Regulatory Impact Assessment: Signed 16 November 2002

On 5th May 2006 the responsibilities of the Office of the Deputy Prime Minister (ODPM) transferred to the Department for Communities and Local Government.

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Contents

Section 1: Introduction

This Regulatory Impact Assessment (RIA) relates to the following two sets of Amendment Regulations:

The Building (Amendment)(No. 2) Regulations 2002

The Building (Amendment)(No. 2) Regulations 2002 substitute revised Parts in Schedule 1 to the Building Regulations 2000, as follows:

- Part B - Fire Safety
- Part E - Resistance to the passage of sound

These Amendment Regulations also make other consequential and drafting amendments to the Building Regulations. In particular, a new Regulation 20A is inserted, which requires the carrying out of sound insulation testing in certain circumstances

The Building (Approved Inspectors etc.) (Amendment) Regulations 2002

The Building (Approved Inspectors etc.) (Amendment) Regulations 2002 make changes to the Building (Approved Inspectors etc.) Regulations 2000 as a consequence of the revision of Part E. They insert a new Regulation 12A, which corresponds to Regulation 20A in the Building Regulations for cases where building control is being carried out by an approved inspector.

These Amendment Regulations also make other consequential and drafting amendments to the Building (Approved Inspectors etc.) Regulations 2000.

Outline of this RIA

This RIA addresses the changes to the technical requirements of the Building Regulations 2000 and to the guidance given in the relevant Approved Documents. It also explains, in the relevant sections, the changes in procedural provisions, in support of the revisions of Parts B and E. Section 2 of this RIA addresses Part B (Fire safety). Section 3 of this RIA relates to Part E (Resistance to the passage of sound). Section 4 contains the Minister's declaration.

Section 2: Amendment of Part B (Fire Safety) of the Building Regulations: Recognition of Harmonised European System of Fire Testing

Outline

1. This section of the RIA addresses the amendment of the Building Regulations (England & Wales) with relation to fire safety so as to recognise the new harmonised European system of reaction to fire and fire resistance testing. England & Wales must recognise the new system of harmonised product standards, and supporting fire standards, having implemented the Construction Products Directive (CPD) through the Construction Products Regulations (CPR) (see paragraph 17 below). **It is important to understand that it is the CPD that has necessitated the need to now refer to these new European Standards within the Building Regulations and supporting guidance of all of the European Member States.**
2. A draft RIA for was produced as part of the public consultation exercise on the proposal that took place from November 2001 to February 2002. The RIA (and the proposed amendments of Approved Document B) have both been revised in the light of comments received during the consultation exercise, and the RIA now also includes the results of a small business litmus test.
3. **The Construction Products Directive (CPD)** is one of the "New Approach" Directives. The intention of the CPD is to remove technical barriers to trade within the European Economic Area (EEA) as part of the move to complete the Single Market. The EEA comprises the European Community and three of the four states making up the European Free Trade Association (EFTA). The member states of the European Union (EU), the EEA and the EFTA are listed at Annex D.
4. The aim of the CPD is ensure existing national standards and technical approvals are replaced with a single set of European-wide technical specifications (i.e. harmonised European standards and European Technical Approvals) for construction products.
5. The CE marking is, in effect, a "passport" enabling manufacturers to place their product on the market in any country in the EEA. However, products declared characteristics will still need to satisfy the level of performance set by the Member State where it is intended to be used.
6. The marking may be affixed to the product itself, to a label attached to it, on its packaging or on any accompanying documentation (e.g. a bill of loading or delivery note). Harmonised technical specifications will include details of how the marking should be affixed.
7. Any manufacturer whose products are specified and are provided with a CE marking according to European technical specifications cannot have his product refused entry to EEA markets on technical grounds. Under the CPD, a product bearing the CE marking will be presumed to meet the requirements of these specifications.
8. As the CPD is concerned with the placing of construction products on the market it aims to facilitate the removal of potential barriers to trade, therefore it is important that the respective European Building Regulations, in this case Part B, provide visible recognition of these new supporting European test methods. While the UK is fully supportive of the CPD and what it is trying to achieve, it has not made CE marking mandatory.
9. The last substantive revision of the fire safety aspects of the Building Regulations, and the

supporting Approved Document B, came into force on 1 July 2000[1].

10. The adoption of a harmonised system of reaction to fire[2] and fire resistance[3] testing and classification across the European Union, in support of the CPD, means that Approved Document B requires revision to incorporate the new European test and classification methods. The current (2000) version of Approved Document B currently only references the BS476 series of fire tests to classify building materials/products and, in addition, Requirement B2 (Internal fire spread (linings)) still relates to the limitation of fire spread within the building, essentially based on the contribution of internal linings to flame spread and rate of heat release. However, the Requirement B2 has been extended to include specific reference to 'rate of fire growth' and 'products' in order to accommodate the new European system
11. It is proposed to recognise the new system of harmonised products standards, and their new supporting fire test and classification methods, through the publication of amendments to both the Building Regulations and Approved Document B (Fire Safety) 2000 edition.
12. This section of the RIA deals with:

- the purpose and intended effect of the proposed amendment (i.e. the proposed European supplement),
- the options that have been considered,
- consultations with small businesses,
- the benefits that will result,
- the compliance costs (principally for building materials producers), and,
- other costs that may accrue.

1. A summary of costs and recommendations on which option to choose is given on page 10.

[1] DETR. The Building Regulations 2000 Fire Safety. Approved Document B (2000 Edition).

[2] Official Journal of the European Communities L50, pp.14-18, 23/2/2000 “Commission decision of 8 February 2000 implementing Council Directive 89/106/EEC as regards the classification of the reaction to fire performance of construction products”.

[3] Official Journal of the European Communities L133, pp.26-32, 6/6/2000 “Commission decision of 3 May 2000 implementing Council Directive 89/106/EEC as regards the classification of the resistance to fire performance of construction works and parts thereof”.

Objective

1. The overall objective of the proposed amendment is to ensure that the requirements of the Building Regulations and the guidance in Approved Document B do not unduly prevent construction products tested by the European fire test methods being used in England & Wales. This means not only adopting the proposed new test methods within the guidance but also the new European classification system associated with them.
2. Meeting this overall objective will also mean improved harmonisation with the Building Standards in Scotland which have already been amended to incorporate the new test and classification methods.

The issue

1. The Building Regulations 2000 (as amended) apply to most building work in England & Wales and are made principally to ensure the health and safety of people in and around buildings. The guidance given in Approved Documents has been approved by the Secretary of State as giving methods that, if followed, will show compliance with the statutory functional requirement. Approved Document B provides guidance on the fire safety aspects of the Regulations for the completed building. It does not address the risk of fire during the construction work, which is covered by the Construction (Health, Safety and Welfare) Regulations 1996.
2. The amendment of Requirement B2 and the Approved Document will ensure that the requirements of the Building Regulations and the guidance in Approved Document B do not unduly prevent construction products tested by the new European fire test methods being used in England & Wales, as required under the Construction Products Directive (CPD).
3. In the UK, the CPD was implemented by the Construction Products Regulations (CPR), which came into force on 27 December 1991.
4. A package of new European fire resistance standards prepared in CEN TC 127 (a European Technical Committee dealing with Fire Safety in Buildings) has been agreed by CEN (European standards organisation) members as European Standards and are being implemented, in the case of the UK, as BSENs. All of the standards that have recently been published, along with those awaiting approval and publication, are referenced in the European amendment document.
5. It has been recognised that the methodology embodied in the new European tests, while similar in general principle, will significantly affect the results achieved by many products tested under the current British Standard regime. In particular, the new standards are more severe on some currently acceptable products and constructions. This is partially due to the introduction of the plate thermocouple to measure fire resistance furnace temperature but also to procedural and other changes from current testing practice.
6. The use of the plate thermocouple, for measuring temperature in the test furnace, is a key difference between the existing British fire resistance test and the new harmonised European test. Fire resistance furnaces across Europe come in many shapes and sizes, and burn a variety of fuels. This can lead to differing results, even when the same test is being used.
7. Plate thermocouples have a larger surface area exposed to the furnace compared with

conventional "point" thermocouples. They are insulated from the test specimen and are less affected by convected heat or other factors connected with the furnace construction. The change to plate thermocouples has made it much easier to achieve consistent test results on the wide variety of furnaces in use in European countries.

8. To assist manufacturers of construction products in adapting to the new test methods, in support of the CPD and applying the CE Marking**, the European Commission** proposes to introduce them in three stages:

From a date, which is dependant upon the availability of each of the harmonised product standards, and their supporting test methods and classification document, all national fire regulations and supporting technical documents (in this case Part B) must recognise the standards of fire performance in terms of the new European tests, whilst also retaining their existing national test specifications (known specifically as the period of co-existence).

A number of years after this, conflicting national test methods (in this case probably much of the BS476 series) must be withdrawn by the relevant National Standards organisation (in this case the British Standards Institution). The European Commission would then expect all new products (which are covered by the CPD) to have been tested and classified in accordance with the new harmonised standards. However products already in the supply chain will be considered to have been 'placed on the market' and will not have to be removed after the period of co-existance.

The European Commission propose that a number of years after this there will be a requirement that only products tested to the new harmonised standards can be placed on the market.

1. For the purposes of CE Marking, the date of the transition period has now effectively begun for a few of the harmonised product standards (Stage 1), and the effective overall transition period will have a duration of at least three to four years while the rest of the harmonised product standards and supporting documents are published (Stage 2). In this transition period it will be possible to use products tested either by the existing British Standards or by the new European harmonised fire tests and therefore during this time both test regimes must be recognised by the Approved Document.
2. While the UK is fully supportive of the CPD and what it is trying to achieve, it has not made CE marking mandatory. However, it is important to understand that, because of the functional nature of the Building Regulations for England & Wales, the new European fire test and classification methods can already be accommodated, as long as compliance with the specific requirements in the Regulations can be shown.

Nature of Proposed Amendment

1. In an attempt to determine the likely technical and financial impact of the proposed new test methods for fire resistance and reaction to fire the then DETR helped to sponsor two research projects[4],[5] led by Warrington Fire Research Centre. The research was steered by an Industry Advisory Group, which had representatives from industry who have experience in manufacturing all types of construction products.

Fire resistance tests

1. In the case of the fire resistance tests on construction products, the research showed that products tested by the European test method record test times that are, on average, some 10 to 15% shorter than for those tested by the British Standard test methods. For example, a product achieving 60 minutes under the British Standard test may only achieve 50 to 55 minutes under the European harmonised test. In many cases, this reduction would lead to the product having a lower European classification, compared with the existing classification in Approved Document B.
2. The proposal - as recommended by the Industry Advisory Group - is to retain the existing classification system to avoid confusion and market distortion. If the periods of fire resistance recommended by Approved Document B were reduced, to reflect the stiffer European tests, this could lead to a perception that safety standards were being reduced (e.g. a product previously achieving a 60-minute fire rating, that was now only achieving 50 minutes, would be perceived as having a poorer performance even though it had not been altered). This could possibly lead to an increase in insurance premiums.
3. Consequently, it is proposed that there is no change to any of the periods of fire resistance given in Approved Document B. The implication for the industry is that, if it wishes to test to the European test methods, it may have to adapt its products, where necessary, to meet the 10 to 15% shortfall in test times. If it did not, it could lead to significantly over-engineered products being entered into the next category down. This will have cost compliance implications for the industry, which are discussed further in Annex B.

Reaction to fire tests

1. In the case of the reaction to fire test the situation is more complex as the European harmonised test does not mirror the British Standard test. Transposition is more difficult as the British Standard tests for "spread of flame", "fire propagation" and "non-combustibility" must be compared to a single new set of tests which has seven classes: A1, A2, B, C, D, E and F. However, on the basis of the 'back to back' fire testing where the two standard regimes were compared for a range of construction products Table 1 contains the proposed transposition for reaction to fire performance.

Table 1. Proposed transposition for reaction to fire performance

National Class	European Class
Non-combustible	A1
Limited combustibility	A2-s3,d2
0	B-s3,d2
1	C-s3,d2
3	D-s3,d2

Note: Euroclasses E & F are not used for the purposes of the guidance in support of the Building Regulations

Reference to guidance documents

1. The current edition of Approved Document B contains references to documents[6] which give guidance on the construction and erection of fire resisting elements which are stated to satisfy its provisions when tested against the British Standard methods. It could be argued that such 'deemed to satisfy' constructions are a barrier to trade as they favour the home industry over an imported product. As such it may be felt that such guidance could stifle the development of new materials, products or constructions that satisfy the European testing regime. However, as the Approved Document will continue to refer to our current national provisions, and it is proposed to adopt the new harmonised European system of fire tests, through the publication of an amendment document, it is felt that the existing references to such documents should remain.

[4] RADAR 1 Project – Modifications required to Approved Document B following the introduction of new European fire resistance test methods on currently acceptable products and constructions. Warrington Fire Research Centre, May 2000.

[5] RADAR 2 Project – Correlation of UK Reaction to Fire Classes for Building Products with Euroclasses and Guidance on Revision of Approved Document B. Warrington Fire Research Centre, May 2000.

[6] Examples of such documents are: *Guidelines for the construction of fire resisting structural elements* (BRE Report 128, 1988) and *Increasing the fire resistance of existing timber floors* (BRE Digest 208, 1988).

Risk Assessment

1. The proposed amendment is intended to be risk neutral, i.e. there should be no increase in the risk of injury or death from fire. However, as a consequence of increased engineering of some building products in order that they achieve the same fire resistance periods under the new test methods (paragraph 21), it is possible that this may result in a small decrease in the number of reported injuries and possibly deaths over time.

Options

1. Two possible options have been identified:

- Do nothing
- Prepare European Supplement to Approved Document B as proposed

However, in reality it is felt that there is really no other alternative other than to follow Option 2, since England & Wales must recognise the new harmonised system of fire standards having implemented the CPD through the Construction Products Regulations (paragraph 17). An alternative option for phasing the new standards over a longer time scale so as to reduce the potential impact on industry is also not possible as the timetable for adopting the standards (paragraphs 22 and 23) has been set, in effect, by the Commission and the availability of the harmonised product standards.

