

DEPARTMENT OF THE ENVIRONMENT

TRANSPORT AND THE REGIONS

PROPOSALS FOR AMENDING PART E OF THE BUILDING REGULATIONS 2000

RESISTANCE TO THE PASSAGE OF SOUND

DRAFT APPROVED DOCUMENT E

E1 PROTECTION AGAINST SOUND FROM ADJOINING DWELLINGS OR BUILDINGS

E2 PROTECTION AGAINST SOUND FROM WITHIN A DWELLING

E3 PROTECTION FROM NOISE FROM EXTERNAL SOURCES

E4 REVERBERATION IN THE COMMON INTERNAL PARTS OF BUILDINGS CONTAINING DWELLINGS

E5 ACOUSTIC CONDITIONS IN SCHOOLS

(A) REMOVING PART E FROM THE LIST GIVEN IN THE BUILDING REGULATION 8, AS IT WILL BE CONCERNED WITH WELFARE AS WELL AS WITH HEALTH

(B) AMENDING THE MATERIAL CHANGE OF USE REGULATIONS TO EXTEND PART E TO COVER HOTELS, BOARDING HOUSES AND ROOMS FOR RESIDENTIAL PURPOSES

(C) INTRODUCING A NEW BUILDING REGULATION AND A NEW IMPROVED INSPECTOR REGULATION WHICH GIVE BUILDING CONTROL BODIES THE POWERS TO ASK BUILDERS TO CARRY OUT PRE – COMPLETION TESTING OF SOUND INSULATION ON SPECIFIED DWELLINGS

OUR CURRENT SOUND INSULATION STANDARD ORIGINATES FROM THE 1950'S AND SINCE THAT TIME THERE HAS BEEN A SUBSTANTIAL IMPROVEMENT IN LIVING STANDARDS. THIS HAS LEAD TO POOR COMPLIANCE AND LOW SATISFACTION WITH THE EXISTING SOUND INSULATION STANDARDS. IT IS ESTIMATED THAT UPTO 40% OF SEPARATING FLOORS AND 25% OF NEW SEPARATING WALLS MAY FAIL TO MEET THE CURRENT REGULATIONS.

THE PROPOSED AMENDMENTS TO PART E WILL BE ENFORCED AT HOTELS, HOSTELS AND CONVERSIONS TO RESIDENTIAL ACCOMMODATION FROM 1ST JULY 2003, AS FOR HOUSES AND FLATS THEY MUST MEET THE NEW STANDARDS BY 1ST JANUARY 2004 OR THE NATIONAL HOUSE BUILDERS FEDERATIONS ALTERNATIVE.

SUSTAINED EXPOSURE TO LOUD AND DISTURBING SOUNDS MEANS THAT THE BODY CAN PRODUCE A STEADY STREAM OF ADRENALINE, A STATE THAT CAN LEAD TO HYPERTENSION, PSYCHOLOGICAL PROBLEMS AND SEXUAL DYSFUNCTION. (TIME MAGAZINE 1998)

STRESS, "FROM A NOISE LEVEL OF 60DB, STRESS APPEARS TOGETHER WITH SLEEP DISTURBANCES, PSYCHOMOTOR AND INTELLECTUAL PERFORMANCES DECREASE". (PROF. LEHMAN, MAX PLANCK

INSTITUTE, KNACK)

TWO EXAMPLES OF WHERE NOISE CAN CONTRIBUTE TO A VARIETY OF HEALTH PROBLEMS.

THE NEW DOCUMENT IS INTENDED TO PROTECT HEALTH BY REDUCING SLEEP DISTURBANCE AND STRESS CAUSED BY NOISE. IT ALSO TARGETS LOW FREQUENCY NOISE, WITH THE MAIN CAUSES BEING IDENTIFIED AS AIRBORNE AND IMPACT NOISE. YOU WILL SEE IT APPLIED TO ALL NEW DWELLINGS (RESIDENTIAL), THIS WILL ALSO INCLUDE "CHANGE OF USE". IT PROPOSES NEW SOUND INSULATION TARGETS AND INTERNAL NOISE LEVELS FOR DWELLINGS.

REQUIREMENT E3

41 PROTECTION OF THE EXISTING ENVELOPE AGAINST EXTERNAL NOISE IS CURRENTLY ACHIEVED THROUGH THE PLANNING SYSTEM. THE PROPOSAL IS THAT THIS SHOULD BE TRANSFERRED TO BUILDING CONTROL, LEAVING SITE LAYOUT ISSUES WITH THE PLANNING AUTHORITY.

42 A SIMILAR APPROACH TO THAT USED FOR REQUIREMENT E1 GIVES EXAMPLES OF CONSTRUCTIONS LIKELY TO PERFORM REASONABLY BUT ALSO ALLOWS ANY TYPE OF CONSTRUCTION TO BE USED PROVIDED THAT THE LIMITS ON INTERNAL NOISE LEVELS ARE MET. THE APPROVED DOCUMENT GIVES GUIDANCE ON HOW TO IMPROVE PERFORMANCE. PUBLISHED COMPREHENSIVE TECHNICAL GUIDANCE HAS NOT BEEN PREVIOUSLY AVAILABLE ON THIS SUBJECT UNDER EITHER THE PLANNING OR BUILDING CONTROL REGIMES.

