Number: WG29692

Welsh Government
Consultation Document

Building Regulations Update - Approved Documents A, B & C 2016

Approved Document A (Structural Safety)
Approved Document B (Fire Safety)
Approved Document C (Resistance to Contaminants and Moisture)

Date of issue: 29 September 2016
Action required: 22 December 2016

Overview

The Building Regulations and the associated statutory guidance set out in Approved Documents seek to ensure buildings meet certain standards for minimum health, safety, welfare, convenience and sustainability.

This document covers proposals for changes relating to:

Approved Document A (Structure)
Approved Document B (Fire Safety)
Approved Document C (Site Preparation and Resistance to Contaminants and Moisture)

This consultation relates to Building Regulations for Wales only. Powers for making Building Regulations in relation to Wales were devolved to the Welsh Ministers on 31st December 2011.

Existing England and Wales building regulations remain in force for Wales until any amending regulations are made by the Welsh Ministers. Changes made to building regulations in England do not generally apply in Wales.

This consultation is aimed primarily at firms, individuals within construction and construction-related industries and their representative bodies and the building control bodies that enable the building control system to operate. Specific elements may be of interest to members of the public.

How to respond

A response form is provided at:
http://gov.wales/consultations/?lang=en
http://gov.wales/consultations/?skip=1&lang=cy

Consultees are invited to email responses to:
enquiries.brconstruction@wales.gsi.gov.uk

Those who prefer to submit a paper copy of their response should send these to:

Building Regulations Consultation
Building Regulations Policy
Planning Directorate
Welsh Government
Rhyd y Car Offices
Merthyr Tydfil
CF48 1UZ

The Welsh Government will continue to engage with external partners throughout the consultation period and beyond on the range of consultation proposals. In particular, it will seek out opportunities presented by our partners to engage with relevant sectors on specific issues at relevant industry events around the country.

The views of the public are also welcomed.

Further information and related documents

Large print, Braille and alternative language versions of this document are available on request.

Section 2 – Economic Impact Assessment.

Contact details

For further information:

Welsh Government
Rhyd y Car Offices
Merthyr Tydfil
CF48 1UZ

Telephone: 0300 062 8535
enquiries.brconstruction@wales.gsi.gov.uk

Data protection

How the views and information you give us will be used.

Any response you send us will be seen in full by Welsh Government staff dealing with the issues which this consultation is about. It may also be seen by other Welsh Government staff to help them plan future consultations.

The Welsh Government intends to publish a summary of the responses to this document. We may also publish responses in full. Normally, the name and address (or part of the address) of the person or organisation who sent the response are published with the response. This helps to show that the consultation was carried out properly. If you do not want your name or address published, please tell us this in writing when you send your response. We will then blank them out.

Names or addresses we blank out might still get published later, though we do not think this would happen very often. The Freedom of Information Act 2000 and the Environmental Information Regulations 2004 allow the public to ask to see information held by many public bodies, including the Welsh Government. This includes information which has not been published. However, the law also allows us to withhold information in some circumstances. If anyone asks to see information we have withheld, we will have to decide whether to release it or not. If someone has asked for their name and address not to be published, that is an important fact we would take into account. However, there might sometimes be important reasons why we would have to reveal someone's name and address, even though they have asked for them not to be published. We would get in touch with the person and ask their views before we finally decided to reveal the information.

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Chapter 1

Introduction

1.1 Background

1.1.1 Building Regulations control certain types of building work, principally the erection and extension of buildings and provision or extension of certain services or fittings, chiefly to ensure that buildings meet certain standards of health, safety, welfare, convenience and sustainability.

1.1.2 Compliance with the Building Regulations is the responsibility of the person carrying out the work and the building control system helps to ensure that the required level of performance has been met. The role of a building control body, either the local authority or a private sector Approved Inspector, is to act as an independent third-party check to help achieve compliance. As an alternative to third-party checking by building control, some types of work may be self-certified as being compliant by installers who are registered as a member of a competent person self-certification scheme and have been assessed as competent to do so.

1.1.3 Building Regulations greatly influence how our buildings are constructed and used. As such, they help to deliver significant benefits to society. Regulation can also impose costs on both businesses and individuals. The “functional” nature of the Building Regulations, by having regulation setting out the broad requirement rather than prescribing how it must be achieved, seeks to minimise this cost and also ensure innovation is not hindered. Guidance in the Approved Documents that accompany the Regulations then sets out some of the ways that these requirements can be met although it does not have to be followed if the required level of performance can be shown to be achieved in a different way. This approach provides clarity for building control bodies and industry alike.

1.1.4 To avoid the risk of unnecessarily onerous and costly standards being imposed on industry it is important that a proper cost/benefit assessment and consultation with industry has been undertaken by Government to assess what reasonable minimum standards are appropriate.

1.1.5 It is also important to ensure that the Building Regulations regime remains current and fit-for-purpose.

1.2 The consultation - Development of the proposals

1.2.1 Consultants working for the Welsh Government have developed proposed technical updates to Approved Documents A, B and C in Wales. The proposals do not involve policy change, but are based on updating of references to technical standards that were undertaken by the Department for Communities and Local Government (DCLG) for England in 2013. The views of the Building Regulations Advisory Committee for Wales (BRACW) have been sought in developing these proposals (see BRACW membership in Annex A).

1.3 BREXIT

1.3.1 The use of Eurocodes is referred to within the consultation. At this point in time the UK remains a member state and this consultation is based on that position.

1.4 Main issues covered in this consultation paper

Part A (Structure)

1.4.1 The main changes proposed in Chapter 2 are replacement of the currently-referenced standards in Approved Document A with the updated British Standards based on Eurocodes. Other more minor and generally related amendments are proposed, for example, in relation to disproportionate collapse and wind maps.

Part B (Fire safety)

1.4.2 Chapter 3 sets out two proposals intended to resolve practical problems in the application of Requirement B2 (Internal fire spread (linings)). Firstly, it is proposed to make a technical amendment to ensure wall coverings are not inadvertently and unnecessarily disadvantaged because of how certain wall coverings are assessed under the European classification system for fire performance. Secondly to amend the existing guidance in relation to lighting diffusers which is now believed to be unnecessarily onerous.

Part C (Site preparation and resistance to contaminants and moisture)

1.4.3 The main element of the proposals in Chapter 4 is an amendment to align the Approved Document C guidance with the most up-to-date radon maps, in effect, ensuring that the current safety provisions are targeted at the appropriate parts of the country. Other minor amendments to the Approved Document proposed include updating a number of referenced standards.

1.5 Impact Assessment

1.5.1 The Welsh Government has published a Regulatory Impact Assessment (RIA). The RIA is an important part of the consultation, as its analysis has shaped the proposals. Consultees are encouraged to read the impact assessment and respond to the relevant questions.

1.6 Consultation responses

1.6.1 All documents can be found at:

http://gov.wales/consultations/?lang=en / http://gov.wales/consultations/?skip=1&lang=cy

Consultees are asked to reply to this consultation using the response form available electronically at:

http://gov.wales/consultations/?lang=en / http://gov.wales/consultations/?skip=1&lang=cy

which contains the questions in this document and the Regulatory Impact Assessment (RIA).

Chapter 2

Part A (Structural safety)

2.1 Proposed changes

Introduction

2.1.1 The consultation proposals for Approved document A (&C) concern changes to the structural engineering standards referenced by Parts A (& C). The main changes include:

- References to British Standard design standards
- Guidance on disproportionate collapse
- Wind maps
- Guidance on strip footings

2.1.2 The most significant change proposed is the updating of references to withdrawn British Standards so that the documents now refer to British Standards based on a pan-EU harmonised approach to structural design, or Eurocodes. Similar changes were made by DCLG in England in 2013, but this consultation also considers some further changes to the relevant guidance since England's amendments.

2.1.3 We are not proposing any changes to the Part A legislative provisions in the Building Regulations. Proposals to change the guidance in Approved Document A will be incorporated by publishing an amendment slip to the current Approved Document A.

Background

2.1.4 The Building Regulations control certain building work - principally to protect the health, safety and welfare of people in or around buildings. Part A of Schedule 1 of the regulations relates to the structural safety aspects of building design and construction and Approved Document A contains statutory guidance that demonstrates one way of how the provisions can be complied with. Part C of the Building Regulations (Resistance to Contaminants & Moisture) also makes reference to structural design standards, albeit to a more limited extent.

2.1.5 The regulations themselves are expressed in "functional" terms and do not dictate how the desired level of safety *must* be achieved. However, for the benefit of both industry and building control bodies, advice on how the requirements of the Building Regulations *may* be met are contained in guidance approved by Welsh Ministers. This covers some of the more common building situations, but there may well be alternative ways of achieving compliance with the provisions. However, if followed, the guidance may be relied upon in any proceedings as tending to indicate compliance with the Building Regulations.

2.1.6 In a comparable way to other Approved Documents, the existing guidance in Approved Document A, references a number of British Standards relating to structural design which it states, if followed, will demonstrate compliance. These design standards provide a baseline set of technical performance requirements which relate to safety and

serviceability for structural design, but do not prevent other options being used to show compliance.

British Standards and the Eurocodes

2.1.7 In 1975, the European Commission decided on action, based on Article 95 of the Treaty of Rome, with the objective of the elimination of technical obstacles to trade and the harmonisation of technical specifications. This included the initiative to establish a set of harmonised technical rules for the structural design of construction works – known as "the Eurocodes".

2.1.8 The Eurocodes have been developed over a number of decades by the European Union (EU) Commission and the European standards body, CEN, (involving the British Standards Institution (BSi) for the UK), to remove barriers to trade created by different national design approaches across the EU. The Commission has outlined expectations that EU Member States will support this harmonisation and market liberalisation by ensuring national regulations refer to British Standards based upon the Eurocodes. For the Building Regulations this would be achieved by aligning references and associated guidance in the Approved Documents with the British Standards based on Eurocodes.

2.1.9 In addition, under the Public Procurement Directive (European Directive 2004/18/EC), the Eurocodes are the mandatory standard design specification for publicly funded projects. This means that parts of the construction industry are already required to use them for aspects of their work. Whilst this will be particularly true for larger-scale, publicly funded building, civil engineering and housing supply work, this requirement has already meant many firms have already moved over, either partially or completely, to this new design approach. ONS1 construction data reveals that in 2015 (the most recent year for this detailed analysis) the value of all new construction work (in the UK) totalled £84.7 billion, of which public sector work accounted for £22 billion. This equates to the proportion of total new construction work being for the public sector of 26%. The construction data can also inform us of the value of work being carried out based on the size of firm, inferred by the number of employees. The data reveals that 68% commercial buildings construction is carried out by firms with more than 35 employees based on the value of work. When the number of employees is greater than 115 the value of commercial building construction is 52%. This shows that the majority of the work within the commercial buildings sector is carried out by larger firms in terms of the value of the work.

2.1.10 As stated previously, Approved Document A makes extensive reference to British Standards to establish what a reasonable level of structural safety in design is. These cover standards relating to loadings, foundations/geotechnics and specific design standards to reflect different materials and methods of construction (for example, timber, masonry, concrete, steel, aluminium). The standards currently referenced are those that were in place in 2004 when Approved Document A was last updated.

The Problem

2.1.11 On 1 April 2010 BSi withdrew the Standards which are listed in the current Approved Document and issued a new set of British Standards for structural design. These reflect a different design methodology from the standards they replaced. The old British Standards will no longer be maintained by BSi and will become increasingly out-of-date with time. The most up-to-date British Standards for structural design are those based on the Eurocodes. It has been normal policy to update the Approved Documents to reflect the latest principal design approaches and Standards developed by BSi with industry.

2.1.12 Alongside the routine updating that has been undertaken by BSi and its industry partners to reflect technological advancement etc., a key change in the new set of British Standards is the adoption of a pan-EU harmonised design approach, developed by the European Commission with the standards bodies and engineers from Member States over 20 years and commonly referred to as “the Eurocodes”.

2.1.13 In addition to the currency of the referenced Standards, there is a risk that the UK could face legal challenge from the European Commission, an EU Member State or industry if we do not align the Approved Documents with the new British Standards based on Eurocodes. If we were to continue to reference only the withdrawn British Standards, we may be seen as providing barriers to trade which prevent or restrict designers based in other EU States practising in Wales, thus breaching EU Treaty obligations; or which potentially hinder the use in Wales of structural products CE marked under the EU Construction Products legislation (which is a separate requirement). The UK is obliged to recognise that buildings designed to the Eurocodes meet the requirements of national regulations. Therefore, maintaining references to currently-referenced British Standards carries the potential risk of infraction and imposition from the European Court of Justice of financial sanctions on the UK.

2.1.14 Although Eurocodes will predominantly impact on the guidance contained in Approved Document A, there are also a small number of consequential changes to guidance and to references and text in Approved Document C (Site preparation and resistance to contaminants and moisture). For the sake of clarity, drafting in the Impact Assessment primarily refers to the changes to be made to Approved Document A.

2.1.15 We therefore propose to replace the current references to these withdrawn standards with references to the new British Standards based on Eurocodes and the relevant UK National Annexes. Alongside these we propose also to include a number of references to BSi Published Documents (PD’s) where these provide designers with essential and other informative advice.

Rationale for intervention

2.1.16 Building Regulations apply to “building work” as defined (typically the erection, extension, alteration or conversion of a building) and seek to ensure buildings meet certain standards for minimum health, safety, welfare and sustainability. Part A seeks to ensure that a building’s structure is structurally safe and robust to resist the actions expected to be

imposed upon them, for example, from occupants and their operation, wind and ground movement.

2.1.17 As the legislative provision is "functional", statutory guidance contained in the Approved Documents sets some of the ways, for the more common buildings, of ensuring basic minimum health, safety etc. standards are achieved when constructing buildings. This provides clarity for building control bodies and industry alike as it sets out what is sufficient (whilst allowing flexibility to provide alternative building approaches where beneficial). Importantly, it also ensures that a proper cost/benefit assessment and consultation with industry has been undertaken by Government to assess what reasonable minimum standards are appropriate (and avoids the risk of unnecessarily onerous and costly standards being imposed on industry).