1. Option 1 could result in the possible resistance to the use of construction products in England & Wales that were not tested in accordance with British Standards methods. This would breach European treaty obligations and leave the UK open to infraction proceedings. In addition, it could lead to a manufacturer of products tested to the new harmonised European methods seeking legal redress if they cannot be specified in England & Wales.
2. During the period of transition, Option 2 would permit the specification of construction products, for the purposes of the Building Regulations, by either British Standard or European test methods, neither being compulsory, and therefore meet EU legislative requirements. In other words, during the transition period there would be two methods of compliance, in relation to the named specific test methods, indicated within the guidance that supports the Building Regulations.

Issues of equity and fairness

1. In terms of equity and fairness it would seem reasonable to have parity between construction products tested under either the British Standards or the European harmonised standards. Through the two research projects (paragraph 25) manufacturers

have been closely involved in evaluating the testing procedures for their products. The transition period will give those manufacturers who wish to apply the CE Marking to their products sufficient time to adjust products and public safety will be maintained. The duration of the transition periods is still the subject of much debate and is in effect dictated by the general availability of the relevant harmonised product standards, associated classification documents and the supporting test methods. There would in effect be a shared burden across the EU as all Member States adopt the harmonised standards having implemented the CPD. Although England & Wales must recognise the new standards, and are very supportive of them, CE Marking is not mandatory in the UK.

The benefits

Option 1

1. Option 1 would provide no benefits other than the avoidance of costs as discussed below in the section *Compliance Costs*. However, as mentioned above, it could leave the UK open to infraction proceedings from the EU.

Option 2

1. The main benefit of Option 2 would be that construction products, which have followed the new harmonised standards and supporting fire test methods, could be specified in the context of Building Regulation applications. In the transition period there would in fact be two methods of compliance with Building Regulations.
2. There would be wider benefits for manufacturers of construction products which have met the new harmonised standards in that they would be able to market their products throughout the EEA. These though are benefits that stem from the CPD rather than through the European amendment document to Part B. As such they are discussed further in Annex A.
3. It is also possible that Option 2 could lead to a small reduction in fire injuries and deaths over time (paragraph 31). However, this is very difficult to quantify because it is unknown how many manufacturers will utilise the new harmonised standards and supporting fire test methods as a means of indicating compliance with Building Regulations. It is also difficult to predict exactly how manufacturers will re-engineer their products and it will take time for the 'new' products to be widely used in the building stock. Because of these difficulties it has not been possible to quantify this benefit.

Compliance costs

Option 1

1. Option 1 imposes no costs.

Option 2

1. As stated at the beginning of this RIA, England & Wales must recognise the new system of harmonised product standards and supporting fire standards having implemented the CPD through the Construction Products Regulations. This is not a Building Regulations requirement. As a result, the only Building Regulation related cost following the implementation of this proposal would be for those affected (e.g. materials producers, builders, developers, specifiers etc.) to acquaint themselves with the amendments of Approved Document B and where necessary invest in recruitment and appropriate professional and technical training. There would be a similar burden on Building Control Bodies who administer the system. This would be a non-recurring cost.
2. The construction products manufacturers' sector comprises around 15,000 producers, of whom up to 7,500 actively promote themselves as suppliers of construction products. The sector is, however, characterised by diversity - with more than 30 industries producing materials for construction use. In addition, there are just under 15,000 intermediaries, which reduce to around 7,300 when agents and retailers are excluded[7]. Assuming that approximately half of them (7400) would be affected by this change and that they would need to spend half a day to become familiar with the amendments of Approved Document B this would amount to a cost of some £0.75 million.

Number affected	7,400
Hourly rate	£25
Hours training/familiarisation	4
Total familiarisation cost	**£740,000**

1. Assuming around 15% of the 110,000 or so construction professionals engaged in design and specification in England and Wales[8] will take some steps to familiarise themselves with the changes it is likely that there would be a cost in the order of £1.75 million.

Number affected	17,000
Hourly rate	£50
Hours	2

familiarisation	
Total familiarisation cost	**£1,700,000**

1. There are about 450 Local Authorities in England & Wales and some 30 Approved Inspectors (either registered as companies or individuals). Assuming they would invest in sending 1 person to a seminar or similar event who would subsequently disseminate this information internally the cost would be in the order of 1.0 million:

480 bodies :1 person incurring £ 30 seminar (part) cost
£ 50 travelling cost

£100 attendance time
£180

480 bodies :Internal dissemination £400/day x ½ day x 10 = £2,000
(Average 10 persons for ½ day)

480 bodies x (2,000 + 180) = **£1,046,400**

1. The total costs for manufacturers, construction professionals and building control bodies of familiarisation with the amendments to Approved Document B is likely to be up to £3.5 million

Summary of costs

Organisations	No affected	Cost (£)	Total Costs	Para
Construction product manufacturers	7,400	100	740,000	36
Construction professionals	16,590	100	1,659,000	37
Building Control Bodies	480	2,180	1,046,400	38
	Total costs:		3,445,400	

1. There are other costs associated with the harmonised European standards but it is important to stress that these are attributable to the CPD as implemented through the CPR and not the amendments of Approved Document B. These costs are recurring and can be considered in two parts:

- higher costs of European tests compared to current British Standard tests for new products and the need to re-test products that currently comply when the transition period is over, and,
- cost to re-engineer products to ensure that they still achieve their current classification.

1. An indication of likely testing and re-engineering costs is given in Annex B.

Extent of consultation

1. The proposed amendment (Option 2) has been subject to consultation with industry through their close involvement with fire testing research undertaken by Warrington Fire Research Centre (paragraph 25). The amendment has also been subject to consultation with the Building Regulations Advisory Committee (BRAC) appointed by the Secretary of State. As discussed above the proposed amendment has now been subject to full public consultation and revised in the light of those comments.

[7] *A study of the UK Building Materials Sector*. Report prepared for Construction Products Association, www.constprod.org.uk

[8] suggested by RIBA & RICS membership figures.

Consultation With Small Business

1. The Small Business Service has been formally consulted. The majority of the small businesses likely to be affected by the amendments are considered to be those offering a Building Control Service from the private sector, i.e. Approved Inspectors. An estimate of that impact has been made and is set out in paragraph 44 above.
2. The impact on other small businesses has been more difficult to assess. Following the public consultation exercise a number of small firms who manufacture construction products have been interviewed in an attempt to determine the impact of the proposed amendment. These are summarised in Annex C, but in the main are not costs attributable to the amendment of Approved Document B.
3. For example, the companies have identified substantial testing costs which they could incur once the transition period is over. Some have also identified re-engineering costs which they would incur should they wish to pursue CE marking. They are not required to do this as CE marking is not mandatory in the UK, but some feel that they would have to take this action because of commercial pressures. Other associated costs have been identified including material and haulage costs.
4. The costs which are attributable to the amendment of Approved Document B are for familiarisation with the new. These costs are separated in paragraph 42-44 above.
5. It may be that not all small businesses in the construction industry need to purchase a copy of, or become familiar with, the amendments of Approved Document B. To enable them to form an opinion of the relevance of the amendments to their business, it is proposed to issue a detailed press notice, in addition to a full copy of the amendments being freely available from the ODPM website.

Summary and recommendations

1. Option 1 imposes no costs, but provides no benefits. Indeed, it would possibly breach European treaty obligations and could leave the UK open to infraction proceedings from the EU.
2. Option 2 is to make the proposed amendments to Approved Document B. This effectively means the Document is recognising legislation that removes a barrier to trade, and it is another way of demonstrating compliance. There is a non-recurring cost associated with the amendments of Approved Document B and that is the training and familiarisation cost for builders, developers, specifiers etc. as well as Building Control Bodies. This is estimated to be about £3.5 million.
3. For those manufacturers wishing to apply the CE marking to their products it will cost them initially to test their products to the new European harmonised system. For some of those manufacturers who go down this route there will also be further financial impacts as they may choose to re-design and re-engineer some of their products to suit the new European classification system. This though will be a commercial decision for a company to make. However, there will be considerable potential benefits to manufacturers who will be able to export their goods more easily within the EEA and they will also be able to have their products tested at any appropriate laboratory in the Community.
4. The recommended course of action is to adopt Option 2 for the reasons outlined above.

Enforcement and sanctions

1. Building work that is subject to the provisions of Part B, or of any other Part of Schedule 1 to the Building Regulations 2000, must be notified to the local authority. The work is subject to inspection by the local authority's building control department, or, at the election of the person carrying out the work, by a private sector approved inspector.
2. Failure to comply with the requirements of Schedule 1 to the Building Regulations 2000 is a criminal offence. Local authorities also have powers to require the removal or alteration of work that does not comply with the requirements of Schedule 1. The local authority's enforcement powers do not apply in a case where building control is being carried out by an approved inspector. However, if a person carrying out building work fails to comply with instructions from an approved inspector to rectify non-compliant work, the approved inspector must cancel the 'initial notice' which brought the project under his supervision. Enforcement power then reverts to the local authority.

Contact point

1. Enquiries and comments regarding this section of the Regulatory Impact Assessment should be addressed to Darren Hobbs at:

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Annex A - Benefits of the Construction Products Directive

The key benefit for manufacturers of construction products which have met harmonised standards is that they would be able to market their products throughout the EEA. Currently, manufacturers wanting to export their products to other European countries need to have their products tested to each country's test standards and pay the associated repeat test fees.

A report[9] prepared for the European Commission on the effect of harmonisation on intra-Community trade suggests that mandatory and quasi-mandatory certification requirements for construction products in Member States may take up to 3 years to obtain with costs ranging from a few thousand up to hundreds of thousands of euros[10]. It goes onto say that typically between 3 and 10 different certification procedures would be needed to trade throughout the whole EU, but that very few companies certify products for other than their home country.

Many construction product manufacturers view the German and French markets as the most difficult to penetrate from a regulatory point of view, and the German market is particularly stringent with respect to fire testing. The new harmonised testing regime will make these markets more accessible to manufacturers in England & Wales if the products meet the new standards. Wider still, products meeting the new European standards could be exported world-wide should they become global standards.

Another benefit would be that manufacturers would be able to have their products tested anywhere within the EEA.

To value the benefits of harmonisation via the CPD is difficult. There will be time and financial savings on repeat testing, although these will be offset to some degree by a higher initial one off cost. The report[9] prepared for the Commission estimates that the hypothetical[11] annual cost saving in testing and certification amounts to some €1-10million for most of the six construction product groups it considered (anchor bolts, WCs, lightweight composite sandwich panels, curtain walling, windows and reinforcement steel).

The scope for increased trade in construction products is considerable. The total EU market is around €200billion and intra-Community trade amounts to around €40billion. (In the UK the construction product market has an annual turnover of £30billion - i.e. €50billion - and makes up some 40% of total construction output[12].) In total construction products contribute around 3% of EU GDP, and during 1994-98 trade in construction products grew faster than GDP at an average of 8% per year. The Commission's report suggests that this rapid growth may be a general effect of the internal market and increasing awareness of opportunities with anticipation of the effects of the CPD.

Implementation of the CPD will provide a direct reduction in the trading costs for producers, in other words[8]:

- Reduction in the costs of multiple testing and certification (hypothetical - see footnote 10 - benefit: €200-400million per year)
- Reduction in the costs of producing multiple product variations to meet different national standards (savings likely to be small but of the order of tens of millions euros per year)

- Reduction in the cost of quality management, overheads, packaging and other trade related costs (estimated at around €100million per year).

This amounts to a total reduction of about €300-400million per year.

These savings will be offset to some degree by the higher one off initial testing as outlined below. In addition, these figures obviously apply to the Community as a whole and are not specific to manufacturers in England & Wales alone. However, based on the proportion of the EU population in E&W (14%), it is estimated that the figure for E&W alone would be in excess of €40million per year.

There will also be trade and competition effects which will benefit consumers and these include[8]:

- *Competition effects* - increased trade and entry of new competitors forcing companies to reduce prices and increase efficiency (estimated to be €1,000million per year)
- *Trade effects* - as customers are able to select from the most economical sources, probably leading to a shift in production towards low cost or high productivity areas (estimated to be €4,000million per year)
- *Restructuring, rationalisation and economies of scale* - Weaker firms and less efficient facilities may close and mergers and acquisitions are likely to result. Savings in production costs are estimated to be €5,000to €10,000million per year.
- *Dynamic long-term effects due to increased RTD (research, testing and development) and innovation* - resulting from increased competition and increased size of firms (could be up to €10 billion after 10years).

All such benefits of the CPD are necessarily long term and need to be compared against the short-term increases arising from additional testing, increased test costs and product re-engineering.

[9] *Effects of Regulation and Technical Harmonisation on the Intra-Community Trade in Construction Products*. Report prepared for the European Commission by WS Atkins International, September 2000.

[10] Based on rate of exchange: £1 equivalent to €1.66.

[11] The 'hypothetical' cost of testing and certification is defined as what it would cost the industry if all firms were certified for all Member States.

[12] Construction Products Association, London, www.constrprod.org.uk.

