

Timber windows — Factory assembled windows of various types — Specification

ICS 91.060.50

Committees responsible for this British Standard

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- Association of Builders' Hardware Manufacturers
- Association of Building Engineers
- British Blind and Shutter Association
- British Plastics Federation
- British Wood Preserving and Damp-proofing Association
- British Woodworking Federation
- Building Research Establishment (BRE)/LPC Laboratories
- Centre for Window and Cladding Technology
- Chartered Institute of Building
- Construction Fixings Association
- Consumer Policy Committee of BSI
- Council for Aluminium in Building
- Door and Shutter Manufacturers' Association
- Flat Glass Manufacturers' Association
- Glass and Glazing Federation
- Guild of Architectural Ironmongers
- Institute of Architectural Ironmongers
- Health and Safety Executive
- LHC Building Components and Services
- National House-building Council (NHBC)
- Office of the Deputy Prime Minister (ODPM) (represented by BRE)
- Police Scientific Development Branch
- Royal Institute of British Architects
- Scottish Office (Construction and Building)
- Security Facilities Executive
- Society of Chief Architects of Local Authorities
- Steel Window Association
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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviations for window types and handing	3
5 Materials	5
6 Profile design	6
7 Workmanship	6
8 Glazing	7
9 Construction	7
10 Manufacturing tolerances	7
11 Security and safety	8
12 Weathertightness performance	8
13 Operation and strength performance	9
14 Marking	9
Annex A (informative) Advisory notes and recommendations for finishing of external joinery	10
Annex B (informative) Specifying a timber window	11
Annex C (informative) Advisory notes on window ranges	13
Annex D (informative) Recommendations for the storage, protection, installation and fixing of windows	14
Bibliography	17
Figure 1 — Window types and handing	4
Table 1 — Maximum difference in length of diagonals	8
Table 2 — Exposure categories	9
Table C.1 — Sizes generally included in the window ranges	13

Foreword

This British Standard has been prepared by Subcommittee B/538/1. It supersedes BS 644-1:1989, BS 644-2:1958 and BS 644-3:1951 which are withdrawn.

This revision of BS 644 incorporates changes which have recently been made as a result of the withdrawal of British Standards which have been replaced by European Standards and also makes reference to enhanced security performance for timber windows as given in BS 7950.

Advisory notes on window ranges, recommendations for finishing of external joinery, guidance and recommendations for the storage, protection, installation and fixing of windows are given in annexes to this standard.

A series of European Standards for the testing and classification of windows, including timber windows, is currently being prepared by CEN Technical Committee CEN/TC 33. As this series will supersede some parts of this British Standard further changes may need to be made to this standard.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 17 and a back cover.

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1 Scope

This British Standard specifies requirements for materials (including timber preservation), profile design, workmanship, glazing, construction, safety, security, weathertightness performance, and operation and strength performance of factory assembled timber windows of the following types:

- a) hinged: side hung, top hung and bottom hung;
- b) projecting side hung (open out or reversible);
- c) projecting top hung (open out or reversible);
- d) pivoted: horizontal and vertical (hung centrally or off-centre, including reversible);
- e) sliding: horizontal and vertical;
- f) tilt and turn;
- g) fixed light;
- h) direct glazed.

This British Standard does not apply to windows supplied as kits for site assembly.

NOTE The timber windows covered by this British Standard may be treated with either opaque or non-opaque finishes. Some glazing and finishing operations may be carried out on site.

2 Normative references

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

BS 952-1, *Glass for glazing — Part 1: Classification*.

BS 952-2, *Glass for glazing — Part 2: Terminology for work on glass*.

BS 1186-2, *Timber for and workmanship in joinery — Part 2: Specification for workmanship*.

BS 1204, *Specification for type MR phenolic and aminoplastic synthetic resin adhesives for wood*.

BS 4255-1, *Rubber used in preformed gaskets for weather exclusion from buildings — Part 1: Specification for non-cellular gaskets*.

BS 5589:1989, *Code of practice for preservation of timber*.

BS 5713, *Specification for hermetically sealed flat double glazing units*.

BS 6100-1.0, *Glossary of building and civil engineering terms — Part 1: General and miscellaneous — Section 1.0: General*.

BS 6100-1.3.5, *Glossary of building and civil engineering terms — Part 1: General and miscellaneous — Section 1.3: Parts of construction works — Subsection 1.3.5: Doors, windows and openings*.

BS 6100-1.5.1, *Glossary of building and civil engineering terms — Part 1: General and miscellaneous — Section 1.5: Operations; associated plant and equipment — Subsection 1.5.1: Co-ordination of dimensions, tolerances and accuracy*.

BS 6100-1.6, *Glossary of building and civil engineering terms — Part 1: General and miscellaneous — Section 1.6: Persons*.

BS 6206, *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*.

BS 6262, *Code of practice for glazing for buildings*.

BS 6375-1:1989, *Performance of windows — Part 1: Classification for weathertightness (including guidance on selection and specification)*.

