

Introduction

This Technical Booklet has been prepared by the Department of the Environment for Northern Ireland and provides for certain methods and standards of building which, if followed, will satisfy the requirements of the Building Regulations (Northern Ireland) 1994 (“the Building Regulations”).

There is no obligation to follow the methods or comply with the standards set out in this Technical Booklet.

If you prefer you may adopt another way of meeting the requirements of the Building Regulations but you will have to demonstrate that you have satisfied those requirements by other means.

Other regulations

This Technical Booklet relates only to the requirements of regulation G4. The work will also have to comply with all other relevant Building Regulations.

British Standards and European Technical Specifications

In this introduction and throughout this Technical Booklet any reference to a British Standard shall be construed as a reference to –

- (a) a British Standard or British Standard Code of Practice;
- (b) a harmonised standard or other relevant standard of a national standards body of any Member State of the European Economic Area;
- (c) an international standard recognised for use in any Member State of the European Economic Area;
- (d) any appropriate, traditional procedure of manufacture of a Member State of the European Economic Area which has a technical description sufficiently detailed to permit an assessment of the goods or materials for the use specified; or
- (e) a European Technical Approval issued in accordance with the Construction Products Directive,

provided that the proposed standard, code of practice, specification, technical description or European Technical Approval provides, in use, equivalent levels of safety, suitability and fitness for purpose as that provided by the British Standard.

Products conforming with a European Council Directive

Any product designed and manufactured to comply with the requirements of a European Council Directive does not have to comply with any other standard or part of a standard, whether British, International or other, which relates to the same characteristic or specific purpose as the EC Directive.

EC marked construction products

Any construction product (within the meaning of the Construction Products Directive) which bears an EC Mark shall be treated as if it satisfied the requirements of any appropriate British Board of Agrément Certificate, British Standard or British Standard Code of Practice relating to such a product, where the EC Mark relates to the same characteristic or specific purpose as the Certificate, Standard or Code of Practice.

Testing of materials and construction

Where for the purposes of this Technical Booklet testing is carried out it shall be carried out by an appropriate organisation offering suitable and satisfactory evidence of technical and professional competence and independence. This condition shall be satisfied where the testing organisation is accredited in a Member State of the European Economic Area in accordance with the relevant parts of the EN 45000 series of standards for the tests carried out.

Foreword

0.1 When an existing wall or floor becomes a separating wall or a separating floor it may be necessary to upgrade its sound resistance.

0.2 This booklet describes 3 ways of meeting the requirements of Regulation G4 –

(a) by assessing the existing wall or floor to show that upgrading is not necessary. This will be the case where the existing wall or floor complies, subject to the qualifications in Section 1, with either of the Methods given in Technical Booklet G: 1990;

(b) by upgrading the wall or floor using one of the Acceptable Upgrading constructions detailed in Section 2; or

(c) by upgrading using a construction which has already been tested, either on site or in a laboratory as defined in the Similar Upgrading Method in Section 3, and which achieved the specified performance level. When using this method it will be necessary to show that the existing construction together with the proposed upgrading are essentially similar to the construction tested.

0.3 The implementation of upgrading measures will impose additional loads on the existing structure. The structure shall be assessed to ensure that the additional loading can be carried safely with appropriate strengthening where necessary.

Section 1 – Essentially similar method

1.1 This Method allows an existing construction to be assessed and retained without upgrading, where it can be shown that the construction is essentially similar to a construction acceptable for new buildings.

1.2 The construction of the separating wall or separating floor shall be similar to either –

(a) a specification given in Section 1 of Technical Booklet G: 1990; or

(b) a construction meeting the test criteria in Section 2 of Technical Booklet G: 1990.

1.3 Conditions on the use of the essentially similar method

(a) Where the existing construction is being assessed under paragraph 1.2(a) –

(i) the mass per square metre may be 15% less than that required in the relevant specification;

(ii) in the case of a separating wall – the requirements, other than for sealing of joints, under the heading “Junctions to limit flanking transmission” in the relevant specification may be disregarded; and

(iii) in the case of a separating floor – the requirements, other than for sealing of joints and for floor penetrations, under the heading “Junctions to limit flanking transmission” in the relevant specification may be disregarded.

(b) Where the existing construction is being assessed under paragraph 1.2(b) –

(i) the mass may be 15% less than the mass of the construction tested;

(ii) the shape and size of the room shall be similar to that of the room in which the measuring equipment was placed during the tests; and

(iii) in the case of a separating wall tested in conjunction with a timber floor which is not a separating floor – the construction of the timber floor may be disregarded.