Annex B - Costs for Fire Testing and Re-Engineering Construction Products

(i) Cost of Fire Testing

With respect to the costs of fire testing (and re-testing) construction products it is not possible to calculate a cost implication to a 'typical' company because of the wide diversity of the construction products industry. However, a cost model has been developed that attempts to illustrate the likely cost implications for product manufacturers in England & Wales. The key features of the model are:

- Data on the cost and number of both reaction to fire and fire resistance tests under both the current BS and the proposed new European standards was obtained from a testing laboratory.
- For the reaction to fire tests it is possible to say what the additional cost for testing each construction product for each of the required tests under the two regimes. It is therefore possible to calculate a range for the cost increases and a weighted average cost increase. The cost increase for testing non-combustible products to the new European standards amounts to about £1,500 (range £1,200 to £2,100), and for other products the increase is about £1,300 (range £1,100 to £2,000). These costs represent a 100% to 300% increase depending on the nature of the product and the ease with which it can be mounted and fixed.
- The situation for fire resistance tests is more complex because of the wide variety of test methods and products. The products tested include structural steelwork (which makes up the majority of tests/income), doors, partitions, floors and penetration seals. Compared with the fees for the equivalent British Standard tests, a manufacturer would have to pay typically 25-30% more for the European tests.
- A five-year time period was assumed during which the balance of testing moves from a majority of British Standard tests to a situation where all tests conform to the new European regime.
- The rate of testing was assumed to rise after two years to accommodate the need to re-test products that currently comply with the British Standard regime to ensure that they comply with the new harmonised regime once the transition period is over.
- The figures for the single test laboratory were then grossed up to obtain the national cost implication for England & Wales.

On the basis of this model it is estimated that the *additional* cost for the resistance to fire tests in England & Wales attributable to the new regime amounts to £2.5 million over 5 years discounted at the Treasury's 6% discount rate. (In other words, this is the cost that product manufacturers will have to pay above and beyond what they would have had to pay anyway.) Similarly, the *additional* cost of the reaction to fire tests amounts to £1.0 million over 5 years discounted at 6%.

Therefore, the total additional cost in England & Wales for construction product manufacturers using the new harmonised European fire tests amounts to £4.0 million over 5 years discounted

at 6%.

The burden of extensive product testing can be reduced though, through the "Classified without further testing" (CWFT) regime. CWFT corresponds to the definition:

> "Products which have been proven to be stable in a given European class (on the basis of testing to the appropriate EN test method(s)) within the scope of their variability in manufacture allowed by the product specification (standard or ETA), and when evaluated for the influence of other possible variations, that may occur outside the scope of the specification, which may have an impact on their fire performance."

CWFT is a list of generic products, not a list of proprietary products.

CWFT lists will be established by Commission Decision(s) in consultation with the Standing Committee on Construction (SCC). The Fire Regulators Group (FRG), advised by its CWFT Working Group - made up of representatives of regulators, CEPMC, a Notified Bodies Group representative, a representative of CEN TC127 WG4, and CEN/EOTA TC representatives (invited for specific cases, as applicants) - will consider all requests made and forward recommendations onto the SCC for final opinion.

CWFT lists will refer to products of known and stable performance for defined end use applications with respect to their reaction to fire performance, their external fire performance and/or their resistance to fire (the latter to be developed in due course). "Products" are product families, product sub-families and generic products as defined in Guidance Paper G and specified by European standards or European Technical Approvals. It may also be possible to extend the concept to kits and systems, if it is possible to define them with sufficient precision.

Products will only be considered for inclusion onto the lists where:

- their fire performance can be considered to be 'stable' (typically, this means that it must be proven by test that the fire performance of a product is not subject to major change by virtue of the variability of the manufacturing process) ;
- they (the product) have been defined with sufficient precision.

Regardless of the fact that the product must correspond to the product description given in the CWFT list, the fire performance of the product should correspond with the given class. The normal safeguard procedures of the CPD apply if a manufacturer is considered to have incorrectly applied the CE marking (e.g. by claiming his product meets the criteria of a 'CWFT' list when it does not). The manufacturer is always responsible for ensuring that his product corresponds to the description, and is within the limits defined.

Positive lists (i.e. lists of products included) will be prepared, although it may be necessary to highlight exceptions within a product family, e.g. all products in product family x, with the exception of y.

(ii) Re-engineering costs

Because of the very diverse nature of building products market it is not possible to say what a 'typical' re-engineering cost is likely to be. Some products only require minimal re-engineering to ensure that they continue to achieve their current classification and manufacturers feel this is broadly acceptable. On the other hand, some products will need more fundamental re-engineering which could entail substantial additional costs. Nationally these costs could amount to millions of pounds and are likely to be passed onto consumers. However, manufacturers may feel that such costs do not justify the wider benefits of trading in the EEA and so may decide not to pursue this option.

Annex C -Business Litmus Test

Five businesses have been interviewed following the public consultation exercise in order to determine the cost impacts of the proposed amendment as well as any benefits than might accrue. It has been difficult to identify 'small' businesses who are also able to quantify the cost impacts, particularly in respect of re-engineering costs that they may incur.

Company: Door Manufacturer

Business: Bespoke door manufacturer, makes doors for UK market from raw materials

Turnover: £2 million

Size: 25 people

Key points:

- Wide range of door types so potentially large impact as large number of designs would need testing. Impact currently unclear.
- Possible one-off cost of £350k to conduct testing (and re-testing) to meet European standards (which assumes all pass first time). Cost could be higher if any failures which would require re-testing.
- Cost of about £300k per annum re-engineering costs if pursue EC labelling route. Include intumescent seals to meet 30-min test, but more involved construction for 60 min test and above.
- 15% increase in cost (based on turnover) which it would be difficult to pass on entirely to customers.
- Costs of literature not considered but would be present.
- Feel EC route does not bring any benefits at all but would be forced to go down this route because of commercial imperatives. Not really a level playing field because feel that there would still be barriers to trade despite passing European tests. Feel that there is a need to manufacture in the country you want to export to.

Company: As below

Business: Wallpaper company

Turnover: £60 million (Half products in UK, rest abroad)

Key points:

Although in UK CE marking is not mandatory they feel they are forced to go down this route even though consumer is not concerned with this.

Feels French and German competitors are just realising the implications of the new testing

regime.

Would have to test and re-test their existing products. Currently they pay £766 for each fire test under BS system for each of their 8 generic group products. This gives a cost of £6k which is repeated every 5 years or so to coincide with the revision cycle of Part B. Now may be required to pay £1,585 for equivalent new test and then a further £890 for an additional two tests if the result for the first test is borderline. Therefore, testing cost could be as much as £2,475. Also, testing may be required for each of the 3,000 'colourways' as opposed to 8 generic groups. Therefore, total cost could be as much as £2.7 to £7.4 million (perhaps 10% of turnover). This may have to be undertaken more frequently than the current 5-year cycle. Feels that this is excessive as response to fire is primarily determined by the substrate rather than the product itself, so queries the need to test all colourways.

Feel that there would be no re-engineering costs.

Unable to pass on costs to consumer as main competitor is the paint which because is not part of the CPD is not subject to the same testing regime.

Can see no benefits. Certification is normally only requested by Trading Standards Officers and Fire Officers in the context of public buildings.

Company: As below

Business: Plasterboard production

Turnover: £1,662 million

Key points:

Main impact is need to move from 12.5mm (key product) to 15mm board to meet new tests.

Currently spend £1/4 million on fire testing for product development but anticipate spending extra £125,000 (as a one-off cost) to re-test existing products (in order just to stand still)

Will also have additional costs for haulage (larger product) and production (increased drying and energy costs). Would also involve a drop in production by about 20% (currently operating at full capacity) which is not good for business.

Probably pass on at least some of the costs to consumers who are going to have a higher specification board. Overall cost impact is difficult to quantify because they sell the product onto a merchant and so they do not know whether the product is used in a fire regulated or non-fire regulated application.

Although most of their product is for the UK market they probably will go down the CE route because of commercial pressures, although this is no greater hardship than that already envisaged.

Company: Fire Damper Manufacturer

Business: Fire dampers and other products

Turnover: £18m in total but £6-7m in respect of dampers (about 30% of UK market)

Key points:

- Under new regime of extended field of application expect the UK fire damper 6-7 companies to each pay £290k for 29 separate fire tests giving a total one-off cost of some £2 million.
- Estimate that payback on this would be 5-10 years assuming no profit in those years.
- Could well incur re-engineering costs of over £100k to cover re-design and re-tooling.
- Company might be large enough to absorb the cost but other smaller companies may not.
- Currently not able to sell into Europe (principally France and Germany) because their product needs to meet insulation requirements which would require expensive additional testing.
- Cannot pursue CE marking route as currently there are no test and product standards although these are under development.

Company: Flooring Products

Business: Flooring products

Turnover: £16.5 million (UK market primarily)

Key points:

- Currently assess adequacy of its products of basis of tables in BS8810 Part 2, i.e. performance in fire on basis of given thickness of concrete.
- Looking at new Europe test means that need to use more concrete (thicker floors) in order to achieve same times (e.g. 60 minutes), estimated to be about 10%.
- This will have implications in terms of increased material and haulage costs. Material costs are estimated to be £3.9 million per year and haulage costs at £2.4 million per year.
- New testing would therefore mean additional annual costs of £390k (material) and £240k (haulage).
- There will also be re-test costs but these are uncertain at the moment.
- The company's focus is primarily the UK market and will not pursue CE marking.
- Overall, they feel that concrete floors are not really an issue in terms of fire so cannot see any benefits.

Annex D - European Member States

The following table sets out the Member States of the three main European Organisations:

Country	The European Union (EU)	The European Free Trade (EFTA)	The European Economic Area (EEA)
Austria	•		•
Belgium	•		•
Denmark	•		•
Finland	•		•
France	•		•
Germany	•		•
Greece	•		•
Iceland		•	•
Ireland	•		•
Italy	•		•
Liechtenstein		•	•
Luxembourg	•		•
Norway		•	•
Portugal	•		•
Spain	•		•

Sweden	•		•
Switzerland		•	
The Netherlands	•		•
United Kingdom	•		•

Section 3: Amendment of Part E of the Building Regulations (Resistance to the Passage of Sound); New Approved Document E

1. Outline

1. This Section of the RIA addresses the requirements of the Building Regulations with relation to sound insulation in England and Wales that are contained in Part E of Schedule 1 to the Building Regulations 2000, and the new requirements for sound insulation testing. This RIA also addresses the practical guidance, contained in Approved Document E (2003 edition), which has been approved and issued by the Secretary of State with respect to these requirements. The main changes will come into effect on 1 July 2003.

2. A consultation paper *Proposals for Amending Part E - Resistance to the Passage of Sound* was prepared in consultation with the BRAC (Building Regulations Advisory Committee) Part E Technical Working Party. The paper was subject to full public consultation between January and April 2001 and revisions have been made to take account of the comments received and subsequent advice from the Technical Working Party. A summary of the main changes made to the Requirements and guidance in response to the comments received is included as Appendix A.

3. This section of the RIA is intended to support:

- the new Requirements E1, E2, E3, and E4 which replace and extend the scope of the current Requirements E1, E2 and E3;
- associated changes to the Building Regulations and the Approved Inspectors Regulations
- the amendments to the guidance within Approved Document E.

It only focuses on those changes that are considered significant.

4. This section of the RIA deals with:

- the purpose and intended effect of the amendments made;
- the options that have been considered;
- the benefits that will result;
- the compliance costs for builders, developers, charities and voluntary organisations, building control bodies; and
- other costs that may accrue.

5. A summary of costs, benefits and recommendations on which option to choose is given in sub-section 9 of this Section.

Go to table of contents

2. Objective

2.1 Purpose

6. The main purpose of the amendments is to address the problems of noise in dwellings and other rooms used for residential purposes as illustrated in the following paragraphs.

Large numbers of complaints about domestic noise

7. The Chartered Institute of Environmental Health (CIEH) reports that the number of complaints about domestic noise has now reached over 5,000 per million population, and that the total number of such complaints trebled in the 10 years between 1986 and 1996. The 1996 English House Condition Survey (EHCS) indicates that 4.7 million (nearly one-quarter) of householders were bothered by noise either from traffic, industry or neighbours. Specifically, 0.67 million householders were bothered by noise from neighbours which they attributed either to poor design of the building or a combination of poor design and behaviour of the neighbours. Further details on the extent of reported problems are given in Section 5.2.

Current sound insulation standards originate in the 1950s

8. Current standards of sound insulation in dwellings can be traced back to surveys carried out in the 1950s which indicated that 225mm thick solid brick walls and solid concrete floors provided reasonable standards of sound insulation at that time. Values derived from the performance of these constructions were used as the basis for selecting constructions for inclusion on a deemed-to-satisfy list that accompanied the 1965 Regulations, and with some refinements, in Approved Document E in 1985 and 1992.

Improvements in living standards

9. Since the 1950s, there have been considerable improvements in living standards. One of the consequences of this is an increased use of home entertainment systems (with increased power output at low frequencies) and other domestic electrical appliances, and also an increase in the amount of noise that people are likely to make at home. Further, the trend towards home working, reduced contact with neighbours and rising expectations has meant that people are less tolerant of noise disturbance. The focus of the media on noise and neighbour disputes has also heightened public awareness of the problem.

Poor compliance and low satisfaction with existing sound insulation standards

10. Studies by BRE, which are referred to later, indicate that the operation of the current Building Regulations and guidance in Approved Document E does not always achieve satisfactory standards of sound insulation in practice. One study indicates that about 25% of occupants living in dwellings that attained the current standards for sound insulation rated the insulation as poor or very poor. A second study by BRE looked at complaints about sound insulation between dwellings that had been approved under current Building Regulations and found a poor level of compliance with current (implicit) standards in the cases investigated. Field tests of sound insulation between new dwellings, undertaken by BRE on behalf of DETR (now ODPM) also show that there is a wide range of performance for some constructions

included in the current guidance and that examples of non-compliance with the current standards are continuing to occur. BRE estimate that, in new dwellings, as many as 40% of new separating floors and up to 25% of new separating walls may fail to meet the current standards. This clearly illustrates that there are problems with the operation of the current system that relies on a combination of plan checking and site visits for enforcement.

Adverse effects of noise

11. Noise, at the sort of levels typically encountered in dwellings, can lead to a wide range of adverse health effects including loss of sleep, stress and high blood pressure. Quantifying the risks attributable to exposure to environmental noise and, particularly, neighbour noise is difficult but it is suggested that there are between one and ten deaths per year in the UK (these being suicides or as a result of assaults) attributed to noise from neighbours. The number of less severe problems attributed to noise (such as stress, migraines, etc.) is estimated to be about 10,000 per year. The same problems are experienced by people living in rooms for residential purposes (i.e. students in halls of residence, elderly people in residential homes etc.) although there are no equivalent figures for health risks. Further discussion of the health risks is given in Section 5.3.

