Department of Health

Health Building Note 00-10 Part D: Windows and associated hardware

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This document is available from our website at www.gov.uk/government/collections/health-building-notes-core-elements

Front cover photograph of Pinderfields Hospital, Wakefield, West Yorkshire, by courtesy of the Mid Yorkshire Hospitals NHS Trust

Preface

About Health Building Notes

Health Building Notes give best practice guidance on the design and planning of new healthcare buildings and on the adaptation/ extension of existing facilities.

They provide information to support the briefing and design processes for individual projects in the NHS building programme.

The Health Building Note suite

Healthcare delivery is constantly changing, and so too are the boundaries between primary, secondary and tertiary care. The focus now is on delivering healthcare closer to people's homes.

The Health Building Note framework (see next page) is based on the patient's experience across the spectrum of care from home to healthcare setting and back.

Health Building Note structure

The Health Building Notes have been organised into a suite of 17 core subjects.

Care-group-based Health Building Notes provide information about a specific care group or pathway but cross-refer to Health Building Notes on generic (clinical) activities or support systems as appropriate.

Core subjects are subdivided into specific topics and classified by a two-digit suffix (-01, -02 etc), and may be further subdivided into Supplements A, B etc.

All Health Building Notes are supported by the overarching Health Building Note 00-01 in which the key areas of design and building are dealt with.

Example

The Health Building Note on accommodation for adult in-patients is represented as follows:

> "Health Building Note 04-01:
> Adult in-patient facilities"

The supplement to Health Building Note 04-01 on isolation facilities is represented as follows:

> "Health Building Note 04-01:
> Supplement 1 – Isolation facilities for infectious patients in acute settings"

Health Building Note number and series title	Type of Health Building Note
Health Building Note 00 – Core elements	Support-system-based
Health Building Note 01 – Cardiac care	Care-group-based
Health Building Note 02 – Cancer care	Care-group-based
Health Building Note 03 – Mental health	Care-group-based
Health Building Note 04 – In-patient care	Generic-activity-based
Health Building Note 05 – Older people	Care-group-based
Health Building Note 06 – Diagnostics	Generic-activity-based
Health Building Note 07 – Renal care	Care-group-based
Health Building Note 08 – Long-term conditions/long-stay care	Care-group-based
Health Building Note 09 – Children, young people and maternity services	Care-group-based
Health Building Note 10 – Surgery	Generic-activity-based
Health Building Note 11 – Community care	Generic-activity-based
Health Building Note 12 – Out-patient care	Generic-activity-based
Health Building Note 13 – Decontamination	Support-system-based
Health Building Note 14 – Medicines management	Support-system-based
Health Building Note 15 – Emergency care	Care-group-based
Health Building Note 16 – Pathology	Support-system-based

Other resources in the DH Estates and Facilities knowledge series

Health Technical Memoranda

Health Technical Memoranda give comprehensive advice and guidance on the design, installation and operation of specialised building and engineering technology used in the delivery of healthcare (for example medical gas pipeline systems, and ventilation systems).

They are applicable to new and existing sites, and are for use at various stages during the inception, design, construction, refurbishment and maintenance of a building.

All Health Building Notes should be read in conjunction with the relevant parts of the Health Technical Memorandum series.

Activity DataBase (ADB)

The Activity DataBase (ADB) data and software assists project teams with the briefing and design of the healthcare environment. Data is based on guidance given in the Health Building Notes and Health Technical Memoranda.

For ADB technical queries only, contact the ADB Helpdesk. Telephone number: 01939 291684; email: support@talonsolutions.co.uk

For new ADB customers and licence renewals only, email: adblicencerenewals@dh.gsi.gov.uk

How to obtain publications

Health Building Notes are available from the UK Goverment's website at:

https://www.gov.uk/government/collections/health-building-notes-core-elements

Health Technical Memoranda are available from the same site at:

https://www.gov.uk/government/collections/health-technical-memorandum-disinfection-and-sterilization

Executive summary

Preamble

Health Building Note 00-10 is a series of documents that provides specifications and design guidance on building components (for example, flooring, walls and ceilings) for healthcare buildings.

This Health Building Note offers guidance on the technical design and output specifications of windows and associated hardware such as window restrictors.

The guidance will also help healthcare organisations to meet the requirements of HSE legislation and Outcome 10 of the Care Quality Commission's (CQC) 'Guidance about compliance'. This focuses on the "safety and suitability of premises" and decrees that "people receive care in, work in or visit safe surroundings that promote their wellbeing". Health Building Notes are specifically referenced in the CQC's "schedule of applicable publications" as a means of compliance with Outcome 10.

Supersession

Health Building Note 00-10 Part D supersedes the previously archived Health Technical Memorandum 55 – 'Windows'.

The Health and Safety Executive (HSE) has assisted in the production of this guidance, which supplements the guidance produced by the HSE on risks to vulnerable members of the public from falling from height from windows (http://www.hse.gov.uk/safetybulletins/windowrestrictors.htm).

Major changes from Health Technical Memorandum 55

The document has been revised to reflect changes in legislation, guidance, the structure of the NHS, and government policy on health and social care.

The guidance has also been updated in response to a Coroner's Rule 43 letter (Ministry of Justice, 2013) issued to the Chief Medical Officer in England (in November 2012) requesting action be taken to reduce the risk of falls from windows. A number of incidents have occurred in which patients have fallen from upper floor hospital windows after overcoming the window restrictor. In the most recent incident, a patient died following a fall after forcibly overcoming the window restrictor while in an acutely confused and agitated state following major surgery. Evidence showed that the restrictor could not be relied upon to prevent a determined effort, such as that described above, to force the window open beyond 100 mm.

This guidance recognises that window restrictors tested to current British standards may be inadequate in preventing a determined effort to force a window open beyond the 100 mm restriction. In the absence of an established performance standard, it is recommended that, dependent on risk assessments, loads on window restrictors used in healthcare premises are tested using forces in excess of those quoted in BS EN 14351.