Section 2 – Acceptable upgrading method

2.1 There is 1 acceptable upgrading construction for walls and 3 acceptable upgrading constructions for floors, details of which are given in subsections 2.4 to 2.7.

2.2 Conditions on the use of the acceptable upgrading method

(a) In an acceptable upgrading construction the standard of workmanship shall be of such quality that the wall or floor will perform its functions.

(b) When upgrading to form a separating wall –

(i) new services shall not pierce the existing wall nor shall any chases or recesses be cut into it;

(ii) existing services which pierce the existing wall and all services which pierce the independent leaf shall have any gaps around them sealed with tape or caulking; and

(iii) no opening shall be permitted through the wall other than a door opening having a door with a mass of 15 kg/m².

(b) When upgrading to form a separating floor –

(i) new and existing services which penetrate the floor shall be enclosed both above and below the floor. The material of the enclosure shall have a mass of 15 kg/m²;

(ii) either the enclosure shall be lined or the pipes and ducts wrapped with 25 mm unfaced mineral wool;

(iii) to prevent rigid contact between the pipe and the floor flexible fire-stopping shall be used to seal any gap where a pipe or duct passes through the floor;

(iv) a 3 mm gap shall be left between the enclosure and the floating layer. The gap shall be sealed with neoprene or caulking. The enclosure may go down to the floor base if Floor Type 2 is used but the isolation from the floating layer shall be maintained; and

(v) the junction of the enclosure and the ceiling shall be sealed with tape or caulking.

2.3 Rules for measurement

The masses and dimensions specified throughout this Section are the minimum required unless otherwise stated. Timber sizes quoted are the minimum actual sizes required.

2.4 Wall Type 1: Independent leaf and absorbent material on one or both sides

The resistance to airborne sound depends on the form of the existing construction, the mass of the independent leaf, its isolation from the existing wall and the absorbent material in the cavity.

Limits on application

The construction may be used on one side of the existing wall only where the existing wall is masonry, has a thickness of 100 mm and is plastered on both faces. Any other construction can be upgraded by providing an independent leaf on both sides.

Points to watch

Support the independent leaf from floor, ceiling and adjoining walls only – do not fix or tie it to the existing wall (to maintain isolation).

The absorbent material may bridge the cavity but shall not be tightly compressed. Any services within the cavity shall not bridge the cavity.

Construction

The independent leaf shall consist of two layers of plasterboard each 12.5 mm thick fixed to any type of framework, or plasterboard having a total thickness of 30 mm if no framework is used.

The plasterboard shall be fixed with joints staggered.

Basic arrangement

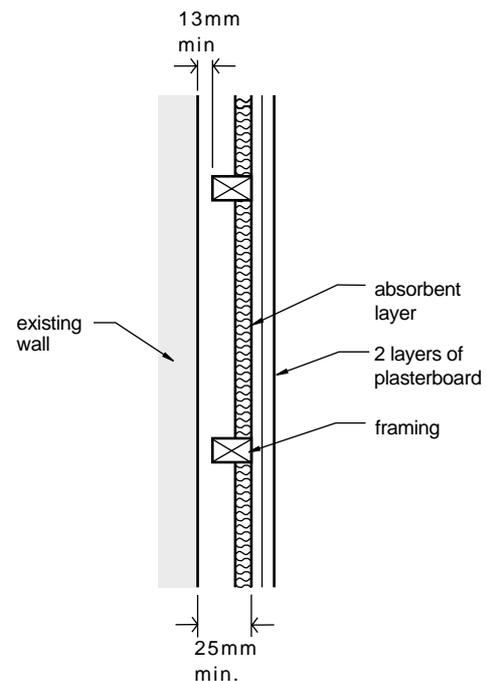
The inside face of the plasterboard shall be 25 mm clear of the face of the existing wall and any framing shall be 13 mm clear of the face of the existing wall.

The absorbent material shall be 25 mm thick mineral wool having a density of not less than 10 kg/m³.