BS 6375-2, *Performance of windows — Part 2: Specification for operation and strength characteristics*.

BS 7479, *Method for salt spray corrosion tests in artificial atmospheres*. [ISO 9227]

BS 7950, *Specification for enhanced security performance of casement and tilt/turn windows for domestic applications*.

BS EN 12420, *Copper and copper alloys — Forgings.*

For the purposes of this British Standard the terms and definitions given in BS 6100-1.0, BS 6100-1.3.5, BS 6100-1.5.1 and BS 6100-1.6 and the following apply.

framed opening light that is hinged or pivoted

framed opening light that slides

casement opening inwards or outwards that is hinged on one edge about a fixed vertical axis

casement opening outwards in which the vertical axis is near to one side but moves during opening

casement opening outwards that is hinged on the top edge about a fixed horizontal axis

casement opening outwards in which the horizontal axis is near to the top edge but moves during opening

casement opening inwards that is hinged on the bottom edge about a fixed horizontal axis

casement that rotates about a fixed horizontal axis through the centre of its height

casement that rotates about a fixed vertical axis symmetrically or asymmetrically placed in the width of the window

side hung casement opening outwards that can be turned and secured in the fully reversed position

top hung casement opening outwards that can be turned and secured in the fully reversed position

3.12**tilt and turn casement**

casement with two modes of operation, bottom hung inward opening for normal ventilation and side hung inward opening for cleaning or emergency egress

3.13**vertical slider**

double hung sash window
window having sashes that slide vertically

3.14**horizontal slider**

window having sashes that slide horizontally

3.15**divided casement**

casement in two parts with one part a fixed light and having the opening portion closing directly against it

3.16**multi-light window**

window incorporating opening and/or fixed lights within one perimeter frame

3.17**composite window**

two or more windows joined to fill an opening

3.18**double window**

two separate windows superimposed in the same opening

3.19**weatherseal**

strip of resilient material designed to reduce air infiltration and water penetration

3.20**window fixing**

any item that is used to secure separate members of a window assembly to each other, to secure an item of hardware to a window member, or to secure a completed window assembly into the structure of a building

3.21**window hardware**

fittings attached to the window that are used to operate and/or secure it

3.22**fixed light**

light that does not open

3.23**direct glazed window**

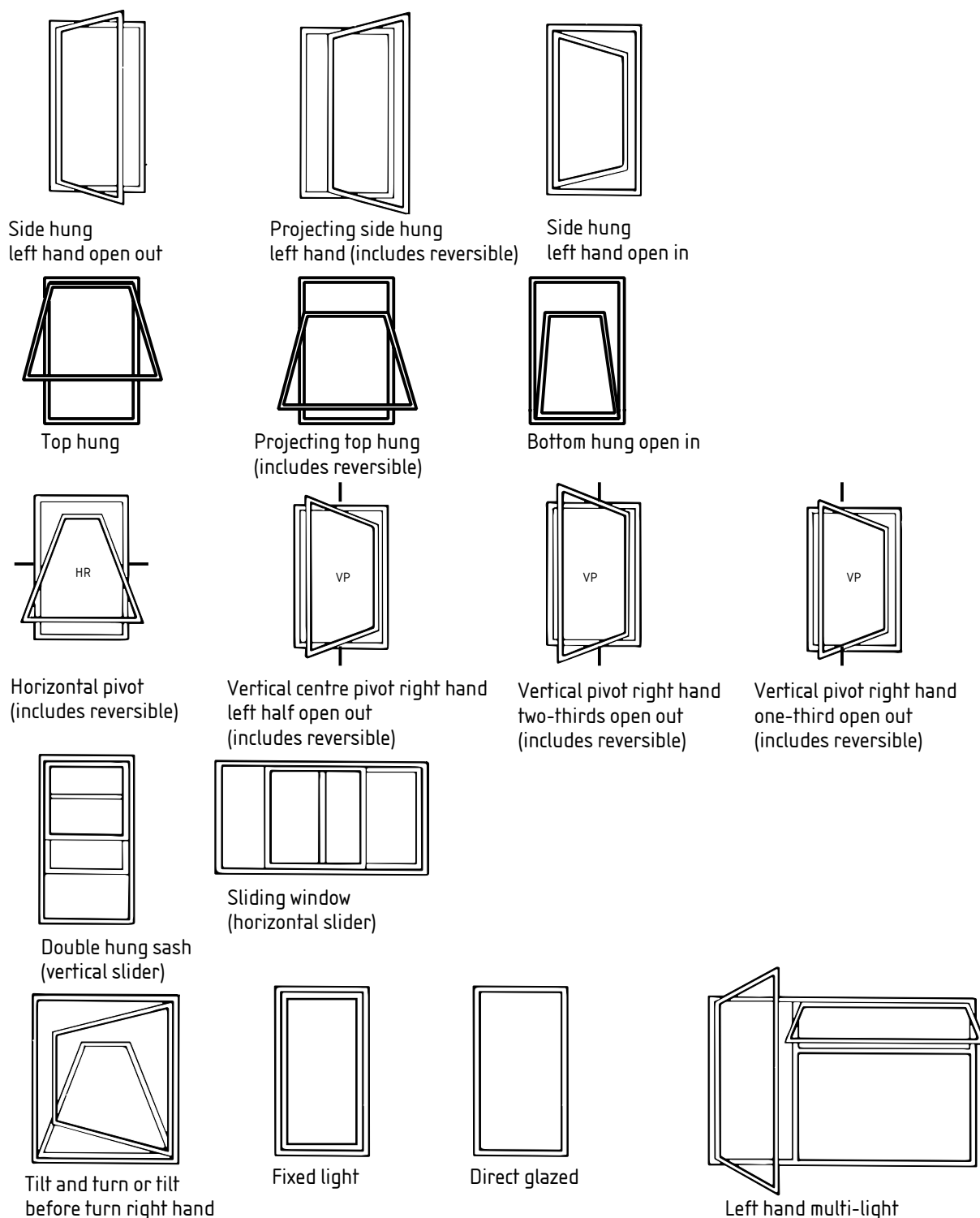
window with glazing installed into the frame of the window

