BS 644:2012

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Timber windows and doorsets – Fully finished factory-assembled windows and doorsets of various types – Specification

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 22, an inside back cover and a back cover.

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 December 2012. It was prepared by Subcommittee B/538/1, *Windows*, and B/538/2, *Doors*, under the authority of Technical Committee B/538, *Doors, windows, shutters, hardware and curtain walling*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

This British Standard supersedes BS 644:2009, which is withdrawn.

Relationship with other publications

The requirements for raw materials and properties are given in BS EN 942:2007 and BS EN 14220:2006.

This British Standard is also related to the following other standards.

- BS EN 14351-1 is the harmonized European product standard for windows and external pedestrian doorsets without resistance to fire and smoke leakage characteristics. It gives a list of performance characteristics and classifications of performance, but does not give guidance on determining the appropriate classification for any specific application.
- BS 6375 is the national application document in the UK, giving performance requirements and guidance for the selection of appropriate classes of performance from BS EN 14351-1.
- The performance aspects in BS 6375 are referred to in BS 644.
- Guidance on the survey and installation of windows is given in BS 8213-4.

Information about this document

This is a full revision of the standard. The principal change is to the scope of the standard, which has been expanded to cover external pedestrian doorsets.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

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

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This British Standard specifies requirements for the design, construction and performance of fully finished and glazed factory-assembled timber windows and external pedestrian doorsets of various types.

This British Standard applies to windows and doorsets that have been treated with either opaque or non-opaque finishes or that are designed to support an externally fixed covering of another material, and that have been factory-glazed. It does not apply to windows or doorsets supplied as kits for site assembly.

This British Standard does not apply to composite doorsets as defined in BS 8529:2010, but does cover doorsets that are predominantly timber-framed (stile and rail construction) with replaceable composite panels.

It applies to windows and doorsets fabricated in a factory, to be installed vertically (±15°) into the external face of buildings, as single or multi-light units, or in coupled assemblies when appropriate, of the following types:

a) windows:
   1) hinged: side-hung (open in or out), top-hung (open out), bottom-hung (open in), tilt and turn or turn before tilt;
   2) projecting: side-hung (open in, open out or reversible) and top-hung (open out or reversible);
   3) pivoted: horizontal and vertical (hung centrally or off-centre);
   4) sliding: horizontal and vertical;
   5) fixed light (direct glazed frames);
   6) fixed casement;
   7) parallel opening;
   8) double opening French casement windows;

b) doorsets:
   1) single leaf, single-swing or double-swing doors with or without side lights and top lights;
   2) double leaf, single-swing or double-swing doors with or without side lights and top panels;
   3) single track sliding doors;
   4) single track sliding folding doors;
   5) inward or outward opening doors.

It is applicable to assemblies in which any frame member is not longer than 3 m. It does not apply to curtain walls that span across horizontal structural members of floors but is applicable to windows or doorsets within a curtain walling system.

It is applicable to assemblies up to the factory gate.

NOTE Guidance on the evaluation of conformity is given in Annex A. Guidance on durability and recycling is given in Annex B.

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2 Normative references

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

Standards publications

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

BS 3987, *Specification for anodic oxidation coatings on wrought aluminium for external architectural applications*

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

BS 4842, *Specification for liquid organic coatings for application to aluminium alloy extrusions, sheet and preformed sections for external architectural purposes, and for the finish on aluminium alloy extrusions, sheet and preformed sections coated with liquid organic coatings*

BS 6100-1 (BS ISO 6707-1), *Building and civil engineering – Vocabulary – Part 1: General terms*

BS 6100-12, *Building and civil engineering – Vocabulary – Part 12: Plant, equipment and persons*

BS 6262-1, *Glazing for buildings – Part 1: General methodology for the selection of glazing*

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

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

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

BS 6262-7, *Glazing for buildings – Part 7: Code of practice for the provision of information*

BS 6375-1, *Performance of windows and doors – Part 1: Classification for weathertightness and guidance on selection and specification*

BS 6375-2, *Performance of windows and doors – Part 2: Classification for operation and strength characteristics and guidance on selection and specification*

BS 6375-3, *Performance of windows and doors – Part 3: Classification for additional performance characteristics and guidance on selection and specification*

BS 6496, *Specification for powder organic coatings for application and stoving to aluminium alloy extrusions, sheet and preformed sections for external architectural purposes, and for the finish on aluminium alloy extrusions, sheet and preformed sections coated with powder organic coatings*

BS 7412, *Specification for windows and doorsets made from unplasticized polyvinyl chloride (PVC-U) extruded hollow profiles*

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

BS 8529:2010, *Composite doorsets – Domestic external doorsets – Specification*

BS 8417, *Preservation of wood – Code of practice*

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BS EN 1991-1-4, *Eurocode 1: Actions on structures – Part 1-4: General actions – Wind actions*

BS EN 204:2001, *Classification of thermoplastic wood adhesives for non-structural applications*

BS EN 330, *Wood preservatives – Field test method for determining the relative protective effectiveness of a wood preservative for use under a coating and exposed out-of-ground contact – L-joint method*

BS EN 350-2:1994, *Durability of wood and wood-based products – Natural durability of solid wood – Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe*

