

Health Building Note 00-10

Part D: Windows and
associated hardware

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1 Introduction

Background

1.1 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.

1.2 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

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

1.4 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.

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

1.6 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](https://www.gov.uk/government/publications/best-practice-design-and-planning-adult-acute-mental-health-units)'
* DH (2011) ['Environmental Design Guide: adult medium secure services](https://www.gov.uk/government/publications/environmental-design-guide-adult-medium-secure-services)'
* DH (2010) ['High secure building design guide: overarching principles - for Ashworth, Broadmoor, Rampton Hospitals](https://www.gov.uk/government/publications/high-secure-building-design-guide-overarching-principles-for-ashworth-broadmoor-rampton-hospitals)'.

Supersession

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

Application and audience

1.8 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 and maintenance of healthcare buildings.

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

Patient safety: regulatory and policy context

**1.10** One of the government’s key priorities is delivering better health outcomes for patients.

**1.11** 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.

**1.12** 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

**1.13** 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.

**1.14** The registration requirements are set out in the Health and Social Care Act 2008 (Regulated Activities) Regulations 2010 and include requirements relating to:

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

**1.15** The CQC is responsible for developing and consulting on its methodology for assessing whether providers are meeting the registration requirements (see the CQC’s [Guidance about compliance](http://www.guidanceaboutcompliance.org.uk) (2010)). Failure to comply with the requirements is an offence and, under the 2008 Act, 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

**1.16** The Health and Safety Executive is the national regulator for workplace health and safety. Regulation 15 of the Workplace (Health, Safety and Welfare) Regulations 1992 states that windows must not expose people to risks to their health and safety either due to operation or location.

Infection prevention and control

**1.17** 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’).

**1.18** The information outlined in this document follows the general principles given in the ‘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.

**1.19** 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.

Never events

**1.20** 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 unrestricted windows".

**1.21** 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.

https://www.gov.uk/government/publications/healthcare-never-events-policy-framework-update

NHS Premises Assurance Model

**1.22** 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 are protected against risks associated with such hazards as unsafe premises.

**1.23** It allows NHS organisations to better understand the effectiveness, quality and safety with which they manage their estate and how that links to patient experience and patient safety. It contains suggested checklists of the key questions and evidence that healthcare organisations should prepare and access to support their assessment of the NHS PAM. These checklists are not mandatory but are produced as a helpful aide-memoir to assist in deciding the level of NHS PAM assurance applicable to a particular healthcare organisation.

**1.24** NHS PAM has been designed to apply to:

* NHS foundation trusts;
* NHS trusts;
* mental health trusts;
* ambulance trusts; and
* community trusts.

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

NHS Constitution

**1.26** 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.

**1.27** Healthcare organisationsneed to “ensure that services are provided in a clean and safe environment that is fit for purpose, based on national best practice (pledge)”
(<http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_113613>).

Life-cycle and maintenance

**1.28** 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](http://www.steelconstruction.info/Concept_design), [construction](http://www.steelconstruction.info/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’.

**1.29** Materials and finishes should be selected to minimise maintenance and be compatible with their intended function and lifespan/duration of use (see also paragraphs 1.34–1.35).

**1.30** 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 the work or people affected by the work from any project arising from building maintenance and cleaning.

**1.31** 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

**1.32** 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 in conjunction with 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.

**1.33** 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

**1.34** 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.

**1.35** 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 C, as rated by BRE’s ‘Green guide to specification’);
* materials with higher than average recycled content; and
* materials that do not harm health and the environment (for example low global warming potential (GWP) insulation and low volatile organic compounds (VOC) coatings (that is, paints)).

Relationship to other data

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

1.37 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.

1.38 First preference should be given to products and services from sources which 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.

1.39 This guidance may be used in conjunction with sections of the [National Building Specification](http://www.thenbs.com) (NBS) relevant to windows.

**Question to ProCure21+ suppliers: Does the initiative on standardisation of components need a mention here? Does it apply to windows?**

Terminology

1.40 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.

* Coupled window – (also known as a dual sash window) consists of two single-glazed frames joined by hinges or fasteners so that both open together in the same direction for ventilation and can be separated for cleaning.
* Double window – two separate single-glazed windows, one external and one internal, in the same wall opening, but capable of acting 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. It can only be overridden by means of a removable key or other device, and be fitted using tamper-proof fixings.
* Reversing catch – device that automatically engages when an opening light is fully opened into a reversed position and holds the light firmly in that position until released by deliberate action.
* 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.