BUILDING ENVELOPE INSULATION

INTRODUCTION

7.1 THIS SECTION PROVIDES GUIDANCE ON MEETING THE REQUIREMENT FOR PROTECTION AGAINST NOISE FROM EXTERNAL SOURCES. IT IS INTENDED TO APPLY TO ALL ROOMS BOTH IN NEW BUILDINGS AND THOSE UNDERGOING MATERIAL CHANGE OF USE. IT IS ALSO INTENDED TO APPLY TO LOFT AND GARAGE CONVERSIONS. ADDITIONAL GUIDANCE IS ALSO PROVIDED IN BS 8233.

7.2 THIS SECTION GIVES EXAMPLES OF ENVELOPE CONSTRUCTIONS, WHICH IF BUILT CORRECTLY, SHOULD PROVIDE SUFFICIENT SOUND INSULATIONS IN MOST INSTANCES. THE AIM OF THE GUIDANCE IS TO ENSURE THAT THE TARGET INTERNAL NOISE LEVELS ARE NOT EXCEEDED.

THE REQUIREMENTS OF APPROVED DOCUMENTS B, F, J AND L SHOULD ALSO BE CONSIDERED.

ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS NOT EXCEEDING 55dB LAEQ,16H OR

45dB LAEQ,8H

7.6 AT 'LOW NOISE' SITES (WHERE THE EXTERNAL NOISE LEVELS DO NOT EXCEED THE ABOVE LEVELS) THE INTERNAL TARGET LEVELS ARE LIKELY TO BE ACHIEVED WITHOUT ANY FAÇADE CONSTRUCTION, WHICH COMPLIES WITH THE OTHER PARTS OF THE BUILDING REGULATIONS.

ANNEX C – C2 GIVES GUIDANCE ON IDENTIFYING LOW NOISE SITES.

ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS NOT EXCEEDING 60dB L Aeq,16H OR 50dB LAeq,8H

7.7 EXAMPLE ENVELOPE CONSTRUCTIONS ARE GIVEN IN TABLE 7.1 BELOW.

ELEMENT	EXAMPLE ENVELOPE CONSTRUCTION
WALL	SOLID BRICKWORK, BRICK/BLOCK CAVITY, BRICK CLAD TIMBER FRAME OR TIMBER FRAME WITH LIGHTWEIGHT CLADDING.
WINDOW	ANY PRACTICAL WINDOW SPECIFICATION WELL SEALED WHEN CLOSED.
ROOF	TILED/SLATED ROOF, 9KG/M2 PLASTERBOARD CEILING.
VENTILATOR	TRICKLE VENTILATORS.

TABLE 7.1 EXAMPLE ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS NOT EXCEEDING 60dB LAeq,16H OR 50dB LAeq,8H

ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS NOT EXCEEDING 65dB LAeq,16H OR 60dB LAeq,8H

7.8 EXAMPLE ENVELOPE CONSTRUCTIONS ARE GIVEN IN TABLE 7.2 BELOW.

ELEMENT	EXAMPLE ENVELOPE CONSTRUCTION
WALL	SOLID BRICKWORK, BRICK/BLOCK CAVITY, BRICK CLAD TIMBER FRAME OR TIMBER FRAME WITH LIGHTWEIGHT CLADDING.
WINDOW	DOUBLE GLAZING, 10/12/6MM, WELL SEALED WHEN CLOSED.
ROOF	TILED/SLATED ROOF, 9KG/M2 PLASTERBOARD CEILING, 100MM SOUND ABSORBING LAYER ABOVE THE CEILING (FOR EXAMPLE, MINERAL WOOL LOFT INSULATION)
VENTILATOR	MECHANICAL VENTILATION IN BEDROOMS. ACOUSTIC TRICKLE VENTILATORS IN OTHER (LIVING) ROOMS.

TABLE 7.2 EXAMPLE ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS NOT EXCEEDING 65dB LAeq,16H OR 60dB LAeq,8H

ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS NOT EXCEEDING 75dB LAeq,16H OR 65dB LAeq,8H

7.9 EXAMPLE ENVELOPE CONSTRUCTIONS ARE GIVEN IN TABLE 7.3 BELOW.

ELEMENT	EXAMPLE ENVELOPE CONSTRUCTION
WALL	SOLID BRICKWORK, BRICK/BLOCK CAVITY, BRICK CLAD TIMBER FRAME.
WINDOW	DOUBLE WINDOW 6/100/4MM, LIMITED TO NOT MORE THAN 2.5M2 IN EACH AREA IN EACH HABITABLE ROOM, WELL SEALED WHEN CLOSED.
ROOF	TILED/SLATED ROOF, 20KG/M2 PLASTERBOARD CEILING, 100MM SOUND ABSORBING LAYER ABOVE THE CEILING (E.G. MINERAL WOOL LOFT INSULATION) AND TIMBER BOARDING ON TOP OF CEILING JOISTS.
VENTILATOR	MECHANICAL VENTILATION THROUGHOUT.