BS EN 351-1:2007, *Durability of wood and wood-based products – Preservative-treated solid wood – Part 1: Classification of preservative penetration and retention*

BS EN 485 (both parts), *Aluminium and aluminium alloys – Sheet, strip and plate*

BS EN 599-1:2009, *Durability of wood and wood-based products – Efficacy of preventive wood preservatives as determined by biological tests – Part 1: Specification according to use class*

BS EN 755-2:2008, *Aluminium and aluminium alloys – Extruded rod, bar, tube and profiles – Part 2: Mechanical properties*

BS EN 755-9:2008, *Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 9: Profiles, tolerances on dimensions and form*

BS EN 927-1, *Paints and varnishes – Coating materials and coating systems for exterior wood – Part 1: Classification and selection*

BS EN 927-2:2006, *Paints and varnishes – Coating materials and coating systems for exterior wood – Part 2: Performance specification*

BS EN 942:2007, *Timber in joinery – General requirements*

BS EN 951, *Door leaves – Method for measurement of height, width, thickness and squareness*

BS EN 952, *Door leaves – General and local flatness – Measurement method*

BS EN 1279 (all parts), *Glass in building – Insulating glass units*

BS EN 1529:2000, *Door leaves – Height, width, thickness and squareness – Tolerance classes*

BS EN 1530:2000, *Door leaves – General and local flatness – Tolerance classes*

BS EN 1670:2007, *Building hardware – Corrosion resistance – Requirements and test methods*

BS EN 1982, *Copper and copper alloys – Ingots and castings*

BS EN 12020-1:2008, *Aluminium and aluminium alloys – Extruded precision profiles in alloys EN AW-6060 and EN AW-6063 – Part 1: Technical conditions for inspection and delivery*

BS EN 12020-2:2008, *Aluminium and aluminium alloys – Extruded precision profiles in alloys EN AW-6060 and EN AW-6063 – Part 2: Tolerances on dimensions and form*

BS EN 12165, *Copper and copper alloys – Wrought and unwrought forging stock*

BS EN 12206-1, *Paints and varnishes – Coating of aluminium and aluminium alloys for architectural purposes – Part 1: Coatings prepared from coating powder*

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BS EN 12365-1, *Building hardware – Gasket and weatherstripping for doors, windows, shutters and curtain walling – Part 1: Performance requirements and classification*

BS EN 12420, *Copper and copper alloys – Forgings*

BS EN 12519, *Windows and pedestrian doors – Terminology*

BS EN 12608, *Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors – Classification, requirements and test methods*

BS EN 13141-1, *Ventilation for buildings – Performance testing of components/products for residential ventilation – Part 1: Externally and internally mounted air transfer devices*

BS EN 13142, *Ventilation for buildings – Components/products for residential ventilation – Required and optional performance characteristics*

BS EN 13307-1, *Timber blanks and semi-finished profiles for non-structural uses – Part 1: Requirements*

BS EN 13986, *Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking*

BS EN 14220:2006, *Timber and wood-based materials in external windows, external door leaves and external doorframes – Requirements and specifications*

BS EN ISO 4042, *Fasteners – Electroplated coatings*

BS EN ISO 7599, *Anodizing of aluminium and its alloys – General specifications for anodic oxidation coatings on aluminium*

BS EN ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests*

PD 6484, *Commentary on corrosion at bimetallic contacts and its alleviation*

Other publications

[N1] BRITISH WOODWORKING FEDERATION. *Guide to the selection, application and testing of end grain sealants for timber windows*. BWF guide Note 18. London: British Woodworking Federation, 2002.

[N2] KELLY, D.J. and GARVIN, S.L. *Factory glazed windows*. BRE Digest 497, Part 1. Watford: Building Research Establishment, 2006.

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS 6100-1, BS 6100-12, BS EN 12519 and the following apply.

3.1 casement
framed window light that is hinged, pivoted or fixed

3.2 fixing
component that is used to secure separate parts of a window or doorset assembly to each other, to secure an item of hardware to a window part, or to secure a completed window assembly into the structure of a building

3.3 glazing gasket
plastic or synthetic rubber member used between the glazing and the frame and/or between the glazing and the glazing bead

3.4 hardware
device attached to a structural member to facilitate opening, closing or making the product secure in the frame

3.5 insulating glass unit
assembly consisting of at least two panes of glass, separated by one or more spacers, hermetically sealed along the periphery, mechanically stable and durable

NOTE Systems are available where the spacer and hermetic seal are included within a single edge sealing system.

[SOURCE: BS EN 1279-1:2004, **3.1**]

3.6 multi-light
window incorporating two or more lights, opening and/or fixed, within one perimeter frame

3.7 range
group of assemblies with defined limits of size, type, configuration, hardware, glazing, construction and security features

3.8 sash
framed opening light that slides

3.9 ventilation device
ventilator other than an opening light incorporated into a window or doorset

NOTE 1 A permanent ventilation device provides continuous ventilation. A controlled device can be closed and may be adjusted to provide ventilation.

NOTE 2 A ventilation device is referred to as an "air transfer device" in BS EN 13142 and is frequently referred to as a "trickle ventilator" or "background ventilator" in the UK.

3.10 weatherseal
resilient material designed to reduce air infiltration and water penetration

NOTE This is sometimes called a weatherstrip.