2.1.18 DCLG undertook an exercise in the latter half of 2010 to determine what changes were necessary to the Building Regulations to ensure they remained fit-for-purpose, with a particular emphasis on identifying measures to reduce the cost of regulation to business and any other "must do" regulatory changes. DCLG received 248 responses from external partners to this exercise. As noted in their summary and analysis of responses[1]:

> "Few responses questioned the principle of regulations setting national standards that ensure buildings are built to baseline standards, although there was some comment that they were on firmest grounds in relation to health and safety rather than wider sustainability objectives. Many specifically recognised the positive role Building Regulations played and welcomed the fact that there was a nationally applied set of minimum requirements."

2.1.19 The exercise demonstrated, therefore, that the general approach to regulating through the Building Regulations (functional requirements supported by guidance as to how to comply) was supported by external partners. In relation to Part A, those that responded did not question the existing regulations' approach to delivering structural safety. However, whilst it was indicated that they were largely content with the technical guidance, there was some concern expressed that technical references had not been updated to reflect the Eurocodes.

2.1.20 Although the approaches outlined in the Approved Documents provide only a way of demonstrating compliance, they do provide assurance that if they are followed that they can be relied upon as tending to indicate compliance with the Building Regulations. Because of that, the approach set out in the Approved Documents is often viewed as the default design approach. It is important, therefore, that the approaches and references deliver the safety outcomes intended and that is why, where referenced Standards evolve to respond to changes in practice and construction techniques, there is a strong case for considering updating them.

2.1.21 In addition, in this instance there is a further driver – namely to align the referenced Standards with the pan-Europe structural design approach represented through the

[1] Future changes to the Building regulation – next steps. Published by DCLG in December 2010. Available at https://www.gov.uk/government/publications/building-regulations-future-changes

Eurocodes. This was developed by the European Commission with the standards bodies and engineers from Member States over 20 years. As the objective of this harmonisation was to eliminate technical barriers to trade in goods and services created by Member States all having different design methodologies, failing to reference the revised British Standards may lead to a successful legal challenge.

Annex B below shows where these references will change within Approved Document A.

Policy Objective

2.1.22 To continue to provide a regulatory framework into the future that ensures buildings are structurally safe for people in or around them in a way that complies with European requirements and does so in the most cost-effective manner. In so doing, to allow for greater standardisation of design standards across European Member States with associated economy and growth benefits.

Question 1
Do you agree that the structural design standards currently referenced in Approved Document A (& C) should be replaced by the Eurocodes-based British Standards with their National Annexes as proposed? Please explain why if you do not.

Question 2
It is generally accepted that use of the Eurocodes-based British Standards with their National Annexes and non-conflicting complementary information provides at least an equivalent level of safety and serviceability to the withdrawn British Standards currently referenced. Do you have evidence that this is not the case?

Question 3
We believe that our approach in Annex B to referencing BSi Published Documents provides essential and helpful additional information in support of Eurocodes implementation. Do you agree? If not, which documents do you feel should be included?

Implementation of Eurocode changes

2.1.23 A Regulatory Impact Analysis (RIA) of the proposed changes accompanies this consultation document. The RIA recognises that there are one-off transitional costs associated with a move to structural design based upon the Eurocodes. A proportion of the industry has already incurred these costs wholly or to some extent. However, large proportions have not, and the Welsh Government accepts that many of the firms yet to be affected might be smaller businesses.

Impact Assessment

2.1.24 In the Impact Assessment that accompanies these proposals we have set out the costs of moving to a system based on Eurocodes. Our initial work suggests that these costs

are one-off associated with the transition to a new system rather than ongoing ones. In particular, we believe that overall there are no additional costs of constructing buildings designed using standards based on Eurocodes, but we would welcome evidence in support of this assumption.

Question 4
Do you agree that the actual cost of constructing buildings using standards based on Eurocodes are neutral overall and what evidence do you have to support or refute this?

2.1.25 The transitional costs in the Impact Assessment are dependent on the estimates and assumptions set out in that document. We would welcome the views of consultees on this assessment and in particular on the following assumptions/costs:

- costs/savings associated with the cost of construction are on the whole neutral
- the estimates on the individual elements of the cost on firms – in particular software, other design aids, productivity and familiarisation costs
- that large firms would mainly have incurred the costs of moving to Eurocodes voluntarily
- that the make-up of those firms that will incur additional cost is 80:20 in favour of the smallest firms
- the number of firms that will not move over to Eurocodes by 2015 (5 years after the withdrawal of British Standards) or at all
- that approximately a half of firms that will have purchased Eurocodes have yet to incur 75% of their costs

Question 5
Do you agree with the estimated transitional costs? If not, please identify which assumptions/estimates you disagree with and, if possible, provide evidence to support your response.

2.1.26 Paragraphs 2.43-2.45 of the Impact Assessment address the potential benefits of moving towards a design approach based on Eurocodes. We would welcome the views and any available evidence that would support better understanding of the benefits to industry and others of moving to referencing Eurocodes in Approved Document A.

Question 6
Do you have any further information to support or refute the assessment of the benefits associated with referencing the Eurocodes-based standards in Approved Document A?

Other Eurocodes-related changes

2.1.27 We are bringing forward for consultation a number of other Eurocodes-related changes in addition to updating the standards references, to ensure consistency in the Approved Document A guidance.

2.1.28 Section 2 of the Approved Document contains guidance for stability and sizing of structural elements for certain residential buildings and other small buildings of traditional construction. This guidance includes information on how wind loads impact on the building height. We propose to amend the wind map provided in Diagram 6 in Approved Document A and the associated calculation approach outlined in Diagram 7 that can be used to establish maximum allowable building heights.

2.1.29 The main changes, as shown in Annex B, reflect and align the diagram with the Eurocodes-based British Standards structural design approach. In addition, we are minded to introduce the alternative approach, shown as a new Figure 3 to Diagram 6. This would introduce a graphical option for determining the orography Factor O that is used in establishing maximum allowable building height. This is believed to provide economy of design for sites where orography is a significant factor, without affecting safety.

Question 7
Do you agree that the changes proposed to Diagram 6 and the adjusted calculation procedure in Diagram 7 provide equivalent safety to the current guidance?

Question 8
Do you agree the new optional procedure for determining Factor O given in Diagram 6, Figure 3 provides equivalent safety and economy of design?

2.1.30 We propose also to amend the guidance on cavity wall ties in Approved Document A. The revised Table 5, shown in Annex B, has obsolescent references removed with BS EN 845-1 becoming the principal reference product specification standard. We propose also to make corresponding changes to the guidance on wall ties and spacing in cavity walls in 2C8 and 2C19. We believe this is consistent with current product specification standards and the Eurocodes-based design approach.

2.1.31 The following section outlines proposals in relation to Approved Document A guidance on robustness and disproportionate collapse. Some of these are Eurocode related.

Robustness and Disproportionate Collapse

2.1.32 We are also bringing forward a number of proposals to amend the guidance in Section 5 of Approved Document A on robustness and disproportionate collapse, to reflect the implementation of a design approach based upon Eurocodes. These are shown in Annex B.

2.1.33 We propose to update the British Standards references in paragraph 5.2 of the Approved Document with references to BS EN 1990, BS EN 1991-1-7 and the relevant materials-based Eurocodes structural design Standards. Alongside this we also propose to amend the existing Table 11 Building classes on page 41of Approved Document A to make its classification terminologies consistent and compatible with Eurocode-based British Standards.

2.1.34 In addition, we also propose to change the Approved Document guidance in paragraph 5.3 on design for key elements to align it with supporting Eurocodes based British Standards. This provides a compatibility of design approach.

2.1.35 We are minded to amend Diagram 24 which shows tolerable limits on the area of collapse for accidental events as shown in Annex B. This would align it with the guidance in BS EN 1991-1-7 "General actions – Accidental actions". It has been suggested that this, which would extend the area of collapse to100m² from the current 70m² does not represent a significant increase in safety risk over the current guidance, given the evolution in modern buildings design which tends to larger grid dimensions, particularly for framed building structures.

2.1.36 We also propose to include additional guidance in relation to seismic design, shown in Annex B as a new paragraph 5.5 for Approved Document A. This reflects the introduction of Eurocode 8 (BS EN 1998) for seismic design as a part of the Eurocodes suite of standards, but clarifies how and where designers might and might not need to consider this.

2.1.37 In addition to these Eurocodes-related changes to the guidance on robustness and disproportionate collapse, we are minded to modify the existing guidance to indicate that Consequence Class 2a and 2b buildings should additionally meet the robustness measures for Consequence Class 1 buildings (5.1c & 5.1d of Approved Document A). This provision has always been implied, but some external partners have suggested it would be useful to state it more clearly in guidance.

2.1.38 It has been suggested that it would be helpful to designers and not incompatible to include a reference in the Alternative approach guidance of Section 5 (specifically paragraph 5.4) to the design guidance published by the Institution of Structural Engineers which provides alternative recommendations on design for robustness and disproportionate collapse of building structures.

Question 9
The changes proposed to Section 5 guidance, particularly in referencing Eurocodes based British Standards for structural design, are intended to provide an equivalent level of safety and robustness to the current approach based upon withdrawn British standards. Do you agree?

Question 10
Do you agree that changing the area limit in Diagram 24 from 70m² to 100m² to align guidance with BS EN 1991-1-7 "General actions – Accidental actions" introduces no significant additional risks?

Question 11
Do you agree that it is helpful to include reference to the ISE Practical Guide to Structural Robustness and Disproportionate Collapse in Buildings as an alternative approach reference?

Other changes

2.1.39 As well as updating references to British Standards based on Eurocodes with Approved Document A, DCLG also consulted on proposed updates to the advice concerning wall claddings, roof coverings and strip foundations. The Welsh Government is proposing to undertake the same updates.

2.1.40 We propose to address a conflict between the guidance in Approved Document A and that in Approved Document K (Protection from falling, collision and impact) by amending paragraph 3.5 of Section 3 of Approved Document A, as shown in Annex B. This will bring the guidance on wall cladding functioning also as pedestrian guarding into line with that contained in Approved Document K.

2.1.41 We are minded to amend the guidance in paragraph 2E4 of Approved Document A on the minimum depth of strip foundations to reflect current industry practice. We would welcome views on amending the guidance to a three-tier graduated approach for minimum foundation depths in clay soils, as shown in Annex B.

Question 12
Do you agree it would be a helpful change in line with industry practice to amend the guidance in Approved Document A (2E4) to a three-tier graduated approach for minimum foundation depths in clay soils?

Chapter 3

Part B (Fire safety)

3.1 Proposed changes

Introduction

3.1.1 This consultation proposes amendments to Approved Document B in relation to guidance associated with lighting diffusers and wall coverings.[2]

3.1.2 This consultation proposes the same changes as DCLG has made for England. The English impact assessment identified significant benefits - reduced costs to development and manufacturers together with energy and carbon savings. There were transitional one off costs related to familiarisation of the changes by engineers and building control professionals.

3.1.3 Whilst the impact of the proposed changes to Wales could be estimated in accordance with accepted impact assessment practice there seems no value in undertaking an exercise which, given the scale of benefits identified with the English changes, would in our view arrive at a similar conclusion.

3.1.4 Based on ONS data[3] Welsh construction outputs (5 year average) are approximately 4% of those for England.

Background on the Building Regulations

3.1.5 The Building Regulations control certain building work - principally to protect the health, safety and welfare of people in or around buildings. Part B of Schedule 1 of the regulations relates to fire safety aspects of building design and construction, and Approved Document B contains statutory guidance that demonstrates how the provisions can be complied with.

3.1.6 The regulations themselves are expressed in “functional” terms and do not dictate how the desired level of safety *must* be achieved. However, for the benefit of both industry and Building Control Bodies, advice on how the requirements of the Building Regulations *may* be met are contained in guidance approved by Welsh Ministers. This covers some of the more common building situations, but there may well be alternative ways of achieving compliance with the provisions. However, if followed, the guidance may be relied upon in any proceedings as tending to indicate compliance with the Building Regulations.

3.1.7 Requirement B2 of the Building Regulations restricts the spread of flame and heat release rate of the materials used in lining any partition, wall, ceiling or other internal

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2 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/39372/121128_-_Part_B_IA_-_to_publish_for_web.pdf

3 http://www.ons.gov.uk/businessindustryandtrade/constructionindustry/datasets/outputintheconstructionindustry
Table 6 and 13

structure. The guidance in Approved Document B sets reasonable standards by reference to both the European (EN) and British (BS) test and classification systems. The appropriate classification varies in the guidance depending on the location of the wall lining and either system of classification can be used. These design standards provide a baseline set of technical performance requirements for fire safety, but are not exclusive of other options being used to show compliance.

The issues to address:

Thermoplastic lighting diffusers

3.1.8 The existing guidance in Approved Document B covering the application of requirement B2 to lighting diffusers was developed some time ago. Since then lighting technology has changed considerably and requirements for energy efficiency have become more stringent. The English review identified and took forward a solution which would allow more efficient lighting layouts by relaxing the restrictions on use of acrylic lighting diffusers.

Decorative wall coverings

3.1.9 The existing guidance in Approved Document B covering the application of requirement B2 to wall linings does not clearly differentiate between decorative wall coverings and wall linings that form part of the construction. As a result there is uncertainty as to how decorative coverings should be addressed. This is particularly pertinent at this time as a mandatory requirement to use the European classification system for fire performance which took effect in 2013 has the potential to introduce unintended consequences and increased costs for certain types of wall coverings.

Rationale for intervention

3.1.10 Building Regulations apply to “building work” (typically the erection or extension of a building) and seek to ensure buildings meet certain minimum health, safety, welfare and sustainability standards. Part B seeks to ensure that a building is safe in the event of a fire. This addresses an important information failure in that assessing fire safety performance after construction is complex and costly to rectify. By specifying fire safety performance standards at the point of build these costs are minimised. Designers, builders and even owners might take too short term a perspective in respect of fire safety and be too optimistic in assessing risk. There are also agency issues in that they also might not face the full costs of fire damage if the building is occupied by tenants who face the health and safety risk, cost of fire service provision are borne by the public sector or they are able to obtain insurance against such an incident.