2 Design guidance

Introduction

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

2.2 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

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

2.4 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.

**2.5** 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 which may be unpleasant to the eye.

**2.6** Consideration should be given to overheating when designing the positioning and size of windows and the need for awnings or shutters.
(See the National Heatwave Plan:
<https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201039/Heatwave-Main_Plan-2013.pdf>)

Daylight

2.7 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.

**2.8** 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. 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

2.9 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

2.10 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).

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

2.12 Maximum or hot weather ventilation can be provided by large openings but patient safety and rigidity of large opening lights must be considered (see paragraphs 2.31–2.33).

2.13 Louvres or additional high level opening lights may be considered when restricted openings cannot provide sufficient natural ventilation in hot weather.

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

**2.15** Gilkeson et al (2013) studied the effect of airflow in large, open wards that have been partitioned into bays. The research showed that when windows are closed to reduce heat losses and energy costs (usually during the winter months), there is an increased risk of infection due to an increase in airborne pathogens. As an alternative design solution for these types of ward, the researchers found that fitting small extractor fans (similar to those found in domestic bathrooms) to windows 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 2.18.

View

2.16 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.

2.17 These factors will determine:

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

Weathertightness

**2.18** 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 difference 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 2.15.

Energy conservation

2.19 Selection of the correct window and glazing has a bearing on the energy efficiency of the building (see also paragraph 3.30). Guidance is contained in Approved Document L.

2.20 Optimum thermal performance may favour small windows and this could conflict with the need for natural lighting, ventilation and view.

2.21 The thermal performance of a window as a whole will be influenced by its frame material; for example, timber and plastic frames have a better thermal performance than metal frames.

Sound insulation

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

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

2.24 For further information see:

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

Security

2.25 This section is not intended to deal with windows for high security situations, but in certain situations special security precautions will be required to prevent unauthorised entry or exit. These areas should be identified early in the design stage and will include spaces which house:

* drugs;
* valuable equipment;
* records;
* certain categories of patient;
* residential staff.

2.26 The provision of security devices should be decided by consultation between the project and design teams who will need to consider their effect on the operation and performance of the windows together with access for fire-fighters and means of escape in case of fire.

2.27 Handles and fasteners should be designed so that they cannot be easily released from the outside by the insertion of a thin blade or other simple tool. Lockable lever handles should be fitted with 20 mm long spurs.

2.28 Openable lights should not be capable of being opened or removed from the outside when fastened in the closed position, except by breaking part of the window.

2.29 Where specified, windows should be provided with:

* special locks, operated from the inside of the window with removable keys;
* adjustable fasteners as specified in paragraphs 5.10–5.16, providing security against unauthorised entry;
* internal bead glazing systems providing maximum security.

2.30 Vertical and horizontal sliding windows should be constructed so that any movement occurring between the inner and outer sashes is capable of being taken up and locked by the operation of a fitch catch or other locking devices.

See also 'Secured by design – hospitals'.

Safety

Falls from windows

2.31 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).

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.

**2.32** If risks from falling are identified, then control measures should be put in place. This usually involves the use of windows with restrictors. 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. It can only be overridden by means of a removable key or other device, and should be fitted using tamper-proof fixings.

Important

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).

Restrictors and their fittings should be suitably robust to prevent vulnerable and determined adults from forcing them open beyond the 100 mm restriction.

**2.33** Other design options are also available. For example:

* in the case of top-hung windows, the opening light could be located above a fixed light (see Approved Document K on the safe opening and closing of windows) ;
* sliding windows are available that incorporate a discreet tamper-proof safety screen on the outer sash/frame. These have the added benefit of allowing better natural ventilation as the window need not be restricted to a 100 mm opening.

|  |
| --- |
| **Table 1. Example questions that could be used as part of the falls risk assessment** |
| Are patients 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? |

**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'](https://www.gov.uk/government/publications/window-restrictors-estates-and-facilities-alert-efa-2013-002).
* [Estates and Facilities Alert Notice 2012/001 – 'Integral side-stay mechanism window restrictors fitted with plastic spacers and used in many window applications'](http://www.hfs.scot.nhs.uk/services/incident-reporting-and-investigation-centre-iric/estates-and-facilities-alerts/).
* [Health Services Information Sheet (HSIS5) – ‘Falls from windows and balconies in health and social care](http://www.hse.gov.uk/pubns/hsis5.htm)’.
* [Health and Safety Executive's web page on "Risk of falling from windows](http://www.hse.gov.uk/healthservices/falls-windows.htm)":

Safety glazing

2.34 Any requirements for the use of safety glazing should be considered early in the design stage and the recommendations of BS 6262-4 complied with. Particular attention should be given to glazing below 800 mm from floor level on ground floors and 900 mm on upper floors. The use of safety glazing should be considered in spaces which are accessible to children or vulnerable patients and generally in exercise areas.