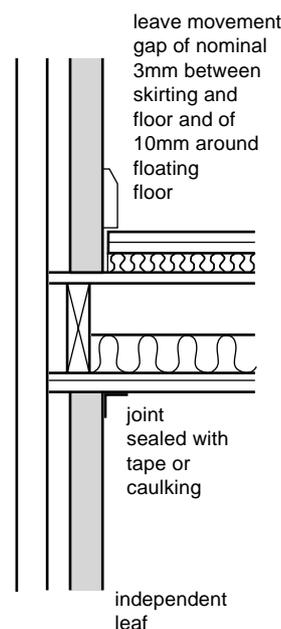
Junctions with abutting construction

All joints between the independent leaf and the abutting walls and ceilings shall be sealed with tape or caulking.

Where loadbearing stud partitions are to be fixed to the existing masonry wall they shall be fixed through a continuous pad of mineral wool.

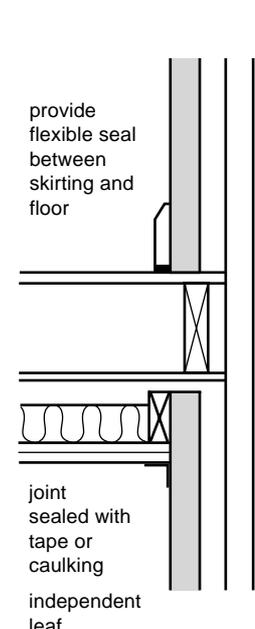


(With floating floor)



(With existing or replacement ceiling)

(With existing floor)



(With independent ceiling)

2.5 Floor Type 1: Independent ceiling with absorbent material

The resistance to airborne and impact sound depends on –

- (a) the combined weight of the existing floor and independent ceiling;
- (b) the absorbent layer;
- (c) the isolation of the independent ceiling; and
- (d) the airtightness of the whole construction.

Work to existing construction

Gaps in floor boarding shall be sealed either with caulking or by overlaying the floor with hardboard.

Where the existing ceiling is not lath and plaster the ceiling shall be upgraded to a thickness of 30 mm of plasterboard in 2 or 3 layers with joints staggered.

Construction

The independent ceiling shall span between walls – do not fix or tie to the existing floor (to maintain isolation).

The independent ceiling shall consist of 2 layers of plasterboard (total thickness 30 mm) with joints staggered and be fixed to independent joists.

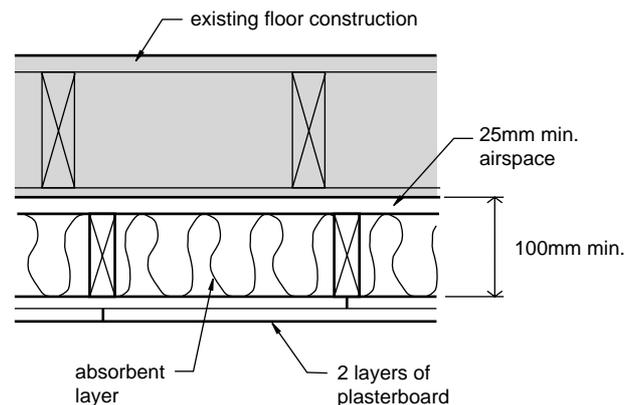
The independent ceiling shall be 100 mm below the existing ceiling. Where there are high window heads the independent ceiling may be raised locally around the window to form a pelmet recess.

A gap of 25 mm shall be provided between the top of the independent ceiling joists and the underside of the existing floor construction

The absorbent material shall be 100 mm thick mineral wool having a density of not less than 10 kg/m^3 .

Junctions with abutting construction

All joints, between the independent ceiling and the abutting construction shall be sealed with tape or caulking.



2.6 Floor Type 2: Floating layer (platform floor)

The resistance to airborne and impact sound depends on the mass of the floor and the effectiveness of the resilient layer.

Work to existing construction

Where the existing ceiling is not lath and plaster the ceiling shall be upgraded to a thickness of 30 mm of plasterboard in 2 or 3 layers with joints staggered. Where possible insert a 100 mm thick absorbent layer of mineral wool between the joists.

Where the existing floor boards are removed, they shall be replaced with 12 mm thick boarding with a 100 mm thick absorbent layer of mineral wool laid between the joists.

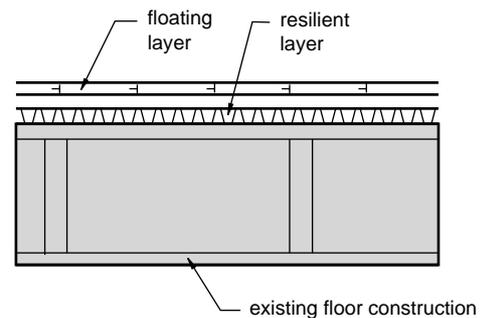
Construction

A floating layer of either –

(a) timber or wood-based board, 18 mm thick with tongued and grooved edges and all joints glued, spot bonded to a substrate of 19 mm plasterboard; or

(b) a single layer of material having the same total mass, as the combination above and with all joints glued.

