BRITISH STANDARD

BS 6262-1:2005

Glazing for buildings —

Part 1: General methodology for the selection of glazing

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Committees responsible for this British Standard

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British Adhesives and Sealants Association

British Plastics Federation

British Woodworking Federation

Consumer Policy Committee of BSI

Council for Aluminium in Building

Flat Glass Manufacturers' Association

Glass and Glazing Federation

Nottingham University

Office of the Deputy Prime Minister — Building Division

Office of the Deputy Prime Minister — represented by the BRE

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Contents

Foreword

This part of BS 6262 has been prepared by Subcommittee B/520/4. It partially supersedes BS 6262:1982, which will be withdrawn upon publication of all seven parts of the newly revised and restructured BS 6262. BS 6262:1982 is being revised and restructured to simplify its use and will be published in seven parts:

— *Part 1: General methodology for the selection of glazing;*
— *Part 2: Code of practice for energy, light and sound;*
— *Part 3: Code of practice for fire, security and wind loading;*
— *Part 4: Code of practice for safety related to human impact;*
— *Part 5: Code of practice for frame design considerations;*
— *Part 6: Code of practice for special applications;*
— *Part 7: Code of practice for the provision of information.*

Recommendations for standards of workmanship for glazing have been published separately in BS 8000-7 and therefore this subject is not dealt with in this standard.

Since the correct selection of materials to be used in glazing for buildings depends on many factors, the recommendations in this part of BS 6262 should be used in conjunction with those in the other parts.

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification, and particular care should be taken to ensure that claims of compliance are not misleading.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

In particular, attention is drawn to the following statutory regulations:

a) the Building Regulations 2000 [1];

b) the Building Regulations (Northern Ireland) 2000 [2];

c) the Building (Scotland) Regulations 2004 [3].

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

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1 Scope

This part of BS 6262 gives a general methodology for the selection of an appropriate choice of glass, plastics glazing sheet material and method of glazing.

These recommendations do not apply to:

a) patent glazing (see BS 5516-1);

b) glass in non-vertical applications (see BS 5516-2);

c) glazing for furniture and fittings (see BS 7376 and BS 7449);

d) glazing for commercial greenhouses (see BS 5502-21);

e) glazing for domestic greenhouses.

Recommendations for standards of workmanship for glazing have been published separately in BS 8000-7 and therefore this subject is not dealt with in this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 6399-2*, Loading for buildings — Part 2: Code of practice for wind loads.*

BS 8206-2*, Lighting for buildings — Part 2: Code of practice for daylighting.*

BS EN 673*, Glass in building — Determination of thermal transmittance (U value) — Calculation method.*

3 Terms and definitions

For the purposes of this part of BS 6262, the following terms and definitions apply.

3.1 glazing (noun)
glass or plastics glazing sheet material, for installation into a building

3.2 pane
single piece of glass or plastics glazing sheet material, in a finished size ready for glazing

3.3 plastics glazing sheet material
plastics materials in the form of a single sheet, or a combination of sheets laminated together, or an extruded multi-wall sheet

4 Design and performance

4.1 Introduction

In recent years, the design and performance requirements, such as higher thermal insulation, amended acoustic performance, etc., for glass and plastics glazing sheet material have become more demanding. There are many requirements that previously had been regarded as client-set (for example, security) that are being incorporated into legislation (outlined in Annex A).

It is important, at the initial project evaluation stage, to adopt a methodology that incorporates the implications of using any glass and plastics glazing sheet materials and the material's influence upon the performance of the building. The sequence in Figure 1 outlines such a methodology, which is expanded on from **4.2** to **4.12**. In this methodology, it has been assumed that:

a) the location of the glazed areas, their shapes and preliminary sizes have been decided as part of the normal building design process;

b) the designer will have acquired information on glass and plastics glazing sheet materials used in similar circumstances;

c) the designer is aware of the implications of any innovatory design.

NOTE For information on the normal building design process, see BS 8213-1.

4.2 Initial constraints

4.2.1 *General*

Before selecting any glass or plastics glazing sheet material, the factors given in **4.2.2** to **4.2.4** should be considered.