4 Handing

The handing shall be in accordance with the specification provided.

Where the manufacturer is specifying the handing, the specification shall conform to Annex C.

*NOTE 1 Where the manufacturer is not specifying the handing, care should be taken to check the handing designation. See Annex C, Note to **C.1**.*

NOTE 2 Further advice on window and doorset specification is given in Annex D.

5 Components

5.1 Timber

5.1.1 Quality

Timber shall be of a species classified as suitable for its purpose in accordance with BS EN 942:2007, National Annex NA. The timber for window frames, door frames, casements, sashes and door leaves shall be of the classes given in BS EN 14220:2006, Table A.17, or better.

Timber blanks, sawn or planed part-finished profiles consisting of laminated or solid material with or without butt joints or finger joints, shall conform to BS EN 13307-1.

NOTE 1 Where for reasons of design or appearance a higher quality of timber is required, the specifier should discuss these special requirements with the manufacturer in respect of timber species and availability.

NOTE 2 BS EN 14220:2006, Table A.17 does not give a recommendation for the minimum moisture content of components. However, to reduce the likelihood of movement, components should not have a moisture content below 12%.

5.1.2 Preservation

The wood or wood-based components of a window or doorset shall either have sufficient natural durability, or be preservative treated.

NOTE 1 The sapwood of any species will require preservative treatment.

The natural durability of wood or wood-based components of a window or doorset to be used without preservative treatment shall be at least durability class 3 as defined in BS EN 350-2:1994.

NOTE 2 If it is desired to use a species not listed in BS EN 350-2:1994, its durability can be established in accordance with BS EN 350-1.

Where the natural durability of the wood is class 4 or class 5 as defined in BS EN 350-2:1994, or where sapwood is present:

a) for preservatives for use in penetrating processes achieving the efficacy criteria for use class 3 coated in BS EN 599-1:2009, Table 3b, option 2, the wood shall be preservative treated in accordance with BS 8417. For other preservatives listed in BS 8417 as suitable for use class 3 coated, the wood shall be preservative treated in accordance with BS 8417;

b) for preservatives for use in superficial processes achieving the efficacy criteria for use class 3 coated in BS EN 599-1:2009, Table 3a, option 3, the wood shall be preservative treated so as to achieve a penetration class NP1 (BS EN 351-1:2007) and a retention requirement of 1.5 times the critical value. For field testing to BS EN 330, the preservative shall be applied using the manufacturer's proposed method of application, and the reference preservative shall be applied by double vacuum.

The preservative process shall be such as to provide a minimum desired service life of 30 years.

Any component or part of a component that is machined in a manner that exposes untreated timber shall receive further treatment to ensure the continuity of the preservative envelope.

*NOTE 3 The long-term performance of a window or doorset depends not only on the maintenance of the preservative envelope but on the maintenance of the window or doorset as a whole (see Clause **9**).*

*NOTE 4 Further information regarding the adjustment factors applied to the critical value and the additional tests for efficacy can be found in BS EN 351-1:2007, **5.3** and BS EN 599-1:2009, **5.2**.*

5.2 Composites

5.2.1 Timber/aluminium composites

If aluminium extrusions are used as cladding or part of the window or doorset frame, they shall be fabricated from designated alloys EN AW-6060 or EN AW-6063 in tempers T5 or T6 conforming to BS EN 755-2:2008 and BS EN 755-9:2008 or BS EN 12020-1:2008 and BS EN 12020-2:2008. They shall be finished by anodizing conforming to BS 3987 or BS EN ISO 7599, with a liquid organic coating conforming to BS 4842, or by a powder coating conforming to BS 6496 or BS EN 12206-1.

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There shall be no direct contact between mill finish aluminium and oak, sweet chestnut or western red cedar, as the acid content in the timbers can damage the aluminium.

NOTE For a full description of the requirements for the selection, fabrication and installation of aluminium windows and doorsets, see BS 4873.

5.2.2 Composites with other materials

Composite materials other than aluminium shall have suitable durability for use as an external element when assessed using the relevant clauses from the appropriate window and/or doorset product standards and related material standards [e.g. BS EN 12608 and BS 7412 for unplasticized polyvinyl chloride (PVC-U)].

NOTE Guidance on the suitability of different types of finish for various locations and environments is given in BS 6150.

5.3 Adhesives

Adhesives shall meet the requirements of BS EN 204:2001. The class of adhesive shall be not less than BS EN 204:2001, type D3 for concealed or semi-concealed joints or type D4 for exposed joints.

5.4 Glass

Glass thickness and type shall be selected using the recommendations given in BS 6262-1, BS 6262-2, BS 6262-3, BS 6262-4 and/or BS 6262-7, as appropriate, to withstand the design wind pressure calculated in accordance with BS 6375-1 or BS EN 1991-1-4.

Insulating glass units shall conform to BS EN 1279.

5.5 Glazing gaskets and weatherseals

Glazing gaskets and weatherseals shall:

- conform to BS 4255-1 or BS EN 12365-1;
- be capable of easy replacement;
- be fitted securely in accordance with the supplier's instructions;
- have a guaranteed life of 10 years;
- when supplied loose for site fixing, be supplied with appropriate fixing information.