3.1.11 As the legislative provision is “functional”, statutory guidance contained in the Approved Documents sets some of the ways, for the more common buildings, of ensuring basic minimum health, safety and welfare standards are achieved when constructing buildings. This provides certainty for building control bodies and industry alike as it sets out what is sufficient (whilst providing flexibility to provide alternative building approaches where beneficial). Importantly, it also ensures that a proper cost/benefit assessment and consultation with industry has been undertaken by Government to assess what reasonable

minimum standards are appropriate (and avoids the risk of unnecessarily onerous and costly standards being imposed on business).

3.1.12 The changes DCLG made to Approved Document B in 2013 followed a consultation on a range of proposed changes to Building Regulations which sought, in respect of Part B to address two industry concerns;

A. Thermoplastic lighting diffusers

3.1.13 The existing guidance in Approved Document B (Fire safety) Volume 2 Wales (http://gov.wales/docs/desh/publications/150827building-regs-approved-document-b2-fire-en.pdf) covering the application of Requirement B2 to lighting diffusers was developed some time ago. Since then lighting technology has changed considerably and requirements for energy efficiency have become more stringent. At the time, it was designed to allow the use of diffuser products that could not be classified in the normal way due to their tendency to soften and fall out of the test apparatus. Products that can be classified in the normal way are not affected by these provisions.

3.1.14 The guidance separates thermoplastics into two groups, TPa and TPb. TPa materials tend to perform better in relation to fire spread than TPb materials and this is reflected in the restrictions that apply to their use. However, the most efficient diffusers tend to be manufactured using TPb materials. This presents a growing conflict between the provisions for fire safety and those for energy efficiency.

3.1.15 The Lighting Industry Federation submitted a request seeking clarification of the provisions in Approved Document B that affect the specification of thermoplastic lighting diffusers.

3.1.16 Supporting evidence in the form of a research report by BRE Global supported the technical case for allowing greater use of acrylic materials, which indicated that a layout allowing acrylic material would deliver fire safety ‘equivalent to or better than’ the current approach[4]. Proposed amendments to Table 11 and a new Diagram 27A are provided on page 21 and page 22 below.

[4] BRE Global Report 127687 - Comparative testing between an Approved Document B compliant lighting layout and an energy and performance optimised lighting layout using PMMA (TPb) luminaires – 31 March 201. (page 31)

Lighting diffusers – proposed amendment to Table 11 of Approved Document B

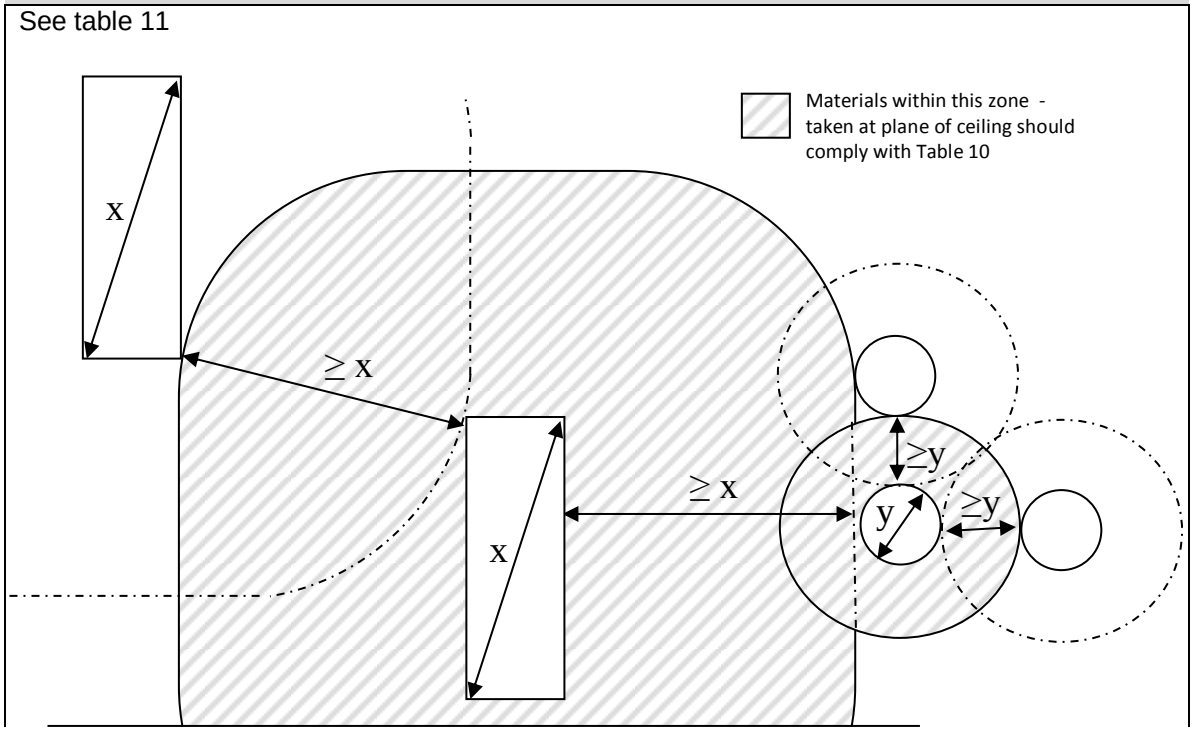
Table 11	Limitations applied to thermoplastic rooflights and lighting diffusers in suspended ceilings and Class 3 plastic rooflights			
Minimum classification of lower surface	**Use of space below the diffusers or rooflight**	**Maximum area of each diffuser panel or rooflight (1) (m^2)**	**Max total area of diffuser panels and rooflights as percentage of floor area of the space in which the ceiling is located (%)**	**Minimum separation distance between diffuser panels or rooflights (1) (m)**
TP(a)	Any except protected stairway	No limit (2)	No limit	No limit
D-s3, d2 or Class 3 (3) or TP(b)	Rooms	1	50 (4)(5)	A distance equal to the largest plan dimension of the largest diffuser or roof light (see diagram 27A)
		5	50 (4)(5)	3(5)
	Circulation spaces except protected stairways	5	15 (4)	3

Notes:

1. Smaller panels can be grouped together provided that the overall size of the group and the space between one group and any others satisfies the dimensions shown in Diagram 27 or 27A.
2. Lighting diffusers of TP(a) flexible rating should be restricted to panels of not more than $5m^2$ each, see paragraph 7.16.
3. There are no limits on Class 3 material in small rooms. See paragraph 7.1, Table 10.
4. The minimum separation between each panel or group must be maintained. Therefore, in some cases it may not also be possible to use the maximum percentage quoted.
5. Class 3 / D-s3, d2 rooflights to rooms in industrial and other non-residential purpose groups may be spaced 1800mm apart provided the rooflights are evenly distributed and do not exceed 20% of the area of the room.

6. This table is not relevant to products which meet the provisions in Table 10.

Diagram 27A Layout restrictions on small Class 3 or D–s3,d2 plastic rooflights, TP(b) rooflights and lighting diffusers



Question 13
Do you agree that the proposed amendments to Table 11 are reasonable and maintain necessary standards of safety?

Question 14
Do you think the proposed new Diagram 27A is necessary to illustrate the changes to Table 11?

B. Decorative wall coverings

3.1.17 In addition to the comments made in response to specific calls for evidence, DCLG identified a need to clarify how the provisions in relation to Requirement B2 relate to decorative wall coverings. As it stands the guidance does not clearly differentiate between decorative wall coverings and wall linings. As a result there is uncertainty as to how decorative wall coverings should be addressed.

3.1.18 The guidance in Approved Document B sets reasonable standards by reference to both the European (EN) and British (BS) test and classification systems. The appropriate

classification varies in the guidance depending on the location of the wall lining and either system of classification can be used.

3.1.19 However the main provisions of the EU Construction Products Regulation (305/2011) took effect from 1 July 2013 in the UK. From this date, manufacturers of wall coverings have to test and label their products in accordance with harmonised European standards and classification systems before they place them on the market. The primary objective of this is to establish a "common language" for specifying the essential characteristics of construction products rather than to restrict the use of any particular products.

3.1.20 The Guidance in Approved Document B for Wales currently calls for wall linings in the corridors and other circulation spaces of non-domestic buildings to be rated as either "Class O" under the British Standard classification system or "Class B" under the European system.

3.1.21 At present most decorative wall coverings for use in non-domestic applications are rated as "Class O" under the British Standard classification system and would be acceptable for use in corridors and other circulation spaces. However, evidence suggests that the same product would tend to be rated as "Class C" or even "Class D" under the European classification system and, under the current guidance in Approved Document B, would not be permitted in those locations. This is a problem peculiar to thin wall coverings such as wall papers and does not manifest itself for other lining products subject to the same guidance.

3.1.22 This had not previously been a problem, as use of the European standards and CE marking labelling system has been voluntary in the UK. CE marking of these products is now mandatory making the issues highlighted of more significance. A building control officer *could* choose to accept a product achieving "Class 0" under the British System despite a European classification of "Class C" rather than "Class B", but this would be a matter of discretion. Furthermore, industry had expressed significant and valid concerns that professionals responsible for specifying materials required would tend towards products classified as "Class B" under the European system in order to ensure compliance.

3.1.23 It should be noted that the amendments made in England and now proposed for Wales are not intended to reduce standards of safety and would not change the need to CE mark products in accordance with the Construction Products Regulation. However, it is possible to mitigate some of the unintended consequences of imposing the European classification system by amending our own national provisions.

Additional research undertaken in England informing final proposals

3.1.24 Research commissioned by the British Coatings Federation, the Association of Interior Specialists and the British Contractor Furnishers Association and conducted by Exova Warrington Fire examined the performance of eight commercial grade decorative wall covering systems. Of the eight products analysed six were classified "Class 0" and two "Class 2" according to the British test system. The two graded "Class 2" and four of the others were classified as European Class C whilst two products classified as "Class 0"

under the British System were classified as “Class D” according to the European testing methodology. These results suggest overall that a European “Class C” is the closest equivalent to a British “Class 0”.

3.1.25 Requiring a European “Class C” would therefore allow most products currently in common use to continue to be marketed as they are, and would, according to this research, deliver a marginal improvement in fire safety overall. Maintaining the current reference to European Class B would effectively increase provision for fire safety for which a cost-benefit case has not been made.

3.1.26 Most other European countries would allow European “Class C” for use in corridors and circulation spaces, so the policy approach provides for greater consistency in terms of use and application of products in the single market, alongside a common system of testing and labelling.

3.1.27 We propose to append a new note to the existing table 10 Classification of linings in Approved Document B which will clarify the position and ensure that the use of the European classification system for reaction to fire does not present a disadvantage (see note 5 to Table 10 below).

Wall coverings – proposed amendment to Table 10 of Approved Document B

Table 10 Classification of linings

Location	National class (1)	European class (1)(3)(4)
Small rooms (2) of area not more than: a. $4m^2$ in residential accommodation b. $30m^2$ in non-residential accommodation.	3	D-s3, d2
Other rooms (2) including garages	1	C-s3, d2
Circulation spaces within dwellings		
Other circulation spaces, including the common areas of blocks of flats	0	B-s3, d2 (5)

Notes:

1. See paragraph B2.v.
2. For meaning of room, see definition in Appendix E.
3. The National classifications do not automatically equate with the equivalent classifications in the European column, therefore, products cannot typically assume a European class, unless they have been tested accordingly.
4. When a classification includes ‘s3, d2’, this means that there is no limit set for smoke production and/or flaming droplets/particles.
5. **Wall coverings which conform to BS EN 15102:2007 *Decorative wallcoverings – roll and panel form products*, which achieve at least Class C-s3,d2 and are bonded to a Class A2-s3,d2 substrate will also be acceptable**

Question 15
Do you agree that the proposed amendments to Table 10 are reasonable and maintain the necessary standards of safety?

Chapter 4

Part C (Site preparation and Resistance to contaminants and moisture)

4.1 Proposed changes

Introduction

4.1.1 This consultation proposes changes to guidance in Approved Document C in relation to Radon protection measures, site investigation, and guidance related to contaminated land and flooding.

4.1.2 Similar changes were incorporated in England in 2013.The English impact assessment identified a net benefit. The benefits related to health benefits as the installation of radon protection measures will reduce future lung cancer incidence. The costs related to installing radon protective measures in radon risk areas and transition costs for firms.

4.1.3 This consultation proposes the same changes for Wales, with some minor additional references to guidance updated since the English changes or differences to reflect the geographical differences between England and Wales.

Background

4.1.4 In 2013, DCLG implemented changes to the guidance in the English Approved Document C, mainly driven by the introduction of British Standards based on Eurocodes and the revision of radon maps.

4.1.5 The Welsh Government has engaged consultants to review the English changes, and in discussion with the Building Regulations Advisory Committee for Wales (BRACW), the Welsh Government has reviewed these changes in relation to their applicability to Wales. This has informed the set of proposals discussed below and detailed at Annex C.

4.1.6 We are not proposing any changes to the Part C legislative provisions in the Building Regulations. Proposals to change the guidance in Approved Document C will be made by amendment slip rather than by republishing Approved Document C and the amendments proposed are set out at Annex C.

Radon

4.1.7 The Requirement C1 of Part C in Schedule 1 to the Building Regulations currently requires reasonable precautions to be taken to protect the health and safety of building occupants from contaminants. This includes the risks associated with radon, a naturally occurring radioactive gas that has been identified as the second largest cause of lung cancer in the UK after smoking. Approved Document C provides guidance on where protective measures should be installed in new buildings and extensions in radon affected areas.

4.1.8 The guidance in Approved Document C refers to guidance published by the Building Research Establishment, and radon maps published by the Health Protection Agency and British Geological Survey in 1999. These publications were revised in 2007 to reflect improved knowledge on the prevalence of radon across the UK. We have examined the costs and benefits of aligning the Approved Document guidance with the 2007 radon maps, and this analysis is shown in the Impact Assessment that accompanies this consultation.