4 Abbreviations for window types and handing

For the purposes of this British Standard the following abbreviations apply for window types and handing.

TH = top hung	DC = divided casement	HS = horizontal slider
SH = side hung	TT = tilt and turn	VS = vertical slider
BH = bottom hung	HP = horizontal pivot	FL = fixed light
PSH = projecting side hung	VP = vertical pivot	DG = direct glazed
PTH = projecting top hung		

NOTE Window types and examples of handing are shown in Figure 1.



When specifying handing the window shall be viewed from the outside.

The arrangement of a multi-light window shall be clarified by the manufacturer.

NOTE 1 The handing of side hung and tilt and turn casements is determined by the position of the hinges and for vertically pivoted windows the handing is determined by the position of the pivots in relation to the opening out portion. The handing of a multi-light or a horizontally sliding window is determined by the position of the largest opening light.

NOTE 2 Windows may include additional rails or glazing bars or be a combination of the types shown.

Figure 1 — Window types and handing

5 Materials

5.1 Timber

5.1.1 General

The timber for factory assembled window frames and casements shall be of the following classes, or better, in accordance with BS EN 942:

- frames: class J50;
- casements, sashes and beads: class J40;
- small section beads (15 mm or less in either direction): class J10.

NOTE 1 Guidance on the use of species of softwood and hardwood is given in BS EN 942:1996, Annex NA (national annex).

NOTE 2 Where, for reasons of design or appearance, a different quality of timber is required, the specifier should discuss these special requirements with the manufacturer in respect of timber species and availability.

5.1.2 Preservation

Timber requiring preservative treatment shall be treated using the methods and preservative formulations recommended in BS 5589:1989, Section 2. Treatment shall be carried out in accordance with BS 5589 after machining of all timber sections is completed.

NOTE Preservative treatment is required for certain hardwoods and softwoods of low natural durability when used in external joinery. Recommendations on the need for preservation are included in BS 5589:1989, Section 2. BS EN 942:1996, Annex NA also includes recommendations with regard to treatment requirements of the more commonly used timber species.

5.2 Adhesives

Adhesives shall conform to BS EN 204:2001, type D3 or BS 1204.

5.3 Weatherseals

Weatherseals used in timber windows shall be one of the following types:

- a) polychloroprene rubber, solid (non-cellular) conforming to BS 4255-1;
- b) polychloroprene rubber, solid (cellular);
- c) cured ethylene propylene-diene monomer (EPDM);
- d) thermoplastic elastomer (TPE) also known as thermoplastic rubber (TPR);
- e) polypropylene pile;
- f) sheathed cellular elastomeric polymer; or
- g) a combination of the above materials.

Weatherseals shall not be overpainted.

5.4 Window hardware and window fixings

5.4.1 All metal straps, clips, brackets, screws, nuts, bolts, washers, other fixings and all metal components of window hardware shall be one of the following types:

- a) metal, or any metal protectively treated, that has a corrosion resistance such that when tested for 96 h by the neutral salt spray test in accordance with BS 7479, no corrosion of the metal is visible to normal, or corrected vision;

NOTE 1 Where steel hardware/fixing grade II protectively treated in accordance with a) is used steels, zinc plated in accordance with BS EN 12329 classification number Zn 12 and chromate passivated in accordance with BS 6338 class 2c, are strongly preferred, especially for parts of the window that are frequently wetted by condensation or for service in marine or polluted industrial environments.

NOTE 2 BS 3382-2 specifies zinc plating thicknesses for threaded components that are less than those given in BS EN 12329 and BS EN 12330 however, alternative proprietary zinc/zinc chromate non-electrolytic coatings are available that provide a higher level of protection and that enable the metal to conform to 5.4.1a). These coatings are specified in BS 3382-7.