NOTE BS EN 12365-1 gives European test methods for evaluating gaskets and weatherstripping, and DD 8455 provides advice on interpreting this standard for UK use.

5.6 Hardware except for fixings

Metallic materials for all hardware, except for fixings as defined in **3.2**, shall have at least the equivalent corrosion resistance of BS EN 1670:2007, grade (class) 3 (96 h) when subjected to a neutral salt spray test as specified in BS EN ISO 9227. Tests shall be carried out on complete hardware items as supplied.

NOTE 1 There is no direct correlation between a given number of hours salt spray testing and real-time natural environment exposure.

NOTE 2 In certain coastal or industrial environments, austenitic stainless steel hardware, conforming to BS EN 10088-2, is particularly suitable.

NOTE 3 Requirements and test methods for hardware materials are specified in BS EN 13126.

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Threaded components for hardware in an external environment shall be treated in accordance with BS EN ISO 4042. Hardware components in an internal environment shall be:

a) treated in accordance with BS EN ISO 4042; or

b) made of leaded brass conforming to BS EN 12165 and BS EN 12420; or

c) made of cast leaded gunmetal conforming to BS EN 1982.

NOTE 4 Materials meeting the requirements of either b) or c) are usually used for more traditional internal fittings and might not be suitable in external environments, e.g. fittings to double hung sash windows.

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 otherwise protected to prevent electrolytic reaction.

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

NOTE 5 Steel fixings grade I may be used with steel hardware grade II.

Hardware shall be:

- accessible for adjustment after the windows and/or doorsets have been installed, if it has provision for adjustment;
- fixed with screws or other fixings in such a manner that splitting of the timber components at the fixing is avoided;
- replaceable without removing the outer frame from the structure of the building.

5.7 Fixings

All straps, clips, brackets, lugs, and similar fixing devices and their attendant screws, bolts etc. shall be capable of meeting the applied wind and operational loads, and shall have at least the equivalent corrosion resistance of BS EN 1670:2007, grade (class) 3 (96 h) when subjected to a neutral salt spray test as specified in BS EN ISO 9227.

5.8 Infill panels

Where wood-based infill is used, it shall conform to the appropriate requirements of BS EN 13986.

Replaceable composite panels, when tested in accordance with BS 8529:2010, Annex B, shall meet the assessment criteria specified in BS 8529:2010, **B.5**. Materials used in replaceable composite panels shall where applicable conform to the appropriate product standards, including:

- BS EN 12608 for unplasticized polyvinyl chloride (PVC-U);
- BS EN 485 for aluminium.

6 Appearance and finish

Timber windows and doorsets shall be supplied with the coating system applied to all surfaces, including those surfaces which will be concealed by the installation process. The coating system, which may be applied to components or an assembled window or doorset, shall be applied in accordance with the coating system manufacturer's recommendations and prior to glazing and fitting hardware.

NOTE The moisture content of the timber prior to the application of the coating system should typically not exceed 16%.

The minimum dry film thickness shall be either:

- as specified by the coating system manufacturer; or
- 120 μm on all weathered exposed or semi-concealed surfaces, and 60 μm on all concealed surfaces.

The coating system shall include the use of an end grain sealer, which shall be applied to all exposed and concealed end grain areas. The end grain sealer shall be applied in line with the manufacturer's recommendations and shall be shown to meet or exceed the performance requirements set out in BWF guide Note 18 [N1].

The coating system shall be selected in accordance with BS EN 927-1 and shall meet the criteria for stable end-use.

The coating system shall be assessed in accordance with BS EN 927-2:2006 and shall meet the performance criteria for stable end-use under medium exposure conditions. The coating shall also meet the requirements of the optional tests within BS EN 927-2:2006, Table 2 for being mould-resistant.

7 Fabrication

7.1 Profile design

Windows and doorsets shall be designed to be glazed in accordance with BS 8000-7.

The glazing rebate sizes and design shall be appropriate for the glazing and the glazing method.

For drained and vented glazing systems, the profile shall be designed such that water is prevented from accumulating anywhere within the rebate. Any drainage channels shall be kept clear.

Unless otherwise agreed (see Note 1), exposed arrises shall be replaced with a radius of not less than 3 mm to avoid thinning of the coating system.

NOTE 1 There might be circumstances where it is not acceptable to have a radius of 3 mm, e.g. owing to planning considerations. Under these circumstances, a smaller radius may be applied with the agreement of the coatings supplier.

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

Sill members shall finish flush with the other main frame components.

When installed, sill nosings shall be designed to shed water away from the window or doorset and over the construction below the window or doorset.

*NOTE 2 Sill nosings may be in timber but should not exceed 100 mm in width to avoid distortion or rapid deterioration of the coating system. Information to this effect should be included with the manufacturer's installation information (see Clause **9**).*

The exposed top surfaces of horizontal members of frames, casements, sashes, door leaves, sill nosings and glazing beads shall be profiled or angled, with a slope of not less than one in eight (7°), to shed water from external surfaces.

The top surfaces of internal horizontal members of windows or doorsets 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.

7.2 Workmanship

Workmanship shall be in accordance with BS 1186-2.

7.3 Construction

Timber members shall be cleanly and accurately machined and shall have a surface finish suitable for the finishing system that is to be applied.