4.1.9 Our Impact Assessment shows that there is a negligible cost impact to industry by updating to align Approved Document C with the 2007 radon maps. Therefore, we propose, subject to consultation, updating Approved Document C to align it with the 2007 radon maps which are contained within the BR211 (2015) guidance. The proposed amendment slip to the radon guidance in Approved Document C are set out at Annex C.

4.1.10 We have used a number of working assumptions in this analysis which we would welcome views on. These are outlined in the Impact Assessment and include estimates of the costs of installing radon protective measures and the assumption that there will be no transitional costs for aligning the regulatory intervention with BR211 (2015).

4.1.11 In 2008 (prior to devolution of the Building Regulations to Wales), the Department for Communities and Local Government issued a Circular Letter highlighting the revised radon maps, their implications and the updated BR211 guidance. Following a survey of BCB bodies, we have used a counterfactual assumption within the Impact Assessment about the current level of good practice (estimated at 98% for new homes and 95% for new extensions) generated by the 2008 Circular Letter.

Question 16
Do you agree with the proposed changes to the radon guidance within Approved Document C?

Question 17
Do you have any evidence/views that would be helpful to refine our analysis, including the working assumptions in the Impact Assessment, post consultation?

Site investigation

4.1.12 Following a review of the English changes, we propose no substantial changes to Section 1 of Approved Document C other than to update some references to align these with the introduction of the Eurocodes-based British Standards that were discussed in Chapter 2 above. These are shown at Annex C.

Guidance related to contaminated land

4.1.13 Our review has also considered the changes to the English guidance on contaminated land in Approved Document C.

Changes in England were made in the light of changes to related legislation such as the simplification of the contaminated land regime under Part 2A of the Environmental

Protection Act 1990. Revised Part 2A statutory and technical guidance has been published and helps clarify when land is, and is not, “contaminated land” as defined.

The proposed contaminated land guidance changes to Approved Document C are shown in Annex C.

4.1.14 In addition, we also propose to remove the current Annex A of Approved Document C as this provides little assistance and may actually add confusion rather than clarification.

Question 18
Would removing Annex A of Approved Document C cause problems?

Flooding

4.1.15 Flood resistance is not currently a requirement in schedule 1 of the Building Regulations 2010, however the Welsh Government is keen to ensure that the guidance in the Approved Document properly signposts relevant additional information. Therefore, we propose to update the references in Approved Document C to further sources of information as shown at Annex C. Principally these changes refer to guidance in improving the flood performance of new buildings.

Chapter 5

5.1 Timetable for introduction of the changes

The proposed timetable for the introduction of changes is set out below.

29 September 2016	Consultation commences (12 weeks)
22 December 2016	Consultation closes
January 2017	Proposed publication of amendment slips
June 2017	Proposed amendment slips come into effect

Annex A

Building Regulations Advisory Committee for Wales

Chairman

Professor Phillip Jones Welsh School of Architecture

Members

- James Chambers (Architect)
- James Player (Building Contractor)
- Heather Jones (Local Authority Building Control)
- Matthew Evans (Structural Engineer)
- Alan Hunt (Accessibility)
- Andy Sutton (Sustainability)
- Nigel Smith (Housebuilder)
- Chris Lynn (M&E Services)

Government Observers

- Welsh Government officials
- Welsh Government consultants - Building Research Establishment

Annex B

Proposed amendments to Approved Document A (2004 edition incorporating the 2010 amendments)

http://gov.wales/docs/desh/publications/130205building-regs-approved-document-a-structure-en.pdf

Page 4

EUROCODES

Delete existing text and insert the following:

EUROCODES

The British Standards Institution notified the British Standards for structural design referenced in the 2004 edition of this Approved Document as withdrawn on 31 March 2010. British Standards for structural design based upon the Eurocodes were correspondingly implemented by the British Standards Institution on 1 April 2010 and it is these standards with their UK National Annexes which are now referenced in this Approved Document as practical guidance on meeting Part A requirements.

There may be alternative ways of achieving compliance with the requirements and there might be cases where the use of withdrawn standards no longer maintained by the British Standards Institution might be appropriate for meeting Part A requirements but their use would need to be justified. The Department will ensure further information on these withdrawn standards is made available.

A1/2 Guidance

Page 6

Introduction

Delete existing paragraph 0.3 and insert the following:

0.3 Grandstands and structures erected in places of public assembly may need to sustain the synchronous or rhythmic movement of numbers of people. It is important to ensure that the design of the structure takes these factors into account so as to avoid the structure being impaired or causing alarm to people using the structure.

Guidance on the design and testing of grandstands may be found in '*Dynamic performance requirements for permanent grandstands subject to crowd action – Recommendations for management, design and assessment' published by The Institution of Structural Engineers, December 2008.'*

A1/2 SECTION 1: Codes, standards and references for all building types

Page 7

Delete all text from "Introduction" up to and including that in paragraph 1.8 and insert the following:

Introduction

1.1 This section is relevant to all building types and lists codes, standards and other references for structural design and construction.

References

1.2 Basis of structural design and loading:

Eurocode: Basis of Structural Design

BS EN 1990:2002+A1:2005 Eurocode – Basis of structural design; with UK National Annex to BS EN 1990:2002+A1:2005

Eurocode 1: Actions on Structures

BS EN 1991-1-1:2002 Eurocode 1: Actions on structures – Part 1.1: General actions – Densities, self weight, imposed loads for buildings; with UK National Annex to BS EN 1991-1-1:2002

BSI PD 6688-1-1:2011 Published Document – Recommendations for the design of structures to BS EN 1991-1-1

BS EN 1991-1-3:2003 Eurocode 1: Actions on structures – Part 1.3: General actions – Snow loads; with UK National Annex to BS EN 1991-1-3:2003

BS EN 1991-1-4:2005+A1:2010 Eurocode 1: Actions on structures – Part 1.4: General actions – Wind actions; with UK National Annex to BS EN 1991-1-4:2005 + A1:2010

BSI PD 6688-1-4:2009 Published Document – Background information to the National Annex to BS EN 1991-1-4 and additional guidance

BS EN 1991-1-5:2003 Eurocode 1: Actions on structures – Part 1.5: General actions – Thermal actions; with UK National Annex to BS EN 1991-1-5:2003

BS EN 1991-1-6:2005 Eurocode 1: Actions on structures – Part 1.6: General actions – Actions during execution; with UK National Annex to BS EN 1996-1-6:2005

BS EN 1991-1-7:2006 Eurocode 1: Actions on structures – Part 1.7: General actions – Accidental actions; with UK National Annex to BS EN 1991-1-7:2006

BSI PD 6688-1-7:2009 Published Document – Recommendations for the design of structures to BS EN 1991-1-7

BS EN 1991-3:2006 Eurocode 1: Actions on structures – Part 3: Actions induced by cranes and machines; with UK National Annex to BS EN 1991- 3:2006

1.3 Structural work of reinforced, pre-stressed or plain concrete:

Eurocode 2: Design of Concrete Structures

BS EN 1992-1-1:2004 Eurocode 2: Design of concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1992-1-1:2004

BSI PD 6687-1:2010 Published Document – Background paper to the UK National Annexes to BS EN 1992-1 and BS EN 1992-3

BS EN 13670:2009 Execution of concrete structures

1.4 Structural work of steel:

Eurocode 3: Design of Steel Structures

BS EN 1993-1-1:2005 Eurocode 3: Design of steel structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1993-1-1:2005

BS EN 1993-1-3:2006 Eurocode 3: Design of steel structures – Part 1.3: General rules – Supplementary rules for cold-formed members and sheeting; with UK National Annex to BS EN 1993-1-3:2006

BS EN 1993-1-4:2006 Eurocode 3: Design of steel structures – Part 1.4: General rules – Supplementary rules for stainless steels; with UK National Annex to BS EN 1993-1-4:2006

BS EN 1993-1-5:2006 Eurocode 3: Design of steel structures – Part 1.5: Plated structural elements; with UK National Annex to BS EN 1993-1-5:2006

BS EN 1993-1-6:2007 Eurocode 3: Design of steel structures – Part 1.6: Strength and stability of shell structures

BS EN 1993-1-7:2007 Eurocode 3: Design of steel structures – Part 1.7: Plated structures subject to out of plane loading

BS EN 1993-1-8:2005 Eurocode 3: Design of steel structures – Part 1.8: Design of joints; with UK National Annex to BS EN 1993-1-8:2005

BS EN 1993-1-9:2005 Eurocode 3: Design of steel structures – Part 1.9: Fatigue; with UK National Annex to BS EN 1993-1-9:2005

BSI PD 6695-1-9:2008 Published Document – Recommendations for the design of structures to BS EN 1993-1-9

BS EN 1993-1-10:2005 Eurocode 3: Design of steel structures – Part 1.10: Material toughness and through-thickness properties; with UK National Annex to BS EN 1993-1-10:2005

BSI PD 6695-1-10:2009 Published Document – Recommendations for the design of structures to BS EN 1993-1-10

BS EN 1993-1-11:2006 Eurocode 3: Design of steel structures – Part 1.11: Design of structures with tension components; with UK National Annex to BS EN 1993-1-11:2006

BS EN 1993-1-12:2007 Eurocode 3: Design of steel structures – Part 1.12: Additional rules for the extension of EN 1993 up to steel grades S 700; with UK National Annex to BS EN 1993-1-12:2007

BS EN 1993-5:2007 Eurocode 3: Design of steel structures – Part 5: Piling; with UK National Annex to BS EN 1993-5:2007 + A1:2012

BS EN 1993-6:2007 Eurocode 3: Design of steel structures – Part 6: Crane supporting structures; with UK National Annex to BS EN 1993-6:2007

BS EN 1090-2:2008+A1:2011 Execution of steel structures and aluminium structures – Part 2. Technical requirements for the execution of steel structures

BRE Digest 437 Industrial platform floors: mezzanine and raised storage

1.5 Structural work of composite steel and concrete:

Eurocode 4: Design of Composite Steel and Concrete Structures

BS EN 1994-1-1:2004 Eurocode 4: Design of composite steel and concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1994-1-1:2004

1.6 Structural work of timber:

Eurocode 5: Design of Timber Structures

BS EN 1995-1-1:2004+A1:2008 Eurocode 5: Design of timber structures – Part 1.1: General – Common rules and rules for buildings; with UK National Annex to BS EN 1995-1-1:2004+A1:2008

BSI PD 6693-1-1:2012 Published Document – Recommendations for the design of timber structures to Eurocode 5: Design of timber structures Part 1: General – Common rules and rules for buildings

BS 8103-3:2009 Structural design of low-rise buildings – Part 3: Code of practice for timber floors and roofs for housing

1.7 Structural work of masonry:

Eurocode 6: Design of Masonry Structures

BS EN 1996-1-1:2005 +A1:2012 Eurocode 6: Design of masonry structures – Part 1.1: General rules for reinforced and unreinforced masonry structures; with UK National Annex to BS EN 1996-1-1:2005 +A1:2012

BS EN 1996-2:2006 Eurocode 6: Design of masonry structures – Part 2: Design considerations, selection of materials and execution of masonry; with UK National Annex to BS EN 1996-2:2006

BSI PD 6697:2010 Published Document – Recommendations for the design of masonry structures to BS EN 1991-1-1 and BS EN 1996-2

BS EN 1996-3:2006 Eurocode 6: Design of masonry structures – Part 3: Simplified calculation methods for unreinforced masonry structures; with UK National Annex to BS EN 1996-3:2006

BS 8103-1:2011 Structural design of low-rise buildings – Part 1: Code of Practice for stability, site investigation, foundations, precast concrete floors and ground floor slabs for housing

BS 8103-2:2005 Structural design of low-rise buildings – Part 2: Code of practice for masonry walls for housing

1.8 Geotechnical work and foundations:

Eurocode 7: Geotechnical Design

BS EN 1997-1:2004 Eurocode 7: Geotechnical design – Part 1: General rules; with UK National Annex to BS EN 1997-1:2004

BS EN 1997-2:2007 Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing; with UK National Annex to BS EN 1997-2:2007

1.9 Seismic aspects:

Eurocode 8: Design of Structures for Earthquake Resistance

BS EN 1998-1:2004 +A1:2013 Eurocode 8: Design of structures for earthquake resistance – Part 1. General rules, seismic actions and rules for buildings; with UK National Annex to BS EN 1998-1:2004

BS EN 1998-5:2004 Eurocode 8: Design of structures for earthquake resistance – Part 5. Foundations, retaining structures and geotechnical aspects; with UK National Annex to BS EN 1998-2:2004

BSI PD 6698:2009 Published Document – Recommendations for the design of structures for earthquake resistance to BS EN 1998

1.10 Structural work of aluminium:

Eurocode 9: Design of Aluminium Structures

BS EN 1999-1-1:2007+A1:2009 Eurocode 9: Design of aluminium structures – Part 1.1: General structural rules; with UK National Annex to BS EN 1999-1-1:2007+A1:2009

BS EN 1999-1-3:2007+A1:2011 Eurocode 9: Design of aluminium structures – Part 1.3: Structures susceptible to fatigue; with UK National Annex to BS EN 1999-1-3:2007 +A1:2011

BSI PD 6702-1:2009 Published Document – Structural use of aluminium – Part 1. Recommendations for the design of aluminium structures to BS EN 1999

BS EN 1999-1-4:2007+A1:2011 Eurocode 9: Design of aluminium structures – Part 1.4: Cold-formed structural sheeting; with UK National Annex to BS EN 1999-1-4:2007

BS EN 1999-1-5:2007 Eurocode 9: Design of aluminium structures – Part 1.5: Shell structures; with UK National Annex to BS EN 1999-1-5:2007

BS EN 1090-3:2008 Execution of steel structures and aluminium structures – Part 3. Technical requirements for aluminium structures

BSI PD 6705-3:2009 Published Document – Structural use of steel and aluminium – Part 3. Recommendations for the execution of aluminium structures to BS EN 1090-3

Page 8

Ground movement (Requirement A2b)

Change paragraph numbering

Replace “1.9” with “1.11”

Page 8

Existing buildings

Change paragraph numbering

Replace “1.10” with “1.12”

Page 8

Existing buildings

Delete existing paragraph 1.10a and insert the following:

1.12a. BRE Digest 366: Structural Appraisal of Existing Buildings, Including for a Material Change of Use, 2012

Delete existing paragraph 1.10 b. and insert the following:

1.12b. The Institution of Structural Engineers Technical Publication ‘Appraisal of existing structures (Third edition), 2010

Note: With reference to ‘design checks’ in the referenced Institution of Structural

Engineers’ Technical Publication the choice of various partial factors should be made to suit the individual circumstances of each case.