2.2 Relation to Other Initiatives

12 As set out in PPG3[13] - Housing, current government housing policy is that 'new housing and residential environments should be well designed and should make a significant contribution to promoting urban renaissance and improving the quality of life'. Further, local planning authorities should 'give priority to re-using previously developed land within urban areas, bringing empty homes back into use and converting existing buildings'. They should 'provide for more intensive housing development in and around existing centres and close to public transport routes' and 'identify and bring back into use empty housing, vacant commercial buildings and upper floors above shops'. The effects of noise on the occupants of dwellings has also been recognised in the DETR (now ODPM) Housing Health and Safety Rating System which has been proposed as a future replacement for the current Housing Fitness Standard.

13. These housing policy initiatives have to be considered alongside a background of rising complaints about noise by building occupants - both noise from neighbours and noise from external environmental sources like road traffic and aviation. A consequence of PPG3 and the targets for housing development is that housing densities are likely to increase, and there could be a proportionate increase in the number of flats and attached houses all of which places a premium on achieving a reasonable standard of sound insulation. Further, the National Society for Clean Air and Environmental Protection is currently campaigning for a National Noise Strategy to include amongst other things 'improved enforceable standards of sound insulation in both new and existing buildings'.

2.3 Overall Aim

14. The amendments have an overall objective of securing reasonable standards of health, safety and welfare for persons in or about buildings in respect of resistance to the passage of sound, without imposing disproportionate bureaucracy and costs on builders, materials producers, building owners or building control bodies.

15. The key objectives are to improve standards of sound insulation and to significantly improve compliance with the Regulations so that reasonable sound insulation is achieved before the home is occupied. These objectives are achieved by the introduction of a sound insulation testing regime and through improving the usefulness of current guidance to designers and builders by clarifying the text in the Approved Document and identifying changes in standards and practice.

[13] DETR, *Planning Policy Guidance Note No.3: Housing*, March 2000

3. Overview of Requirements

3.1 Background

16. The Building Regulations 2000 apply to most building work in England and Wales. Approved Documents are approved by the Secretary of State and are intended to provide guidance, for some of the more common building situations, on ways of demonstrating compliance with the Requirements in the Regulations. However, there may be alternative ways of achieving compliance with the Requirements. There is no obligation to adopt a particular solution contained in an Approved Document provided the requirement is met in some other way. Approved Document E provides guidance on resistance to the passage of sound.

17. There are currently three Requirements under Part E of Schedule 1 to the Building Regulations 2000:

- E1: Airborne sound (walls);
- E2: Airborne sound (floors and stairs); and
- E3: Impact sound (floors and stairs).

18. These three Requirements apply to separating walls, floors and stairs:

- between dwellings;
- between dwellings and other buildings; and
- between dwellings and another part of the same building which is not used exclusively as part of the dwelling.

Essentially, the objective is that walls shall provide reasonable resistance to airborne sound, and floors and stairs shall provide reasonable resistance to both airborne and impact sound.

3.2 The New Requirements

19. A revised Requirement E1 consolidates the current Requirements E1, E2 and E3 within a new Requirement E1 *Protection against sound from adjoining dwellings or buildings etc.* The new Requirement E1 extends the current Requirements to apply the need for sound insulation more generally and to cover rooms for residential purposes (which includes rooms within hotels, boarding houses, hostels, student accommodation and similar accommodation). A new Regulation has been introduced to ensure that compliance with Requirement E1 is verified by a system of sound insulation testing - subsequently referred to as pre-completion testing in this document.

20. The changes also include three new Requirements:

- E2 Protection against sound within a dwelling etc.;
- E3 Reverberation in the common internal parts of buildings containing dwellings etc.; and
- E4 Acoustic conditions in schools.

21. The consultation paper *Proposals for Amending Part E - Resistance to the Passage of Sound* also contained details of an additional proposed Requirement *Protection against noise from external sources*. This proposed Requirement involved the transfer of responsibility for the protection of the building envelope against external noise from planning to Building Regulations. The proposed Requirement was well supported during the consultation exercise but legal advice has since been received that the proposals are not workable without changes to the Town and Country Planning Act 1990. The benefits of the proposed Requirement included that sound insulation, thermal and ventilation aspects of the building envelope could have been considered together and that the inter-dependence of sound insulation from external sources, internal sources and adjacent dwellings could have been addressed.

22. Requirement E4, although a new Requirement, is simply a mechanism for the transfer of control over the acoustics of schools from the Department for Education and Skills (DfES) (Previously Department for Education and Employment - D*f*EE) to Building Regulations. This proposal was the subject of a separate consultation exercise by the D*f*EE[14]. Requirement E4 parallels the requirement in the current DfEE School Premises Regulations that in turn quotes the acoustic criteria contained in Section A of Building Bulletin 87 'Guidelines for Environmental Design in Schools'. It is intended that a new Building Bulletin 93, to be produced by DfES, will incorporate this Section A and give guidance on compliance with the requirements. The Government ended the current system where maintained schools were exempt from Building Regulations on 1st April 2001. The same minimum design standards now apply to all new schools, and all new schools are subject to the building control system in order to improve enforcement.

23. The D*f*EE consultation paper discussed the issues surrounding the exemption of maintained schools from the Building Regulations and, accordingly, the remainder of this RIA is only concerned with Requirements E1 to E3.

24. The amendments to the Building Regulations and to Approved Document E in support of Requirements E1 to E3 fall into three main categories:

1. changes resulting from the extended scope of the Requirements;
2. measures to improve sound insulation; and
3. measures that improve compliance with the Requirements.

25. This RIA focuses on those changes that are considered significant, as summarised in Table 1. More details on the changes from the current arrangements that are associated with Requirement E1 are given in Appendix B.

Table 1: Summary of new Requirements E1 to E3
Requirement E1 Protection against sound from adjoining dwellings or buildings etc. *(i) Changes resulting from the extended scope of Requirement E1* 'Rooms for residential purposes' (includes rooms within hotels, boarding houses, hostels, student accommodation, nurses' homes and elderly persons' homes) are now covered. *(ii) Measures to improve sound insulation* Introduction of an explicit (minimum) performance standard to replace the current need to infer the meaning of 'reasonable sound insulation' from the performance of the constructions described in the current Approved Document E. The new performance standard is set at a higher level than current implicit target values, and reflects current European standards by adopting a new rating method for airborne sound insulation that takes better account of the transmission of low frequency sounds. Technical changes to guidance on separating and flanking constructions in the Approved Document so that those constructions remaining in the Approved Document are likely to meet the performance standard; those constructions that are less likely to meet the performance standard have been removed. *(iii) Measures that improve compliance with Requirement E1* Introduction of a pre-completion testing regime to apply to new dwellings, material change of use and rooms for residential purposes. Pre-completion testing also replaces the alternative compliance procedures contained in Sections 3, 4 and 6 of the current Approved Document. Clarification and restructuring of current guidance. Change from current generic descriptions of constructions and construction elements to performance standards, which encourage development of proprietary products, wherever current knowledge allows.
Requirement E2 Protection against sound within a dwelling etc. a. New Requirements E2(a) and E2(b) based on current good practice extended to protect rooms designated as bedrooms. b. New guidance in the Approved Document standardises and extends current good practice.
Requirement E3 Reverberation in the common internal parts of buildings containing dwellings etc. a. New Requirement based on current good practice. b. New guidance in the Approved Document standardises and informs current good

practice.

[14] DfEE. *Ending the Exemption of Maintained Schools from the Building Regulations*, Consultation Paper, March 2000

4. Nature of Amendments

This section of the RIA further explains the nature of the main changes associated with the new Requirements E1 to E3 and the guidance in Approved Document E.

4.1 Requirement E1 Protection against Sound from Adjoining Dwellings or Buildings Etc.

(i) Changes resulting from the extended scope of Requirement E1

26. The scope of the current Part E is restricted to sound transmission between dwellings, and between dwellings and other buildings, but no definition of 'dwelling' is provided. A working definition of dwelling is in common use that restricts the current application to a self-contained living space containing its own cooking, washing and sanitary facilities.

27. The Performance Statement in the current Approved Document E states that:

> "In the Secretary of State's view the requirements of E1, E2 and E3 will be met if the relevant parts of the dwelling are designed and built in such a way that noise from normal domestic activities in an adjoining dwelling or other building is kept down to a level that will not threaten the health of the occupants of the dwelling and will allow them to sleep, rest and engage in normal domestic activities in satisfactory conditions."

This current performance statement suggests that the requirement should apply to the spaces in any type of building which cater for the domestic functions listed. This would include not only dwelling-houses and flats, but also hotels, hostels, student accommodation, nurses' homes and elderly persons' homes. The explicit extension in the scope of Regulation E1 to include rooms for residential purposes will ensure that the intention of the Requirement is made clear.

28. The drafting of Requirement E1 also extends the scope of the current Requirement to ensure that reasonable resistance to sound is provided when walls and floors separate a bathroom from other parts of the same building, such as when a bathroom adjoins a common circulation space in a block of flats.

(ii) Measures to improve sound insulation

29. This group of changes introduces an explicit minimum performance standard and uses a new rating method for airborne sound insulation that places greater emphasis on low frequencies and corresponds better with subjective evaluations of sound insulation. It is not possible to make simple comparisons between the airborne sound insulation standards and the limits for inclusion of constructions in the current guidance because of the nature of the new rating method and the allowance made for measurement uncertainty in the pre-completion testing regime[15].

30. In very general terms, for both new dwellings and material change of use (as defined in Regulation 5 of the Building Regulations), the required airborne sound insulation for separating

walls has been increased by at least 3 dB and that for separating floors has been increased by at least 4 dB (n. b. the opportunity has also been taken for a small additional improvement in the performance standard for separating floors to bring it into line with the standard for separating walls). The required standard for resistance to the transmission of impact sound for new dwellings has been improved by 5dB. On the basis that 3 dB is probably the smallest discernible change in performance, standards need to be raised by at least this amount for the change to be significant. The standards are generally in line with improved standards currently being adopted by some developers and bring our approach more into line with other parts of Europe.

31. For material change of use the required minimum airborne and impact sound insulation performance has been set at a level that is 2 dB lower than that required for new build in recognition of the difficulties of controlling flanking transmission in some circumstances. The resulting increase in the required standard is therefore broadly in line with the increase in required standard for new build[16].

(iii) Measures that improve compliance with Requirement E1

32. This group of changes seeks to stimulate greater compliance with the required standards of sound insulation through the introduction of a pre-completion testing regime the cost of which is to be borne by the developer. The regime is accompanied by the removal of Sections 3, 4 and 6 of the current Approved Document, which describe alternative methods for meeting the current Requirements. In future, there will be no restriction on the use of other types of building construction provided that the required standards are met when the properties are tested. Therefore, in the longer term, given a high rate of compliance with the required standards, the regime will promote greater freedom for the industry and enable a more de-regulatory approach to be taken.

33. The pre-completion testing regime does not require 100% testing of all new attached residential properties and is based on testing a sample of new properties selected at the discretion of the building control body following the guidance in Section 1 of the Approved Document. The requirement on a developer to improve the sound insulation when failures are detected is crucial to the system and is seen as being the main stimulus to the general achievement of the minimum performance requirements through the adoption of improved quality control procedures on site. Constructions included in the revised Approved Document E should meet the required standards provided that there is sufficient attention to detail and that a good standard of workmanship is maintained.

34. It may be difficult to meet the required standards when dwellings are created as a result of the material change of use of some historic buildings. The conversion of such buildings to residential use presents particular challenges and once all reasonable remedial work has been undertaken, a system of 'test and declare' is to be used. The intention of this system is to strike a balance between the demand for this type of property, the need to conserve the special characteristics of some historic buildings and the rights of occupants to know the standard of sound insulation in the conversion. In general, it is often difficult to estimate the likely performance of dwellings created as a result of material change of use and, for this reason, the pre-completion testing regime encourages more frequent testing of conversions.

35. Changes are also made to the structure and content of Approved Document E. These

changes are in response to feedback from users, changes in construction good practice and complaints from building occupants. Some of the changes are necessary to bring the Approved Document into line with revisions of British and European Standards. All these changes should also contribute to improved compliance with the Requirements

4.2 Requirement E2 Protection against Sound within a Dwelling Etc.

36. Requirement E2(a) incorporates and extends a current requirement for the sound insulation of internal walls made by the NHBC (National House Building Council)[17] and will extend and standardise current good practice. The requirement seeks to reduce disturbance for people in rooms designated as bedrooms and to protect the privacy of people using toilet facilities.

37. Requirement E2(b) extends the same principle to improve the sound insulation of all internal floors.

4.3 Requirement E3 Reverberation In The Common Internal Parts Of Buildings Containing Dwellings Etc.

38. Reverberation describes how long sound takes to die away after the source has stopped. By paying attention to the control of reverberation in the common internal parts of blocks of flats and buildings containing rooms for residential purposes it is possible to prevent excessive build up of sound in corridors, stairwells and hallways and so reduce the noise transmitted to adjoining residential rooms.

39. The guidance has been provided in terms of the amount of absorption required rather than a target reverberation time. This overcomes the practical difficulties of determining compliance with a target reverberation time in awkwardly shaped spaces.

4.4 Inter-Dependence of Sound Insulation Requirements

40. Although this RIA reviews the need for each of the changes on an individual basis it is important to appreciate that Requirements E1 - E3 will act together to change the noise environment in buildings. For example, if steps are taken to improve the sound insulation between dwellings then occupants may notice noise sources within a dwelling more readily. Providing additional absorption in the common parts of blocks of flats will help to improve insulation between flats as well as prevent build up of noise in the common parts. The guidance has been drafted to take into account the interactions between the various issues.

