submission of design calculations, though these demonstrate only the construction's 'potential' to meet performance standards. BB 93 therefore recommends that building contracts contain an acoustic testing requirement, with a set of rooms being completed for advance testing.

#### Suitable construction materials

Designers now have maximum mid-frequency reverberation times for finished, but unoccupied and unfurnished rooms. This is to help ensure a suitable acoustic environment for music, performance and clear oral communication. **Corridors, entrance halls and stairwells** Sound should be absorbed in such areas so as not to interfere with teaching and study activities in adjacent rooms. BB 93 recommends that the sound absorption should be calculated according to Approved Document E, Section 7. **Sound quality in open spaces** Noise from pupils working in groups in the same space significantly increases background noise levels, affecting speech intelligibility. Table 1.6 in BB 93 sets requirements for a Speech Transmission Index (STI) in such areas greater than 0.60 in . It is calculated from the overall noise level (considered as the background noise level). The calculated value should be between 0.60 and 1.00, giving either a 'good' or 'excellent' STI rating. **On-site acoustic testing?** The preferred method for demonstrating Part E compliance in

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