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

NOTE 1 Single small pins used to secure joints on casements and sashes may be fixed externally.

Windows and doorsets shall be supplied without horns unless required by the specifier or the window or doorset style dictates.

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

Separate timber drips and timber sill nosings shall be fixed by glue or mastic, preferably with mechanical fixing, through a concealed surface at the time of manufacture.

NOTE 2 Mechanical fixings can be concealed by plugs or suitable filler.

Bottom glazing beads shall be full width.

NOTE 3 Mitred beads are only acceptable on windows, door frames or door leaves:

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

7.4 Ventilation devices

Ventilation devices shall not permit the penetration of moisture into the profile.

NOTE Conformity to this requirement is determined by visual examination.

7.5 Hardware

Hardware shall be replaceable without removing the outer frame from the structure of the building.

NOTE Conformity to this requirement is determined by visual examination.

7.6 Tolerances

7.6.1 Windows and door frames

7.6.1.1 The overall height and width of the finished window or door frame shall not differ from the work size by more than ±2 mm.

NOTE Work size is the overall size of the frame measured at the factory gate and at a moisture content of (16 ± 3)%.

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

a) 3 mm for lengths not greater than 1 200 mm;

b) 5 mm for lengths between 1 200 mm and 2 400 mm;

c) as agreed between the manufacturer and the purchaser for lengths in excess of 2 400 mm.

7.6.1.3 Notwithstanding the provisions of **7.6.1.2**, any deviation from straightness in the plane of the window or door frame of framing members to individual glazed areas shall not exceed the tolerances given in **7.6.1.1**.

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

Table 1 **Maximum difference in length of diagonals**

Dimensions in millimetres

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

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

7.6.2 Door leaves

7.6.2.1 The height, width, thickness and squareness of a door leaf shall be measured in accordance with BS EN 951 and classified in accordance with BS EN 1529:2000. Unless specified otherwise, door leaves shall achieve tolerance class 2 as specified in BS EN 1529:2000, Table 1.

7.6.2.2 The flatness of a door leaf shall be measured in accordance with BS EN 952 and classified in accordance with BS EN 1530:2000. Unless specified otherwise, door leaves shall achieve tolerance class 3 as specified in BS EN 1529:2000, Table 1 for general flatness, and tolerance class 2 as specified in BS EN 1529:2000, Table 1 for local flatness.

8 Glazing

Glazing shall be fitted to windows and doorsets in accordance with the recommendations given in BS 8000-7 and BRE Digest 497 Part 1 [N2].

NOTE 1 Although BS 8000-7 is for workmanship on building sites, the systems that it identifies are equally applicable for factory-glazed windows and doorsets.

NOTE 2 Bead glazing and flexible glazing systems are generally required when exterior stain finishes are used, and should always be used with insulating glass units.

9 Use, cleaning and maintenance

Guidance on the installation, use, cleaning, maintenance, handling and storage of timber windows and doorsets, including information on sill nosings (see Note 2 to **7.1**), shall be provided by the manufacturer.

NOTE Guidance on installation is given in BS 8213-4.

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10 Security

NOTE Guidance on security against crime is given in BS 8220.

10.1 Basic security

When a completed window or doorset is subjected to the basic security test specified in BS 6375-3, it shall not be possible to gain entry.

10.2 Enhanced security

When enhanced security is required, windows and doorsets shall conform to BS 6375-3.

11 Safety in case of fire

11.1 Fire resistance

Where fire resistance forms part of the requirements, it shall be declared in accordance with BS 6375-3.

11.2 Reaction to fire

Where reaction to fire forms part of the requirements, it shall be declared in accordance with BS 6375-3.

12 Safety in use

12.1 General

It shall not be possible for any opening light or door leaf to become accidentally dislodged from the frame when the window or doorset is being operated.

NOTE 1 BS 6375-2 specifies performance requirements for the strength of windows and doorsets based on a series of mechanical tests that check the integrity of the frame.

NOTE 2 BS 8213-1 gives guidance on the safety in use and in cleaning of windows.

12.2 Impact resistance

Where impact resistance forms part of the requirements, it shall be declared in accordance with BS 6375-2.

12.3 Safety devices

Any safety devices shall conform to the requirements specified in BS 6375-2.

13 Weathertightness

Weathertightness shall be declared in accordance with BS 6375-1.

14 Operation and strength characteristics

Operation and strength characteristics shall be declared in accordance with BS 6375-2.

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15 Hygiene, health and the environment

NOTE 1 This clause is relevant to Essential Requirement 3 of the Construction Products Directive [1].

NOTE 2 There is a requirement in BS EN 14351-1 for the manufacturer to declare if there is a risk of any potentially dangerous substances being released from the window or doorset during normal intended use.

NOTE 3 Ventilation requirements are set out in the UK national building regulations [2–4].

The performance of any ventilation device (see **3.9**) mounted within the window or doorset shall be classified in accordance with BS EN 13142 when tested in accordance with BS EN 13141-1.

16 Acoustic performance

When specified, acoustic performance shall be declared in accordance with BS 6375-3.

17 Energy conservation

The U value shall be declared in accordance with BS 6375-3.

NOTE Window and doorset energy ratings are outside the scope of this standard.