- b) leaded brass conforming to BS EN 12165 and BS EN 12420;
- c) cast leaded gunmetal conforming to BS EN 1982.

NOTE 3 Materials meeting the requirements of either b) or c) are usually used for more traditional fittings and may not be suitable for external environments.

5.4.2 To minimize corrosion arising from electrolytic reaction, metals that are in contact with each other shall only be used in combinations that have ratings 0 or 1 for atmospheric environments given in PD 6484 or are protected to prevent electrolytic reaction.

Steel fixings grade II shall not be used in the fixing of steel hardware grade I to a window.

NOTE Steel fixings grade I may be used with steel hardware grade II.

5.4.3 Window hardware with provision for adjustment shall be accessible for adjustment after the windows have been installed.

5.5 Glass

If the windows are factory glazed, the type and quality of glass shall conform to BS 952-1 and -2. Hermetically sealed insulated glass units shall conform to BS 5713 and shall be of the double sealed type. Where safety glass is required, it shall conform to BS 6206.

NOTE Bead glazing and flexible glazing systems are generally required when exterior stain finishes are used and should always be used with insulating glass units.

5.6 Coating systems

Only exterior quality paint and stain coating systems shall be used on timber windows.

NOTE Guidance on the suitability of different types of finish for various locations and environments is given in Annex A.

6 Profile design

6.1 Windows shall be designed to be glazed in accordance with BS 6262. The glazing rebate sizes and design shall be appropriate for the glazing and the glazing method. The window manufacturer shall indicate in his/her literature the maximum glass thickness that can be accommodated by the frame or casement.

NOTE Windows manufactured to receive insulated glass units should have a minimum rebate depth of 15 mm.

6.2 Exposed arrisses shall, where practicable, have a radius of at least 1.5 mm to avoid thinning of the finish film at these points.

NOTE A 3 mm arris is preferable.

6.3 Sills shall have a throat formed in their undersurface adjacent to the front face to prevent water running back across the underside of the sill.

6.4 The exposed top surfaces of horizontal members of frames, casements, sashes and glazing beads shall be profiled or angled to shed water from external surfaces.

NOTE A minimum slope of one in eight (7°) is recommended.

6.5 The internal top surfaces of internal horizontal members of windows shall, where practicable, be profiled or angled to shed any water from condensation or cleaning away from the internal face of the glass and the glazing rebate.

7 Workmanship

7.1 Workmanship shall be in accordance with BS 1186-2.

7.2 Weatherseals and/or glazing gaskets shall be fitted in accordance with the manufacturer's recommendations and in such a manner that no gaps occur at corners or joints. Weatherseals shall be fitted into a groove in the frame, casement or sash.

NOTE Weatherseals and glazing gaskets should have a life of 10 years.

When weatherseals are supplied loose for site fixing, the window manufacturer shall supply appropriate fixing information.

7.3 Window hardware shall be fixed with screws or other window fixings in such a manner that splitting of the timber components at the fixing is avoided.

8 Glazing

Windows shall be glazed in accordance with BS 6262 (see also Annex B).

9 Construction

9.1 Timber members shall be machined and shall have surface finish suitable to receive either primer or a stain basecoat (see Annex A).

9.2 Joints between members shall be either combed joints, mortice and tenon joints and mitred joints in accordance with BS 1186-2 or mechanical joints, designed so that water cannot be entrapped.

NOTE Glued and dowelled and mechanical joints may be used for joints between mullions and frame and between glazing bars.

9.3 Nails, star dowels or other fixings used to secure joints in casements and sashes shall be inserted from the inside surface. All window fixings shall be punched below the surface of the timber members.

NOTE Single small pins used to secure joints on casements and sashes may be fixed externally.

9.4 Open joints occurring at the junction of shaped components (e.g. where a transom adjoins a jamb or mullion incorporating weathering grooves) shall be filled to prevent water ingress to the joint, unless designed to function otherwise.

9.5 Window frames shall be supplied without horns unless required by the specifier, or if the window style dictates

9.6 Where sills or other frame, casement or sash members are formed by laminating two or more pieces of timber, joints shall be positioned so that their edges are located away from any point of severe exposure to the weather.

9.7 Drips or extended sill members, formed using separate sections, shall be fixed by glue or mastic, preferably with mechanical fixing, through a concealed surface at the time of manufacture.

NOTE Mechanical fixings can be concealed by plugs or a suitable filler.

9.8 Windows to be site glazed shall be supplied with the beads loose. Factory glazed windows shall have fully fixed beads. Bottom glazing beads shall be full width.

Mitred beads shall only be supplied:

- for windows with a drained and ventilated glazing system;
- with small panes where the cut beads have been end sealed; or
- where the beading is fitted internally.

Timber beads shall be fixed at 50 mm from each end and at 150 mm centres for pins, or at 200 mm centres for screws. The length of the pins and screws shall be at least twice the thickness of the bead being fixed.