2.35 Approved Document K of the Building Regulations sets requirements for safety glazing.

Fire spread

2.36 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'.

3 Specification guidance

**Question to consultees: Do you believe that Chapter 3 is relevant for windows in healthcare? Would it be more helpful to provide useful links, for example, to trade associations etc? Which parts (if any) should be retained and possibly expanded upon bearing in mind one of the main goals of this document is to enhance patient outcomes?**

Testing and assessment

3.1 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.

3.2 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 5.1–5.2).

Material and finishes

See also paragraphs 1.29 and 1.34–1.35.

General

3.3 Steel and wood windows are commonly delivered to site for finishing by others, although factory-finished windows in both these materials are also available. Aluminium and plastic windows are factory-finished.

3.4 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 users.

**3.5** For relevant British Standards, see Table 2.

Aluminium

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

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

3.8 Anodising to BS 3987 should offer a maintenance-free life of 15 years or more in normal locations. It is not recommended for marine and industrial environments.

3.9 Powder organic coating to BS 6496 is thicker than other finishes and has an expected maintenance-free life of up to 20 years. The thicker finish also affords improved protection against impact damage.

3.10 Ultimately all finishes will deteriorate and the frames will need further protection. At this time manufacturers’ advice should be sought. Aluminium frames can act as a cold bridge and may result in condensation forming on the inner surfaces. Frames with a thermal barrier should be used.

Plastics

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

3.12 Cleaning may well be desirable at intervals in polluted atmospheres, but the frames should offer a 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

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

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

3.15 Steel frames can act as a cold bridge and will generally result in condensation forming on the inner surfaces. Some provision should be made for condensation run-off in such windows or an alternative frame material considered.

Timber

3.16 Timber frames provide good thermal insulation, minimising the risk of condensation.

Hardwood

3.17 Appearance and good functional performance are reasons for selecting hardwood windows. Resistance to decay is largely determined by the correct choice of species. However, with certain species preservative treatment is essential (see BS 8417).

Softwood: preservative treatment

3.18 Softwood windows should have preservative treatment applied by a licensed processor. The double vacuum process is suitable for all types of softwood. For further information see BS 8417.

Paint finish

3.19 In addition to preservative treatment and factory priming, two undercoats and one finishing coat are recommended for internal surfaces. For recommended finishes on external surfaces, see TRADA's Wood Information Sheet (WIS) 2/3-1.

3.20 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.

3.21 The following factors should be considered:

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

3.22 For further information, see BS 6150 – ‘Painting of buildings. Code of practice’.

Stain treatment

3.23 Stain treatment is an alternative to paint, offering a different appearance, but is less protective and less able to hide defects. It does not obviate the need for preservative treatment.

3.24 The use of stains could allow greater variations in moisture content to take place, with consequential variations in dimensional stability and splitting of the timber.

3.25 The following factors should be considered:

* the use of better quality timber;
* the use of bead or gasket instead of putty glazing;
* more frequent but easier maintenance;
* the use of a low solid or high solid type of stain;
* the compatibility of bedding, pointing and glazing compounds.

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

Glazing

3.27 The type of glass and glazing method will be determined by the design guidance as set out in Chapter 2. Further guidance on the selection of glazing is given below.

Solar control

3.28 The use of tinted, solar-reflective or other specialised or coloured glass should only be used after the clinical effect has been considered (see paragraphs 2.7–2.9). 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.

Privacy

3.29 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.

Energy conservation

3.30 In sealed glass units the optimum width of air space is 20 mm: below 20 mm the insulation value progressively decreases until it approaches that of single glazing; above 20 mm the value remains practically constant (see paragraphs 2.19–2.21).

Security and safety

3.31 When specifying glass with regard to security and safety, it is essential to know what risks are involved.

**3.32** The need for special glazing can be met by one of the following types:

* laminated;
* toughened;
* wired;
* plastics;
* wired plastics.