Main recommendations

- There is a need to assess the risks of patients falling from windows. This risk assessment should take account of patient category and physical capability. It applies not only to new builds or refurbishments – but also to all existing stock. If risks from falling are identified, then control measures should be put in place. This usually involves the use of windows with restrictors and, where risk assessment dictates, safety glazing.
- It is important at the procurement stage that the correct type of restrictor, based on the definition used in this document, is specified.
- Restrictors and their fittings should be suitably robust to prevent vulnerable and determined adults from forcing them open beyond the 100 mm restriction.
- Where window restrictors are fitted, they should be included on planned preventative maintenance and monitoring schedules. Where a damaged, defeated or defective restrictor is found, questions should always be asked about the significance of the finding and any wider implications, and a programme to repair or replace the restrictor put in place. The risk assessment should also be reviewed.

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Project team

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NHS Protect

Steel Window Association

Wood Protection Association

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1 Patient safety: policy and regulatory overview

1.1 One of the government's key priorities is delivering better health outcomes for patients.

1.2 The quality and fitness-for-purpose of the healthcare estate is vital for high quality, safe and efficient healthcare, and this document seeks to set out the quality of, and standards for, windows used in the construction of the estate.

1.3 Quality and fitness-for-purpose of the estate are assessed against a set of legal requirements and standards. Adhering to the guidance outlined in this HBN will be taken into account as evidence towards compliance with these legal requirements and standards.

Regulator requirements: essential standards of quality and safety

1.4 The Care Quality Commission (CQC) regulates all providers of regulated health and adult social care activities in England. The CQC's role is to provide assurance that the care given meets essential requirements of quality and safety.

1.5 The registration requirements are set out in the Care Quality Commission (Registration) Regulations 2009 (CQC Regulations) and include requirements relating to:

- safety and suitability of premises;
- safety, availability and suitability of equipment; and
- cleanliness and infection control.

1.6 The CQC is responsible for assessing whether providers are meeting the registration requirements (see the CQC's 'Guidance about compliance' (2010)). Failure to comply with the CQC Regulations is an offence and, under the Health and Social Care Act 2008 (Regulated Activities) Regulations 2010, CQC has a wide range of enforcement powers that it can use if the provider is not compliant. These include the issue of a warning notice that requires improvement within a specified time, prosecution, and the power to cancel a provider's registration, removing its ability to provide regulated activities.

Health and safety legislation

1.7 The Health and Safety Executive is the national regulator for workplace health and safety. Regulation 14 of the Workplace (Health, Safety and Welfare) Regulations 1992 applies to glazing material and where necessary requires windows to be constructed of safety material (for example safety glass) or otherwise protected against breakage (for example by means of a screen or barrier). The Health and Safety Executive's (2013) Approved Code of Practice (ACOP) states that if a person going through the glass would fall from a height, and a screen or barrier is used, then it should be designed to be difficult to climb. Regulation 15 states that windows must not expose people to risks to their health and safety either due to operation or location. Regulation 16 states that all windows and skylights in a workplace shall

be of a design or be so constructed that they may be cleaned safely.

1.8 The following legislation also applies to employers' duties to service-users:

- Health and Safety at Work etc Act 1974, section 3;
- Management of Health and Safety at Work Regulations 1999, regulation 3.

See HSE Information Sheet 5 – 'Falls from windows or balconies in health and social care'.

Never events

1.9 DH's never events policy framework defines "never events" as serious, largely preventable patient safety incidents that should not occur if the available preventative measures have been implemented by healthcare providers. On the list of never events is falls from inadequately restricted windows.

1.10 The policy framework is designed to provide healthcare workers, clinicians, managers, boards and accountable officers with clarity about their responsibilities. In particular, it is designed to be clear about what they are expected to do in terms of preventing never events and how they must respond to them if they should occur, including providing more clarity on reporting. The aim of the policy is to reduce the incidence of never events to zero.

NHS Premises Assurance Model

1.11 The NHS has developed, with the support of DH, the NHS Premises Assurance Model (NHS PAM), whose remit is to provide assurance for the healthcare environment and to ensure patients, staff and visitors are protected against risks associated with hazards such as unsafe premises.

1.12 Aimed at providing governance and assurance to boards of organisations, it allows organisations that provide NHS-funded care and services to better understand the effectiveness, quality and safety with which they manage their estate and facilities services and how that links to patient experience and patient safety.

1.13 Key questions are underpinned by prompt questions which require the gathering of evidence. Healthcare organisations should prepare and access this evidence to support their assessment of the NHS PAM.

1.14 The model also includes reference to evidence and guidance as a helpful aide-memoir to assist in deciding the level of NHS PAM assurance applicable to a particular healthcare organisation.

1.15 NHS PAM has been co-produced with the NHS and is designed to be available as a universal model to apply across a range of estates and facilities management services.

1.16 For more information on how to use the tool, visit http://www.dh.gov.uk/health/2013/01/nhs-pam

NHS Constitution

1.17 The NHS Constitution sets out the rights to which patients, public and staff are entitled. It also outlines the pledges that the NHS is committed to achieve, together with responsibilities that the public, patients and staff owe to one another to ensure that the NHS operates fairly and effectively. All healthcare organisations will be required by law to take account of this Constitution in their decisions and actions.

1.18 Healthcare organisations need to "ensure that services are provided in a clean and safe environment that is fit for purpose, based on national best practice (pledge)".

Infection prevention and control

1.19 A complex range of issues distinguishes healthcare environments from most other building types. One of the most important of these relates to the control of infection. Infection

prevention and control teams should be consulted on any design decisions and a risk analysis conducted on the many issues of design involving windows and associated hardware (see Health Building Note 00-09 – 'Infection control in the built environment').

1.20 The information outlined in this document follows the general principles given in the 'Health and Social Care Act 2008: Code of Practice on the prevention and control of infections and related guidance' (the HCAI Code of Practice). This Code of Practice sets out criteria against which a registered provider will be judged on how it complies with the registration requirement for cleanliness and infection control. Not all criteria will apply to every regulated activity.

1.21 The law states that the HCAI Code of Practice must be taken into account by the CQC when it makes decisions about registration against the cleanliness and infection control requirement. The regulations also say that providers must have regard to the Code when deciding how they will comply with registration requirements. Therefore, by following the Code, registered providers will be able to show that they meet the requirement set out in the regulations. However, the Code is not mandatory. A registered provider may be able to demonstrate that it meets the regulations in a different way (equivalent or better) from that described in this document. The Code aims to exemplify what providers need to do in order to comply with the regulations.

2 Introduction

Background

2.1 This is one of a series of Health Building Notes which provides specifications and design guidance on building components for healthcare buildings which are not adequately covered by current British Standards.