NOTE When loose components such as beads or other inserts are supplied, instructions for their secure final fixing should be provided by the manufacturer.

9.9 Windows shall be supplied with at least one coat of primer or basecoat stain, on all timber surfaces including faces not visible when the window is installed (see Annex A).

9.10 Composite windows shall be tested as complete units for weathertightness and operational performance in accordance with Clause 12 and Clause 13.

10 Manufacturing tolerances

10.1 In all cases, work sizes shall be 5 mm less than the modular sizes subject to the tolerances given in 10.2 to 10.5 (see Annex C, Table C.1).

NOTE Specified sizes are those at the time the windows are handed over to the purchaser and are measured at an average moisture content of 16 % ± 3 %.

10.2 Timber windows shall conform to their specified sizes within the following tolerances:

- an allowance of ±2 mm on the finished size of the overall height and width and the glass opening (tight) size;
- an allowance of ±0.5 mm on the rebate depth.

10.3 The head, jambs, sill, transoms or mullions of the frame shall not deviate from straightness in either the plane of the window or at right angles to the plane, by more than:

- 3 mm, if not greater than 1 200 mm in length;
- 5 mm, for lengths between 1 200 mm and 2 400 mm.

10.4 Any deviation from straightness in the plane of the window of framing members to individual glazed areas shall be within and not additional to the tolerances for glass opening (tight) sizes given in **10.2**.

10.5 The difference in length of the diagonals of the outer frames shall not exceed the dimensions given in Table 1.

Table 1 — Maximum difference in length of diagonals

Frame width plus height mm	Difference mm
Up to 1 800	3
Over 1 800 up to 3 000	5
Over 3 000	10

10.6 Casements and sashes shall not be distorted, nor deviate from shape to such an extent that the correct function of the glazing system, the weatherseals or the hardware is prevented.

10.7 The average moisture content of the timber in the window shall be 16 % ± 3 %.

11 Security and safety

11.1 Security

Window hardware shall be designed so that the window cannot be opened from the outside by the insertion of simple tools such as a blade.

NOTE 1 The manipulation test in BS 7950 may be used as a method of assessment.

Opening lights shall not be openable, or removable, from the outside when fastened in the closed position, except by the use of special tools or by deforming part of the window.

Windows designated to have enhanced security shall be tested in accordance with BS 7950.

NOTE 2 Guidance on the security of windows is given in BS 8220-1 and -2.

11.2 Safety

When limit catches are fitted they shall restrict the opening of any sash or casement to not more than 100 mm. To permit wider opening, the catches shall be capable of being unfastened in accordance with the recommendations regarding the safety of openable windows as given in BS 8213-1.

NOTE Recommendations for glazing in risk areas are given in BS 6262-4.

12 Weathertightness performance

12.1 General

All types of timber windows shall be tested for weathertightness performance in accordance with BS 6375-1:1989, Clause 4.

The minimum exposure category test levels to be attained or exceeded for each test criteria shall conform to Table 2.

NOTE 1 Factory assembled oriel or bay windows cannot normally be tested to indicate conformity to BS 6375-1 and therefore cannot conform to BS 644, although the individual component parts may be tested. Site assembled composite windows, including oriel or bay windows, cannot conform to BS 644, although the individual component parts may be tested. When composite windows are assembled on site, fixing instructions should be supplied by the window manufacturer.

NOTE 2 The overall size of a coupled window may prevent the necessary tests from being carried out on the full size unit although the individual component parts may be tested.

12.2 Air permeability

Windows shall be tested in accordance with BS 6375-1:1989, Clause 5 and shall conform to Table 2. The rate of air permeability for the required exposure category of Table 2 shall not exceed the level set by graph B in Figure 1 of BS 6375-1:1989. Double windows shall be tested with both windows closed, the length of opening joint being that which is visible on the inner surface of the inner window only.

12.3 Watertightness

Windows shall be tested in accordance with BS 6375-1:1989, Clause 6 and shall conform to the required exposure category test level in Table 2. Double windows shall be tested with both windows closed and the performance class shall be that obtained by the outer windows.

12.4 Wind resistance

12.4.1 Windows shall be tested in accordance with BS 6375-1:1989, Clause 7 and shall conform to the required exposure category test level given in Table 2. Double windows shall be tested with the inner window open and the outer window closed. The test shall then be repeated with the inner window closed and with any opening light(s) open.

12.4.2 The design wind pressure shall be calculated in accordance with BS 6375-1:1989, Annex B.

Table 2 — Exposure categories

Exposure category (Design wind pressure) Pa	Test pressure classes (Pa)		
	Air permeability	Watertightness (see Note)	Wind resistance
1 200	Up to 200 (graph B)	100	1 200
1 600	Up to 300 (graph B)	200	1 600
2 000	Up to 300 (graph B)	200	2 000
>2 000 (State design wind pressure)	Up to 300 (graph B)	300	Equal to the design wind pressure
NOTE The watertightness test pressure classes given for the different exposure categories cover most situations. Where local exposure conditions are more onerous than those determined by the surrounding area, windows of a higher watertightness class than those given in this table may be required.			