The loadbearing resilient layer shall be 25 mm thick mineral wool having a density of between 80 and 100 kg/m³.



Junctions with abutting construction

A movement gap of 10 mm shall be left around the floating layer and shall be filled with resilient material.

A 3 mm gap shall be left between the skirting and the floating layer. A seal is not necessary but if used shall be flexible.

The perimeter of any new ceiling shall be sealed with tape or caulking.

2.7 Floor Type 3: Floating layer with absorbent material between joists

The resistance to airborne and impact sounds depends on the mass of the floor, the effectiveness of the resilient strip and the absorbent material.

Points to watch

The existing joists shall be 45 mm wide.

Additional bridging may be needed between the existing joists to ensure stability of the floor after removal of the floor boarding.

Work to existing construction

Where the existing ceiling is not lath and plaster the ceiling shall be upgraded to a thickness of 30 mm of plasterboard in 2 or 3 layers with joints staggered.

Constructions

Two alternative upgrading treatments for existing floors to give suitable resistance to direct sound transmission are specified. Floor Type A(ii) or Floor Type B can be used where floor levels are critical. Floor Type B is suitable only where the existing construction can support the additional loading imposed by the heavy pugging.

Floors

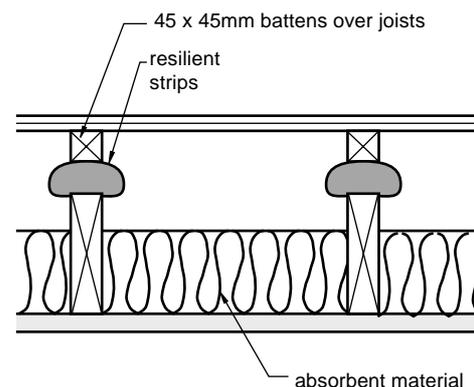
A. A floating layer of either –

- (i) timber or wood-based board, 18 mm thick, with tongued and grooved edges and all joints glued, spot bonded to a substrate of 19 mm plasterboard; or
- (ii) a single layer of material having the same total mass, as the combination above, and with all joints glued.

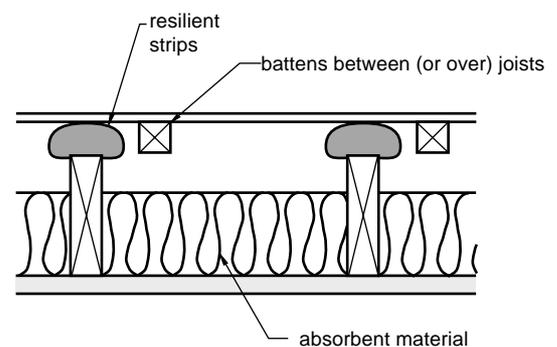
The floating layer shall be nailed or screwed to 45 mm x 45 mm timber battens. Where the floating layer incorporates plasterboard the timber battens shall be placed directly over the joists.

The resilient strips shall be of 25 mm thick mineral fibre, density between 80 and 140 kg/m³, laid on the joists.

The absorbent material laid between the joists shall be 100 mm thick mineral wool having a density of not less than 10 kg/m³.



Floor type A(i)



Floor type A(ii)

B. The floating layer shall be of timber or wood-based board, 18 mm thick, with tongued and grooved edges and all joints glued, nailed or screwed to 45 mm x 45 mm timber battens. The battens shall run in the direction of and between or directly over the joists.

The resilient strips shall be of 25 mm thick mineral fibre, density between 80 and 140 kg/m³, laid on the joists.

The absorbent material laid between the joists shall be pugging of mass 80 kg/m² laid on a polyethylene liner.

Fixings should be adequate to carry the heavy pugging.

*Pugging may be of the following types –

- Traditional ash (75 mm);
- 2-10 mm limestone chips (60 mm);
- 2-10 mm whin aggregate (60 mm); or
- dry sand (50 mm).

Figures in brackets show approximate thickness to achieve 80 kg/m².