2.2 The numbers and titles of the Health Building Notes in this series are:

- Health Building Note 00-10 Part A – 'Flooring'
- Health Building Note 00-10 Part B – 'Walls and ceilings'
- Health Building Note 00-10 Part C – 'Sanitary facilities'.

Scope and status

2.3 This Health Building Note offers guidance on the technical design and output specifications of windows and associated hardware.

2.4 Its content does not diminish either the manufacturer's responsibility for fitness for purpose of products or the design team's responsibility for selection and application of products to meet project requirements. Design teams are also reminded of their obligations under the Construction, Design and Management (CDM) Regulations 2007 to ensure safe construction.

2.5 The term "windows" as used in this Health Building Note includes matching doors, and doors forming an integral part of a window unit.

2.6 Additional guidance for adult mental heath facilities in relation to the specification of windows is given in:

Health Building Note 03-01 – 'Adult acute mental health units'

DH (2011) 'Environmental Design Guide: adult medium secure services'

DH (2010) 'High secure building design guide: overarching principles - for Ashworth, Broadmoor, Rampton Hospitals'.

Supersession

2.7 This document supersedes all versions of Health Technical Memorandum 55 –Windows'.

Application and audience

2.8 Because of the wide-ranging considerations necessary to successful selection, specification, installation and use of windows, this Health Building Note should be read by project teams, design teams, window manufacturers and those responsible for construction, commissioning, maintenance and testing/ auditing of healthcare buildings.

2.9 It is mainly concerned with new building work but much of the information it contains is equally applicable to windows in existing buildings.

Life-cycle and maintenance

2.10 Health Technical Memorandum 07-07 – 'Sustainable health and social care buildings' recommends that healthcare organisations

should adopt a life-cycle costing approach. This approach is relevant throughout the building's life-cycle, in particular during the project planning, design, construction and in-use phases.

A useful document that will aid designers and NHS organisations in both design and choice of materials when designing new schemes or refurbishments is the British Standards Institute's (BSI) 'Standardized method of life cycle costing for construction procurement: a supplement to BS ISO 15686-5 Buildings & constructed assets – Service life planning – Part 5: Life cycle costing'.

2.11 Materials and finishes should be selected to minimise maintenance and be compatible with their intended function and lifespan/ duration of use (see also paragraphs 2.16–2.17).

2.12 All involved in the design and installation of windows need to be aware of the Construction (Design and Management) Regulations 2007. These require designers to minimise foreseeable risks to people doing work on, or people affected by the work of, any project arising from building maintenance and cleaning.

2.13 Organisations responsible for building and engineering maintenance should have access to original copies of all building and engineering commissioning data, including as-fitted drawings and records of any changes implemented since the building was originally built and commissioned. Maintenance personnel should have access to operation and maintenance manuals (including BIM systems) containing building and engineering information such as the suppliers of the materials, fittings and equipment installed during construction, including instructions on cleaning and maintenance.

Sustainability

BREEAM

2.14 Health Technical Memorandum 07-07 – 'Sustainable health and social care buildings' provides relevant advice on how to embrace sustainability protocols throughout the design and build process and should be read while undertaking the BREEAM Healthcare assessment.

The Building Research Establishment Environmental Assessment Method for healthcare facilities (BREEAM Healthcare) is the standard tool for assessing the environmental impact of a healthcare facility.

2.15 All new healthcare development projects and refurbishments are required to use BREEAM Healthcare to demonstrate that facilities are built with sustainability in mind. The Department of Health requires that all new builds achieve an "excellent" rating and all refurbishments achieve a "very good" rating under BREEAM Healthcare. Visit BREEAM Healthcare at http://www.breeam.org/page.jsp?id=105

Materials

2.16 Choosing the right materials can lead to a reduction in harmful environmental impacts. For example:

- it can lead to reduced waste generation;
- the need to transport goods can be minimised;
- it can reduce carbon emissions and other pollutants.

2.17 Examples of ways of achieving this are by specifying:

- materials with high environmental ratings (for example, limiting the options to environmental ratings between A+ and B, as rated by BRE's 'Green guide to specification');
- materials with higher than average recycled content;
- materials that do not cause harm to health and the environment (for example, low global warming potential insulation

and low volatile organic compounds (VOC) coatings (that is, paints)); and

- materials that can be recycled at end of life.

Relationship to other data

2.18 The main sources of data used in the preparation of this Health Building Note are listed in the References section.

2.19 This Health Building Note was prepared for publication in December 2013. After this date, readers should ensure that they use the latest or new edition of all building legislation, British Standards etc which may post-date the publication of this document.

2.20 This guidance may be used in conjunction with sections of the National Building Specification (NBS) relevant to windows.

Procurement and specification

2.21 First preference should be given to products and services from sources that have been registered under BSI Quality Assurance procedures or other certification schemes. Suppliers offering products other than to British Standards should provide evidence to show that their products are at least equal to such Standards (but see the Important Note on next page).

2.22 Fittings and mounting hardware (for example screws and bolts) for window restrictors need to be tamper-proof.

Terminology

2.23 In this Health Building Note the following terms apply. Others are defined in the sections in which they are used or in other documents listed in the References section.

- **Casement** – hinged or pivoting component of a window.
- **Coupled window** – where two (or more) casements or sashes (with single or multiple panes of glazing) are operated by one action, but can be disconnected for specific purposes such as maintenance or cleaning.
- **Double window** – window with casements or sashes that operate independently.
- **Light** – individual glazed unit of a window:
  - Fixed light – a light that does not open.
  - Opening light – a light that opens.
- **Restrictor** – mechanical device that limits the movement of an opening light so that an opening of not more than 100 mm is achieved at any point even with the application of a significant additional opening force. It can either be fixed (that is, cannot be overridden) or can only be overridden by means of a removable key or other device. They should only be fitted using tamper-proof fixings.

Note

The above definition is applicable to windows used in healthcare. Other types of restrictor exist such as initial opening restrictors (sometimes called limiting restrictors and holding restrictors). However these can be overridden and are mainly designed for domestic environments – therefore they are not suitable for use in healthcare premises. It is important at the procurement stage that the correct type of restrictor, based on the definition used in this document, is specified. See also the Important Note on next page.