[15] For example, inclusion of a particular new build wall construction in the current guidance is based on the following limits:

i. The mean value of individual airborne sound insulation tests on a number of specimens was at least

52 dB ($D_{nT,w}$).

ii. The ‘true’ performance of each of the test specimens was at least 49 dB ($D_{nT,w}$). The true performance of an individual wall is a notional quantity, corresponding to the mean value of a large number of tests carried out on it.

In the revised guidance the intention is that the ‘true’ performance of all individual walls should meet an improved minimum standard, with the consequence that the average ‘true’ performance will be in excess of this standard.

i. For masonry walls and concrete floors the new rating method generates values for airborne sound insulation that are generally about 5 dB lower than the current method.

ii. The nearest equivalent to the 49 dB standard would therefore be 44 dB using the new $D_{nT,w} + C_{tr}$ rating.

iii. The standard has then been raised by 3 dB and a 2 dB allowance made for measurement uncertainty as part of the pre-completion testing regime, to give the new minimum standard of 45 dB ($D_{nT,w} + C_{tr}$).

[16] On the assumption that the ‘true’ performance of a remedial treatment included in the current guidance would be 2 dB lower than the mean performance given in current Section 6.

[17] NHBC Standards – Chapter 6.3-D9, September 1999 edition

5. Risk Assessment

5.1 Overview

41. This section focuses on those amendments that address areas where the current requirements or guidance are now thought to be inadequate. They generally have a cost compliance implication. Those amendments that are considered to be cost-neutral or perhaps offering a cost saving are covered in detail in the Benefits section below.

5.2 Extent of reported problems

42. Data from the Chartered Institute of Environmental Health (CIEH) indicates that the number of complaints about domestic noise per million people has risen in the last twelve years. In 1987/88 the number of complaints was just over 1,500 per million people, but by 1997/98 the number of complaints about domestic noise had reached 5,051 per million people. The 1997/98 CIEH Report states that 148,006 complaints about domestic noise were reported from 225 responding local authorities. In the period between 1986 and 1996 the total number of domestic noise complaints has trebled, although the rate of increase has reduced during recent years. Part of the reason for the rise in noise complaints is thought to be due to changing lifestyles and rising expectations. Heightened awareness of the issue following increased media coverage may also play a part.

43. Data regarding reported noise problems was gathered during the 1996 English House Condition Survey (EHCS). This showed that over a third of households (7.0 million households) experienced problems with noise over the last year. Respondents to the EHCS who said they had problems with noise were then asked to identify the source of the noise. 67% (4.7 million) of all households having a problem with noise said that it originated from sources such as traffic, industry, etc. The remaining 33% (2.3 million) said that the noise was due to neighbours (either immediate neighbours, those in common areas or both).

44. EHCS data shows that occupants of flats (10.9%) report a higher number of noise problems from immediate neighbours than those living in houses (4.9%). Residents in detached houses (2.5%) report fewer problems than those living in semi-detached (5.3%) or terraced houses (6.1%). It appears that dwelling age does not have an effect on the extent of reported problems with no significant difference reported by occupants living in post 1980s dwellings compared to those living in dwellings constructed pre 1980.

45. Nearly 80% of the 2.3 million households that claimed that the noise was due to neighbours said that the noise was either wholly or partially the fault of the neighbours in question, and not solely a consequence of a flaw in the design of the building.

46. In summary the 1996 EHCS survey has shown that:

- 4.7 million households (24% of all households) were bothered by traffic, industry or other noises;

- 2.3 million households (12%) were bothered by noisy neighbours (either immediate neighbours, those in common areas or both);
- 1.6 million households (8.3%) were bothered by noise from neighbours and attributed it solely to the behaviour of the neighbours;
- 0.67 million households (3.4%) were bothered by noise from neighbours and attributed this solely to the poor design of the building or a combination of the poor design of the building and behaviour of the neighbours. In the case of conversions it was far more likely that the residents considered that the problem was due to poor building design.

47. NHBC field staff regularly receive complaints about poor sound insulation in new dwellings. For new buildings, those complaints received in the first two years are referred back to the builder to put right and only become formal claims if the builder defaults. For the years 1998/99 there were 163 formal claims processed for poor sound insulation between dwellings[18] and these are thought to represent the 'tip of the iceberg'. In many cases each formal claim will front many further sound insulation problems in similar buildings, where owners may be afraid of blighting their properties.

48. Perhaps the main survey on the subjective acceptability of sound insulation across separating walls was carried out by Langdon *et al*[19] and reported in 1982. Whilst the method of rating sound insulation has changed since the survey was published, the target standard is still about the same. The survey found that poor sound insulation was mentioned spontaneously by 20% of respondents, and that 24% of respondents in dwellings at or below the target standard ranked poor sound insulation as the most important of a list of nine housing defects. In response to another question approximately 25% of respondents in dwellings that attained the target standards rated the insulation as poor or very poor, whilst a further 25% rated the insulation as fair. Considerable annoyance was attributed to impact sounds such as footsteps and slamming doors in adjoining dwellings, and as the insulation against airborne sound improved so annoyance from impact sounds became more common.

49. A study undertaken by BRE[20] between 1992 and 1994 investigated complaints (mainly to local authorities and housing associations) about sound insulation between dwellings that had been approved under Building Regulations and that appeared to comply with the relevant design guidance in the current version of Approved Document E. The study found that, in the main, complainants lived in dwellings with sound insulation below the standard generally regarded as reasonable for Building Regulations purposes. Noise from amplified music, television, radio, domestic appliances (particularly washing machines, telephones, vacuum cleaners), footfalls, the slamming of doors and plumbing noises could all be heard in complainants' dwellings. The survey also found that some people were dissatisfied even when their home met current standards - although these complaints were often concerned with banging doors and other noises not controlled by regulations.

50. Since the BRE study was confined to dwellings where the occupants were dissatisfied it cannot be extrapolated to indicate what proportion of the total population are dissatisfied with the standard of sound insulation in their homes, nor to investigate what proportion of domestic noise complaints might be attributable to poor sound insulation. However, the study does provide evidence of non-compliance with current standards and that sound insulation problems do arise when non-compliance occurs.

51. BRE estimate that, in new dwellings, as many as 40% of new separating floors and up to 25% of new separating walls may fail to meet the current standards. The changes for new dwellings, particularly the pre-completion testing regime, are intended both to improve standards and to reduce the failure rate to below 5% over 10 years.

5.3 Health risks

52. There are a number of adverse effects that may result from exposure to noise in dwellings and rooms used for residential purposes. These include[21]:

- annoyance;
- disturbance of rest and sleep;
- psychophysiological effects;
- interference with speech communication;
- mental-health effects;
- performance effects;
- high blood pressure;
- stress;
- impediment to learning in young children;
- pre-term birth in pregnant women;
- effects on residential behaviour; and
- interference with intended activities.

53. Noise-induced hearing impairment is unlikely to occur in dwellings. For bedrooms the critical effect will usually be sleep disturbance and lack of privacy, but other effects will be more critical in other rooms depending on the individual concerned and the activity taking place. The effects of noise in the domestic environment are embraced by the WHO definition of health: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

54. Quantifying the health risks attributable to exposure to noise is difficult. Research on noise is normally concerned with effects on a population basis, but individuals differ considerably in the extent to which they are affected by noise. There are groups of people within the population for whom the population indicator 'no medical effect of noise' is incorrect. This could include groups more likely to spend long hours in the home such as young children, the sick, the elderly, the disabled and their carers.

55. Nevertheless, the BRE report *Building regulation and health*[22] suggests the number of extremely severe health risks per year in UK homes due to noise at between one and ten, these being suicides or assaults attributed to noise from neighbours. The number of less severe problems (such as stress, migraines, etc.) is estimated to be about 10,000 per year.

[18] NHBC. *Private communication*, August 2000.

[19] F. J. Langdon, I. B. Buller, W. E. Scholes*, Noise from neighbours and the sound insulation*

of party walls in houses. Journal of Sound and Vibration 79, pp2205-2228, 1981

[20] C. Grimwood, *Complaints about poor sound insulation between dwellings in England and Wales.* Applied Acoustics, Vol.52, No.3/4, pp.211-223, 1997.

[21] Medical Research Council *IEH Report on the non-auditory effects of noise*. Report R10, ISBN 1 899110 14 3, 1997.

[22] *BRE. Building Regulation and Health*. BRE Report 289, edited by G J Raw and R M Hamilton, 1995.

6. Options

56. Three options have been considered and are described below:

Option 1	*Do nothing*. Retain the current Requirements and the current version of Approved Document E.
Option 2	*Promote good practice*. The DETR (now ODPM) has supported the development of good practice guidance in this field for many years.
Option 3	*Adopt the amendments to Part E*. This means adopting the three Requirements E1, E2 and E3 which will apply to new dwellings and rooms for residential purposes whether purpose built or created as a result of material change of use, adopting Requirement E4 which applies only to schools and adopting the revised Approved Document E.

6.1 Issues of equity and fairness

57. The current arrangement by which occupants and building owners seek to obtain redress for poor sound insulation is recognised to be unsatisfactory. It is difficult to retrospectively apportion blame for sound insulation defects that only become apparent once the dwelling is occupied. It is also difficult, and more expensive, to apply retrospective remedial treatment in an occupied property.

58. There is some evidence to suggest that the current arrangements are socially inequitable with improved standards of sound insulation only being available to those who complain, or who take legal action, or those who are fortunate enough to have responsible landlords or to be living at the luxury end of the market. The current lack of sound insulation testing means that little performance information is available, even to informed prospective occupants.

7. Benefits

7.1 Option 1 - Do nothing

59. Many householders attribute noise problems to poor building design. There is also evidence of a lack of compliance with current Building Regulations and that this lack of compliance results in complaints about poor sound insulation. This evidence supports the raising of standards of sound insulation. For all the reasons already referred to, including improvements in living standards, changes in lifestyles, rising expectations, and current Government housing policy, it is considered that to continue with the current Requirements and Approved Document is unsustainable. The 'do nothing' option would do nothing to stem the rising trend in reported noise problems. Rather than delivering benefits the 'do nothing' option would mean that the situation would probably deteriorate. A discussion of the costs of Option 1 is given in Section 8.

7.2 Option 2 - Promote good practice

60. The DETR (now ODPM) has for many years adopted a policy towards sound insulation which has involved a combination of good practice guidance and minimum standard regulation. Once again, the evidence presented earlier shows that this approach has not been entirely successful. There are many BRE Reports, Digests and Information Papers available that provide good practice advice. In recent years the DETR (now ODPM) has also supported the development of two good practice guides, with industry involvement, under the Partners in Innovation Scheme. The first of these guides[23] was intended to reduce the risk of poor sound insulation and the second[24] is a guide to specifying enhanced sound insulation. Whilst some developers have voluntarily begun to adopt higher standards of sound insulation in the specification of new housing developments, there is little evidence available to demonstrate widespread application of good practice guidance. It appears that the guidance is only used by certain sectors of the industry and that this approach is essentially preaching to the converted.

61. A better resourced dissemination of good practice guidance might help to increase take up. However, experience with sound insulation codes of practice that have been more widely adopted shows that enforcement problems would remain. An example would be the problems in the conversion sector, where prior to 1991 there were a number of voluntary codes in common use. Many of these codes had deficiencies in the advice they gave, but most importantly they had no mechanism for ensuring compliance. The result is a legacy of poor conversions from the 1980s, regular legal actions on behalf of occupants, and continuing complaints about poor sound insulation from the occupants. The Building Regulations were extended in 1991 to specifically deal with the problems arising from an over reliance on good practice guidance in this sector.

62. Therefore it is considered that a reliance on the promotion of good practice, which would essentially be a development of the current approach, would deliver socially inequitable benefits, coupled with probable poor take up and associated problems arising from there being

no mechanism for enforcement. A discussion of the costs of Option 2 is given in Section 8.

7.3 Option 3 - Adopt the amendments to Part E

63. Adopting the Requirements and Approved Document will create a level playing field that will improve sound insulation in a socially equitable manner, which in turn will help to address the health issues associated with exposure to noise and the rising trend in reported noise problems.

64. A number of the amendments within Option 3 are cost-neutral since they involve the transfer of existing controls to Building Regulations (Requirement E4) or because they standardise current good practice. Requirement E2(a), for example is developed from a requirement of the warranty companies who cover some 90% of new dwellings. Further, some of the changes to support new Requirement E1 are revisions to the structure and content of the Approved Document in response to feedback from users, changes in construction good practice, complaints from building occupants and changes in British and European Standards. These are also considered to be cost-neutral.

Requirement E1 - *Changes resulting from the extended scope of Requirement E1*

65. Extending the scope of Requirement E1 to include rooms used for residential purposes is compatible with the intention of the current Requirement (see Section 4.1) and is socially more equitable in that it provides protection for a wider range of buildings where people may sleep, rest and engage in normal domestic activities. Extending the scope also ensures that Part E is more in step with the government's recent housing policy initiatives (see Section 2.2).

Requirement E1 - *Measures to improve sound insulation and measures that improve compliance with the Requirements*

66. These amendments are best considered in conjunction. The new performance standard and the measures to improve compliance with the Regulations together will improve the overall sound insulation performance of dwellings. The constructions included in the current version of Approved Document E are intended to meet a 'true' performance value for walls and floors of 49 dB and 48 dB respectively. However, field test data show that there is a wide range of performance for some of the constructions included in the current guidance and that examples of non-compliance occur. As explained in Section 4.1, the new minimum performance standards for the airborne sound insulation of walls and floors involve an increase of at least 3 dB and 4 dB respectively. Further, the introduction of the pre-completion testing regime will ensure these minimum standards are met.

67. As discussed in Section 5.2 Langdon *et al* undertook studies in flats during the early 1980s where the sound insulation performance of walls and floors was measured and then related to the occupant rating of their performance. It was found that occupant satisfaction was positively correlated with sound insulation performance despite a number of confounding factors. Data from these studies remain one of the few sources available to give some indication of the anticipated improvement in occupant rating as a result of an increase in sound insulation performance.