18 Marking

Each window or doorset shall be identified with the following information:

a) the number and date of this British Standard, i.e. BS 644:2012 [1)];

b) claimed performance classifications;

c) the name or trade mark of the manufacturer or other means of identifying the manufacturer; and

d) means of traceability.

The identification shall be affixed:

- to any suitable part of the product; or
- on an attached label; or
- on its packaging; or
- on the accompanying commercial documents; or
- on the manufacturer's website; or
- in the manufacturer's published technical specifications.

[1)] Marking BS 644:2012 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 solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (informative) Guidance on the evaluation of conformity

A.1 Selection of samples for type approval

When considering a product range of windows or doorsets for testing and approval with a view to selecting representative samples, the following aspects should be taken into account:

a) windows:

1) size of the window:

i) largest area top-hung with the widest width;

ii) largest area side-hung with the tallest height;

iii) maximum area fixed light;

iv) maximum area multi-light frame with the longest continuous mullion/transom;

v) maximum area tilt and turn or turn before tilt;

vi) maximum area tilt and turn or turn before tilt multi-light with longest continuous mullion or transom;

viii) largest area vertical pivot with tallest height;

NOTE 1 If an offset pivot is available, this should be selected instead of a centre pivot. A centre pivot window should be selected to represent windows with an opening ratio of two thirds to one third.

ix) maximum area horizontal slider with the tallest height;

x) maximum area vertical slider with longest length;

b) doorsets:

1) i) largest area door leaf (leaves) of tallest height;

ii) largest area door leaf (leaves) of widest width;

2) size of door frame:

i) tallest door frame with longest continuous mullion;

ii) widest door frame with longest continuous transom;

iii) largest area side light;

iv) largest area top light;

c) general:

1) classification under weathertightness and mechanical testing;

NOTE 2 This will be affected by the size of products tested. The effects of loading will generally be greater on components of greater size. A product range can be given more than one rating according to the size of components used.

2) internal/external beaded systems;

3) glazing – single, double or triple glazed – consider the window or doorset having the thinnest glass with the maximum area for the wind loading classification being considered (if applicable);

4) single or multi-point locking and various systems;

NOTE 3 When considering single lights with multi-point locking systems, take the greatest value of opening perimeter divided by the total number of locking points.

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5) hingeing systems/suppliers;

6) other hardware used to support the weathertightness/mechanical performance.

A.2 Testing schedule

Type tests in accordance with this British Standard should be carried out initially (i.e. at first assessment of the range) and at significant changes to the window or doorset construction.

Annex B (informative) Durability and recycling

B.1 General

The durability of timber windows and doorsets is affected by the following factors:

- the specification of the framing material;
- the ambient atmosphere, i.e. coastal, industrial, etc.;
- the conditions of use/abuse, frequency of operation;
- the specification of the components used in the manufacture;
- the quality of manufacture and assembly;
- the quality of installation;
- maintenance and replacement of components.

Because of these variables, actual performance can vary in use such that any figures given for service life can only be general estimates. Such figures bear no relationship to warranties given by the manufacturer(s).

A window or doorset is considered to have failed when it is no longer possible to repair or replace timber components or hardware, and the physical integrity has been lost.

B.2 Components

B.2.1 Timber sections

Timber windows and doorsets manufactured in accordance with this British Standard are capable of a very long service life and can be expected to last in excess of the 35 years given in the Building Research Establishment *Green guide to specification* [5]. Correctly maintained timber windows and doorsets have been in use for at least 100 years.

The *Green guide to specification* [5] uses a reference service life (RSL) of at least 35 years.

B.2.2 Insulating glass units (IGU)

Insulating glass units manufactured in accordance with BS EN 1279 can last in excess of 20 years if they are correctly glazed into the frame. Insulating glass units can be replaced without removing the outer frame from the fabric of the building.

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B.2.3 Glazing gaskets and weatherseals

Over time, the performance of glazing gaskets and weatherseals can decline and they might need replacing after 10 to 20 years. This can be done without removing the window or doorset from the fabric of the building. While it might prove impossible or impractical to replace glazing gaskets and weatherseals with exact replicas, most gasket manufacturers carry a sufficiently wide range to ensure that a near match can be achieved that enables the performance of the window or doorset to be maintained.

B.2.4 Hardware and fixings

Hardware and fixings are available in many shapes, sizes and performance levels, however some hardware can be specific to a manufacturer or a window or doorset design. Subject to filling of the original holes, the introduction of replacement hardware on timber windows and doorsets is relatively easy to carry out.

Hardware is generally designed and supplied to perform a particular function at a specific performance level. Many items are unique to a system and even a profile, so care needs to be taken when ordering replacements, particularly when a product has been discontinued. Always choose hardware made from materials that can cope with the actual conditions: for example, marine, swimming pool and some industrial environments are more demanding and higher grade materials, such as austenitic stainless steel, and enhanced finishes are recommended.

Fixings should be correctly chosen with due note taken of the environment and their intended usage.

B.3 Installation and maintenance

Correct installation is essential in ensuring adequate weather performance. BS 8213-4 gives guidance on the survey and installation of windows and doorsets in dwellings, but the principles are valid for most types of buildings.

Regular maintenance in accordance with the manufacturer's recommendations will ensure that product performance, appearance and durability are maximized (see Clause **9**).