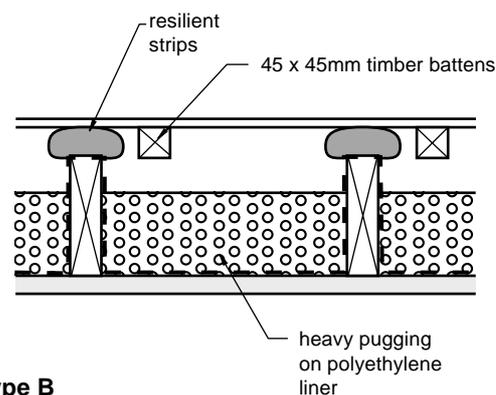
Do not use sand in kitchens, bathrooms or water closets where it may become wet and overload the ceiling.

Junctions with abutting construction

A movement gap of 10 mm shall be left around the floating layer and shall be filled with resilient material.

A gap of 3 mm shall be left between the skirting and the floating layer. A seal is not necessary but if used shall be flexible.

The perimeter of any new ceiling shall be sealed with tape or caulking.



Floor type B

Section 3 – Similar upgrading method

3.1 This Method allows the repetition of a construction which has been tested either by Site Test (Procedure 1) or by Laboratory Test (Procedure 2).

Laboratory measurements are made with suppressed flanking transmission. When the construction is repeated in an actual building, insulation against airborne sounds may be lower than that achieved in the laboratory. To allow for this a higher standard is required in a laboratory test than in a site test.

Conditions on the use of the similar upgrading method

3.2 The separating wall or floor construction shall be essentially similar to the construction tested.

Where a site test has been carried out additional features such as room sizes, room relationships, steps and staggers shall also be essentially similar.

The standard of workmanship shall be of such quality that the wall or floor will perform its functions.

3.3 Walls

For walls, the upgrading construction shall be tested in conjunction with at least 2 separate samples of the basic wall construction. Each basic wall construction shall be tested on its own and then with the upgrading construction.

3.4 Floors

For floors, at least 2 samples of the upgrading construction shall be tested. Where the upgrading construction uses parts of the original floor (other than the joists) the original floor shall be tested on its own and then with the upgrading construction.

Where the upgrading construction replaces the floor components (other than the joists) it is not necessary to test the original floor.

3.5 The insulation against both airborne and impact sounds for floors shall be measured unless the improvement required is solely related to airborne or impact sound insulation.

- 3.6** Tests shall be carried out to determine –
- (i) The airborne sound insulation of a separating wall or floor in accordance with BS 2750: Part 4: 1980 (1993) [the tests determine the standardised level differences (D_{nT}); and
 - (ii) the impact sound transmission of a separating floor in accordance with BS 2750: Part 7: 1980 (1993) [the tests determine the standardised impact sound pressure levels (L'_{nT})].

3.7 Calculation of results

From each set of measurements calculate –

- (i) for airborne sound insulation, the weighted standardised level difference ($D_{nT,w}$) in accordance with BS 5821: Part 1:1984 (1993); or
- (ii) for impact sound transmission, the weighted standardised impact sound pressure level ($L'_{nT,w}$) in accordance with BS 5821: Part 2: 1984 (1993).

3.8 Assessment of results

- (a)** Separating walls and separating floors.

For airborne sound insulation the weighted standardised level difference ($D_{nT,w}$) shall be not less than that given in Table 1.

- (b)** Separating floors.

For impact sound transmission the weighted standardised impact sound pressure level ($L'_{nT,w}$) shall not be more than that given in Table 1.

Table 1 Sound transmission and insulation values

Airborne sound

Minimum values of weighted standardised level difference ($D_{nT,w}$) as defined in BS 5821: Part 1: 1984 (1993)–

	Individual value (dB)
Walls	49
Floors	48

Impact sound

Maximum values of weighted standardised impact sound pressure level ($L'_{nT,w}$) as defined in BS 5821: Part 2: 1984 (1993)–

	Individual value (dB)
Floors	65

3.9 Details required in the test report

The report which details the test shall contain the following information –

- (a)** The name, address and NAMAS accreditation number (if appropriate) of the organisation undertaking the test.
- (b)** The name of the person in charge of the test.
- (c)** The date on which the test was undertaken.

(d) Brief details of the test equipment and procedures including reference to the appropriate British Standards.