A1/2 Section 2A: Basic requirements for stability

Page 10

2A2 sub paragraph d. “Note:”

Delete existing text and insert the following:

Note: A traditional cut timber roof (i.e. using rafters, purlins and ceiling joists) generally has sufficient built in resistance to instability and wind forces (e.g. from hipped ends, tiling

battens, rigid sarking or the like). However, the need for diagonal rafter bracing equivalent to that recommended in BS EN 1995-1-1:2004 with its UK National Annex and additional guidance given in BSI Published Document PD 6693-1-1:2012 and BS 8103-3:2009 for trussed rafter roofs should be considered, especially for single-hipped and non-hipped roofs of greater than 40° pitch to detached houses."

A1/2 Section 2B: sizes of certain timber members in floors and roofs for dwellings. Areas at risk from house longhorn beetle

Sizing of members

Page 11

2B1 second paragraph

Delete existing text and insert the following:

Alternative guidance is available in BS EN 1995-1-1:2004 Design of timber structures, with its UK National Annex and additional guidance given in BSI Published Document PD 6693-1:2012 and also BS 8103-3:2009 Structural design of low-rise buildings, Code of practice for timber floors and roofs for housing.

House longhorn beetle

Page 11

2B2 second paragraph

Delete existing text and insert the following:

Guidance on suitable preservative treatments is given within The Wood Protection Association's manual 'Industrial Wood Preservation: Specification and Practice (2012)', available from 5C Flemming Court, Castleford, West Yorkshire, WF10 5HW.

A1/2 Section 2C: Thickness of walls in certain small buildings

The use of this section

Page 12

2C3 sub paragraph c.

Delete existing text and insert the following:

c. walls should comply with the relevant requirements of BS EN 1996-2:2006 with its UK National Annex and additional guidance given in BSI Published Document PD 6697:2010, except as regards the conditions given in paragraphs 2C4 and 2C14 to 2C38;

Page 12

2C3 sub paragraph e. second paragraph

Delete existing text and insert the following:

BS EN 1996-1-1:2005 with its UK National Annex gives design strengths for walls where the suitability for use of masonry units of other compressive strengths is being considered.

Thickness of walls

Page 13,

2C8

Delete existing text and insert the following:

2C8 Cavity walls in coursed brickwork or blockwork:

All cavity walls should have leaves at least 90mm thick and cavities at least 50mm wide. The wall ties should have a horizontal spacing of 900mm and a vertical spacing of 450mm, or alternatively should be spaced such that the number of wall ties per square metre is not less than 2.5 ties/m2. Wall ties should also be provided, spaced not more than 300mm apart vertically, within a distance of 225mm from the vertical edges of all openings, movement joints and roof verges. For selection of wall ties for use in a range of cavity widths refer to Table 5. For specification of cavity wall ties refer to paragraph 2C19."

Page 16

2C13

Delete existing text and insert the following:

2C13 Modular bricks and blocks:

Where walls are constructed of bricks or blocks having modular dimensions, wall thicknesses prescribed in this section which derive from a dimension of brick or block may be reduced by an amount not exceeding the deviation from work size permitted by a British Standard relating to equivalent sized bricks or blocks made of the same material.

Page 16

2C16

Delete existing text and insert the following:

2C16 Maximum height of buildings:

The design guidance in this section is based on BS EN 1991-1-4:2005 with its UK National Annex. The maximum heights of buildings given in Table C of Diagram 7 correlate to various site exposure conditions and wind speeds. A map showing wind speeds is given in Figure 1 of Diagram 6.

Construction materials and workmanship

Page 17

2C19

Delete existing text and insert the following:

2C19 Wall ties:

Wall ties should comply with BS EN 845-1 and should be material references 1 or 3 in BS EN 845-1 Table A1 austenitic stainless steel. Wall ties should be selected in accordance with Table 5 of this Approved Document.

Page 17

2C20

Delete existing text and insert the following:

2C20 Masonry units:

Walls should be properly bonded and solidly put together with mortar and constructed of masonry units conforming to:

a. clay bricks or blocks to BS EN 771-1;
b. calcium silicate bricks or blocks to BS EN 771-2;
c. concrete bricks or blocks to BS EN 771-3 or BS EN 771-4;
d. manufactured stone to BS EN 771-5;
e. square dressed natural stone to the appropriate requirements described in BS EN 771-6.

Page 18

Diagram 6

Delete the existing Diagram 6 and insert the following:

See para 2C16

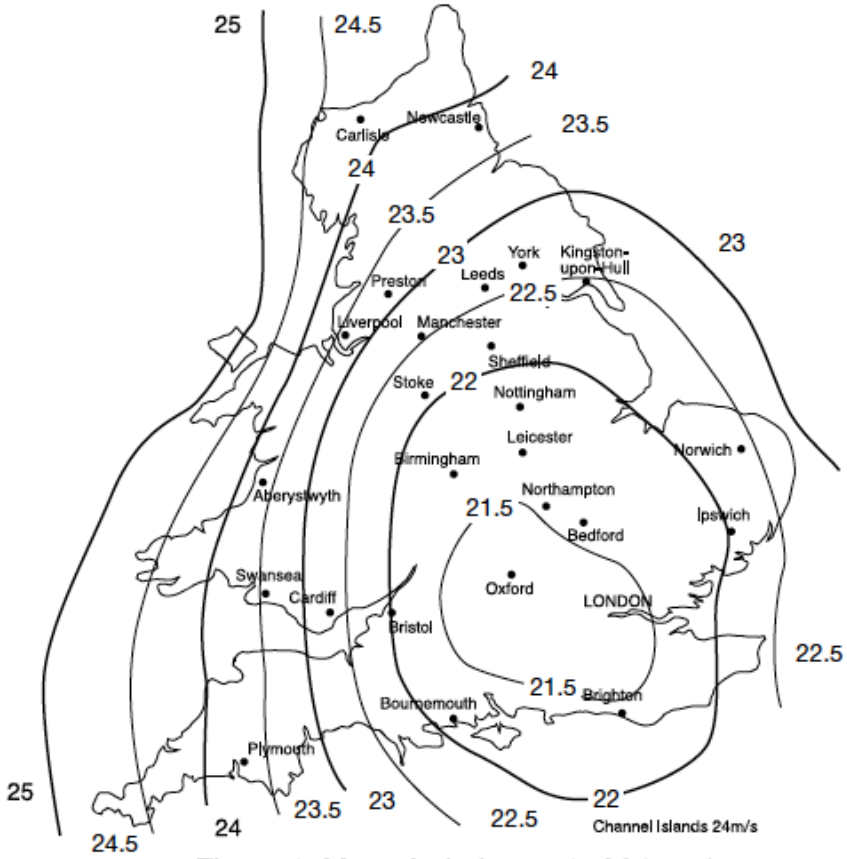


Figure 1 Map of wind speeds (V) in m/s

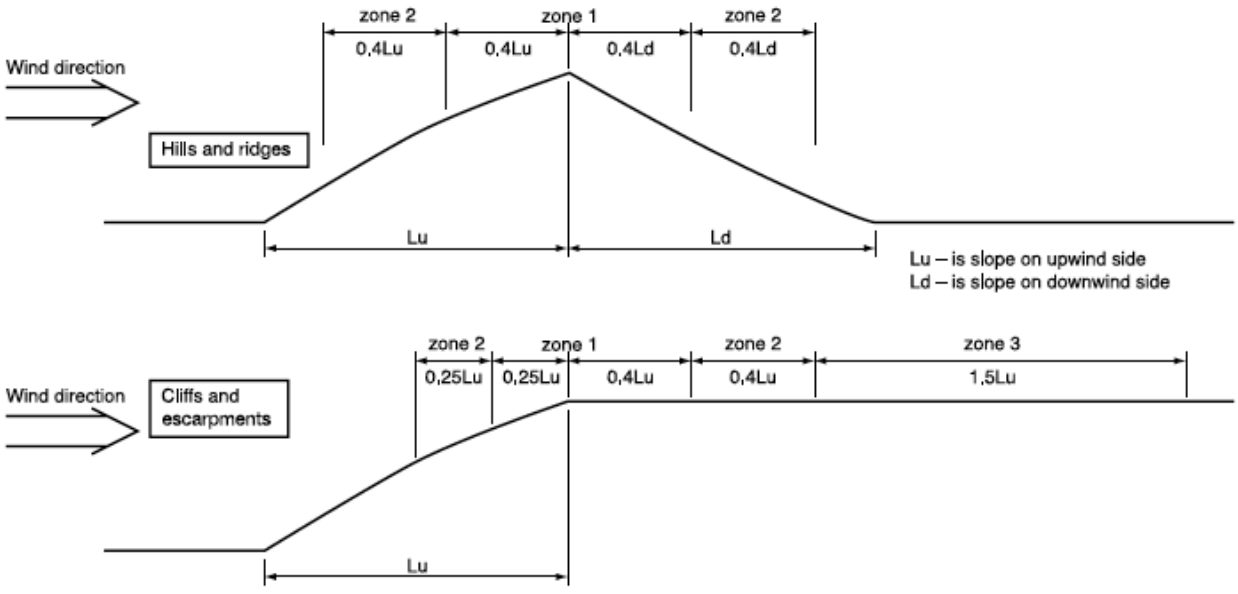


Figure 2 Orographic zones for Factor O

Note: A more detailed approach for obtaining Factor O is given by Figure 3 Diagram 6.