13 Operation and strength performance

Windows shall conform to the performance requirements for operation and strength specified in BS 6375-2.

14 Marking

Each timber window shall be clearly marked in a permanent, unobtrusive and accessible position with the following information:

- the number and date of this British Standard, i.e. BS 644:2003¹⁾, the manufacturer's name or trade mark, and the weathertightness exposure category; or
- sufficient information to provide traceability and identify the weathertightness characteristic of the window.

The method of marking shall be either:

- permanent; or
- tamper evident format.

NOTE Permanent marking or labelling cannot be removed intact and re-used (see BS 6206).

¹⁾ Marking BS 644:2003 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Annex A (informative)

Advisory notes and recommendations for finishing of external joinery

A.1 General

Windows conforming to this standard will normally be supplied with at least one coat of primer or stain basecoat (see 9.9). Weather protection is improved by having additional coats factory applied. Where practicable windows should have the full finishing system applied before delivery and installation.

All timber windows should receive a full exterior grade finishing system as soon as practicable after installation, to reduce the effects of weathering.

Primers and stain basecoats do not provide adequate long term protection. Primed windows should have a finishing system applied as soon as possible and within 6 months of exposure. Windows with a stain basecoat either a second basecoat or the full finishing system within 3 months.

If primed finishes have deteriorated because of prolonged exposure, the surface should be properly prepared and reprimed before finishing. The moisture content of the timber should be checked to ensure it is at or below an acceptable level (see 10.7).

Reference should be made to BS 7956 for solvent-borne primers, BS 7956 for water-borne primers, BS 7956 for stain basecoats and BS 6150 for the painting of buildings.

Only exterior quality finishes should be used on timber windows (see 5.6).

A.2 Choice of finishes

Windows may be finished with either opaque finishes (paints) or semi-transparent finishes (stains). The main difference between the two types is the ratio of pigment, binder and solvent contained in the product. Exterior wood coatings are grouped into two main types, those in which the solvent is predominantly water (water-borne) and those in which it is a water-immiscible organic liquid, usually but not always of the white spirit type (often described as solvent-borne or oil-based coatings). Paints, stains and varnishes are available as both water-borne and solvent-borne types. The choice of finish relates to the design, place and time of use of the window.

The long-term performance of paint or stain finishes relies on maintaining the moisture content of the timber at an acceptable level, avoiding variations that cause swelling and shrinkage. A paint or paint finish relies on the integrity of the paint film to resist the ingress of moisture. Once the film is cracked or broken, moisture can enter, adversely affecting the wood and the coating. It is therefore essential that coatings are formulated for exterior use and have the necessary flexibility, adhesion and weather resistance.

Paint systems provide a high build uniform protective film (in excess of 60 µm), which obliterates all but the coarser features of the wood.

Semi-transparent finishes (stains) allow the natural characteristics of the wood (or permitted remedial work) to be seen.

Stains are grouped into low, medium and high build coating types. Low build stains possess a film thickness in the range 5 µm to 20 µm. It is recommended that stain used on exterior joinery should be of the high build variety (with a film thickness in the range 20 µm to 60 µm). Low and medium build stains generally weather by erosion and maintenance costs are claimed to be lower than with paint finishes, although maintenance may be required at more frequent intervals. High build stains, because of their thicker film, may weather by eroding and have a similar maintenance requirement to paint. The maintenance interval for high build stains is longer than for low and medium build stains, but will usually be less than that of exterior paint.

Provided that the stain finish has been specifically formulated for exterior use on timber then generally it should permit small amounts of resin to bleed out of knots and resinous areas without causing a significant break-down of the finish.

Varnishes have a lower resistance to ultraviolet light than other coating types. This can result in degradation of the substrate and the substrate coating bond and lead to premature coating failure. Finishes of this type should not be used for the outer faces of external joinery.

A.3 Finishing

A.3.1 General

Prior to finishing all surfaces should be thoroughly cleaned and should be dry and free of oil or grease before any coats are applied.

Coatings of low permeability should always be used on all surfaces of windows.

Particular attention should be given to horizontal surfaces such as bottom glazing beads and sills, end grain and the top and bottom edges of casements and sashes.

Operation of the window should be checked and corrected as necessary before applying finishing coats. Site finishing coats should only be applied in fine weather. They should not be applied to wet joinery.

Paint or stain on weatherseals can impair performance.

When selecting the finishing materials for external joinery, consideration should be given to the choice of colour, as this can affect heat gain and ultraviolet resistance. Dark colours absorb more solar heat than light ones. On an average summer day black finishes can be up to 20 °C hotter than white finishes, which can result in resin bleed or drying and cracking of the wood. Selection of knot free timber will reduce the possibility of extractive staining. Pale-coloured semi-transparent stains may not give sufficient protection against ultraviolet light, resulting in discoloration and degradation of the timber surfaces under the stain.