(e) A full description of the construction tested including –

- (i) a sketch showing the relationship and dimensions of the rooms;
- (ii) the dimensions of any step or stagger;
- (iii) descriptions of the existing constructions (separating and abutting elements);
- (iv) details of openings (if any) within 700 mm of the separating construction;
- (v) the mass per square metre of the existing construction; and
- (vi) a description of the materials and method used to upgrade the existing construction.

(f) Whole number ratings shall be stated for airborne sound and/or impact sound as appropriate.

(g) The ratings and the underlying data shall be shown in tabular and graphical form for both –

- (i) the existing construction; and
- (ii) the upgraded construction.

Test procedure 2 – Laboratory test

3.10 Test laboratories shall comply with BS 2750: Part 1: 1980 (1993).

3.11 Tests shall be carried out to determine –

- (i) the airborne sound insulation of a separating wall or floor in accordance with BS 2750: Part 3: 1980 (1993) (the tests determine the sound reduction index); and
- (ii) the impact sound transmission of a separating floor in accordance with BS 2750: Part 6: 1980 (1993) (the tests determine the weighted impact sound pressure level).

3.12 Calculation of results

From each set of measurements calculate –

- (i) for airborne sound insulation, the weighted sound reduction index (R_w) in accordance with BS 5821: Part 1: 1984 (1993); or
- (ii) for impact sound transmission, the weighted normalised impact sound pressure level ($L_{n,w}$) in accordance with BS 5821: Part 2: 1984 (1993).

3.13 Assessment of results

(a) Separating walls and separating floors.

For airborne sound insulation the weighted sound reduction index (R_w) shall be not less than that given in Table 2.

(b) Separating floors.

For impact sound transmission the weighted normalised impact sound pressure level shall be not more than that given in Table 2.

Table 2 Sound transmission and insulation values

Airborne sound

Minimum values of weighted sound reduction index as defined in BS 5821: Part 1: 1984 (1993) –

	Individual value (dB)
Walls	53
Floors	52

Impact sound

Maximum values of weighted normalised impact sound pressure level as defined in BS 5821: Part 2: 1984 (1993)–

	Individual value (dB)
Floors	65

3.14 Details required in the test report

The report which details the test shall contain the following information –

- (a)** The name, address and NAMAS accreditation number (if appropriate) of the organisation undertaking the test.
- (b)** The name of the person in charge of the test.
- (c)** The date on which the test was undertaken.
- (d)** Brief details of the test equipment and procedures including reference to the appropriate British Standards.

(e) A full description of the construction tested including –

- (i) a description of the base construction;
- (ii) the mass per square metre of the base construction; and
- (iii) a description and sketch of the upgraded construction.

(f) Whole number ratings shall be stated for airborne sound and/or impact sound as appropriate.

(g) The ratings and the underlying data shall be shown in tabular and graphical form for both –

- (i) the base construction; and
- (ii) the upgrading construction.

3.15 Standard base construction – masonry separating walls

Where an upgrading construction in combination with the base construction described below can be shown to achieve the value stated in Table 2, it may be repeated with any existing masonry wall which is plastered on both sides.

The base construction shall be 100 mm thick brick plastered both sides, have a total mass not exceeding 200 kg/m².

3.16 Standard base construction – timber separating floors

Where an upgrading construction in combination with the base construction described below can be shown to achieve the value stated in Table 2, it may be repeated with any timber joisted floor which has timber or wood-based floor boarding and a ceiling of lath and plaster or plasterboard 30 mm thick.

The base construction shall be a timber floor having 22 mm plain edged boards on joists at 400 mm centres with a ceiling of lath and plaster or 30 mm of plasterboard.

3.17 Where the upgrading construction is intended for use with a base construction, other than those described in paragraphs 3.15 and 3.16, the upgrading construction shall only be used in combination with the tested base wall or floor.

Appendix – Publications referred to

BS 2750: Measurement of sound insulation in buildings and of building elements

Part 1: 1980 (1993) Recommendations for laboratories

Part 3: 1980 (1993) Laboratory measurements of airborne sound insulation of building elements

Part 4: 1980 (1993) Field measurements of airborne sound insulation between rooms

Part 6: 1980 (1993) Laboratory measurements of impact sound insulation of floors

Part 7: 1980 (1993) Field measurements of impact sound insulation of floors

BS 5821: Methods for rating the sound insulation in buildings and of building elements

Part 1: 1984 (1993) Method for rating the airborne sound insulation in buildings and of interior building elements

Part 2: 1984 (1993) Method for rating the impact sound insulation