68. On the basis of these studies an estimate of the anticipated overall occupant satisfaction ratings for walls and floors based on the standards in the current and revised Approved Document are given in Table 2. In preparing Table 2 it has been necessary to extrapolate data outside the performance range of the original Langdon data. It must also be borne in mind that the Langdon work is over 20 years old and that improvements in living standards and changes in social attitudes and lifestyles have occurred since the interviews took place. Despite these limitations, Table 2 presents a best estimate of the likely outcome of the revised sound insulation standards.

Table 2:	Change in occupant satisfaction ratings arising from improvement in airborne sound insulation performance of walls and floors in flats (1982 data)	
	Proportion of occupants rating sound insulation as:	
Building element	**Poor or Very poor**	**Good or Very good**
Floors		
Current	30%	40%
Revised	5%	85%
Walls		
Current	35%	35%
Revised	10%	60%

69. More recently, Grimwood and Tinsdeall[25] have undertaken a social survey and analysis involving the occupants of converted flats. A series of over 200 field measurements of sound insulation were conducted between 1993 and 1997 in a sample of converted and refurbished flats; occupants were subsequently interviewed during 1998. An analysis, similar to that used by Langdon, was applied to a subsample of interviews, where the remedial treatment applied to the separating floor had followed guidance in the current Approved Document E.

70. On the basis of this study the anticipated overall occupant satisfaction ratings for floors based on the standards in the current and revised Approved Document are given in Table 3.

Table 3:	Change in occupant satisfaction ratings arising from improvement in airborne sound insulation performance of floors in converted flats (1998 data)	
	Proportion of occupants rating sound insulation as:	
Building element	**Poor or Very poor**	**Good or Very good**
Floors		
Current	50%	20%
Revised	40%	30%

71. Support for adopting the new $D_{nT,w} + C_{tr}$ rating has come from a subjective listening experiment carried out under controlled laboratory conditions as recently reported by Wright and Fothergill[26]. The tests simulated the situation in which a flat is situated above a pub or bar which plays amplified music and allowed the effect of typical floor constructions and low frequency insulation performance to be investigated. Subjects were asked to provide ratings of acceptability of the level of a series of amplified music stimuli. Use of the new $D_{nT,w} + C_{tr}$ rating markedly improved the strength of the relationship between subjective acceptability and the insulation rating. An increase of 3 dB in the new rating was associated with a clear reported improvement in acceptability.

72. Tables 2 and 3 give some indication of the benefits that will result from the introduction of the revised standards. The tables indicate that the proportion of occupants rating sound insulation as either poor or very poor will fall, whilst the proportion of occupants rating sound insulation as either good or very good will rise.

73. It has to be noted that the revised standard is not intended to provide protection from unreasonable levels of noise. However, there is also some acceptance that the current standards are set close to a threshold of noise audibility where certain everyday sounds such as that from normal conversation and listening to the TV or radio at a reasonable level are only just audible. The improvements to sound insulation will help to ensure that many of these reasonable everyday sounds that might currently just be heard will become inaudible. Achieving such a step change in the audibility of everyday noises may well provide significant additional benefits.

74. Clearly, this improvement in occupant satisfaction rating may well correspond to a reduction in noise complaints and an improvement in health of a significant proportion of the population, although the precise extent is difficult to quantify on the available data.

75. The pre-completion testing regime would not only contribute to improving compliance with required standards. The testing regime would also offer an opportunity for an extensive database of sound insulation performance to be developed. The database would allow information to be fed back to the industry (both developers and enforcement bodies) in a useful manner. Ultimately, the database would allow poorly performing constructions to be identified and removed from the Approved Document, as well as providing a route whereby new and innovative constructions can prove their field performance and be added to future revisions of the Approved Document.

Requirement E2 - *Protection against sound within a dwelling etc.*

76. Requirement E2(a) has been developed from an existing NHBC requirement (see Section 4.2) and seeks to standardise and extend current good practice regarding the standard of sound insulation of internal walls. Requirement E2(a) will reduce disturbance for people in rooms designated as bedrooms and protect the privacy of persons using toilet facilities. Requirement E2(b) extends the principle to improve the sound insulation of all internal floors. Requirement E2 will also apply to rooms for residential purposes.

77. The benefit of these changes is that they will enable homes to provide occupants with more flexible accommodation that has a level of sound insulation more appropriate to the current extended use of bedrooms. Social changes have meant that bedrooms are increasingly being used as a 'home within a home' with a wide range of electronic equipment (e.g. stereos, televisions, computers etc.) being used, all of which can be a noise nuisance to others in the house as well as occupants in adjacent dwellings. Further, the move towards home-working has meant that bedrooms are frequently used as offices which in turn leads to the need to insulate that room from the rest of the house. It should also be noted that the concrete beam with infilling block floor construction has been included as an internal floor, rather than a separating floor, in the revised Approved Document. Use of this floor construction would provide an additional benefit in terms of improved fire resistance within dwellings.

78. The amendment helps Part E to address the Government's strategy for sustainable

construction as it involves designing with more flexibility and meeting people's social needs and aspirations. The amendment also brings Part E more into line with European building standards. For example, Germany, Netherlands, Belgium and Portugal all require some level of internal sound insulation in their building codes.

Requirement E3 - Reverberation in the common internal parts of buildings containing dwellings etc.

79. Requirement E3 involves the provision of acoustically absorbent material in the common areas that give access to flats and rooms for residential purposes. The benefits are:

- the build up of reverberant sound in these common access areas will be reduced;
- noise transmitted from common areas to adjoining residential rooms will be reduced, requirements for absorption will be uniform across the country; and
- accessible technical guidance will be available on this subject for the first time.

80. The amendment helps Part E to address current government policy initiatives on housing as set out in PPG3 and brings Part E more into line with European building standards. For example, Germany, Netherlands, Denmark and Norway all require some level of control over reverberation time in their building codes.

7.4 Valuation of the benefits of Option 3

81. The preceding discussion has sought to present the benefits of adopting Option 3 in both a qualitative and, as far as practical, in a quantitative manner. The WHO[27] advocates that cost-benefit analysis should only be applied with caution in the noise field and that it should 'never be used as the sole and overriding determinant of decisions'. Further, the WHO also state that 'there is a tendency to overestimate the cost of control action and underestimate the benefits' due to different levels of knowledge of the costs and health effects. The extent to which it is reasonable to attempt to quantify the benefits of Option 3 in financial terms is clearly debatable and the figures in the following paragraphs are speculative and should be considered in this context.

82. There appear to be very few cost-benefit studies that attempt to value the benefits of improving sound insulation between dwellings. One such study[28] concluded that around 60% of the population of Sweden were willing to pay on average a 10% higher rent if the sound insulation of the dwelling could be improved. The report estimated that insufficient sound insulation cost Swedish society around 7,500 million SEK per year (about £630 million).

83. However, in the transport noise field, particularly in France, Germany, Switzerland and the Scandinavian countries there has been some research on the use of a monetary value of noise in cost-benefit analysis. In France[29], for example, revealed preferences studies applied to the housing market have shown that each additional decibel of noise pollution reduces the value of real estate by about 1%. Assuming it was reasonable to apply these sort of figures to improvements in sound insulation, then the 3 dB improvement in standards for dwelling houses would correspond to 3% of the value of the attached housing stock, producing a benefit of the

order of £160 million. These countries also typically account for the direct costs of noise (due to stress, annoyance etc.) by adding a further 50% to this figure - so total benefits of about £240 million would result from applying these techniques.

84. Alternatively, some of the benefits of Option 3 can be valued using the time off work and cost to the NHS that may result from noise induced cases of stress. The report '*Building Regulation and Health*'[10] suggests that 100,000 such cases may result each year. If we assume that the Part E changes might prevent say 20% of these cases taking 5 days off work over the course of a year and with, say, an average salary of £20K and a cost to the NHS of £500 per case then the resulting benefit would be of the order of £18 million.

85.The same report states that up to 10 people a year are killed as a result of noise problems. If it is assumed that the changes to Part E could save 2 lives a year, and adopt the valuation of a life used by the DfT for road traffic accidents, then further benefits of £1.6 million would result.

86. In a national noise attitude survey conducted in England and Wales during 1991 some 2% of householders said that they were prepared to move because of noisy neighbours. If we assume that 1% of new households in attached dwellings, i.e. about 800 households (see note to Table 4), would actually move because of noise, at a cost of £5K per move, then the annual benefit would be of the order of £4 million.

87. A different approach to estimating the financial benefits that could result from the amendments is to look at the avoided costs of the remedial treatment that is required where sound insulation problems are corrected after occupants have moved in. For example, there has recently been a block of 40 purpose built flats where remedial work to the value of £1 million was undertaken[30] at an average cost per flat of £25K. More typically the additional cost of retrospective remedial work in a small flat conversion might vary between £1K - £10K per flat. This cost cannot be grossed up to provide a national figure because the required information is not available.

88. This attempt to value the benefits of Option 3 provides speculative estimates ranging from £24million (paragraphs 85, 86 and 87) to about £240 million (paragraph 84). These figures should be considered in conjunction with the qualitative and quantitative estimates of the benefits of Option 3 that are presented in Section 7.3.

[23] BRE. *Quiet Homes – a guide to good practice and reducing the risk of poor sound insulation between dwellings.* BRE Report 358, edited by BRE and Wimtec Environmental, 1998

[24] BRE. *Specifying dwellings with enhanced sound insulation.* BRE Report BR406, edited by Wimtec Environmental and BRE, September 2000

[25] C. J. Grimwood and N. J. Tinsdeall, *Occupant opinion of sound insulation in converted and refurbished dwellings in England and the implications for national Building Regulations*, Proceedings Euronoise ’98, pp 705 – 710, 1998

[26] P. Wright and L. Fothergill, *The spectrum adaptation terms in BS EN ISO 717-1:1997*, Acoustics Bulletin, Vol 23 No 6, December 1998

[27] WHO. *Guidelines for Community Noise*, 2000

[28] S. Wibe. *The demand for silent dwellings (in Swedish)*, 1997. ISBN 91 540 5780 9

[29] J. Lambert. *Using monetary values of noise for transport policy decisions*, Proceedings of Internoise 2000.

[30] NHBC. *Private communication*, September 2000

8. Compliance Costs

89. There are no additional costs associated with Option 1 but it is felt that to 'do nothing' would contribute to a worsening of the situation for the reasons given in Section 7.1. An indication of the likely financial consequences resulting from the 'do nothing' option could be derived from the unrealised benefits associated with Option 3 that are discussed in Section 7.4.

90. In order to estimate the costs of Option 2 it is necessary to make a number of assumptions. For example, if £1million were invested to promote similar design guidance to that envisaged in the revised Approved Document then the cost of the enforcement regime would be avoided. However, in the absence of the enforcement regime then the rate of take up and rate of compliance with the guidance would be much less, perhaps say 20% of the industry would voluntarily improve standards and, perhaps 10% would comply with the intended standard. At first glance, costs would appear to have been reduced by approximately 80%. However the costs of the unrealised benefits have also to be included since 80% of new dwellings would not be affected at all by the adoption of Option 2, and a further 10% would not meet the intended standard. Further, the costs (and benefits) of Option 2 would be distributed in an inequitable manner both within the industry and within society since voluntary codes would not be followed by all.

91. Options 1 and 2 are not considered to be viable options for the reasons given above. Therefore this Section presents an estimate of the additional costs of Option 3.

8.1 Business sectors affected

92. The proposals discussed are wide ranging and would affect several sectors of the building industry including builders, developers, designers, manufacturers, and building control bodies. Some sectors would be affected by national sound insulation requirements for the first time, particularly those sectors covered by the definition of rooms for residential purposes (which include hotels, boarding houses, hostels, student accommodation, nurses' homes and elderly persons' homes). Charities would be affected in their role as social landlords and the effect of the new Requirements on the social housing sector has been specifically examined during the consultation period (see Appendix C).

8.2 Consultation with small business

93. The Small Business Service has been formally consulted. The impact of the amendments on small business has also been assessed during the consultation process. The amendments have received a mixed response from small businesses. Some consultees have welcomed the level playing field and quality assurance aspects of the amendments and commented that the move to a performance standards based approach would encourage the development of new techniques. A common concern was that small businesses would not be as aware of the risks involved in using certain constructions as larger companies and for this reason small businesses strongly support the collation and feedback of sound insulation test data to the

construction industry. Some consultees have been concerned about the cost of the required changes in construction practice and the cost of the pre-completion testing regime and felt that this cost would fall disproportionately on small businesses. This issue has been examined during the consultation period and typical costs for small developments have been estimated and included in Appendix C.

94. As a result of the small business consultation exercise the operation of the pre-completion testing regime has been thoroughly reviewed by the BRAC Technical Working Party in order to try and reduce the burden on small businesses. This review has included consideration of alternatives to pre-completion testing, such as introducing robust details and using supervision from acoustic consultants.

95. The Working Party has also received improved information from NHBC and the House Builders Federation (HBF) regarding house types and typical site sizes and, as a consequence, has acknowledged that the costs of the pre-completion testing regime will be greater than at first estimated.

96. After considerable debate, the Working Party has endorsed the operation of a slightly revised pre-completion testing regime as detailed in Section 1 of Approved Document E and further recommended that the status and importance of pre-completion testing should be clarified. The reference to the need for pre-completion testing that was previously contained in Section 0 is now contained in a new Regulation. The Working Party has been unable to identify suitable ways of reducing the cost of the testing regime without compromising the objectives and has subsequently accepted a revised estimate of the costs involved.

8.2 Non-recurring costs

97. Those who are affected by implementation of the amendments will have, as a non-recurring cost, to acquaint themselves with the new provisions and where necessary to invest in appropriate professional and technical training.