4.2.2 *Design requirements*

Design requirements, including aesthetic considerations (such as the view) and any specific client requirements, such as security and maintenance considerations, should be considered.

NOTE The desire to provide a visual link from the inside of the building to the outside (and, in some cases, vice versa) might determine the size, proportion and type of window and the positioning of intermediate frame members and, hence, the size and type of the glass and plastics glazing sheet material, all of which are beyond the scope of this code of practice.

4.2.3 *Legislative requirements*

Attention is drawn to the following statutory regulations: the Building Regulations 2000 [1], the Building Regulations (Northern Ireland) 2000 [2] and the Building (Scotland) Regulations 2004 [3].

The size and type of the glass and plastics glazing sheet materials, and in some cases the surrounds, might be affected by Approved Documents (England and Wales), Technical Handbooks (Domestic and Non-domestic) (Scotland) and Technical Booklets (Northern Ireland) (as detailed in Annex A).

4.2.4 *Effect of design on cost*

The following should be considered:

a) the initial cost of the glazing system, including:

   1) type, size and thickness of glass and plastics glazing sheet materials;

   2) method and materials for glazing;

   3) access for initial glazing;

   4) continuity of work schedule;

   5) possible need for protection during construction and its removal on handover;

b) the effects of the glass and plastics glazing sheet materials on the capital and running costs related to the building, its heating, cooling, lighting and ventilation;

c) the maintenance of the glazed areas, where the factors most likely to affect maintenance costs are:

   1) the glazing materials used;

   2) access for cleaning and re-glazing;

   3) ease of re-glazing.

The use of expensive glass and plastics glazing sheet materials should be assessed against the possibility of reduced fuel consumption and lower running costs.

The comparative costs of glazing materials should be considered in conjunction with their life expectancy and the probability of need for maintenance. (For guidance, see BS 6262-5.)

4.3 Glazing systems

When the designer has evaluated the effect of the constraints given in **4.2**, a preliminary selection of a system of glazing can be made. The design requirements in **4.4** to **4.12** should be considered in detail in order to check the validity of the initial selection.

4.4 Natural lighting

4.4.1 *Design information*

For design guidance relating to the assessment and provision of natural lighting, reference should be made to BS 8206-2. Consideration of natural lighting should be related to the provision of artificial lighting.

NOTE The topic of natural lighting is discussed in more detail in BS 6262-2.

4.4.2 *Glare*

The following four manifestations of glare from glass and plastics glazing sheet materials should be considered:

a) direct glare from the sun;

b) glare from the sky, excluding direct sunlight;

c) glare resulting from diffracting or diffusing glass and plastics glazing sheet materials of high luminance;

d) glare resulting from reflection of sunlight or skylight.

Preventing the sun from entering the window aperture is one way to control direct glare from the sun.

In relation to glare from the sky, or reflected glare, it is possible to use special glass and plastics glazing sheet materials with reduced light transmission in order to produce satisfactory lighting.

Methods exist for the prediction of glare indices when direct sunlight is excluded. These relate to the size and shape of the glazed area, the luminance of the relevant part of the field of view and the light transmission characteristics of the glass and plastics glazing sheet materials. As a general rule, maintaining the size and reducing the light transmission of the glass or plastics glazing sheet materials is recommended, rather than maintaining a high light transmission and reducing the area. This is because the contrast between the glazed area and its surrounding opaque walls, etc., has to be minimized if glare is to be reduced to an acceptable level.

4.4.3 *Fading*

When an object receives sunlight or skylight, fading can occur. The rate of fading depends on the nature of the object, the duration and intensity of the exposure and the type of radiation. Fading is generally associated with ultraviolet radiation, which comprises 3 % of the sun's energy received at the earth's surface. When assessing the performance of glass or plastics glazing sheet materials in reducing fading, it should be considered that fading can result from exposure not only to ultraviolet radiation but also to some parts of the visible radiation in sunlight and skylight.

4.4.4 *Privacy*

The required degree of obscuration should be considered, in respect of the privacy needed, from either side of the glass or plastics glazing sheet materials and the difference between internal and external lighting conditions.

4.5 Thermal considerations

4.5.1 *General*

The total annual energy implications of solar gain and heat loss should be considered in relation to the total heat balance of the building and the glazed areas should be chosen accordingly.