- **Secondary window** – a glazed unit added to an existing glazed window to improve the thermal and acoustic performance.
- **Thermal barrier** – a spacer of insulating material incorporated in a frame to separate the outer surface from the inner surface to improve its thermal performance.

Important note

This guidance recognises that window restrictors tested to current British Standards may be inadequate in preventing a determined effort to force a window open beyond the 100 mm restriction. The relevant tests for restrictors cited in BS EN 14351-1 and BS EN 13126-5 have been developed to prevent accidental falling from windows. BS EN 14351-1 recommends that restrictors must be able to hold a window in place for 60 seconds when a static load of 350 newtons is applied to that window.

However, these static loads may not be sufficient to prevent determined patients who want to force the window beyond its 100 mm restriction. None of the British and European Standards deal with deliberate attempts to defeat the restrictor using impact forces, which may be the situation encountered in hospitals and care homes.

In the absence of an established performance standard, it is recommended that loads on window restrictors used in healthcare are tested using forces in excess of those quoted in BS EN 14351 and BS EN 13126-5. (Note also that BS EN 13126-5 recommends a maximum opening of 89 mm to prevent the passage of small children.)

Two publications (see below) contain the most up-to-date ergonomic data on adult push forces from a standing position. The data in these documents can be used as a guide to the amount of force to be exerted when testing the restrictor.

References

Peebles, L. and Norris, B.J. (1998) Adultdata: the handbook of adult anthropometric and strength measurements – data for design safety. Department of Trade and Industry, London.

Smith, S.A., Norris, B.J. and Peebles, L. (2000) Older adultdata: the handbook of measurements and capabilities of the older adult – data for design safety. Department of Trade and Industry, London.

3 Design guidance

Introduction

3.1 The design of a satisfactory patient environment has to balance various needs.

3.2 When selecting windows, architects and designers will consider the following:

- natural lighting;
- natural ventilation;
- view;
- weathertightness;
- energy conservation;
- sound insulation;
- security;
- safety;
- fire spread.

Natural lighting

General considerations

3.3 The character and control of natural daylighting should be based on the needs of the occupants and the function of the space.

3.4 In addition to considering the position and size of the window in relation to the use of a space, the designer should consider the effect of obstruction to vision and restriction of daylight by framing members of the window and curtains or blinds.

3.5 Tall narrow windows give greater penetration of light than wide windows of the same area. Splayed reveals give a gradation of light from outside to inside, improve the spread and quality of light and reduce harsh contrasts that may be unpleasant to the eye.

3.6 Consideration should be given to overheating when designing the positioning and size of windows and the need for awnings, shutters or reflective film. (See Public Health England's 'Heatwave plan for England'.)

Note

Short et al. 2012 considered the implications of excessive solar gain in a hospital environment and the benefits from an energy and comfort perspective of mitigation such as solar shading.

Daylight

3.7 Daylight varies in quality and intensity according to location and weather. Window shapes and positions can be evaluated by calculating the daylight factor, which depends on the area of glazing, on whether it is unobstructed and on the type of glazing.

3.8 A daylight factor of at least 2% is needed for a space to appear day-lit, and at least 3% is recommended for most hospital spaces. However, areas with a daylight factor much greater than 5% may be overglazed. Dalke et al. (2004) explain how to calculate the daylight factor. See also:

- BS 8206-2: 'Lighting for buildings. Code of practice for daylighting'.
- BRE Report 288: 'Designing buildings for daylight'.

- CIBSE lighting guide 10: 'Daylighting and window design'.

Sunlight

3.9 Sunlight is beneficial provided that glare, dazzle and overheating are controlled. These undesirable effects can be countered by installing various devices located either:

- outside the window;
- between the glazing;
- within the glass;
- inside the window.

Natural ventilation

3.10 Opening lights should be used to provide normal ventilation except where:

- the level of outside noise is unacceptable;
- unpleasant smells are generated either inside or outside the building;
- inflows of air are undesirable (such as in a laboratory).

3.11 Mechanical ventilation may be required in these circumstances (see Health Technical Memorandum 03-01 – 'Specialised ventilation for healthcare premises').

3.12 Maximum or hot weather ventilation can be provided by large openings but patient safety (see paragraphs 3.25–3.32), security and rigidity of large opening lights must be considered.

3.13 Louvres or additional high-level opening lights may be considered when restricted openings cannot provide sufficient natural ventilation in hot weather – but only if risk assessment identifies that there is no risk of falling (see also the section on the safe opening and closing of windows in Approved Document K).

3.14 The provision of opening lights should be discussed with the building services engineer when mechanical ventilation is to be provided.

3.15 Gilkeson et al (2013) studied the effect of airflow in large, open wards that rely on opening windows to provide cross-ventilation. The research showed that when windows are closed to reduce heat losses and energy costs (usually during the winter months), the reduced ventilation increases the risk of infection as it is less effective at diluting and removing airborne microorganisms. Designers should be aware of this risk and make alternative ventilation provision in the winter months. The study showed that the installation of simple extract ventilation had a marked positive effect on ventilation, reducing risks to a comparable level to opening the windows.

Note

Only unopenable windows should be specified for operating theatres and special ventilated isolation rooms in order to ensure that the desired air-flow pattern is maintained under all external environmental conditions and to avoid infestation. Trickle vents, if fitted, should also be sealed. For further guidance, see:

- Health Building Note 26 – 'Facilities for surgical procedures'.
- Health Building Note 04-01 Supplement 1 – 'Isolation facilities for infectious patients in acute settings'.

See also the Note under paragraph 3.18.

View

3.16 The ideal viewing zone will be determined by the eye level of occupants, depending upon whether they are standing up, sitting or lying down. The following factors will affect the ideal viewing zone (see also BS 8206-2):

- security and safety;
- outlook and privacy;
- under-sill requirements for mechanical services or furniture.

3.17 These factors will determine:

- size of the window;
- shape of the window;
- height of sill;
- height of transom;
- height of head.

Weathertightness

3.18 For standards on weathertightness, see Appendix 1.

Note

To ensure effective isolation in ventilated isolation rooms, it is important that air leakage is kept to a minimum. External windows and cladding elements will be required to withstand a pressure differential across them due to wind forces. The actual pressure will relate to their height above ground level, the site exposure factor and the internal room test pressure (see Health Building Note 04-01 Supplement 1 – 'Isolation facilities for infectious patients in acute settings'). Their fixings to the main structure of the building will need to be able to withstand this load without flexing.