Diagram 6 Map showing wind speeds in m/s for maximum height of buildings

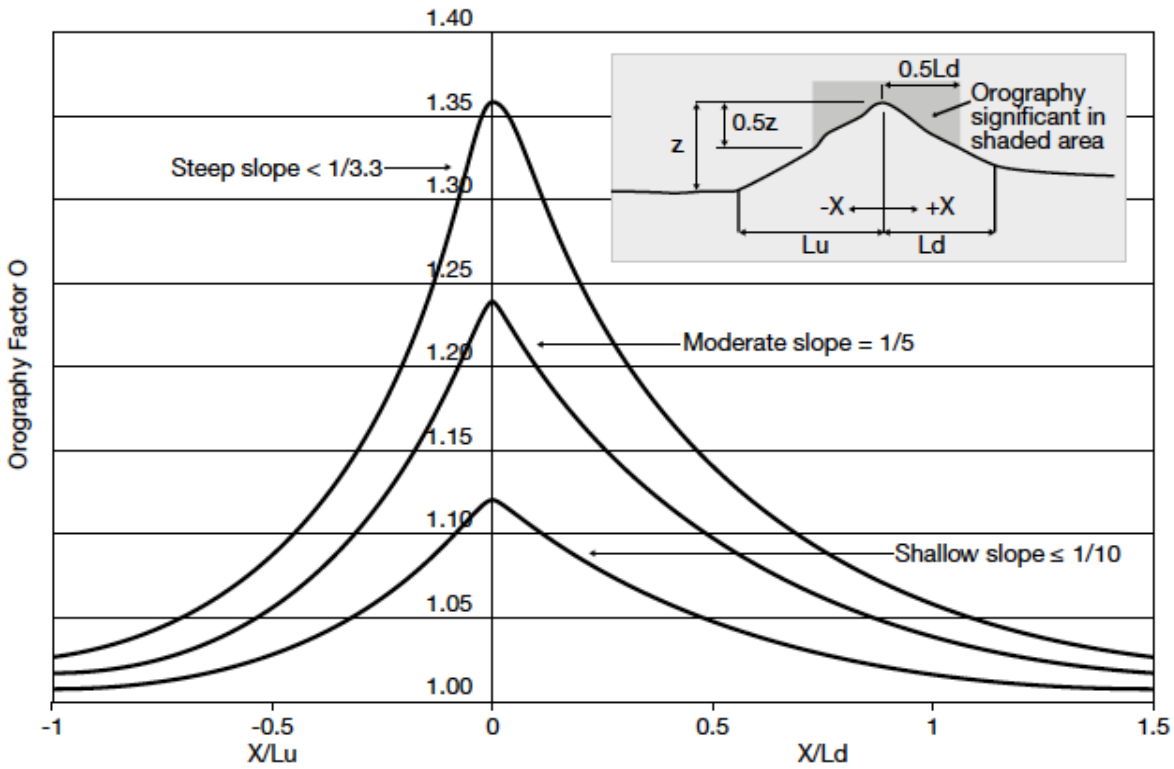


Figure 3a Orography Factor O for hills and ridges

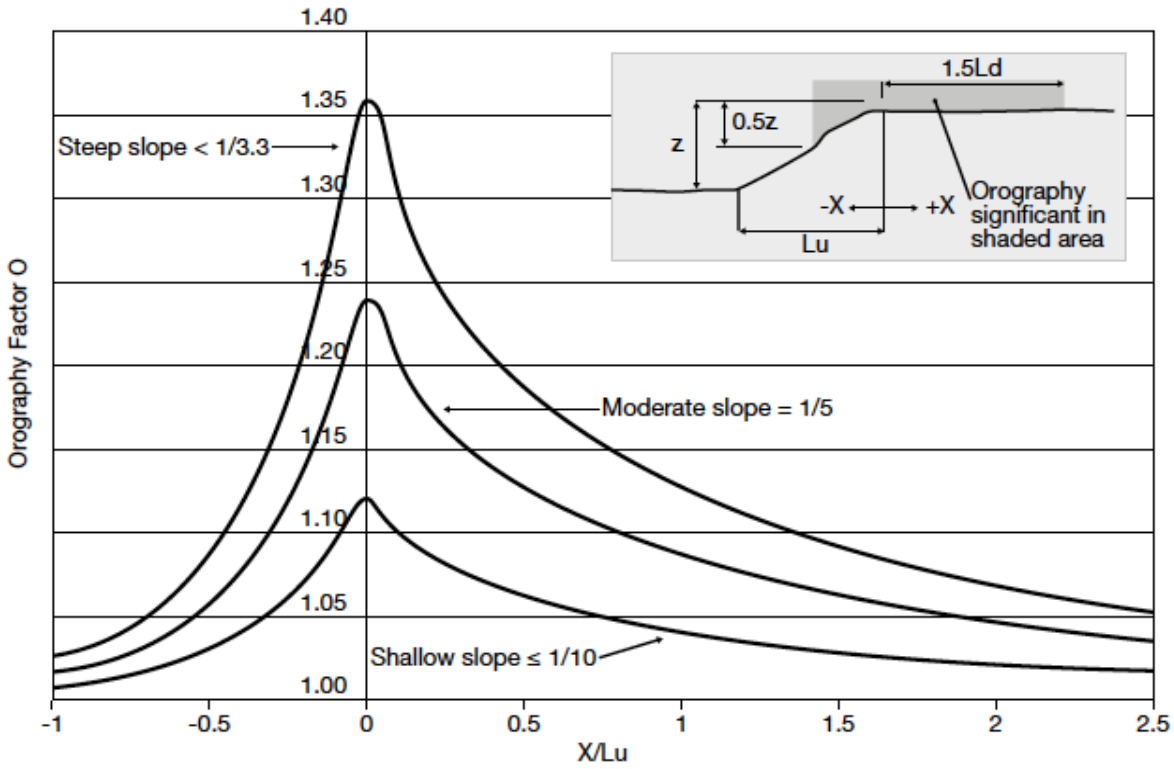


Figure 3b Orography Factor O for cliffs and escarpments
(interpolation between curves may be used)

Figure 3 Alternative graphical method for determining Orography Factor O

Diagram 6 Map showing wind speeds in m/s for maximum height of buildings

Page 19

Diagram 7

Delete the existing Diagram 7 and insert the following:

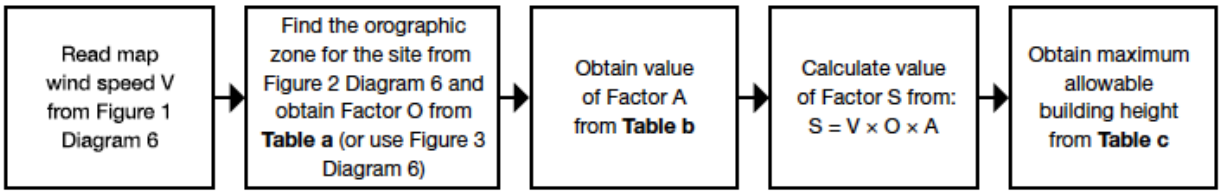


Table a Factor O

Orographic category and average slope of whole hillside, ridge, cliff or escarpment	Factor O		
	Zone 1	Zone 2	Zone 3
Category 1: Nominally flat terrain, average slope < 1/20	1.0	1.0	1.0
Category 2: Shallow terrain, average slope < 1/10	1.12	1.07	1.05
Category 3: Moderately steep terrain, average slope < 1/5	1.24	1.13	1.10
Category 4: Steep terrain, average slope > 1/5	1.36	1.20	1.15

Table b Factor A

Site altitude (m)	Factor A
0	1.00
50	1.05
100	1.10
150	1.15
200	1.20
300	1.30
400	1.40
500	1.50

Table c Maximum allowable building height in metres

	Country sites			Town sites		
Factor S	Distance to the coast			Distance to the coast		
	< 2km	2 to 20km	> 50km	< 2km	2 to 20km	> 50km
≤ 25	15	15	15	15	15	15
26	11.5	13.5	15	15	15	15
27	8	11	14.5	15	15	15
28	5.5	8	11	15	15	15
29	4	6.5	8.5	12.5	15	15
30	3	5	6.5	10	12.5	15
31		4	5.5	8.5	11	13.5
32		3.5	4.5	7	9.5	11.5
33		3	3.5	6	8	10
34			3	5.5	7	87.5
35				4.5	6.5	7.5
36				4	5.5	6.5
37				3.5	5	6
38				3	4.5	5.5
39					4	5
40					3.5	4.5
41					3	4
42						3.5
43						3.5
44						3

Notes: Table a – Outside of the zones shown in **Table a**, Factor O = 1.0.

Table b – For elevated sites where orography is significant a more accurate assessment of Factor A can be obtained by using the altitude at the base of the topographic feature instead of the altitude at the site, see Figure 2 Diagram 6 or, alternatively, Figure 3 Diagram 6.

Table c – i) Sites in town less than 300m from the edge of the town should be assumed to be in country terrain.
ii) Where a site is closer than 1km to an inland area of water which extends more than 1km in the wind direction, the distance to the coast should be taken as < 2km.
Interpolation may be used in **Tables b** and **c**.

Diagram 7 Maximum height of buildings

Page 21

Table 5 Cavity wall ties

Delete the existing Table 5 and insert the following:

Nominal cavity width mm (Note 1)	e length mm (Note 2)	BS EN 845-1 tie
50 to 75 76 to 100 101 to 125 126 to 150 151 to 175 176 to 300	200 225 250 275 300 (See Note 3)	Type 1, 2, 3 or 4 to BSI PD 6697:2010 and selected on the basis of the design loading and design cavity width.

Page 23

2C22

Delete existing text and insert the following:

2C22 Mortar:

Mortar should be:

a. One of the following
   i. Mortar designation (iii) according to BS EN 1996-1-1:2005 with its UK National Annex;
   ii. Strength class M4 according to BS EN 998-2;
   iii. 1:1:5 to 6 CEM I, lime, and fine aggregate measured by volume of dry materials, or
b. of equivalent or greater strength and durability to the specification in a. above.

Lateral support by roofs and floors

Page 27

Diagram 14 Sizes of openings and recesses, Note 8

Delete existing text and insert the following

Note 8: Take the value of the factor X from Table 8, or it can be given the value 6, provided the compressive strength of the bricks or blocks (in the case of a cavity wall – in the loaded leaf) is not less than 7N/mm^2.

Page 28

2C35 sub paragraph b.

Delete existing text and replace with the following:

2C35 b. in the longitudinal direction of joists in houses of not more than 2 storeys, if the joists are carried on the supported wall by joist hangers in accordance with BS EN 845-1 of the restraint type described by additional guidance given in BSI Published Document PD 6697:2010 and shown in Diagram 15(c), and are incorporated at not more than 2m centres, and

Small single-storey non-residential buildings and annexes

Page 30

2C38 Size and proportion i. General sub paragraph h.

Delete existing text and insert the following

2C38 h. The roof is braced at rafter level, horizontally at eaves level and at the base of any gable by roof decking, rigid sarking or diagonal timber bracing, as appropriate, in accordance with BS EN 1995-1-1:2004 with its UK National Annex and additional guidance given in BSI Published Document PD 6693-1-1:2012 or BS 8103-3:2009.

Page 32

Diagram 19 Lateral restraint at roof level, Key Note:

Delete existing text and insert the following:

Note: Fixings should be in accordance with Diagram 16

A1/2 Section 2E: Foundations of plain concrete

Minimum depth of strip foundations

Page 35

2E4, second paragraph

Delete existing text and insert the following:

In clay soils subject to volume change on drying ('shrinkable clays', with Modified Plasticity Index greater than or equal to 10%), strip foundations should be taken to a depth where anticipated ground movements will not impair the stability of any part of the building taking due consideration of the influence of vegetation and trees on the ground. The depth to the underside of foundations on clay soils should not be less than 0.75m on low shrinkage clay soils, 0.9m on medium shrinkage clay soils and 1.0m on high shrinkage clay soils, although these depths will commonly need to be increased in order to transfer the loading onto satisfactory ground, or where there are trees nearby.

A1/2 Section 3: Wall cladding

Page 36

3.3

Delete existing text and insert the following:

3.3 Wind loading on the cladding should be derived from BS EN 1991-1-4:2005 with its UK National Annex with due consideration given to local increases in wind suction arising from funnelling of the wind through gaps between buildings.

Page 36

3.5

Delete existing text and insert the following:

Where the wall cladding is required to function as pedestrian guarding to stairs, ramps, vertical drops of more than 600mm in dwellings or more than the height of two risers (or 380mm if not part of a stair) in other buildings, or as a vehicle barrier, then account should be taken of the additional imposed loading, as stipulated in Approved Document K, Protection from falling, collision and impact.

Page 36

3.6

Delete existing text and insert the following:

Where the wall cladding is required to safely withstand lateral pressures from crowds, an appropriate design loading is given in BS EN 1991-1-1:2002 with its UK National Annex and the Guide to Safety at Sports Grounds (4th Edition, 1997).

Page 37

3.11

Reference to Guidance notes published by the Construction Fixing Association

Delete existing text and insert the following:

Guidance notes published by the Construction Fixings Association www.fixingscfa.co.uk.

A1/2 Section 4: Roof covering

Page 38

4.1

Delete existing text and insert the following:

All materials used to cover roofs, excluding windows of glass in residential buildings with roof pitches of not less than 15°, shall be capable of safely withstanding the concentrated imposed loading upon roofs specified in BS EN 1991-1-1:2002 with its UK National Annex. Transparent or translucent covering materials for roofs not accessible except for normal maintenance and repair are excluded from the requirement to carry the concentrated imposes load upon roofs if they are non-fragile or are otherwise suitably protected against collapse.

Page 38

4.4

Add the following new text after existing paragraph:

Consideration might also be given to whether the roof covering being replaced is the original as-built covering.

A3 Section 5: Reducing the sensitivity of the building to disproportionate collapse in the event of an accident

Pages 41-42

Delete existing Section 5 inclusive of paragraphs 5.1 to 5.4, Table 11 and Diagram 24 and insert the following:

5.1 The requirement will be met by adopting the following approach for ensuring that the building is sufficiently robust to sustain a limited extent of damage or failure, depending on the consequence class of the building, without collapse:

a. Determine the building's consequence class from Table 11.

b. **For Consequence Class 1 buildings –** Provided the building has been designed and constructed in accordance with the rules given in this Approved Document, or other guidance referenced under Section 1, for meeting compliance with requirement A1 and A2 in normal use, no additional measures are likely to be necessary.

c. **For Consequence Class 2a buildings –** In addition to the Consequence Class 1 measures, provide effective horizontal ties, or effective anchorage of suspended floors to walls, as described in the Standards listed under paragraph 5.2 for framed and load-bearing wall construction (the latter being defined in paragraph 5.3 below).

d. **For Consequence Class 2b buildings –** In addition to the Consequence Class 1 measures, provide effective horizontal ties, as described in the Standards listed under paragraph 5.2 for framed and load-bearing wall construction (the latter being defined in paragraph 5.3 below), together with effective vertical ties, as defined in the Standards listed under paragraph 5.2, in all supporting columns and walls.

Alternatively, check that upon the notional removal of each supporting column and each beam supporting one or more columns, or any nominal length of load-bearing wall (one at a time in each storey of the building), the building remains stable and that the area of floor at any storey at risk of collapse does not exceed 15% of the floor area of that storey or 100m^2, whichever is smaller, and does not extend further than the immediate adjacent storeys (see Diagram 24).

Where the notional removal of such columns and lengths of walls would result in an extent of damage in excess of the above limit, then such elements should be designed as a 'key element' as defined in paragraph 5.3 below.

e. **For Consequence Class 3 buildings –** A systematic risk assessment of the building should be undertaken taking into account all the normal hazards that may reasonably be foreseen, together with any abnormal hazards.

Critical situations for design should be selected that reflect the conditions that can reasonably be foreseen as possible during the life of the building. The structural form and concept and any protective measures should then be chosen and the detailed design of the structure and its elements undertaken in accordance with the recommendations given in the Standards given in paragraph 5.2.

Further guidance is given in Annexes A and B to BS EN 1991-1-7:2006 Eurocode 1: Actions on structures – Part 1.7: General actions – Accidental actions; with UK National

Annex to BS EN 1991-1-7:2006 and BS EN 1990:2002+A1:2005 Eurocode – Basis of structural design; with UK National Annex to BS EN 1990:2002+A1:2005.