3.33 See also paragraphs 2.25–2.35.

Fittings

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

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

3.36 As a minimum, restrictors should conform to BS EN 14351-1 + A1 and BS EN 13126-5 (see also BS 8213-1)

Operating height

3.37 The maximum height for operating most opening devices when the user can stand close to the wall is about 1600 mm. In other situations it may be necessary to use some form of remote operating device such as cords or mechanical winding mechanisms. 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.

3.38 Where vertical sliding windows are to be used, consideration could be given to the use of a full width low-level bar attached to the upper sash. This will enable the sash to be opened without resorting to the use of poles or mechanical devices.

4 Maintenance and replacement

4.1 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.

4.2 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.

**4.3** Where window restrictors are fitted, they should be included on planned preventative maintenance 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.

**4.4** Inspection should ensure that devices fitted are designed to prevent reasonable forces being applied by adults. 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.

**4.5** Where a damaged or defeated restrictor is found, questions should always be asked about the significance of the finding and a programme to repair or replace the restrictor put in place.

**4.6** Frequency of inspection may be decreased if damage or failure is never encountered – but it will always be required.

**Question to consultees: Is there any other useful guidance we can (or should) include here to guide maintenance personnel etc?**

For further guidance, see [Estates and Facilities Alert Notice 2013/002 – 'Window restrictors'](https://www.gov.uk/government/publications/window-restrictors-estates-and-facilities-alert-efa-2013-002).

Hygiene and cleaning

4.7 The method of cleaning should follow the guidance given in the ‘Revised healthcare cleaning manual’ (http://www.nrls.npsa.nhs.uk/resources/?EntryId45=61830).

**4.8** See BS 8213-1 for further guidance on safe methods of cleaning and maintenance.

5 Performance requirements

Standards

5.1 Windows must comply with the current editions of all relevant British Standards (see Table 2), Codes of Practice and statutory requirements with regard to their performance, constituent materials, method of assembly and use.

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

|  |  |
| --- | --- |
| Table 2 Relevant British Standards |  |
| **Material and finishes** | **Standards** |
| **Aluminium windows** | BS 4873 |
| **PVC-U windows** | BS 7412 |
| **Steel windows** | BS 6510 |
| **Timber windows** | BS 644BS 1186-2BS 1186-3BS EN 942 |
| **Note**:Standards on weathertightness are given in Appendix 1 |

Description

5.3 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:

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

Strength and safety of moving parts

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

5.5 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.

5.6 All tests should be in accordance with BS 6375-2, followed by repeat air and water penetration tests, the results of which should be within 10% of the original tests but should not downgrade the window to a lower category.

5.7 In addition to BS 6375-2, where untried mechanisms, fittings, weather strips etc are used or where the specifier may be in doubt as to the mechanical performance of the assembly, the manufacturer may be required to submit a window to an endurance test of not less than 20,000 complete opening and closing cycles.

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

5.9 The following safety fittings should be provided where specified:

* Reversing catches: these should be provided to hold pivoted or projected windows firmly when reversed for cleaning or other maintenance.
* Restrictors: these should check the opening of an opening light of whatever type, at an aperture of not more than 100 mm. To permit the window to be opened more widely, the catch should be capable of being unfastened. The catch should re-engage automatically when the window is closed.
Restrictors should conform to BS EN 14351-1 + A1 and BS EN 13126-5.
* Remote controls: these should be provided for opening lights when specified and in positions as indicated on project drawings.

Manoeuvrability and control

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

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

5.12 It is desirable that all high-level opening lights are operated at a point of not more than 1575 mm above finished floor level.

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

5.14 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.

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

5.16 In the case of turn and tilt 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 which prevents the use of the side-hung mode except by means of key operation.

Thermal insulation

5.17 Windows of the following types may be required and should satisfy the following conditions:

* Coupled and double windows should be tested for airtightness, watertightness and wind resistance in accordance with BS EN 1026, BS EN 1027 and BS EN 12211 (respectively) and should satisfy the requirements of BS 6375 Parts 1 and 2. For coupled windows, those parts that can be opened to permit cleaning of the inner faces should be subject to the appropriate tests of BS 6375-2.
* Secondary windows should be tested as single windows for airtightness and wind resistance to BS EN 1026 and BS EN 12211:2000 (respectively).

5.18 Suppliers of aluminium “thermal break” windows will be required to supply evidence of the thermal properties of the frames.