It is very important that levels of leakage control be maintained. If not, the effectiveness of the room will be compromised.

See also the Note under paragraph 3.15.

Energy conservation

3.19 Selection of the correct window and glazing has a bearing on the energy efficiency of the building. Guidance is contained in Approved Document L.

3.20 For whole window u-values, see Approved Document L. For the environmental impacts of certain construction materials, see BRE's 'Green Guide to Specification'.

Sound insulation

3.21 There is a need to identify locations in healthcare facilities where improved sound insulation is required.

3.22 Effective reduction of sound transmission through a window can only be achieved by a high standard of design, manufacture and installation.

3.23 For further information see:

- Health Technical Memorandum 08-01: 'Acoustics'.
- BS 6262 (parts 1 to 6): 'Glazing for buildings'.

Security

Note

This section is not intended to deal with windows for high security situations.

3.24 Certain areas require special security precautions. These areas should be identified early in the design stage and will include spaces that house:

- medicines and controlled drugs, including pharmacy;
- security-sensitive areas such as cash handling/cashiers office.

In these areas, windows should comply with PAS 24. See also 'Secured by design – hospitals'.

Safety

Falls from windows

3.25 There is a need to assess the risks of patients falling from windows. This risk assessment should take account of patient category and physical capability (see Table 1).

Are patients and visitors (particularly children and young people) at risk of falls from windows? Which are at most risk, why, and where?
If they fall, what harm might they come to?
How easily can they access and fall through the window openings?
If they can easily access and fall through window openings, and are therefore at risk of serious injury, how can that risk be effectively prevented?
If restrictors are used, are they suitably robust and do they remain effective – i.e. are proper maintenance procedures in place? In addition, are the responsibilities of staff to implement and check those procedures clear and adequate?
Are employees aware of the risks and their responsibilities? For example, are they aware of the risks of patients falling from windows and of the need to report defective window restriction?

Table 1. Example questions that could be used as part of the falls risk assessment

Note

This risk assessment applies not only to new builds or refurbishments – but also to all existing stock.

If the type of occupancy significantly changes, the risks should be reassessed.

3.26 If risks from falling are identified, then control measures should be put in place. This usually involves the use of windows with restrictors and, where risk assessment dictates, safety glazing.

3.27 For the purposes of this document, the term "restrictor" is used to define any mechanical device that limits the movement of an opening light so that an opening of not more than 100 mm is achieved at any point even with the application of a significant additional opening force. It can either be fixed (that is, cannot be overridden) or can only be overridden by means of a removable key or other device. They should only be fitted using tamper-proof fixings. The size of the opening can be validated using a 100 mm sphere or other such measuring device.

Note

1. The definition in paragraph 3.27 is applicable to windows used in healthcare. Other types of restrictor exist such as initial opening restrictors (sometimes called limiting restrictors and holding restrictors). However these can be overridden and are mainly designed for domestic environments – therefore they are not suitable for healthcare. It is important at the procurement stage that the correct type of restrictor, based on the definition used in this document, is specified.

2. Restrictors and their fittings should be suitably robust to prevent vulnerable and determined adults from forcing them open beyond the 100 mm restriction. See the Important Note on page 7.

3. Organisations should have safe systems of work in place in the event that there is a requirement to override the restrictor (for example, for maintenance purposes).

3.28 Other design options are also available. For example, windows are available that incorporate a discreet tamper-proof safety screen. These have the added benefit of allowing better natural ventilation as the window need not be restricted to a 100 mm opening.

Important

With regard to restrictors and falls from windows, the following DH Safety Alert Notices and guidance from the Health & Safety Executive need to be taken into account:

Estates and Facilities Alert Notice 2013/002 – 'Window restrictors'.

Estates and Facilities Alert Notice 2012/001 – 'Integral side-stay mechanism window restrictors fitted with plastic spacers and used in many window applications'.

Health Services Information Sheet (HSIS5) – 'Falls from windows and balconies in health and social care'.

Health and Safety Executive's web page on "Risk of falling from windows".

Safety glazing

3.29 Regulation 14 of the Workplace (Health Safety and Welfare) Regulations 1992 imposes on those responsible, a duty to undertake a risk assessment of their glazing in critical locations to identify any glass that could create a risk of injury to the building's users or visitors. Critical glazing locations are given in Approved Document K of the Building Regulations.

3.30 Any requirements for the use of safety glazing should comply with BS 6262-4.

3.31 Any fixed glazing less than 800 mm above floor level which acts as a barrier to prevent people falling out should be replaced with glazing which meets the impact resistance requirements of BS 6262-4 taking into account Approved Document K for containment.

3.32 The use of safety glazing should also be considered in spaces that are accessible to children or vulnerable patients.

Fire spread

3.33 Requirements for the location and size of windows are set in the Firecode document Health Technical Memorandum 05-02 – 'Guidance in support of functional provisions for healthcare premises'.

4 Specification guidance

Testing and assessment

4.1 Manufacturers' product specifications and test data should be appraised to ensure that the sizes and types of windows tested are applicable to those to be used on the healthcare project.

4.2 Window restrictors and associated hardware should be of the appropriate design and type to match the window style and construction materials.

4.3 Some tests are for units of moderate size only, for example 1200 x 1200 mm. If a project requires larger units for which test data is not available, an authoritative assessment must be obtained from the manufacturer to cover the larger units (see paragraphs 6.1–6.2).

Materials and finishes

See also paragraphs 2.11 and 2.16–2.17.

General

4.4 Special care should be exercised in the selection of finishes in industrial and marine atmospheres. When selecting surface finishes with a relatively low initial cost and short life, for example stains or paint finishes on wood, the periodic refurbishment that will be necessary should be assessed. Apart from the cost of this work and the problems of access, it will also cause considerable disruption and inconvenience to the building's users.

4.5 For relevant British Standards, see the References section.

Aluminium

4.6 Mill finish is not recommended as it will become unsightly and could ultimately incur significant maintenance costs.

4.7 Liquid organic coating to BS 4842 should offer a maintenance-free life of about ten years.

4.8 Anodising to BS 3987 or BS EN ISO 7599 can offer a maintenance-free life of 40 years or more in normal locations. It can also be used in marine environments.

4.9 Powder organic coating to BS 6496 has an expected maintenance-free life of up to 20 years, but regular maintenance and cleaning is recommended. Thicker finishes afford improved protection against impact damage.