NOTE Solar transmission, solar heat gain, thermal insulation and heat absorption are discussed in more detail in BS 6262-2.

4.5.2 *Solar transmission*

The effects of solar transmission can be considered in two ways:

a) solar gains that occur during the summer months;

b) solar gains that occur during the normal heating season between September and May.

Unwanted summertime solar gains can be dealt with by the means of window design and orientation, and various forms of shading.

Solar gains that occur during the heating season can be used to advantage by considering window geometry and orientation and using suitable controls on heating and lighting systems. Effective use can mean that the net energy balance of windows facing south of the east/west axis is positive, i.e., the useful solar gains more than equal the conduction losses due to the glazed areas.

4.5.3 *Thermal insulation*

The thermal insulation of building material, such as glass or plastics glazing sheet materials, is conveniently expressed by its thermal transmittance (U-value).

To determine the total heat loss for a particular type of glass or plastics glazing sheet material, single or multiple, multiply the U-value by the area of the glass or plastics glazing sheet material and by the temperature difference between the environment, usually indoor and outdoor, on each side of the glazed area, as specified in BS EN 673.

Glazed areas enable daylight to be admitted to a building but at the expense of a comparatively high heat loss. Multiple glazing has reduced heat loss (lower U-value) compared with single glazing because of the additional thermal insulation provided by the cavity(ies) separating the individual panes. Glass and plastics glazing sheet materials can also be used in conjunction with insulating materials to reduce the heat loss through an opaque building element.

Using multiple glazing reduces the risk of condensation on the indoor surface of glass or plastics glazing sheet materials. The risk of condensation in the cavities of such systems is minimized either by hermetically sealing and filling them with dehydrated air/gas or by venting them to the outside air.

4.5.4 *Heat absorption*

The effects of the window design on the creation of excessive thermal stresses resulting from the heat absorbed by the glass and plastics glazing sheet materials should be considered in the design and performance of glazing materials.

4.6 Sound

The reduction of transmitted noise requires an appraisal of the following four elements, each of which is frequency dependent.

a) The noise source. Most noises are complex in that they include sounds of different frequencies and amplitudes.

b) The human response. The range of sound energy to which the ear responds is very large. A logarithmic scale is more in accord with the ear's response and is therefore used to measure sound levels (decibels).

c) The glass or plastics glazing sheet material and its surround.

1) Sound insulation of windows: effects of mass. The mean sound insulation value of glazing is predicted, with reasonable accuracy, from its mass. However, it is not the mean sound insulation value that is important but the sound insulation at the dominant frequencies of the relevant noise spectrum. High insulation values at other frequencies in no way compensate for a deficiency in these bands.

2) Differences in pane thickness. Where two parallel panes are of equal thickness, a drop in sound insulation occurs at the coincidence frequency of the individual panes. By employing panes of different thicknesses, this loss does not occur at the same frequency and thus an improved sound insulation performance results.

3) Physical separation of panes. Glass and plastics glazing sheet materials separated by an air space or a plastics interlayer can provide increased sound insulation. However, the vibrations of the first pane can be transmitted to the second pane and also via the surround.

4) Non-parallel panes. Theoretically, non-parallel panes should provide better acoustic insulation than parallel panes. However, unless the angle of incidence of the noise is well defined, this improvement is negligible in practice.

d) The recommended internal noise level.

NOTE The topic of sound insulation is discussed in more detail in BS 6262-2.

4.7 Safety

Glass and plastics glazing sheet materials of suitable type, thickness and size should be selected to provide an appropriate degree of safety, taking into account the intended use.

In addition to considering the risks of accidental impact, or where activities generate a special risk, the following criteria should be taken into account:

a) wind loading;

b) fire;

c) criminal attack;

d) barriers.

In the case of internal doors, the wind loading is negligible but the possibility of accidental human impact could be appreciable.

NOTE The topic of safety is discussed in more detail in BS 6262-4.

4.8 Security

Security glazing is used in situations where a high degree of protection, either to persons or property, is required.

The basic considerations are:

a) protection against violent, malicious manual attack;

b) protection against the use of firearms;

c) protection against the effects of explosions.