Consequence Classes	Building type and occupancy
1	Houses not exceeding 4 storeys
	Agricultural buildings
	Buildings into which people rarely go, provided no part of the building is closer to another building, or area where people do go, than a distance of 1.5 times the building height
2a Lower Risk Group	5 storey single occupancy houses
	Hotels not exceeding 4 storeys
	Flats, apartments and other residential buildings not exceeding 4 storeys
	Offices not exceeding 4 storeys
	Industrial buildings not exceeding 3 storeys
	Retailing premises not exceeding 3 storeys of less than 2000m^2 floor area in each storey
	Single-storey educational buildings
	All buildings not exceeding 2 storeys to which members of the public are admitted and which contain floor areas not exceeding 2000m^2 at each storey
2b Upper Risk Group	Hotels, blocks of flats, apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys
	Educational buildings greater than 1 storey but not exceeding 15 storeys
	Retailing premises greater than 3 storeys but not exceeding 15 storeys
	Hospitals not exceeding 3 storeys
	Offices greater than 4 storeys but not exceeding 15 storeys
	All buildings to which members of the public are admitted which contain floor areas exceeding 2000m^2 but less than 5000m^2 at each storey
	Car parking not exceeding 6 storeys
3	All buildings defined above as Consequence Class 2a and 2b that exceed the limits on area and/or number of storeys
	Grandstands accommodating more than 5000 spectators
	Buildings containing hazardous substances and/or processes

5.2 Details of the effective horizontal and vertical ties including tie force determination, together with the design approaches for checking the integrity of the building following the notional removal of vertical members and the design of key elements, are given in the following Standards:

BS EN 1990:2002+A1:2005 Eurocode – Basis of structural design; with UK National Annex to BS EN 1990:2002+A1:2005

BS EN 1991-1-7:2006 Eurocode 1: Actions on structures – Part 1.7: General actions – Accidental actions; with UK National Annex to BS EN 1991-1-7:2006 and BSI PD 6688-1-7:2009

BS EN 1992-1-1:2004 Eurocode 2: Design of concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1992-1-1:2004 and BSI PD 6687-1:2010

BS EN 1993-1-1:2005 Eurocode 3: Design of steel structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1993-1-1:2005

BS EN 1994-1-1:2004 Eurocode 4: Design of composite steel and concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1994-1-1:2004

BS EN 1995-1-1:2004+A1:2008 Eurocode 5: Design of timber structures – Part 1.1: General – Common rules and rules for buildings; with UK National Annex to BS EN 1995-1-1:2004+A1:2008 and BSI PD 6693-1:2012

BS EN 1996-1-1:2005+A1:2012 Eurocode 6: Design of masonry structures – Part 1.1: General rules for reinforced and unreinforced masonry structures; with UK National Annex to BS EN 1996-1-1:2005+A1:2012 and BSI PD 6697:2010

BS EN 1999-1-1:2007+A1:2009 Eurocode 9: Design of aluminium structures – Part 1.1:

General structural rules; with UK National Annex to BS EN 1999-1-1:2007+A1:2009 and BSI PD 6702-1:2009

5.3 Definitions

Nominal length of load-bearing wall

The nominal length of load-bearing wall construction referred to in 5.1d should be taken as follows:

– in the case of a reinforced concrete wall, the distance between lateral supports subject to a maximum length not exceeding 2.25H,

– in the case of an external masonry wall, or timber or steel stud wall, the length measured between vertical lateral supports,

– in the case of an internal masonry wall, or timber or steel stud wall, a length not exceeding 2.25H,

where H is the storey height in metres.

Note: Annex A of BS EN 1991-1-7:2006 with its UK National Annex provides corresponding guidance.

Key elements

A 'key element', as referred to in paragraph 5.1d, should be capable of sustaining an accidental design loading of 34kN/m^2 applied in the horizontal and vertical directions (in one direction at a time) to the member and any attached components (e.g. cladding etc.) having regard to the ultimate strength of such components and their connections. Such accidental design loading should be assumed to act simultaneously with all other design loadings (i.e. wind and imposed loading) in accidental actions loading combination.

BS EN 1990:2002+A1:2005 with its UK National Annex provides guidance on accidental design loading and accidental actions loading combination for 'key elements' and expressions 6.11a and 6.11b of that Standard are relevant.

Note: Annex A of BS EN 1991-1-7:2006 with its UK National Annex provides corresponding guidance for 'key elements'.

Load-bearing construction

For the purposes of this Guidance the term 'load-bearing wall construction' includes masonry cross-wall construction and walls comprising close centred timber or lightweight steel section studs.

Alternative approach

5.4 As an alternative to Table 11, for any building which does not fall into the classes listed under Table 11, or for which the consequences of collapse may warrant particular examination of the risks involved, performance may be demonstrated using the recommendations given in the following Reports and Publication:

'Guidance on Robustness and Provision against Accidental Actions', dated July1999.

'Proposed Revised Guidance on meeting Compliance with the requirements of Building Regulation Part A3'. Revision of the Allott and Lomax proposals. Project Report No. 205966.

Both of the above documents are available on www.planningportal.gov.uk

'Practical Guide to Structural Robustness and Disproportionate Collapse in Buildings' dated

October 2010. Published by The Institution of Structural Engineers, London.

Page 42

Insert the following new sub title and paragraph 5.5

Seismic design

5.5 Seismic design is not usually required for buildings classified by Table 11 as being in Consequence Classes 1, 2a and 2b. For buildings classified as Consequence Class 3 the risk assessment should consider if there is any need to carry out seismic design, although such a need is not an explicit requirement for these buildings.

Page 43

Diagram 24 Area at risk of collapse in the event of an accident

Insert the following amended diagram

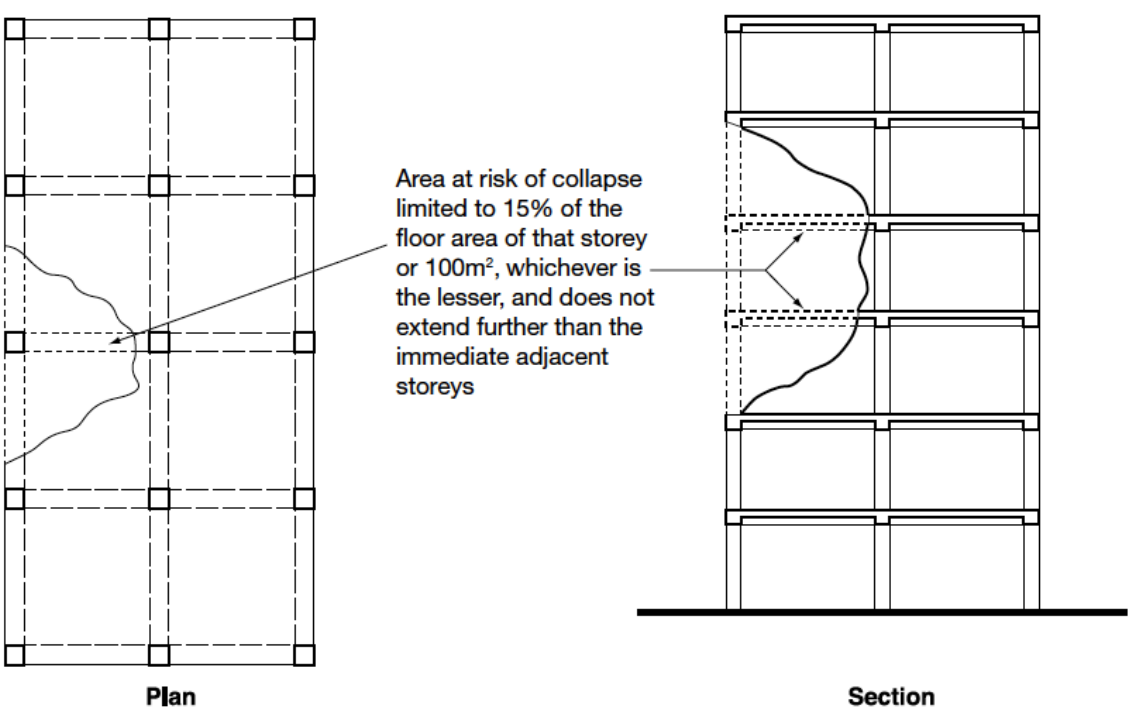


Diagram 24 Area at risk of collapse in the event of an accident

Pages 44-45

A

Standards referred to

Delete the reference list and insert the following

A1/2

BS 5080-1:1993

Structural fixings in concrete and masonry. Method of test for tensile loading.

BS 8103-1:2011

Structural design of low-rise buildings. Code of practice for stability, site investigation, foundations, precast concrete floors and ground floor slabs for housing.

BS 8103-2:2005

Structural design of low-rise buildings. Code of practice for masonry walls for housing.

BS 8103-3:2009

Structural design of low-rise buildings. Code of practice for timber floors and roofs for housing.

BS 8297:2000

Code of practice for design and installation of non-loadbearing precast concrete cladding. AMD 11064 2000, AMD 13018 2000.

BS 8298-1:2010

Code of practice for the design and installation of natural stone cladding and lining. General

BS 8298-2:2010

Code of practice for the design and installation of natural stone cladding and lining. Traditional handset external cladding.

BS 8298-3:2010

Code of practice for the design and installation of natural stone cladding and lining. Stone-faced pre-cast concrete cladding systems.

BS 8298-4:2010

Code of practice for the design and installation of natural stone cladding and lining. Rainscreen and stone on metal frame cladding systems.

BS 8500-1:2006+A1:2012

Concrete. Complementary British Standard to BS EN 206-1. Method of specifying and guidance for the specifier.

BS 8500-2:2006+A1:2012

Concrete. Complementary British Standard to BS EN 206-1. Specification for constituent materials and concrete.

BS EN 197-1:2011

Cement. Composition, specifications and conformity criteria for common elements.

BS EN 197-2:2000

Cement. Conformity evaluation.

BS EN 771-1:2011

Specification for masonry units. Clay masonry units.

BS EN 771-2:2011

Specification for masonry units. Calcium silicate masonry units.

BS EN 771-3:2011

Specification for masonry units. Aggregate concrete masonry units (dense and lightweight aggregates). AMD 16001.

BS EN 771-4:2011

Specification for masonry units. Autoclaved aerated concrete masonry units.

BS EN 771-5:2011

Specification for masonry units. Manufactured stone masonry units.

BS EN 771-6:2011

Specification for masonry units. Natural stone masonry units.

BS EN 845-1:2003+A1:2008

Specification for ancillary components for masonry. Ties, tension straps, hangers and brackets. AMD 14736 2003, AMD 15539 2006.

BS EN 845-2:2003

Specification for ancillary components for masonry. Lintels.

BS EN 845-3:2003+A1:2008

Specification for ancillary components for masonry. Bed joint reinforcement of steel meshwork.

BS EN 998-2:2010

Specification for mortar for masonry. Masonry mortar. AMD July 2011.

BS EN 1090-2:2008+A1:2011

Execution of steel structures and aluminium structures – Part 2.Technical requirements for the execution of steel structures.

BS EN 1090-3:2008

Execution of steel structures and aluminium structures – Part 3. Technical requirements for aluminium structures.

BS EN 1990:2002+A1:2005

Eurocode – Basis of structural design; with UK National Annex to BS EN 1990:2002 +A1:2005.

BS EN 1991-1-1:2002

Eurocode 1: Actions on structures – Part 1.1: General actions – Densities, self weight, imposed loads for buildings; with UK National Annex to BS EN 1991-1-1:2002.

BS EN 1991-1-3:2003

Eurocode 1: Actions on structures – Part 1.3: General actions – Snow loads; with UK National Annex to BS EN 1991-1-3:2003.

BS EN 1991-1-4:2005+A1:2010

Eurocode 1: Actions on structures – Part 1.4: General actions – Wind actions; with UK National Annex to BS EN 1991-1-4:2005+A1:2010.

BS EN 1991-1-5:2003

Eurocode 1: Actions on structures – Part 1.5: General actions – Thermal actions; with UK National Annex to BS EN 1991-1-5:2003.

BS EN 1991-1-6:2005

Eurocode 1: Actions on structures – Part 1.6: General actions – Actions during execution; with UK National Annex to BS EN 1996-1-6:2005.

BS EN 1991-1-7:2006

Eurocode 1: Actions on structures – Part 1.7: General actions – Accidental actions; with UK National Annex to BS EN 1991-1-7:2006.

BS EN 1991-3:2006

Eurocode 1: Actions on structures – Part 3: Actions induced by cranes and machines; with UK National Annex to BS EN 1991-3:2006.

BS EN 1992-1-1:2004

Eurocode 2: Design of concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1992-1-1:2004.

BS EN 1993-1-1:2005

Eurocode 3: Design of steel structures – Part 1.1: General rules and rules for buildings; with

UK National Annex to BS EN 1993-1-1:2005.

BS EN 1993-1-3:2006

Eurocode 3: Design of steel structures – Part 1.3: General rules – Supplementary rules for cold-formed members and sheeting; with UK National Annex to BS EN 1993-1-3:2006.

BS EN 1993-1-4:2006

Eurocode 3: Design of steel structures – Part 1.4: General rules – Supplementary rules for stainless steels; with UK National Annex to BS EN 1993-1-4:2006.

BS EN 1993-1-5:2006

Eurocode 3: Design of steel structures – Part 1.5: Plated structural elements; with UK National Annex to BS EN 1993-1-5:2006.

BS EN 1993-1-6:2007

Eurocode 3: Design of steel structures – Part 1.6: Strength and stability of shell structures.

BS EN 1993-1-7:2007

Eurocode 3: Design of steel structures – Part 1.7: Plated structures subject to out of plane loading.

BS EN 1993-1-8:2005

Eurocode 3: Design of steel structures – Part 1.8: Design of joints; with UK National Annex to BS EN 1993-1-8:2005.

BS EN 1993-1-9:2005

Eurocode 3: Design of steel structures – Part 1.9: Fatigue; with UK National Annex to BS EN

1993-1-9:2005.

BS EN 1993-1-10:2005

Eurocode 3: Design of steel structures – Part 1.10: Material toughness and through-thickness properties; with UK National Annex to BS EN 1993-1-10:2005.

BS EN 1993-1-11:2006

Eurocode 3: Design of steel structures – Part 1.11: Design of structures with tension components; with UK National Annex to BS EN 1993-1-11:2006.

BS EN 1993-1-12:2007

Eurocode 3: Design of steel structures – Part 1.12: Additional rules for the extension of EN

1993 up to steel grades S 700; with UK National Annex to BS EN 1993-1-12:2007.

BS EN 1993-5:2007

Eurocode 3: Design of steel structures – Part 5: Piling; with UK National Annex to BS EN 1993-5:2007+A1:2012

BS EN 1993-6:2007

Eurocode 3: Design of steel structures – Part 6: Crane supporting structures; with UK National Annex to BS EN 1993-6:2007.

BS EN 1994-1-1:2004

Eurocode 4: Design of composite steel and concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1994-1-1:2004.

BS EN 1995-1-1:2004+A1:2008

Eurocode 5: Design of timber structures – Part 1.1: General – Common rules and rules for buildings; with UK National Annex to BS EN 1995-1-1:2004+A1:2008.

BS EN 1996-1-1:2005+A1:2012

Eurocode 6: Design of masonry structures – Part 1.1: General rules for reinforced and unreinforced masonry structures; with UK National Annex to BS EN 1996-1-1:2005 +A1:2012.