4.10 Aluminium framing systems are designed to meet the energy conservation requirements in Approved Document L of the Building Regulations, using thermal barriers within the profiles to minimise heat losses and the risk of condensation. Manufacturers should be consulted for further information.

Plastics

4.11 The lighter coloured materials have the advantage over the darker colours in that solar heat gain, expansion and contraction are less.

4.12 Cleaning may well be desirable at intervals in polluted atmospheres, but the frames should offer a relatively maintenance-free life of up to 25 years. Frames made up of this material, in whole or in part, may minimise the risk of condensation resulting from cold bridging.

Steel

4.13 Galvanizing provides good durability in mild and moderate environments but normally requires painting for aesthetic reasons.

4.14 Factory-applied polyester coatings offer a maintenance-free life of up to 15 years.

4.15 Steel frames can act as a cold bridge and will sometimes, dependent upon conditions, result in condensation forming on the inner frames. Some provision should be made for condensation run-off in such windows or thermal barrier steel windows should be considered.

Timber

4.16 Refer to the Forest Stewardship Council for guidance on sustainable sources (http://www.fsc-uk.org).

4.17 Specifications for timber used in windows should comply with the requirements given in BS EN 14220.

Paint finish

4.18 Coatings should be factory-applied and in accordance with BS EN 927-1 to suit climate and for stable end-use. Coating manufacturers' requirements should be followed.

4.19 Newer types of microporous paint or moisture-vapour-permeable coatings are alternatives to the more traditional paint systems. They are easier to maintain due to improved weathering characteristics, but preservative treatment is still essential.

4.20 The following factors should be considered:

- oil-based or water-based type;
- priming paint of compatible formulation.

4.21 For further information, see BS 6150 – 'Painting of buildings. Code of practice'.

Staining

4.22 Staining is an alternative to paint, offering a different appearance, but is less protective and less able to hide defects (for classifications, see BS EN 927-1). It does not obviate the need for preservative treatment.

Glazing

4.23 The type of glass and glazing method will be determined by the design guidance as set out in Chapter 3. Further guidance on the selection of glazing is given below.

Solar control

4.24 The use of tinted, solar-reflective or other specialised or coloured glass should only be used after the clinical effect has been considered (see also paragraphs 3.7–3.9). Orientation of the building and the different elevations also need to be taken into consideration.

Note

Health Technical Memorandum 07-02 – 'Encode' advises that tinted glazing should be avoided in clinical areas because it rarely discriminates enough between light and heat, often causes increased lighting use as the exterior appears duller than it really is, and hinders true colour rendition, which is vital for clinical diagnosis. However, solar control glass is available that limits solar gains while also allowing high levels of daylight to be transmitted. To minimise the effect on the incoming light, solar control glass can be specified with a high colour rendering index, Ra, to ensure clinical diagnosis is not compromised.

Privacy

4.25 As well as in sanitary accommodation, obscured glass is often required in spaces such as examination and consulting rooms. The degree of obscuration should be determined by the privacy needed from either side of the glass and the difference between internal and external lighting.

Security and safety

4.26 When specifying glass with regard to security and safety, it is essential to know what risks are involved. For security purposes, laminated glass should be included within all ground floor and easily accessible windows; as a minimum, performance specification P2A (BS EN 356) should be installed. See also paragraphs 3.24 and 3.29–3.32.

4.27 In acute mental health units, windows should be fitted with a mechanical winding mechanism (which could be motorised). Manually operated mechanisms should only be accessed via a protected/concealed handle to prevent operation by high-risk patients. Such an arrangement will also assist in the removal of ligature points.

Fittings

4.28 Windows and external doors should be complete with the appropriate fittings, which should be assessed for ease of operation, security, safety and mechanical wear.

4.29 The choice of material and finish will be determined by the window material selected and the range of fittings offered by the window manufacturer.

4.30 As a minimum, restrictors should conform to BS EN 14351-1 + A1 and BS EN 13126-5 (see also BS 8213-1) but see the Important Note on page 7.

Operating height

4.31 The maximum height for operating opening devices is set out in Approved Document M, which references BS 8300.

4.32 It may be necessary to use some form of operating device such as a mechanical winding mechanism, which could be motorised and remote-controlled. The use of poles should be avoided. Stays and similar devices on high-level windows in deep reveals may be difficult to operate; a sloping sill often alleviates the problem.

5 Maintenance and replacement

5.1 The form and type, material, finish, accessories and accessibility of windows should be considered in respect of the maintenance, cleaning, repair and replacement of the whole or part of the component. All fittings and finishes should be selected to facilitate maintenance and cleaning.

Note

A number of healthcare buildings are either listed or located within conservation areas. Any alterations to windows and hardware may require planning approval.

5.2 Maintenance manuals should include the following:

- identification of manufacturer;
- window specification;
- method of replacement of glass;
- size and thickness of glass;
- type and pattern of glass;
- fittings, including safety devices;
- gaskets, bedding and pointing materials;
- finishes;
- instructions on cleaning and maintenance.

Maintenance of restrictors

See also Appendix 2.

5.3 Where window restrictors are fitted, they should be included on planned preventative maintenance and monitoring schedules. The frequency of inspection should follow the manufacturer's advice and will depend partly on experience gained from the inspection. For example, when new restrictors are fitted, inspection should be frequent and should look for evidence of damage and wear or of devices being defeated/defective. Future frequency of inspections can then be determined by risk assessment.

5.4 Inspection should ensure that devices fitted are designed to resist reasonable forces being applied by adults (for example, where determined adults may use impact forces to open the window beyond its 100 mm restriction). Some integral restrictors may not be sufficiently robust. Attention should also be given to the method of fixing to the window frame as different materials may give different performance results.

5.5 Where a damaged, defeated or defective restrictor is found, questions should always be asked about the significance of the finding and any wider implications, and a programme to repair or replace the restrictor put in place. The risk assessment should also be reviewed.

5.6 Frequency of inspection may be decreased if damage or failure is never encountered – but

it will always be required and will also need to be documented as part of the risk assessment process.

5.7 Depending on the style and size, even with restrictors fitted, certain windows can flex beyond the designated 100 mm maximum opening when forces are applied by determined adults. Friction stays, when worn, further add to the ability of the window to flex and can allow the opening to widen under pressure. To provide reassurance that the restrictor will limit the initial opening to a maximum of 100 mm under forseeable force, it is recommended that professional advice is sought with regard to site-specific testing methods.