NOTE The topic of security is discussed in more detail in BS 6262-3.

4.9 Fire

The performance of glass or plastics glazing sheet materials with reference to fire protection is the subject of regulation, by-laws and similar laws relating to building use, such as Approved Document B: Fire Safety (England and Wales) [5] (see Annex A).

NOTE The topic of fire protection is discussed in more detail in BS 6262-3.

4.10 Durability

The designer should consider the durability of the glass, plastics glazing sheet materials and glazing materials and should also consult the system manufacturer in the selection of appropriate material[1)].

It is important to consider the possibility of interaction between adjacent materials, both in the glazing system and between it and the surrounding area.

4.11 Wind loading

4.11.1 *General*

The design wind pressure acting upon the glazed area should be determined in accordance with BS 6399-2.

NOTE 1 However, if the complexities of the design are obviously beyond BS 6399-2, a wind engineering specialist should be consulted.

NOTE 2 The topic of wind loading and load carrying capacity of glass and plastics glazing sheet materials is discussed in more detail in BS 6262-3.

4.12 Maintenance (including reglazing after occupation)

The selection of glazing systems (including materials and surrounds) should be influenced by the:

a) provision of suitable and safe access for cleaning and maintenance, including consideration of any possible inconvenience to the building occupants;

b) ease and cost of replacement materials;

c) cleaning cost;

d) cleanliness or otherwise of the environment.

NOTE 1 Attention is drawn to the Construction (Design and Management) Regulations 1994 [4].

Adequate provision for cleaning, care and replacement should be incorporated in the design of the building.

The requirements for maintenance should be handed over to the main contractor/building owner/occupier on completion of the glazing, thus ensuring awareness of the need to conform to the maintenance procedure for the satisfactory performance of the glazing system in the years to follow.

NOTE 2 The Glass and Glazing Federation[2)] have published a maintenance manual, Glazing Manual, that is applicable to domestic premises.

[1)] The topic of glazing material durability will be discussed in more detail in BS 6262-5. This is yet to be published.

[2)] Glass and Glazing Federation. 44–48 Borough High Street, London, SE1 1XB, www.ggf.org.uk