A.3.2 Paint finishes

All surfaces of joinery should be primed including glazing rebates and back faces of beads.

Ends cut after preservation treatment should be liberally brushed with preservative and primed.

NOTE Treatment of cut ends is not required for windows that are made from naturally durable timber species in which sapwood has not been used, and for windows that do not require preservative treatment (see 5.1.2).

One additional brush coat of paint should be applied before building in.

All coats of finishing paint on external surfaces should be formulated for exterior use. The paint system should be applied in accordance with the manufacturer's recommendations.

A.3.3 Stain finishes

All surfaces of joinery should be painted with the stain basecoat including glazing rebates and back faces of beads. Ends cut after preservation treatment should be brushed with preservative and primed with stain basecoat.

NOTE Treatment of cut ends is not required for windows that are made from naturally durable timber species in which sapwood has been excluded from the specification, and for windows that do not require preservative treatment (see 5.1.2).

One additional brush coat of stain should be applied before building in.

Only stains formulated for exterior use should be used on external surfaces and applied in accordance with the manufacturer's recommendations.

Annex B (informative) Specifying a timber window

B.1 General

When preparing a specification for a factory assembled timber window, it is important that precise details of the requirements of the window are provided. The various types of windows conforming to this British Standard have different performance and installation criteria. This annex lists items that should be considered at the time of ordering the window.

B.2 Weathertightness

The general guidance on selection and specification of windows given in BS 6375-1 should be followed.

B.3 Glazing

B.3.1 Glazing carried out on site should conform to the recommendations of BS 8000-7. The following factors should be considered when specifying a timber window:

- single, double or triple glazing affect the width of the glazing platform and the rebate depth;
- the width of insulating glass units varies;
- and not all windows accept the wider types.

NOTE Linseed oil putty and some types of butyl compounds are unsuitable for insulating glass units.

B.3.2 Windows that are subdivided into small panes with glazing bars may only be suitable for single glazing.

B.3.3 Recommendations for the use of safety glazing are given in BS 6262-4 and BS 6180.

B.3.4 It is essential that some types of safety glass are bead fixed.

B.3.5 Some window types can be reglazed and cleaned from inside by reversing the casements, obviating the need for external access. Fixed casements and sashes in sliding windows cannot be reversed.

B.4 Exterior finish

The type of finish specified may affect the following:

- a) the quality and possibly the species of timber specified (see Clause 5);
- b) the type of factory applied primer or basecoat stain;
- c) the method of glazing.

B.5 Security

The basic ironmongery for timber windows provided by manufacturers varies while some manufacturers offer additional security locks and/or trickle ventilators as optional items. If such items are required and are not offered by the manufacturer, the specifier should check the availability with the manufacturer. Recommendations on window security are included in BS 8220-1 and -2.

Windows requiring enhanced security performance should be tested to BS 7950.

B.6 Maintenance

Failure to maintain timber windows at recommended intervals may affect their durability.

B.7 Fixing details

B.7.1 Windows should be installed according to the recommendations given in BS 8213-4.

B.7.2 The detail of the junction between the window and the surrounding wall is important in order to protect the window and maintain its overall thermal performance. Manufacturers' recommendations should be sought for both new build and replacement installations.

The external joint between the window frame and the flanking construction may be sealed, depending upon the position of the frame in the wall, the positioning of the damp-proof course and the degree of exposure.

NOTE 1 Guidance on types of joint sealants and on their selection and correct application according to joint function and design is given in BS 6213.

NOTE 2 When detailing the joint, consideration should be given to preventing moisture becoming trapped.

B.7.3 In general windows are supplied without horns, however, when oriel or bay windows are formed on site, window frames to be supplied with horns. Horns may be required to enable the construction of the bay, and a suitable detail for the abutment with the flanking construction to be achieved. Any cut ends formed by such construction should be liberally brushed with a suitable preservative and, where appropriate, the paint system should be applied prior to fixing.

Annex C (informative)

Advisory notes on window ranges

C.1 Although specific sizes or ranges of sizes have not been specified in this British Standard, most manufacturers offer ranges of sizes based upon the most commonly used sizes and types (see Table C.1). In addition, many manufacturers fabricate windows to specifier dimensions up to a stated maximum size determined by test evidence. Sizes of the more common types of window are based on two separate sets of criteria and are denoted modular and equal divide ranges.

The modular range of windows is based upon a matrix of heights in 150 mm increments and widths in 300 mm increments.

The equal divide range has heights in increments of 150 mm and widths based on multiples of a standard size of casement enabling component parts of similar dimensions to be used in the manufacture of a range of windows in the interest of manufacturing economy.

Table C.1 gives the range of sizes generally included in the two window ranges. Not all window types are available in the full range of sizes.

C.2 Windows should be marked with a code designating their size and type. This code should indicate the window width, window height and the type and number of casements or sashes.

C.3 When specifiers designate windows without using an individual manufacturer's, it is recommended that drawings are coded with the following information.