Durability and reliability

5.19 Windows should have a minimum life of 25 years. The manufacturer must state the expected life of the units.

5.20 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.

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

5.22 The 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.

5.23 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.

5.24 In polluted and marine atmospheres, all factory-applied finishes, excluding those for wood windows, should have a minimum life of five years without cleaning.

**Question to consultees: Do you believe that this document captures all the salient design and specification issues for windows used in healthcare facilities, particularly with regard to patient safety and better patient outcomes?**

Appendix 1: Weathertightness

General

A1 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 the National Building Specification in order to:

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

A2 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'.

A3 Building configuration, site topography and location are taken into account in the calculations for wind pressure.

A4 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 (see also BS 8104).

A5 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

A6 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.

A7 Achievement of an acceptable level within a given weathertightness classification will depend on:

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

A8 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 2.18.

Watertightness

A9 The test methods called up by BS 6375-1 to measure watertightness are specified in BS EN 1027.

Wind resistance

A10 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.

A11 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 2.18.

Classification for weathertightness

A12 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.

A13 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

**Question to consultees: This appendix and the accompanying flowchart on page 33 are new additions to this document (i.e. were not in the predecessor HTM 55) and have been included to try to help providers comply with the guidance in this new edition and Estates and Facilities Alert Notice 2013/002 on window restrictors.**

**DH would welcome comments and suggestions on its usefulness and validity.**

Introduction

To prevent falls from windows, it is important to assess all windows to which patients have access. 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 is fit for purpose;
* a replacement or additional restrictor is needed;
* the window is functional and safe for use.

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

1 Preparation

Guidelines to documenting the assessment for reference

* Ensure suitably experienced/trained staff are conducting the assessment. Only staff with appropriate qualifications and/or 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 33).
* 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 elements and guidelines

Assessment methodology and key points

Operate the window to assess the following:

* Does the restrictor meet the minimum requirements for restrictors defined in paragraph 2.32?
* Do the window and restrictor (if fitted) operate/function correctly?
* Are existing restrictors fit for purpose?
* Do restrictors (and/or other hardware) need replacing/installing due to wear and tear or corrosion?

Recommended device types to match window style

* For sash windows: use sash restrictors
* For slider windows: use cable restrictors
* For casement windows: use cable restrictors
* For tilt and turn windows: use cable restrictors
* For pivot/awning/projecting windows: use cable restrictors

[DRAFT NOTE: POSSIBLE PHOTOGRAPHS OF RESTRICTORS COULD BE INCLUDED HERE]

**Note**:

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

3 Documenting the assessment

An example assessment form is shown below.

4 To action: considerations for any non-compliances

Device selection – acceptable applications, certifications etc

See the assessment flowchart on next page.

Installation considerations

See the assessment flowchart on next page.

Alternative options

Choose an experienced external assessor.

5 Archiving of documented assessment results

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

6 Frequency of assessments and maintenance recommendations

The frequency of assessments and maintenance will be influenced by information supplied by manufacturers. [QUESTION TO CONSULTEES: ANY OTHER CRITERIA?]

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<http://www.legislation.hmso.gov.uk/si/si2000/20002380.htm>

(The) Disability Discrimination Act 1995. HMSO, 1995.
<http://www.legislation.hmso.gov.uk/acts/acts1995/Ukpga_19950050_en_1htm>

NHS Estates resources

Activity DataBase
http://195.92.246.148/nhsestates/adb/adb\_content/introduction/home.asp

NHS Cleaning Manual http://patientexperience.nhsestates.gov.uk/clean\_hospitals/ch\_content/home/home.asp

National Standards of Cleanliness http://patientexperience.nhsestates.gov.uk/clean\_hospitals/ch\_content/home/home.asp

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Trade associations

British Coatings Federation (http://www.coatings.org.uk)

British Fenestration Rating Council (http://www.bfrc.org)

British Plastics Federation (http://www.bpf.co.uk)

British Wood Preserving Association (http://www.bwpda.co.uk)

British Woodworking Federation (http://www.bwf.org.uk)

Centre for Window and Cladding Technology (http://www.cwct.co.uk)

Council for Aluminium in Building (http://www.c-a-b.org.uk/public/about.htm)

Glass and Glazing Federation (http://www.ggf.org.uk)

Plastic Windows Federation (http://www.pwfed.co.uk/home.htm)

Steel Window Association (http://www.steel-window-association.co.uk)

Timber Research and Development Association (http://www.trada.co.uk)