BS EN 1996-2:2006

Eurocode 6: Design of masonry structures – Part 2: Design considerations, selection of materials and execution of masonry; with UK National Annex to BS EN 1996-2:2006.

BS EN 1996-3:2006

Eurocode 6: Design of masonry structures – Part 3: Simplified calculation methods for unreinforced masonry structures; with UK National Annex to BS EN 1996-3:2006.

BS EN 1997-1:2004

Eurocode 7: Geotechnical design – Part 1: General rules; with UK National Annex to BS EN 1997-1:2004.

BS EN 1997-2:2007

Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing; with UK National Annex to BS EN 1997-2:2007.

BS EN 1998-1:2004+A1:2013

Eurocode 8: Design of structures for earthquake resistance – Part 1: General rules, seismic actions and rules for buildings; with UK National Annex to BS EN 1998-1:2004.

BS EN 1998-5:2004

Eurocode 8: Design of structures for earthquake resistance – Part 5. Foundations, retaining structures and geotechnical aspects; with UK National Annex to BS EN 1998-2:2004.

BS EN 1999-1-1:2007+A1:2009

Eurocode 9: Design of aluminium structures – Part 1.1: General structural rules; with UK National Annex to BS EN 1999-1-1:2007+A1:2009.

BS EN 1999-1-3:2007+A1:2011

Eurocode 9: Design of aluminium structures – Part 1.3: Structures susceptible to fatigue; with UK National Annex to BS EN 1999-1-3:2007+A1:2011.

BS EN 1999-1-4:2007+A1:2011

Eurocode 9: Design of aluminium structures – Part 1.4: Cold-formed structural sheeting; with UK National Annex to BS EN 1999-1-4:2007.

BS EN 1999-1-5:2007

Eurocode 9: Design of aluminium structures – Part 1.5: Shell structures; with UK National Annex to BS EN 1999-1-5:2007.

BS EN 12620:2002+A1:2008

Aggregates for concrete. AMD 15333 2004.

BS EN 13670:2009

Execution of concrete structures

BSI PD 6687-1:2010

Published Document – Background paper to the UK National Annexes to BS EN 1992-1 and BS EN 1992-3.

BSI PD 6688-1-1:2011

Published Document – Recommendations for the design of structures to BS EN 1991-1-1.

BSI PD 6688-1-4:2009

Published Document – Background information the National Annex to BS EN 1991-1-4 and additional guidance.

BSI PD 6688-1-7:2009

Published Document – Recommendations for the design of structures to BS EN 1991-1-7.

BSI PD 6693-1:2012

Published Document – Recommendations for the design of timber structures to Eurocode 5: Design of timber structures Part 1: General – Common rules and rules for buildings.

BSI PD 6695-1-9:2008

Published Document – Recommendations for the design of structures to BS EN 1993-1-9.

BSI PD 6695-1-10:2009

Published Document – Recommendations for the design of structures to BS EN 1993-1-10.

BSI PD 6697:2010

Published Document – Recommendations for the design of masonry structures to BS EN

1991-1-1 and BS EN 1996-2.

BSI PD 6698:2009

Published Document – Recommendations for the design of structures for earthquake resistance to BS EN 1998.

BSI PD 6702-1:2009

Published Document – Structural use of aluminium – Part 1. Recommendations for the design of aluminium structures to BS EN 1999.

BSI PD 6705-3:2009

Published Document – Structural use of steel and aluminium – Part 3. Recommendations for the execution of aluminium structures to BS EN 1090-3.

A3

BS EN 1990:2002+A1:2005

Eurocode – Basis of structural design; with UK National Annex to BS EN 1990:2002 +A1:2005.

BS EN 1991-1-7:2006

Eurocode 1: Actions on structures – Part 1.7: General actions – Accidental actions; with UK National Annex to BS EN 1991-1-7:2006.

BS EN 1992-1-1:2004

Eurocode 2: Design of concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1992-1-1:2004.

BS EN 1993-1-1:2005

Eurocode 3: Design of steel structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1993-1-1:2005.

BS EN 1994-1-1:2004

Eurocode 4: Design of composite steel and concrete structures – Part 1.1: General rules and rules for buildings; with UK National Annex to BS EN 1994-1-1:2004.

BS EN 1995-1-1:2004+A1:2008

Eurocode 5: Design of timber structures – Part 1.1: General – Common rules and rules for buildings; with UK National Annex to BS EN 1995-1-4+A1:2008.

BS EN 1996-1-1:2005+A1:2012

Eurocode 6: Design of masonry structures – Part 1.1: General rules for reinforced and unreinforced masonry structures; with UK National Annex to BS EN 1996-1-1:2005 +A1:2012.

BS EN 1999-1-1:2007+A1:2009

Eurocode 9: Design of aluminium structures – Part 1.1: General structural rules; with UK National Annex to BS EN 1999-1-1:2007+A1:2009.

BSI PD 6687-1:2010

Published Document – Background paper to the UK National Annexes to BS EN 1992-1 and BS EN 1992-3.

BSI PD 6688-1-7:2009

Published Document – Recommendations for the design of structures to BS EN 1991-1-7.

BSI PD 6693-1:2012

Published Document – Recommendations for the design of timber structures to Eurocode 5: Design of timber structures Part 1: General – Common rules and rules for buildings.

BSI PD 6697:2010

Published Document – Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2.

BSI PD 6702-1:2009

Published Document – Structural use of aluminium – Part 1. Recommendations for the design of aluminium structures to BS EN 1999.

Annex C

Proposed amendments to Approved Document C (2004 Edition incorporating 2010 amendments)

http://gov.wales/docs/desh/publications/130205building-regs-approved-document-c-site-prep-en.pdf

Page 7

Delete footnote reference 3 and replace with the following:

BS 7913:2013 *Guide to the principles of the conservation of historic buildings*. Provides guidance on the principles that should be applied when proposing work on historic buildings.

Page 8

Third paragraph

Delete existing text and replace with the following:

If internal mechanical ventilation is used to disperse ground gases, it may affect the functioning of combustion appliances and may lead to the spillage of products of combustion into the building. Guidance on this can be found in BRE Report BR 211[6].

Change subsequent reference 6 to the following:

6 BRE Report BR 211 *Radon: Guidance on protective measures for new buildings 2015*.

Page 9

Flood risk

0.8

Delete the first sentence and replace with the following:

Policies set out in the National Planning Policy aim to avoid inappropriate development in areas at risk of flooding.

Delete footnote reference 7 and replace with the following:

7 Planning Policy Wales (Edition 8), Welsh Government, January 2016

Page 10

Delete footnote references 8 to 10 and replace with the following:

8 BS 85500:2015 *Flood resistant and resilient construction – Guide to improving the flood performance of buildings*, November 2015

9 BRE, *Applying flood resilience technologies*, Good Building Guide, GBG84, 2014

10 BRE, *Flood-resilient building: BRE Digest 523: Parts 1 and 2*, 2012

Land affected by contaminants

0.9

Delete reference to: 'The Contaminated Land (England) Regulations 2000' *and replace with:* 'The Contaminated Land (Wales) Regulations 2006 (as amended 2012)'

0.10

Delete reference to: 'guidance in PPG 23' *and replace with:* 'guidance in Planning Policy Wales'.

Change subsequent footnote reference 12 to the following:

12 Planning Policy Wales (Edition 8), Welsh Government, January 2016

Page 12

SECTION 1

1.2

Delete existing text and replace with the following:

The extent and level of investigation need to be tailored to the type of development and the previous use of land. Typically the site investigation should include susceptibility to groundwater levels and flow, underlying geology, and ground and hydro-geological properties. A geotechnical site investigation should identify physical hazards for site development, determine an appropriate design and provide soil parameters for design and construction. BS EN 1997-2:2007: Eurocode 7: Geotechnical design with its UK National Annex[36] supported by BS 5930:1999+A2:2010[14] provide comprehensive guidance on site investigation. Guidance on site investigation for low-rise buildings is given in six BRE Digests covering procurement[15], desk studies[16], the walk-over survey[17], trial pits[18], soil description[19] and direct investigation[20]. Reference should also be made to BS 8103-1:2011[21].

Add new footnote reference:

36 BS EN 1997-2:2007: *Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing,* with UK National Annex to BS EN 1997-2:2007.

Delete footnote reference 14 and replace with the following:

14 BS 5930:1999+A2:2010. *Code of practice for site investigations*

Delete footnote reference 21 and replace with the following:

21 BS 8103-1:2011 *Structural design of low-rise buildings – Part 1: Code of Practice for stability, site investigation, precast concrete floors and ground floor slabs for housing*

Page 16

2.9 b

Delete text and replace with the following:

b. BS 5930:1999 including Annex A2: 2010[14]

2.9 c

Delete text and replace with the following:

c. BS 10175:2011[37]

Delete footnote reference 36 and replace with the following:

14 BS 5930:1999+A2:2010. *Code of practice for site investigations*

Delete footnote reference 37 and replace with the following:

37 BS 10175:2011 *Code of practice for investigation of potentially contaminated sites.*

Page 21

RADON

Delete paragraph 2.40 and replace with the following:

2.40 Guidance on whether an area is susceptible to radon, and appropriate protective measures, can be obtained from BRE Report BR 211[75]. The maps in BR 211 are based on the indicative atlas published by Public Health England (formerly the Health Protection Agency) and the British Geological Survey.

Radon risk reports may be used as an alternative approach to the maps for assessing the need for protective measures. These reports are available from:

- UK Radon, www.UKradon.org , for small domestic and workplace buildings (and extensions) that have an existing postal address.
- BGS Georeports, https://shop.bgs.ac.uk/GeoReports/ , for other development sites.
- Public Health England (formerly the Health Protection Agency), radon@phe.gov.uk , for large workplaces.

BR 211 provides guidance on basic radon protective measures appropriate in areas where 3% to 10% of homes and full radon protective measures in areas where more than 10% of homes are predicted to have radon at or above the Radon Action Level of 200Bq/m^3.

Note: Use of the alternative radon risk reports approach will provide a more accurate assessment of whether radon protective measures are necessary and, if needed, the level of protection that is appropriate.

The Ionising Radiations Regulations[76] and other legislation set out relevant requirements including a national reference level for radon in workplaces. See also the BRE guide Radon in the Workplace[77].

The Health and Safety Executive provides guidance on protection from radon in the workplace (www.hse.gov.uk/radiation/ionising/radon.htm). Additionally techniques for installing radon resistant membranes described in BR 211 may be suitable for use in domestic sized buildings with heating and ventilation regimes similar to those used in dwellings but this should be done with caution. Information in 'Radon in the workplace' provides guidance for existing non-domestic buildings.

Delete paragraph 2.41

Delete footnote reference 75 and replace with the following:

75 BRE Report BR 211 *Radon: Guidance on protective measures for new buildings* 2015.

Delete footnote reference 77 and replace with the following:

77 BRE Report FB 41 *Radon in the workplace: A guide for building owners and managers* (Second edition), 2011

Delete footnote reference 78

Page 24

Delete footnote reference 81 and replace with the following:

81 BRE Report BR 211 *Radon: Guidance on protective measures for new buildings* 2015.

Page 31

SOLID EXTERNAL WALLS

Technical solution

5.9 b *Delete reference to* 'BS EN 998:2003' *and replace with* 'BS EN 998:2010'.

Change subsequent reference 105 to the following:

BS EN 998-2:2010 *Specification for mortar for masonry. Masonry mortar*.

Page 36

IMPERVIOUS CLADDING SYSTEMS FOR WALLS

Technical solution

5.25 *Delete reference to* 'BS 8000-6:1990' *and replace with* 'BS 8000-6:2013'.

Change subsequent reference 117 to the following:

BS 8000-6:2013 *Workmanship on building sites. Code of practice for slating and tiling of roofs and claddings*.

Page 39

ROOFS (RESISTANCE TO MOISTURE FROM THE OUTSIDE)

Technical solution

6.8 *Delete reference to* 'BS 8000-6:1990' *and replace with* 'BS 8000-6:2013'.

Change subsequent reference 134 to the following:

BS 8000-6:2013 *Workmanship on building sites. Code of practice for slating and tiling of roofs and claddings*.

Page 41

Delete reference 14, 36 and replace with the following:

14 BS 5930:1999+A2:2010. *Code of practice for site investigations*

Delete reference 21 and replace with the following:

21 BS 8103-1:2011 *Structural design of low-rise buildings – Part 1: Code of Practice for stability, site investigation, precast concrete floors and ground floor slabs for housing*

Delete reference 37 and replace with the following:

37 BS 10175:2011 *Code of practice for investigation of potentially contaminated sites*

Delete reference 105 and replace with the following:

BS EN 998-2:2010 *Specification for mortar for masonry. Masonry mortar*.

Delete reference 117 and replace with the following:

BS 8000-6:2013 *Workmanship on building sites. Code of practice for slating and tiling of roofs and claddings*.

Page 42

Insert reference 8

8 BS 85500:2015 *Flood resistant and resilient construction – Guide to improving the flood performance of buildings*, November 2015

Insert reference 36

36 BS EN 1997-2:2007: *Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing,* with UK National Annex to BS EN 1997-2:2007.

Page 43

Delete references 6 and 78

Insert new references 9 and 10:

9 BRE, *Applying flood resilience technologies*, Good Building Guide, GBG84, 2014

10 BRE, *Flood-resilient building: BRE Digest 523: Parts 1 and 2*, 2012

Delete references 75, 81 and replace with:

6, 75, 81 BRE Report BR 211 *Radon: Guidance on protective measures for new buildings* 2015.

Delete reference 77 and replace with:

77 BRE Report FB 41 *Radon in the workplace: A guide for building owners and managers* (Second edition), 2011

Page 44

Delete reference 7

Delete reference 10

Page 46

Insert new sub section: '**Welsh Government (WG)**'

Below **Welsh Government (WG)** *Insert reference 7 and 12*

7, 12 Planning Policy Wales (Edition 8), Welsh Government, January 2016