For further guidance, see Estates and Facilities Alert Notice 2013/002 – 'Window restrictors'.

Hygiene and cleaning

5.8 The Construction (Design and Management) Regulations 2007 require designers to minimise foreseeable risks to people doing work on, or people affected by the work of, any project arising from cleaning.

5.9 The method of cleaning should follow the guidance given in the 'Revised healthcare cleaning manual' (http://www.nrls.npsa.nhs.uk/resources/?EntryId45=61830). See also BS 8213-1 for further guidance on safe methods of cleaning and maintenance.

5.10 Further information and advice is also available from the relevant trade associations (see References).

6 Performance requirements of windows

Standards

6.1 Windows must comply with the current editions of all relevant British Standards, Codes of Practice and statutory requirements with regard to their performance, constituent materials, method of assembly and use. See References for the full list of sources.

6.2 The possession of satisfactory test evidence covering the components must not relieve a supplier of his normal legal liabilities to supply goods that are fit for their intended purpose.

Description

6.3 The requirements apply to windows and matching doors forming an integral part of a window unit, manufactured as non-loadbearing single or composite units, coupled horizontally or vertically. The units should include as appropriate:

- a frame;
- a sub-frame;
- fixed lights;
- opening lights;
- solid infill panels;
- glazing and glazing components;
- a sill;
- fittings;
- all accessories necessary to complete and install the window units to ensure their normal operation.

Strength and safety of moving parts

6.4 The moving parts of the windows offered should have sufficient strength and robustness to withstand incidental static and dynamic loads occurring during use.

6.5 Strength and robustness of the windows will be assessed by selected mechanical tests, appropriate to different types of window operation. After each test the window should function normally and any damage and deformation should be within the prescribed limits. The overall evaluation will be based on the test results and experience from use.

- Windows in the scope of BS EN 14351-1 must be tested and CE-marked accordingly. BS 6375 provides advice on the selection of performance characteristics for windows.
- BS 6375-1 specifies the exposure categories related to test pressure levels for air permeability, watertightness and wind resistance for external windows (see Appendix 1).
- BS 6375-2 specifies the performance requirements for the operation and strength of manually operated windows in their fully finished condition.

- BS 6375-3 identifies those characteristics that are not discussed in the other parts of BS 6375, including security.

6.6 It should not be possible for any opening light to become accidentally disengaged from the outer frame.

Manoeuvrability and control

6.7 Windows should be designed for manual control and the forces required for their operation should not exceed those stated in BS 6375-2.

6.8 All windows should comply with the appropriate recommendations in BS 8213-1 or should provide equivalent standards of safety for occupants and operatives.

6.9 The maximum height for operating opening devices is set out in Approved Document M, which references BS 8300.

6.10 Fasteners to hinged and pivoted opening lights should enable a light to be held at an opening of approximately 20 mm for night ventilation.

6.11 Windows depending on friction devices to control the degree of opening should be capable of holding the window open at a pressure of 50 Pa. Where these devices are unable to achieve this with the window opened to the extremity of the restriction device, the manufacturer should provide an auxiliary hold-open device.

6.12 The space between the back face of operating handles and the window frame should not be less than 30 mm.

6.13 In the case of tilt-and-turn windows, the operating handle should be designed to function in such a way that the locking position for the bottom-hung mode occurs before that for the side-hung mode. Preference will be given to a locking system that prevents the use of the side-hung mode except by means of key operation.

Durability and reliability

6.14 The manufacturer must state the expected life of the units.

6.15 Fittings and component parts should have a life expectancy of at least ten years under expected conditions of use, and should be easily removable and replaceable. The life expectancy should be stated.

Note

While fittings may need to be removed for maintenance purposes, some safety fittings may need to be tamper-proof and therefore special consideration of how they are secured to the frame will be needed.

6.16 Component parts must be listed, with names of suppliers, part reference numbers and the current cost of replacement.

6.17 Windows will be operated by users at considerable frequency and with low incentive to exercise care. Robustness and simplicity of operation of the component is important.

6.18 The manufacturer is to state his recommendations for maintaining the windows, their fittings and finishes in a satisfactory condition, together with an indication of the likely frequency of such maintenance, assuming the windows are not subject to abuse.

6.19 In polluted and marine atmospheres, all factory-applied finishes should have a minimum life of five years without cleaning.

Appendix 1: Weathertightness

General

A1.1 The classification of windows in terms of weathertightness required may be determined by following the guidance in BS 6375-1 and the specifications given by National Building Specifications in order to:

- calculate the design wind loading;
- select the exposure category and test pressure classes for air permeability, watertightness and wind resistance.

A1.2 Methods of determining design wind loading for buildings and windows are set out in:

- BS 6375-1: 'Performance of windows. Classification for weathertightness and guidance on selection and specification'.
- BS EN 1991-1-4+A1: 'Actions on structures. General actions. Wind actions'.
- BS 6262 (parts 2 and 3): 'Glazing for buildings'.

A1.3 Building configuration, site topography and location are taken into account in the calculations for wind pressure.

A1.4 Actual performance in use will depend on a number of factors including the location of the building, size and shape of the windows, the way the windows are installed in the building, the associated design detailing and the degree of maintenance.

A1.5 Choosing the proper grade of window, installing it in a suitably sheltered position, with well-detailed protective damp-proof courses in head, jambs and sill, can avoid undesirable consequences. It may be necessary to choose a grade higher than the minimum indicated by exposure charts to obtain weather-resisting qualities throughout the life of the window, or to allow for special local conditions.

Air permeability

A1.6 In determining an acceptable level of air permeability, account must be taken of:

- the function of the rooms;
- the need to minimise heat losses;
- whether air conditioning is to be employed.

A1.7 Achievement of an acceptable level within a given weathertightness classification will depend on:

- type of window;
- construction;
- weather stripping;
- fittings;
- water shedding.

A1.8 The test methods called up by BS 6375-1 to measure air permeability are specified in BS EN 1026.

See also the Note under paragraph 3.18.

Watertightness

A1.9 The test methods called up by BS 6375-1 to measure watertightness are specified in BS EN 1027.