TABLE 7.3 EXAMPLE ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS NOT EXCEEDING 75dB LAeq,16H OR 65dB LAeq,8H

ENVELOPE CONSTRUCTIONS FOR EXTERNAL LEVELS EXCEEDING 75dB LAeq,16H OR 65dB LAeq,8H

7.10 IF DEVELOPMENT IS ALLOWED AT THESE LEVELS, A SPECIALIST SHOULD BE CONSULTED.

CHANGE OF USE

7.11 THE EXAMPLE ENVELOPE CONSTRUCTIONS WILL BE RELEVANT TO MANY BUILDINGS UNDERGOING A MATERIAL CHANGE OF USE, WHERE THE EXISTING CONSTRUCTIONS ARE SIMILAR. THE PERFORMANCE OF OTHER BUILDING ENVELOPES CAN BE DETERMINED USING THE GUIDANCE IN ANNEX C- 3.

7.12 WHERE IT IS NECESSARY TO RETAIN EXISTING WINDOWS (FOR EXAMPLE IN CONSERVATION AREAS), A SECONDARY GLAZING SYSTEM CAN BE USED INSTEAD OF SEALED UNITS. THIS MAY MEAN THAT THE TARGET INTERNAL LEVELS ARE NOT MET.

7.13 IT SHOULD BE NOTED THAT THE CONSTRUCTIONS WILL NOT PROVIDE SUFFICIENT INSULATION IN THE LOFT, SHOULD IT BE USED AS (OR CONVERTED INTO) A LIVING SPACE. SPECIALIST ADVICE IS LIKELY TO BE NECESSARY FOR CONVERSIONS OF LOFTS AND OTHER SPACES.

AIRBORNE SOUND INSULATION OF A BUILDING ENVELOPE

B3.2 THE AIRBORNE SOUND INSULATION OF A BUILDING ENVELOPE SHOULD BE MEASURED IN ACCORDANCE WITH BS EN ISO 140-5:1998. ALL MEASUREMENTS AND CALCULATIONS SHOULD BE CARRIED OUT IN ONE-THIRD OCTAVE FREQUENCY BANDS. THE STANDARD GIVES OPTIONS ON HOW THE MEASUREMENT MAY BE CONDUCTED. FOR THE PURPOSES OF THE APPROVED DOCUMENT THE PREFERRED PROCEDURE IS THE GLOBAL ROAD TRAFFIC (OR TRAIN OR AIRCRAFT) METHOD WITH THE MICROPHONE POSITIONED 2M IN FRONT OF THE FAÇADE.

B3.3 MEASUREMENTS SHOULD BE PREFERABLY MADE IN UNOCCUPIED BUILDINGS, SO THAT ALL EXTERNAL SOURCES OF NOISE MAY BE SWITCHED OFF. THE BACKGROUND NOISE REFERRED TO IN BS EN ISO 140-5:1998 SHOULD BE TAKEN TO COMPROMISE INTERNAL AND EQUIPMENT SELF NOISE.

TABLE C5: VALUES OF SOUND REDUCTION INDEX (R) FOR TYPICAL BUILDING ELEMENTS

TABLE C5: VALUES OF SOUND REDUCTION INDEX (R) FOR TYPICAL BUILDING ELEMENTS						
BUILDING ENVELOPE ELEMENT	SOUND REDUCTION INDEX (R) OCTAVE BAND CENTER FREQUENCY (Hz)					
	125	250	500	1K	2K	
BRICK/BLOCK CAVITY WALL	41	45	45	54	58	
TIMBER FRAME WALL WITH LIGHTWEIGHT CLADDIN	24	34	40	45	49	
WELL SEALED WINDOW:						
4MM SINGLE GLAZING	20	22	28	32	33	
6MM SINGLE GLAZING	20	24	31	35	27	
10MM SINGLE GLAZING	26	27	34	35	36	
4/12/4MM DOUBLE GLAZING	24	20	25	34	37	
6/12/6MM DOUBLE GLAZING	20	19	29	38	34	
10/12/6MM DOUBLE GLAZING	26	27	34	40	38	
6/100/4MM OR 6/100/6MM SECONDARY GLAZING	26	34	44	44	38	
6/150/4MM SECONDARY GLAZING	29	35	45	56	52	
10/200/6MM SECONDARY GLAZING	35	46	46	46	56	

IT CAN ALSO BE CONVENIENT TO DETERMINE THE EXTERNAL NOISE LEVEL AT THE MOST EXPOSED WINDOW OF A BUILDING AND TO ASSUME THIS RESULT FOR OTHER ELEVATIONS, OR FOR LARGER SITES THE MOST EXPOSED ELEVATION.