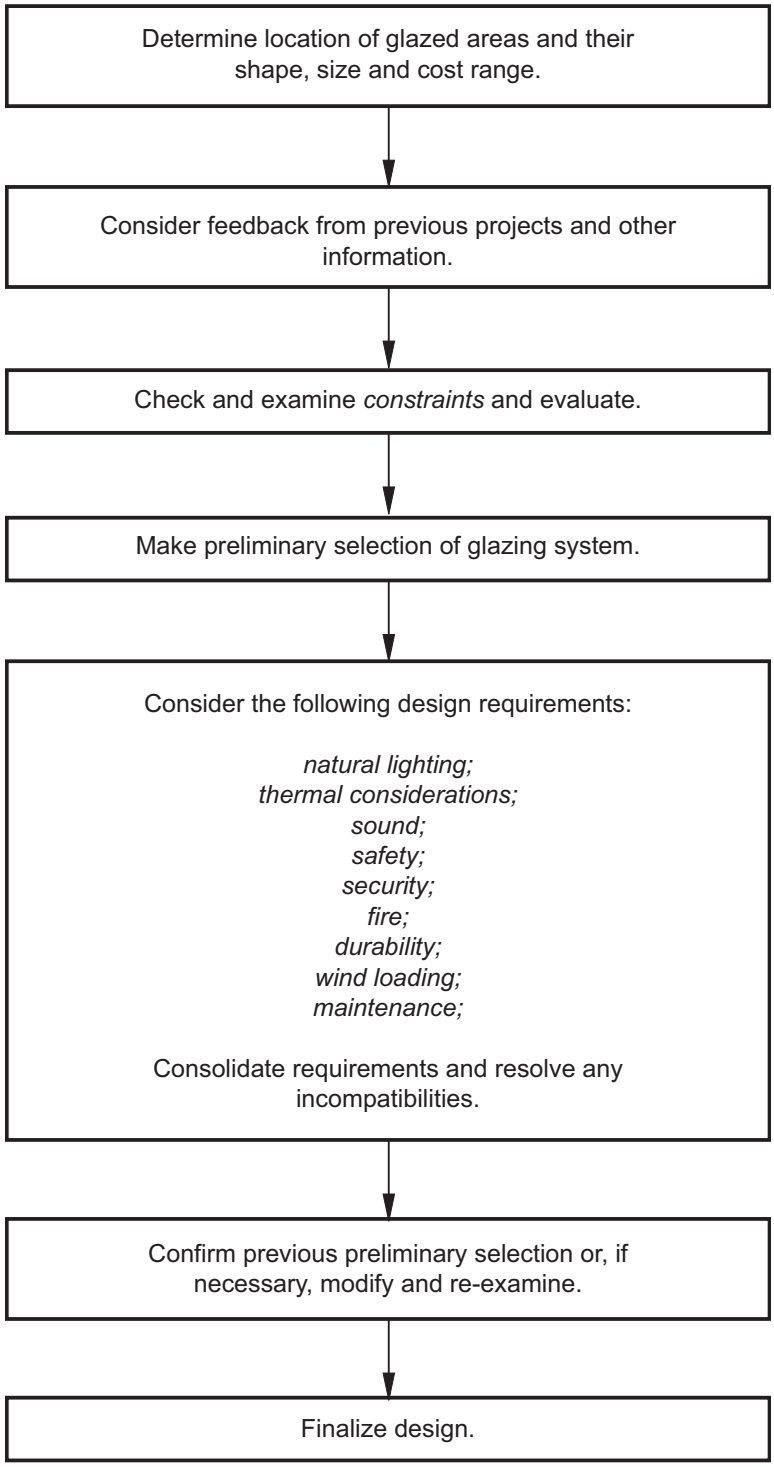

Figure 1 — Sequence of design evaluation for glazed areas

Annex A (informative)
Influence of legislation

A.1 General

The design of new buildings and the change of use of existing buildings falls under the remit of the Building Regulations 2000 (England) [1], the Building Regulations (Northern Ireland) Statutory Rules 2000 [2] and the Building (Scotland) Regulations 2004 [3].

Under certain circumstances, refurbishment, i.e. replacement windows, doors, etc., also comes within the remit of the Building Regulations 2000 (England) [1], the Building Regulations (Northern Ireland) Statutory Rules 2000 [2] and the Building (Scotland) Regulations 2004 [3].

The regulations are set by the appropriate legislators and are separated into the following regions:

a) England and Wales;

b) Scotland;

c) Northern Ireland.

A number of approved documents in England and Wales, technical booklets in Northern Ireland and technical handbooks (domestic and non-domestic) in Scotland, accompany the regulations. The documents that could influence the selection of glass and plastics glazing sheet materials are listed below.

A.2 England and Wales

Approved Documents:

B: Fire Safety [5]
E: Resistance to the Passage of Sound [6]
K: Protection from Falling, Collision and Impact [7]
L1: Conservation of Fuel and Power in Dwellings [8]
L2: Conservation of Fuel and Power in Buildings Other Than Dwellings [9]
M: Access To and Use of Buildings [10]
N: Glazing — Safety in Relation to Impact, Opening and Cleaning [11]

A.3 Scotland

Technical Handbook (Domestic):

Section 0: General [12]
Section 1: Structure [13]
Section 2: Fire [14]
Section 3: Environment [15]
Section 4: Safety [16]
Section 5: Noise [17]
Section 6: Energy [18]

Technical Handbook (Non-domestic):

Section 0: General [19]
Section 1: Structure [20]
Section 2: Fire [21]
Section 3: Environment [22]
Section 4: Safety [23]
Section 5: Noise [24]
Section 6: Energy [25]

A.4 Northern Ireland

Technical Booklets:

Part E: Fire Safety [26]
Part F: Conservation of Fuel and Power [27]
Part H: Stairs, Ramps, Guarding and Protection from Impact [28]
Part V: Glazing [29]

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Standards publications

BS 5502-21, *Buildings and structures for agriculture — Part 21: Code of practice for selection and use of construction materials.*

BS 5516-1, *Patent glazing and shaping for buildings — Part 1: Code of practice for design and installation of sloping and vertical patent glazing.*