Wind resistance

A1.10 The wind resistance performance of windows depends on:

- strength of frame and sashes;
- fixed or opening lights;
- location and type of fixings;
- glazing;
- location and type of fittings.

A1.11 The test methods called up by BS 6375-1 to measure wind resistance are specified in BS EN 12211 (see also BS EN 1991-1-4+A1 and National Building Specification guidelines).

See also the Note under paragraph 3.18.

Classification for weathertightness

A1.12 Classification by weathertightness is based on test pressures for air permeability, watertightness and wind resistance as set out in BS 6375-1. The appropriate test pressure can be arrived at by calculation of the design wind loading and by reading off the corresponding test pressures for watertightness and air permeability.

A1.13 However, the specifier should not assume that the values obtained will apply automatically in all circumstances. For example, where high energy conservation values are required, it may be appropriate to specify higher levels of test pressures for air permeability than that required for wind resistance, which relates to the strength of the window and its ability to resist wind pressures.

Appendix 2: Window safety assessment and restrictor selection

Introduction

A2.1 This appendix gives basic guidance on the assessment, selection and installation of suitable window restrictors.

A2.2 To prevent falls from windows, it is important to assess all windows to which patients have access.

A2.3 There is a need to assess the suitability and functionality (fitness for purpose) of those windows that are already fitted with restrictors to determine whether:

- a suitably acceptable restrictor is already in place: the restrictor should be of the appropriate design and type to match the window style and construction materials;
- the restrictor is fit for purpose;
- a replacement or additional restrictor is needed;
- the window is functional and safe for use.

A2.4 For mental health facilities, risk assessment should be undertaken to determine the most appropriate windows, fittings and devices.

1 Preparation: documenting the assessment for reference

- Ensure suitably experienced/trained staff are conducting the assessment. Only competent staff with the necessary skills and experience in the following disciplines should be involved in any window safety self-assessment:
  - mechanical engineering;
  - window maintenance and installation;
  - safety and fall prevention;
  - window and door security.
- Create an assessment folder and document file.
- Consult the floor plan for all levels and wards to be assessed.
- Create an assessment checklist – (see the assessment flowchart on page 25).
- Create a method of numerical itemising and registering each window assessed.
- Ensure ward staff are aware of the requirements for assessment.
- Ensure floor plans are current revisions.
- Prepare to photograph each type of window to be assessed.

2 Assessment methodology and key points

A2.5 Operate the window to assess the following:

- Does the restrictor meet the minimum requirements for restrictors defined in paragraph 3.27?
- Do the window and restrictor (if fitted) operate/function correctly?
- Are existing restrictors fit for purpose (for example, is the restrictor/frame arrangement sufficiently robust to withstand determined efforts by patients to open it further)?
- Do restrictors (and/or other hardware) need replacing/installing due to wear and tear or corrosion?

Note

Cable restrictors are not suitable for mental health units and where anti-ligature regulations need to be complied with.

3 Documenting the assessment

A2.6 An example assessment form is shown on the next page.

4 To action: considerations for any non-compliances

Device selection – acceptable applications, certifications etc

A2.7 See the assessment flowchart on page 25.

Installation considerations

A2.8 See the assessment flowchart on page 25.

Alternative options

A2.9 Choose an experienced external assessor.

5 Archiving of documented assessment results

A2.10 Refer to local policies and procedures for record-keeping requirements and storage of archived records.

6 Frequency of assessments and maintenance recommendations

A2.11 The frequency of assessments and maintenance will be influenced by information supplied by manufacturers, initial inspections, ongoing monitoring, and local reporting of defects and failures.

Assessment report for window restrictors

Facility name: _____ **Ward name:** _____ **Date:** _____

Window type: _____ **Number/location against floor plan:** _____

Unique reference number/barcode: _____

Is a photograph attached? Yes ❑ No ❑

Name of assessor: _____ **Compliance with HBN 00-10 Part D?** Yes ❑ No ❑

Comments (*please provide information on: functionality of window operation; suitability/unsuitability of existing restrictor; whether a restrictor is needed; the type of restrictor needed; and other hardware that needs replacing*):

Assessment flowchart		
The actions below should be considered along with the guidance in HBN 00-10 Part D		
Compile relevant floor plans and documents		
↓		
Decide which of the facility's windows are to be assessed		
↓		
Hold a meeting of all relevant parties		
↓		
Decide whether resources and skills allow internal or external assessor		
↓		
Ensure the assessor fully understands all aspects of the inspection criteria,		
selection and in-situ operation/functional test of window restrictors		
↓		
Plan the floor-by-floor assessment, inform all relevant		
ward staff in advance and agree assessment dates/times		
↓		
Create and produce an inspection checklist criteria chart (see below)		
↓		
Commence the floor-by-floor assessment, and record the inspection		
results, noting locations on the floor plan		
↓		
Criteria to be recorded		
Assessment date	→	Record data
Assessor's name and status	→	Record data
Floor, location and ward number or facility name	→	Record data
Patient category and physical capability	→	Record data
Anti-ligature compliance needed	→	yes or no
Type of window	→	noted report needed
Window material and finishes	→	noted report needed
General condition of the window	→	noted report needed
Photograph of window	→	noted report needed
Fully opened window gap is less than 100mm (see Important Note in HBN 00-10 Part D)	→	yes or no
Tamper-proof fixing/anchoring used	→	yes or no
Tamper-proof fixing/anchoring needed	→	yes or no
HBN 00-10 Part D compliant restrictors are fitted	→	yes or no
Functionality and operation of the window	→	noted report needed
Condition of hardware	→	noted report needed
Non-compliant restrictors fitted	→	yes or no
No restrictors fitted	→	yes or no
Type of compliant certified restrictors required	→	noted report needed
Summary recommendations	→	noted report needed
↓		
Compile an assessment report		
↓		
Document all part numbers and copies of test certificates of		
the restrictors installed		
↓		
Make correct selection of restrictors to be installed		
↓		
Decide whether an internal or external installation team are needed		
↓		
Correlate the entire assessment report into a file for action and archiving		
↓		
Create the remedial action plan (for implementation by internal staff or outsourced)		

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British Fenestration Rating Council

British Plastics Federation

British Woodworking Federation

Centre for Window and Cladding Technology

Council for Aluminium in Building

Glass and Glazing Federation

Plastics Window Federation

Steel Window Association

Timber Research and Development Association

Wood Protection Association