8.3 Recurring costs

Requirement E1 - *Changes resulting from the extended scope of Requirement E1*

98. The main additional cost in this category of change would arise from the extension of the Requirement to cover rooms for residential purposes. There is little reliable data on the number of such rooms that are created each year. However it is reasonable to assume, in the absence of current guidance, that a large proportion of purpose built rooms for residential purposes will currently be designed to meet the current sound insulation standards for dwellings. Some such rooms, for example in modern hotels, will be designed to exceed current sound insulation standards for dwellings. The requirement will also apply to rooms for residential purposes created as a result of a material change of use. The number of such conversions is likely to be small in comparison with the number of new build dwellings, although numbers may grow as a result of changes in housing policy. In Table 4 an estimate has been made of the potential national cost to this sector on the basis that it is 5% of the total cost to the traditional dwelling sector (i.e. 5% of the £36 million estimate derived below) covered by the current Approved

Document.

Requirement E1 - *Changes to the structure and content of Approved Document E so as to improve sound insulation*

99. Requirement E1 will only affect attached dwellings, i.e. semi-detached and terraced houses and flats. In order to calculate the overall cost of compliance representative models of these three house types were considered and the areas of separating floors and flanking and separating walls calculated. In the current and the revised Approved Document there are a range of constructions that can be used for each of these walls and floors and so the cost of building these constructions to the current and revised guidance were obtained from a quantity surveyor.

100. The frequency of occurrence of the construction types for separating floors and flanking and separating walls as specified in the current Approved Document were obtained from a survey of 27 large and small house builders. The builders surveyed are responsible for constructing over 36,000 units per year (covering both the private and social sectors) which is over 20% of the total number of houses built each year in England and Wales. It is therefore considered to be a representative sample.

101. The compliance cost for this category was estimated by calculating the cost of moving from the current range of common constructions to the anticipated new situation. A judgement was made as to the changes in building practice that would result from the changes to the constructions in the revised Approved Document. The compliance cost has been adjusted to reflect the true additional cost of improving standards because not all examples of current constructions meet the existing standards.

102. On the basis of this calculation it is estimated that the increase in wall construction costs for a typical pair of terraced and semi-detached houses is about £100. It is estimated that there will be no overall increase in the costs of wall construction in flats, because slight increased costs resulting from restrictions on the use of certain concrete blocks in flanking walls (the new Approved Document proposes a minimum mass per unit area 120 kg/m^2) have been offset by changes in external wall design resulting from the Part L revisions. The estimated cost for floors in flats varies depending on the type of new construction chosen, the typical cost increase will be about £1,500 with a range of £500 to £3,000 per dwelling.

103. Another reason for these small cost changes is that the new Approved Document proposes an increased use of plaster finish to masonry walls, replacing the current widespread use of plasterboard. Research has shown that wet plastered walls have a better sound insulation performance compared to similar walls with a plasterboard finish. It is acknowledged that a wet plastered wall will require drying time, which may delay other trades (e.g. painters). However, the use of a wet plaster finish is cheaper than the use of plasterboard and is common practice in several countries.

104. These unit costs can be grossed up to a national level using DTI construction statistics on the annual rate of house building and NHBC data[31] on the incidence of the different house types. The annual total cost for walls will be £5.5 million, and that for floors will be £27.1 million.

105. It is more difficult to estimate the cost of compliance in the case of those dwellings created as a result of a material change of use, because it will depend on the type of building being converted. If the current building already meets the new requirements then the cost of compliance will be zero. More commonly, the new guidance may result in a need to undertake some additional work above that required by the current Approved Document. In a typical house conversion this could involve, for example, lining flanking walls, which is estimated to cost about £380 per flat. BRE estimate that there are currently approximately 10,000 buildings converted a year. The national annual cost is estimated to be £3.4 million on an assumption that there would be, on average, 3 new dwellings created per conversion and that about 30% of these will require additional flanking treatment. Costs for rooms for residential purposes formed by material change of use are discussed earlier in this section.

Requirement E1 - *Measures that improve compliance with the Requirements*

106. The cost for these measures has been estimated primarily on the basis of the implementation of the pre-completion testing regime for separating walls and floors in attached dwellings. The regime was initially costed on the basis of just over 1 in 10 of new attached dwellings being tested together with an allowance for administrative costs. This estimated cost has been revised based on improved information received during the consultation exercise from NHBC and the House Builders Federation (HBF) regarding house types and typical site sizes. The information received showed that small sites, with between 2 - 10 attached dwellings, currently make up about 10% of the total annual build of new attached dwellings. The frequency of pre-completion testing will therefore be considerably higher than 10% on these smaller sites. The information received also showed that it is now more common for several different house types to be built on larger sites, which will necessitate an increased frequency of testing on these larger sites. Overall, the revised estimate is that about 27% of new attached dwellings will be tested under the regime.

107. In order to determine the probable costs of pre-completion testing to builders seven acoustic consultants were surveyed on their likely charges for carrying out the required tests. Based on this survey, and the new information received from NHBC and HBF, the weighted[32] average cost of a set of tests for separating walls in attached dwelling houses will be about £260. In the case of flats, the weighted average cost will be about £840 where both airborne and impact tests are required on separating walls and floors and about £670 where these tests will be required on separating floors only.

108. The national annual costs can therefore be estimated to be £3.6 million for testing separating walls in attached dwelling houses, £2.4 million for testing flats with separating walls and floors and £0.6 million for testing flats with only separating floors. When combined with an allowance for the additional costs related to the administration and organisation of the testing this produces a total estimated annual cost for pre-completion testing of £7.1 million.

Requirement E2 - *Protection against sound within a dwelling etc.*

109. Standard representative housing models were used to determine the cost implications of Requirements E2(a) and E2(b), including models for a detached house and a bungalow. As before, unit costs were obtained from a quantity surveyor. It is estimated that the additional cost for walls between bedrooms and between bedrooms and other rooms will be small amounting to some £5 to £8 per dwelling. The additional cost for floors will be greater and will

range from £170 to £300 per dwelling, on an assumption that the improved timber floor construction will be most commonly used. If the industry were to adopt concrete internal floors more widely then costs (and benefits - such as improved fire resistance) would be higher.

110. The national cost for Requirement E2(a) is estimated to be £1 million. This figure is the grossed up additional cost of improving the sound insulation of internal walls between bedrooms and between bedrooms and other rooms. An allowance had been made for the aspects of this Requirement that are already current practice based on an existing NHBC requirement (See Section 4.2).

111. The national cost for Requirement E2(b) is estimated to be £27.6 million. This reflects the fact that the whole of the first floor area (rather than just the bedroom floors) for every new dwelling (rather than just attached dwellings) will need to be improved in order to comply with this Requirement.

Requirement E3 - *Reverberation in the common internal parts of buildings containing dwellings etc.*

112. The cost of Requirement E3 has been estimated on the basis of assumptions about the layout of typical blocks of flats and the areas of entrance halls, corridors, hallways, stairwells and stair enclosures. An absorptive material, for example a proprietary acoustic ceiling, could be applied in these areas to control reverberation and representative prices were obtained from a quantity surveyor. On the basis of these assumptions it is estimated that this amendment will increase building costs by about £350 per flat. This equates to an annual national cost of about £8.1 million. In Table 4 we have also included an estimate of the potential national cost for rooms for residential purposes and material change of use on the basis of 5% of the total cost for flats.

8.4 Possible Future Scenario

113. The cost and benefit estimates presented above relate to current house building policies. As sound insulation problems of the type addressed by Requirement E1 occur only in attached dwellings and rooms for residential purposes, the costs and benefits depend on the number of attached dwellings and rooms for residential purposes being built each year.

114. As Requirement E2 relates to internal sound insulation, it is affected by the total number of units built, but is less affected by the mix of dwelling types. Requirement E3 applies to flats and similar accommodation and so is strongly affected by the number of flats being built.

115. Currently there are about 160,000 housing units built annually. However, because of the policies set out in PPG 3, the mix of attached, detached and flats is likely to change in the future. The ODPM Planning Directorate judges that the mix will vary between local planning authorities, depending on local circumstances, and they do not have numerical estimates of the future mix. However, the House Builders Federation (HBF) has prepared an estimate and the current mix and a future scenario anticipated by the HBF is set out below.

Type of dwelling	Current (1999)[33] %	Future (2005)[34] %
Detached	50	15

Attached	35	42.5
Flats	15	42.5

116. Clearly, the costs and benefits could be considerably different in the future under this HBF scenario.

8.5 Estimate of Future Costs (HBF Scenario)

117. For Requirement E1 the current building cost estimates given in paragraph 105 would be increased as follows:

- The annual cost of walls will increase from £5.5 million to £5.9 million
- The annual cost of floors will increase from £27.1 million to £83.9 million

118. For Requirement E2 the current building cost estimates given in paragraphs 111 and 112 would be increased as follows:

- For E2(a) the annual cost of walls will decrease from £1.0 million to £0.9 million
- For E2(b) the annual cost of floors will decrease from £27.6 million to £18.0 million

119. For Requirement E3 the current building cost estimates given in paragraph 113 would be increased as follows:

- The annual cost would increase from £8.5 million to £22.8 million.

120. The cost of pre-completion testing given in paragraph 109 could increase from £7.1 million to £22 million under this HBF scenario.. However, if sound insulation performance improves as expected, it is likely that the frequency of testing will decrease to a low level with a proportionate reduction in cost.

8.6 Estimate of Future Benefits (HBF scenario)

121. The estimated increase in the numbers of attached houses and flats increase the potential for complaints about hearing noise from neighbours, and so increase the need for the amendments to Part E. Under the HBF future scenario the estimated benefits will increase as follows.

The annual benefits estimated by the method given in paragraph 84 will increase from £240 million to £408 million.

The annual benefits estimated as in paragraphs 85 - 87 will increase from £24 million to £40

million.

8.7 overview of costs and benefits

122. Under current conditions the annual total costs are about £82 million, with speculative benefits ranging from £24 million to £240 million. These are the figures given in Table 4. Under the HBF future scenario the costs could increase to £161.7 million while the range of speculative benefits also increases to between £40 million - £408 million.

123. The range of annual costs is therefore between £82 million and £161.7 million while the benefits are between £24 million - £408 million depending on assumptions made about the mix of dwelling types in any future scenario.

124. The range of the estimated annual costs to address the problems of noise in dwellings and other rooms used for residential purposes represents approximately 0.8% of the current total annual selling price of new homes in England and Wales.

[31] NHBC. *New House Building Statistics – Quarter 3,* 1999

[32] Weighted to take account of typical site size and the typical number of different house types per site.

[33] NHBC. *New House Building Statistics – Quarter 3*, 1999

[34] HBF. *Private communication*, November 2001

9. Summary and Conclusion

125. Table 4 contains a summary of the costs and benefits for each of the Requirements under current conditions.

Table 4:	Summary of costs and benefits of new requirements in Part E.		
	Unit cost	**Annual national cost**	**Benefits**
Requirement E1(a)			*Qualitative benefits* *(examples only)* *Improves sound insulation (particularly at low frequencies). Improves acoustic quality.* *Affects wider range of domestic buildings.* *Improves compliance with required standards.* *Reduces complaints about neighbour noise.* *Improves privacy within dwellings.* *Reduces annoyance and sleep disturbance.* *Creates level playing field for developers.* *More socially equitable,* *Better aligned with current Government housing policy and*

Walls	£0 (flat) - £100 (semi-detached)	£5.5	million	*Strategy for Sustainable Construction.* *Quantitative benefits* *Reduces proportion of occupants rating sound insulation as poor or very poor and increases proportion rating insulation as good or very good (see Tables 2 and 3)* *Currently 25% of new walls and up to 40% of new floors are estimated not to meet current standards - these proposals should reduce the failure rate to below 5% over 10 years.* *Valuation of benefits* *Speculative estimates ranging from £24M to about £240M have been presented but these must be applied with care.*
Separating floors	£1,500 (range: £500 to £3,000)	£27.1	million	
Material change of use (dwellings)	£130	£3.4	million	
Rooms for residential purposes	-	£1.8	million	
Subtotal E1(a)	**-**	**£37.8**	**million**	
Requirement E1(b) *Pre-completion testing regime*				
Attached dwelling houses	£260	£3.6	million	
Flats (walls & floors)	£840	£2.4	million	
Flats (floors only)	£670	£0.6	million	
Additional costs	-	£0.5	million	
Subtotal E1(b)	**-**	**£7.1**	**million**	
Requirement E2(a)	Walls: £5-£8	**£1.0**	**million**	
Requirement E2(b)	Floors: £170 to £300	**£27.6**	**million**	
Requirement E3				
Flats	£350 per flat	£8.1	million	
Rooms for residential purposes	-	£0.4	million	
Subtotal E3	-	**£8.5**	**million**	
Requirement E4	-	**Cost-neutral**		
TOTAL COST **E1 - E4**	-	**£82.0**	**million**	

Note:

In order to derive these figures it has been necessary to estimate the annual build rate of different house types using DTI construction statistics and NHBC data. These data shows that in England and Wales there are about 160,000 dwellings built per year, which includes 80,000 detached dwellings and a comparable number of attached dwellings (e.g. semi-detached, terraced, flats and maisonettes).

b. Requirement E1 only applies to attached dwellings and rooms for residential purposes. The requirement for separating floors within E1 only applies to flats and maisonettes. Detached dwellings are only affected by E2.

126. It has been argued that Option 1 'Do nothing' would do nothing to stem the rising trend in reported noise problems and would mean that the situation would probably deteriorate. Option 2 'Promote good practice' would be a development of the current approach, but the current approach has been shown not to be entirely successful. Option 2 would deliver benefits but these are likely to be socially inequitable. When this 'promote good practice' approach is coupled with probable poor take up and associated enforcement problems it is considered to be unsustainable.