BS 5516-2, *Patent glazing and sloping for buildings — Part 2: Code of practice for sloping glazing.*

BS 6262-2, *Glazing for buildings — Part 2: Code of practice for energy, light and sound.*

BS 6262-3, *Glazing for buildings — Part 3: Code of practice for fire, security and wind loading.*

BS 6262-4, *Glazing for buildings — Part 4: Code of practice for safety related to human impact.*

BS 7376, *Inclusion of glass in the construction of tables or trolleys — Specification.*

BS 7449, *Specification for inclusion of glass in the construction of furniture, other than tables or trolleys, including cabinets, shelving systems and wall hung or free standing mirrors.*

BS 8000-7, *Workmanship on building sites — Part 7: Code of practice for glazing.*

BS 8213-1, *Windows, doors and rooflights — Part 1: Design for safety in use and during cleaning of windows, including door-height windows and roof windows — Code of Practice.*

Other publications

[1] GREAT BRITAIN: The Building Regulations 2000, SI 2000, No. 2531, as amended. London: The Stationery Office.

[2] GREAT BRITAIN: The Building Regulations (Northern Ireland) Statutory Rules 2000, SI 2000, No. 389. London: The Stationery Office.

[3] GREAT BRITAIN: The Building Standards (Scotland) Regulations 2004, SI 2004, No. 406, as amended. London: The Stationery Office.

[4] GREAT BRITAIN: The Construction (Design and Management) Regulations 1994, SI 1994, No. 3140. London: The Stationery Office, 1994.

[5] The Building Regulations Approved Document B: Fire Safety (as amended). London: The Stationery Office, 2000.

[6] The Building Regulations Approved Document E: Resistance to the Passage of Sound (as amended). London: The Stationery Office, 2003.

[7] The Building Regulations Approved Document K: Protection from Falling, Collision and Impact (as amended). London: The Stationery Office, 1998.

[8] The Building Regulations Approved Document L1: Conservation of Fuel and Power in Dwellings (as amended). London: The Stationery Office, 2002.

[9] The Building Regulations Approved Document L2: Conservation of Fuel and Power in Buildings Other Than Dwellings. London: The Stationery Office, 2002.

[10] The Building Regulations Approved Document M: Access To and Use of Buildings. London: The Stationery Office, 2004.

[11] The Building Regulations Approved Document N: Glazing — Safety in Relation to Impact, Opening and Cleaning (as amended). London: The Stationery Office, 1998.

[12] Building (Scotland) Regulations Technical Handbook (Domestic) Section 0: General. London: The Stationery Office, 2004.

[13] Building (Scotland) Regulations Technical Handbook (Domestic) Section 1: Structure. London: The Stationery Office, 2004.

[14] Building (Scotland) Regulations Technical Handbook (Domestic) Section 2: Fire. London: The Stationery Office, 2004.

[15] Building (Scotland) Regulations Technical Handbook (Domestic) Section 3: Environment. London: The Stationery Office, 2004.

[16] Building (Scotland) Regulations Technical Handbook (Domestic) Section 4: Safety. London: The Stationery Office, 2004.

[17] Building (Scotland) Regulations Technical Handbook (Domestic) Section 5: Noise. London: The Stationery Office, 2004.

[18] Building (Scotland) Regulations Technical Handbook (Domestic) Section 6: Energy. London: The Stationery Office, 2004.

[19] Building (Scotland) Regulations Technical Handbook (Non-domestic) Section 0: General. London: The Stationery Office, 2004.

[20] Building (Scotland) Regulations Technical Handbook (Non-domestic) Section 1: Structure. London: The Stationery Office, 2004.

[21] Building (Scotland) Regulations Technical Handbook (Non-domestic) Section 2: Fire. London: The Stationery Office, 2004.

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[26] The Building Regulations (Northern Ireland) Statutory Rules Technical Booklet E: Fire Safety. London: The Stationery Office, 1994.

[27] The Building Regulations (Northern Ireland) Statutory Rules Technical Booklet F: Conservation of Fuel and Power. London: The Stationery Office, 1998.

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[29] The Building Regulations (Northern Ireland) Statutory Rules Technical Booklet V: Glazing. London: The Stationery Office, 2000.

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