B.4 Sequence of work on site

The sequence of work on site should be considered as the storage and protection of windows and doorsets before installation are important. The manufacturer's recommendations should be followed (see Clause **9**).

B.5 Recycling

Timber, glass, gaskets and weatherseals made from natural and synthetic vulcanized rubbers or thermoplastics, and the metallic components from a timber window or doorset, can be recycled. Aluminium from timber/aluminium composite windows and doorsets can be recycled; other materials used in composite window and doorsets might be recyclable.

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Annex C (normative) Specification for handing

C.1 View

When specifying handing, the window or doorset shall be viewed from the outside.

NOTE Drawing conventions for window and doorset types are illustrated in Figure C.1 and Figure C.2. The European designations (BS EN 12519) are significantly different and care should be taken to establish which is being used.

C.2 Side-hung windows

The handing of side-hung windows or doorsets shall be described by the hinge position when viewed from outside.

NOTE For instance, a window viewed from the outside with the hinges on the left, is a left-hand window.

C.3 Vertically pivoted windows

For windows pivoted vertically off-centre, the handing shall be described by the pivot position in relation to the portion opening out. The proportion opening outwards shall be stated.

C.4 Multi-lights

The handing of a multi-light shall be clearly described when viewed from outside.

NOTE A drawing or diagram is useful.

Figure C.1 **UK drawing conventions for window types**

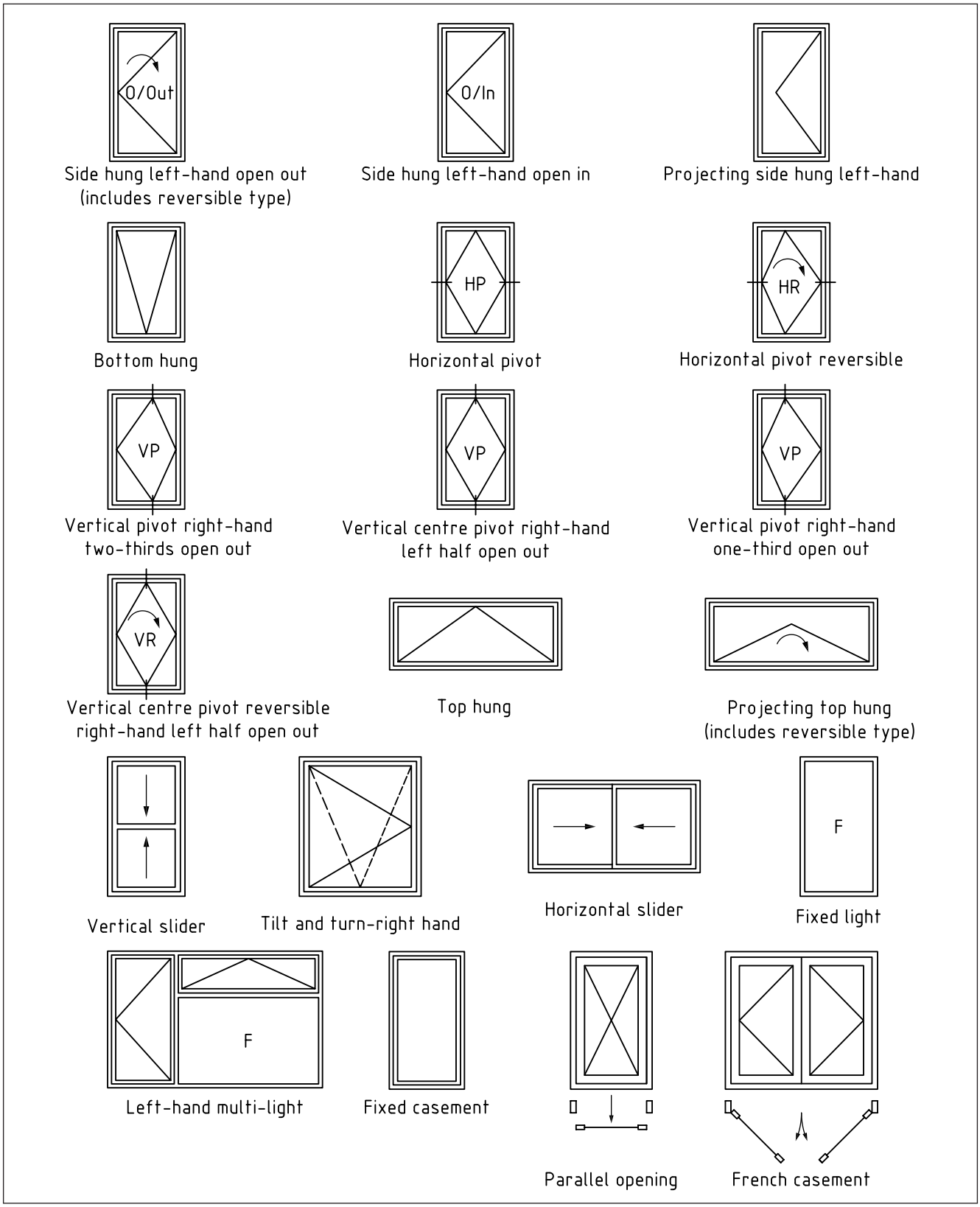
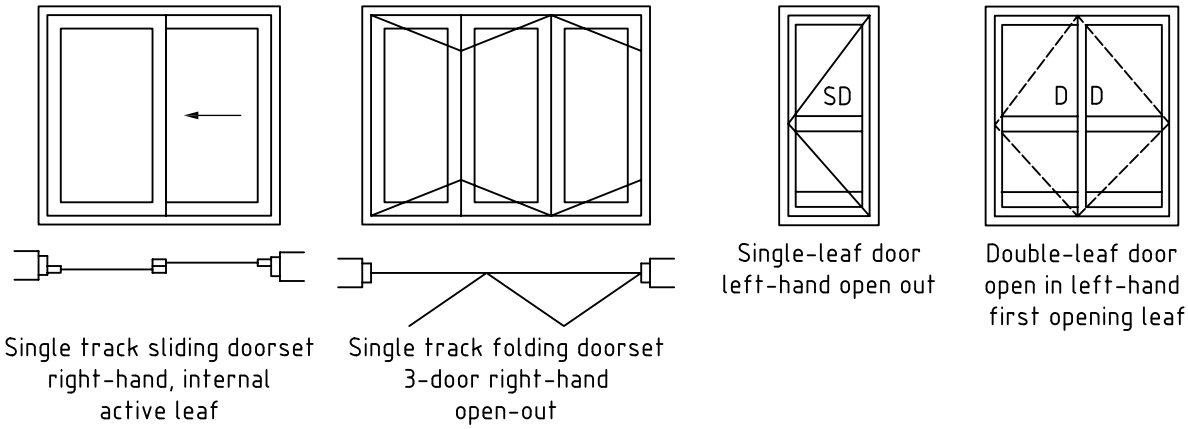