127. It is clear that there is dissatisfaction with the current sound insulation performance in new dwellings and conversions, with particular problems arising from the transmission of low frequency sounds, such as the bass beat from music. Improvements in living standards and changes in social attitudes and lifestyles appear to be associated with an increase in complaints about noise. Social surveys and field measurements indicate that the problem is due both to current implicit target values being set too low and because the target values are not achieved consistently. There is evidence that noise in dwellings can adversely affect health, particularly causing annoyance and sleep disturbance, for a considerable number of people. There is a potential for conflict between aspects of current housing policy and rising public expectations. These are the key issues that measures contained in Option 3 seek to address.

128. It is considered that Option 3 meets the overall objective of securing reasonable standards of health and safety for persons in or about buildings in respect of the passage of sound, without imposing disproportionate bureaucracy and costs. The Department will review the operation and costs of the new arrangements once they have been introduced in order to ensure that sound insulation between dwellings and rooms for residential purposes has improved as anticipated.

10. Contact point

129. Enquiries and comments regarding this section of this Regulatory Impact Assessment should be addressed to:

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Appendix A: Summary of main changes made in response to comments received on draft proposals.

Changes to the Requirements

Guidance on the need to carry out pre-completion testing, previously contained in Section 0, has been replaced with a new Regulation.

The wording has been clarified so that Requirement E2(a) covers internal walls and E2(b) covers internal floors. The scope of E2(a) has been extended slightly to include some additional internal walls in rooms designated as bedrooms and rooms containing a wc.

The proposed Requirement E3 'Protection against noise from external sources' has been removed following legal advice that the proposals were not workable without changes to the Town and Country Planning Act 1990. The proposed Requirements E4 and E5 have been renumbered as E3 and E4 respectively.

Changes to consultation draft of Approved Document E

Changes to Section 0 - Performance

- Paragraphs 0.1 and 0.2 have been amended to reflect the changes to Requirement E1
- A new paragraph 0.3 has been added to say that 'Sound insulation testing should be carried out by a test body with appropriate third party accreditation. Test bodies conducting testing should preferably have UKAS accreditation (or a European equivalent) for field measurements'. This does not preclude other bodies offering a suitable accreditation system.
- Paragraph 0.5 has been amended so that the test and declare option that applied to listed buildings now applies to 'historic' buildings. Historic buildings have also been defined for the purposes of Approved Document E.
- Diagrams 0-2 and 0-3 have been amended to match the revised Requirements E2(a) and E2(b).

Changes to Section 1 - Pre-completion testing

- Additional guidance has been given on the operation of the pre-completion testing regime. In particular, in Paragraphs 1.34 - 1.36, the guidance elaborates on the procedure that should be followed after a wall or floor has failed a test.
- The guidance that building control bodies should have 2dB discretion when determining the need for appropriate remedial treatment contained in the original Paragraphs 1.30 - 1.32 has been removed in the revised Paragraphs 1.37 - 1.39.
- Paragraph 1.42 has been amended to refer to historic buildings.

- A new Paragraph 1.43 has been added to standardise the reporting of test results.

Changes to Section 2 - Walls

- The main editorial change is the addition of text at the beginning (2.2) to explain that the guidance is not comprehensive and that other designs, products and materials can be used - provided manufacturer's advice is sought. This advice is repeated where generic products are referred to but proprietary products or systems are available - such as blocks with voids (2.13), plasterboard/foamed plastic laminates (2.14) and cavity fill materials (2.28).
- A new separating wall (Wall Type 2.4) constructed from aircrete has been added for use only in constructions without separating floors and where there is a step and/or stagger between adjoining dwellings. Use of aircrete inner leaves has been extended, and aircrete internal walls for use in conjunction with separating Wall Types 2.3 and 2.4 have been added in Section 5.
- To improve clarity, new diagrams to illustrate cavity stops (e.g. Diagram 2.5), window aperture size (Diagram 2.8) and staggers (Diagram 2.20) have been added.
- The Wall Type 4 junction details have been amended slightly by the addition of a ring beam option (see e.g. 2.152).

Changes to Section 3 - Floors

- The main changes are made to the guidance on ceilings (starting at 3.16). Resilient channels have been removed from Type B specification and grouped with timber battens which has allowed Ceiling Types C and D to be merged as Type C.

Changes to Section 4 - Material change of use

- Only minor editorial changes have been made to this Section.

Changes to Section 5 - Internal walls and floors

- Internal wall Type D, built from aircrete, has been added (Diagram 5.4).

Changes to Section 6 - Rooms for residential purposes

- More emphasis has been given to the fire regulations when the separating wall does not extend to the roof (6.13 - 6.15).

Changes to Section 7 - Building envelope insulation

- This Section has been removed and subsequent Sections have been renumbered.

Changes to renumbered Section 7 - Reverberation time

- Only minor editorial changes have been made to this Section.

Changes to renumbered Section 8 - Schools

- ODPM and DfES have decided that it would be better to include the targets and guidance on acoustics in BB 93 rather than BB 87 and the text has been changed accordingly.

Changes to Annex A - Method for calculating mass

- An additional calculation procedure for internal beam and block floors has been included (A5.2).

Changes to Annex B - Measurements

- An indicative target value for flanking laboratory tests has been included (B3.13). This can be used to show that flanking laboratory tests indicate that a novel construction would be worth field-testing. It is made clear that such a test does not override the need for pre-completion testing.

Changes to Annex C - Building envelope insulation

- This Annex has been removed and subsequent Annexes renumbered.

Changes to renumbered Annex C - Glossary

- Only minor editorial changes have been made.

Changes to renumbered Annex D - References

- Only minor editorial changes have been made.

Changes to the Regulatory Impact Assessment

- Appendix A has been added listing the main changes to the proposed Part E made in response to comments received on the draft proposals during the consultation exercise.
- Editorial amendments have been made throughout the RIA as a consequence of the changes made to the Requirements and to Approved Document E.
- Paragraph 22 has been amended as the Government ended the system where maintained schools were exempt from Building Regulations on 1st April 2001.
- Section 8.2 Consultation with Small Business has been added.
- The estimated cost of pre-completion testing has been revised to take account of general comments received during consultation and improved information received from NHBC and HBF regarding house types and typical site sizes.
- Section 8.5 - 8.8 has been added to reflect the mix of dwelling types anticipated by the HBF in a possible future house building scenario.
- Appendix C has been added examining the typical cost of the changes to small developments and the overall impact of the changes on the social housing sector.
- Section 10 Ministerial Declaration has been added.

Appendix B: Significant changes associated with Requirement E1 Protection against sound from adjoining dwellings or buildings etc.

Changes resulting from the extended scope of Requirement E1:

- 'Rooms for residential purposes' (includes hotels, boarding houses, hostels, student accommodation, nurses' homes and elderly persons' homes) are now covered by Requirement.
- New guidance on rooms for residential purposes in Approved Document E - Section 6.
- Vertical transmission of impact sound now covered by Requirement where a dwelling or a room for residential purposes is above another part of the same building that is not part of the dwelling above.

Bathroom walls now covered by Requirement where they are adjacent to other parts of the same building.

Measures that improve sound insulation:

- Introduction of an explicit (minimum) performance standard to replace the current need to infer the meaning of 'reasonable sound insulation' from the performance of the constructions described in the current Approved Document E.
- New performance standard increases the required level of airborne sound insulation for separating floors and brings it into line with that for separating walls.
- New performance standard set at a higher level than current implicit target values.
- New performance standard for airborne sound insulation adopts a new rating method that takes better account of the transmission of low frequency sounds.

Measures that improve compliance with the Requirements:

- Introduction of pre-completion testing regime to apply to new dwellings, material change of use and rooms for residential purposes.
- Encouragement of more frequent pre-completion testing for material change of use.
- Introduction of 'test and declare' system for material change of use.
- Explicit mention of need for attention to sound insulation requirements between adjoining residential and non-residential uses.

Major revision of the structure and content of Approved Document E:

- Technical changes to guidance on separating and flanking constructions in the Approved Document so that constructions remaining in the Document are likely to meet the performance standard and removal of those constructions that are less likely to meet the

performance standard:
  - e.g. reduced use of plasterboard finish on masonry separating walls included in Section 2 of Approved Document E;
  - e.g. lightweight blocks not included in Section 3 of Approved Document E for use in flanking walls in flats; and
  - e.g. concrete beam and block separating floors not included in Section 3 of Approved Document E.
  - e.g. additional aerated concrete block construction included in Section 2 (Wall Type 2.4) in order to increase the number of constructions that will also satisfy the revised Approved Document L.

- Revisions and restructuring to reflect the importance of flanking sound transmission.
- Restructuring so that constructions are ranked in order of performance (based on current available knowledge) within each separating wall and floor type.
- Alternative ceiling specifications given for separating floor type 2, again ranked in order of performance.
- Change from current generic descriptions of constructions and construction elements to performance standards, which encourage development of proprietary products, wherever current knowledge allows:
  - e.g. 'butterfly tie' now any wall tie meeting dynamic stiffness requirements;
  - e.g. use of proprietary floating floors (with floor type 2) provided they meet laboratory measurement requirements; and
  - e.g. plasterboard now described by mass per unit area rather than thickness.

- Updating to reflect changes in relevant Standards. In particular, the performance standards set using indicators from BS EN ISO 717-1:1997 i.e. $D_{nT,w} + C_{tr}$
- Supplementary guidance on acoustic measurement standards to clarify ambiguities in current Standards - Approved Document E - Annex C.
- 'Similar Construction Method For New Building' replaced by pre-completion testing.
- 'Test Chamber Evaluation For New Construction' replaced by pre-completion testing.
- 'Field and Laboratory Tests For Conversions' replaced by pre-completion testing.

Appendix C: The typical cost of the changes for small developments and the overall impact of the changes on the social housing sector

Typical cost of the changes for small developments

The following examples have been prepared to illustrate how the additional cost of the changes in construction practice and the introduction of pre-completion testing will affect small sites:

Example 1. A small site with one pair of semi-detached dwelling houses.

Requires 1 set of tests (walls only)
2 airborne tests @ £240 per test = £480
Thus cost of tests per dwelling is 480÷2 = £240
Increased cost of separating construction per dwelling = £50
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increased cost is £583 per dwelling

For dwelling houses, the increased costs are greatest on small sites like this.

Example 2. A site with 2 terraces each having 5 dwelling houses.

Requires 1 set of tests (walls only)
2 airborne tests @ £240 per test = £480
Thus cost of tests per dwelling is 480÷10 = £48
Increased cost of separating construction per dwelling = £50
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increased cost is £391 per dwelling

Example 3. A site with 1 terrace of 5 dwelling houses and 3 pairs of semi-detached dwellings.

Requires 2 sets of tests (walls only)
4 airborne tests @ £240 per test = £960
Thus cost of tests per dwelling is 960÷11 = £87
Increased cost of separating construction per dwelling = £50
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £285
Total increased cost is £430 per dwelling

Example 4. A small site with 1 block of flats having 1 ground floor flat and 1 first floor flat.

Requires 1 set of tests (floors only)
2 airborne tests @ £240 per test = £480
2 impact tests @ £300 per test = £600
Thus cost of tests per dwelling is 1080÷2 = £540

Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increased cost is £1298 per dwelling

For flats, the increased costs are greatest for small blocks of flats like this.

Example 5. A site with 5 blocks of flats each block having 1 ground floor flat and 1 first floor flat.

Requires 1 set of tests (floors only)
2 airborne tests @ £240 per test = £480
2 impact tests @ £300 per test = £600
Thus cost of tests per dwelling is 1080÷10 = £108
Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increased cost is £866 per dwelling

Example 6. A site with 1 block of flats having 2 ground floor flats and 2 first floor flats.

Requires 1 set of tests (walls and floors)
4 airborne tests @ £165 per test = £660
2 impact tests @ £300 per test = £600
Thus cost of tests per dwelling is 1260÷4 = £315
Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increased cost is £1073 per dwelling

The following example is given to illustrate typical costs with flats tested at the rate of 1 set of tests per 10 units and with a reduction in costs where there are multiple tests in the same block of flats.

Example 7. A site with 1 block of flats containing 78 flats.

Requires 8 sets of tests (walls and floors)
32 airborne tests @ £105 per test = £3360
16 impact tests @ £200 per test = £3200
Thus cost of tests per dwelling is 6560÷78 = £84
Increased cost of separating construction per dwelling = £750
Increased cost of internal walls per dwelling = £8
Increased cost of internal floors per dwelling = £0
Total increased cost is £842 per dwelling

Overall impact of the changes on the social housing sector

There is considerable concern in the social housing sector at the number of neighbour disputes

that relate to noise complaints and raising sound insulation standards has been an issue in the sector for some time.

In the example calculations shown above, the construction related compliance cost has been estimated by calculating the cost of moving from the current range of common constructions to the anticipated new situation. In order to ensure reasonable standards of sound insulation several registered social landlords already tend to use better performing constructions than many speculative small builders. Also, the cost of sound insulation testing has been shown as an additional cost, although many of the larger social landlords already conduct pre-completion testing on their sites.

Because of these issues it is thought likely that the increase in costs for the social housing sector may well be smaller than for speculative builders. It has been estimated, and agreed with the Housing Corporation, that the sector will lose between 70 and 100 dwelling units per annum (0.4% -0.6% of the number of new units approved by the Housing Corporation in 2001/02). Alternatively, the sector will require an additional public subsidy of approximately £5.5 million a year at 2001/02 prices in order to retain current levels of development.

As Housing Associations already build to a fairly high density it is unlikely that this estimate will be affected significantly by the PPG3 policy.

Section 4: Declaration

I have read the Regulatory Impact Assessments contained in this document, and I am satisfied that the balance of cost and benefit is the right one in the circumstances.

Signed by the responsible Minster *Christopher Leslie MP(Parliamentary Under Secretary of State, Office of the Deputy Prime Minister)* on 16 November 2002

Copies of this RIA are available from Kathleen Morris (Building Regulations Division, ODPM. Fax 020 7944 5739 or 5719. E-mail: bregsa.br@communities.gov.uk). It can also be found on the ODPM web-site (www.communities.gov.uk).