Range designation (where appropriate):

M = modular

ED = equal divide

Opening height: number of 150 mm modules

Opening width (for M): number of 100 mm modules

Opening width (for ED): number of casement increments

The drawing should also indicate opening casements, sashes and fixed glazing using the abbreviations given in Clause 4.

Table C.1 — Sizes generally included in the window ranges

Window height mm	Window width for modular range mm						Window width for equal divide range mm					
	300	600	900	1 200	1 800	2 400	488	630	915	1 200	1 770	2 339
450	—	—	—	—	—	—	—	*	*	*	*	*
600	—	*	*	*	*	—	—	*	*	*	*	*
750	*	*	*	*	*	*	*	*	*	*	*	*
900	*	*	*	*	*	*	*	*	*	*	*	*
1 050	*	*	*	*	*	*	*	*	*	*	*	*
1 200	*	*	*	*	*	*	*	*	*	*	*	*
1 350	*	*	*	*	*	*	*	*	*	*	*	*
1 500	—	*	*	*	*	*	—	*	*	*	*	*
2 100	—	—	*	*	*	*	—	—	*	*	*	*
NOTE 1 Sizes given are known as co-ordinating sizes.												
NOTE 2 Work sizes are 5 mm less than co-ordinating sizes.												

Annex D (informative)

Recommendations for the storage, protection, installation and fixing of windows

D.1 Joinery should be protected during site operations to ensure that the moisture content of the material is maintained at the appropriate level. Care should be taken to ensure that windows are not damaged during unloading, storage and installation and when in position.

D.2 If windows are stored externally, they should be stacked on level bearers above the ground to allow free air circulation beneath the pile.

The windows should be covered so as to protect them from dampness and sunlight but care should be taken to ensure free circulation of air throughout the pile.

D.3 Windows are normally delivered with at least a primer or stain basecoat applied. As a primer or stain basecoat does not provide full protection, it is essential that further coats are applied within an appropriate period of time (see **A.1**). Where windows are to be fixed in brick openings and a face of the frame is to abut the exterior brick leaf (even if separated by a virtual damp-proof course), consideration should be given to protecting this face of the window frame with an additional coat(s) of paint or stain prior to fixing the windows.

Windows delivered at the request of the specifier without any applied protective finish should be primed, sealed or stained immediately on arrival at site. Manufacturers may modify or negate their guarantees if an adequate protective finish is not provided.

D.4 Correct installation techniques are essential to ensure the correct operation of windows.

Installation provisions vary depending upon the individual requirements and the type of wall construction in which the joinery is fixed.

Preglazed or prefinished windows should not be built in due to the risk of damage but should be fitted into preformed openings. Windows to receive a paint or stain finish may be built into masonry walls providing the necessary steps are taken to protect them during construction.

Where the window is to be fitted into a prepared opening, a fitting tolerance for the insertion of the frame into the opening should be allowed.

Windows should be installed true and square, without twist or diagonal racking and without distorting the frame members along their lengths so as to alter the casement to frame clearances to an extent that could reduce weathertightness and/or impair glazing or operation. The vertical jambs of window frames may be fixed using cramps, straps, screws or expanding bolts. In each case, fixings should be not more than 150 mm from each corner and at 450 mm (maximum) centres, ensuring that there are at least two fixings to each side of the frame.

NOTE Requirements for materials and finishes of fixings, such as cramps, screws and bolts, are given in **5.5**.

For windows fitted into prepared openings, a tie-back strap, cramp or screw fixings may be used and secured to the inner reveal.

Screw holes, drilled in the timber and countersunk or counter bored should be filled with a weatherproof plug or filler where there is a possibility of moisture penetrating round the screws.

When screws or bolts are employed for fixing frames into a prepared opening, packing pieces or wedges (ideally folding wedges) should be used between the wall and the window to avoid distortion of the frames.

In the case of built-in frames, the cramps should be positioned to correspond with the brick or block coursing and bedded into the mortar joint. The frame should be restrained while the mortar sets. The practice of building timber windows as the work proceeds can result in damage to the finished windows.

Care should be taken during installation to ensure building debris does not foul drainage holes or impair the fittings, mechanisms or weatherseals and the timber and its finishes are not damaged.

Where a window abuts masonry or concrete at its sides, mastic should not be used for the vertical joints if this could lead to moisture from the masonry or concrete being trapped.

When perimeter pointing with sealant is used and the joint is greater than 5 mm, the use of a backing strip of polyethylene foam inserted into the gap before applying the sealant is recommended. The sealant should have a minimum depth of 6 mm. Joints exceeding 10 mm in width should be avoided. Care should be taken to avoid trapping moisture.

When sealant perimeter pointing is used with a joint less than 5 mm, the sealant should cover the face of the frame by 6 mm and the surrounding masonry by 6 mm.

NOTE Guidance on types of joint sealants and on their selection and correct application according to joint function and design is given in BS 6213.

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