Figure C.2 **UK drawing conventions for doorset types**



Annex D (informative) Guidance for specifiers

D.1 General

Different types of window and doorset conforming to this British Standard might have widely differing performance and installation criteria. Specifiers should be aware of the variables when selecting windows and doorsets, and the notes in this annex are set out to provide basic guidance.

D.2 Degree of exposure

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

D.3 Safety of windows in use and during cleaning

Guidance on the safety of windows and doorsets in use and during cleaning is given in BS 8213-1.

D.4 Glazing

Recommendations for the use of safety glazing in relation to human impact are given in BS 6262-4.

Recommendations for the use of safety glazing in relation to protection from falling (safety barriers) are given in BS 6180.

D.5 Exterior finish

The type of finish specified can affect the following:

- the quality and possibly the species of timber specified (see Clause **5**);
- the type of factory-applied finishes;
- the method of glazing.

When selecting the finishing materials for external joinery, consideration should be given to the choice of colour, since this can affect heat gain and ultraviolet resistance.

Dark colours absorb more solar heat than light ones. Black finishes can be up to 30 °C hotter than white ones when subjected to direct sunlight on an average summer day, which can result in resin bleed or excessive drying and cracking of the wood. Selection of knot-free timber will reduce the possibility of extractive staining.

Pale-coloured semi-transparent stains might not give sufficient protection against ultraviolet light, resulting in discoloration and degradation of the timber surfaces under the stain.

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

D.6 Security

The basic hardware provided by manufacturers varies, and some manufacturers offer additional security locks as optional items. If such items are required and are not offered by the manufacturer, the specifier should check the suitability of the window or doorset to receive them. Recommendations on window and doorset security are included in BS 8220-1 and BS 8220-2.

Windows and doorsets requiring an enhanced security performance may be tested in accordance with Clause **10**.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 4873, *Aluminium alloy windows and doorsets – Specification*

BS 6150, *Painting of buildings – Code of practice*

BS 6180, *Barriers in and about buildings – Code of practice*

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

BS 8213-4, *Windows, doors and rooflights – Part 4: Code of practice for the survey and installation of windows and external doorsets*

BS 8220 (all parts), *Guide for security of buildings against crime*

BS EN 350-1, *Durability of wood and wood-based products – Natural durability of solid wood – Part 1: Guide to the principles of testing and classification of natural durability of wood*

BS EN 10088-2, *Stainless steels – Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

BS EN 13126 (all parts), *Building hardware – Hardware for windows and door height windows – Requirements and test methods*

BS EN 14351-1, *Windows and pedestrian doorsets – Product standard, performance characteristics – Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics* [2)]

DD 8455, *Materials for gaskets and weatherstripping for windows, doors, conservatories and curtain walling – Requirements and test methods*

Other publications

[1] EUROPEAN COMMUNITIES. 89/106/EEC. Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products. Luxembourg: Office for Official Publications of the European Communities, 1988.

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[3] GREAT BRITAIN. Building (Scotland) Regulations 2004. Edinburgh: The Stationery Office.

[4] GREAT BRITAIN. Building Regulations (Northern Ireland) 2000. Belfast: The Stationery Office.

[5] ANDERSON, Jane, SHIERS, David E., and SINCLAIR, Mike. *The green guide to specification*. Third edition. Oxford: Blackwell Publishing, 2002. ISBN 0 632 05961 3. [3)]

[2)] Parts 2 and 3 are currently in preparation.

[3)] The Green Guide is available and kept up to date in an online version on the website www.thegreenguide.org.uk.

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