

Specification for

Wood double hung sash windows

Co-operating organizations

The Timber Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- British Door Association*
- British Furniture Trade Confederation
- British Railways, the British Transport Commission
- D.S.I.R. — Forest Products Research Laboratory*
- English Joinery Manufacturers' Association (Incorporated)*
- Flush Door Manufacturers' Association*
- Institution of Civil Engineers
- Institution of Municipal Engineers*
- Institution of Structural Engineers
- Ministry of Housing and Local Government*
- Ministry of Works*
- National Federation of Building Trades Employers*
- Royal Institute of British Architects*
- Royal Institution of Chartered Surveyors*
- Timber Development Association*
- Timber Trade Federation of the United Kingdom*

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of the standard.

- Admiralty
- D.S.I.R.— Building Research Station
- Fibre Building Board Development Organisation Ltd.
- Incorporated Association of Architects & Surveyors
- Joinery Managers Association
- Joint Fire Research Organization of D.S.I.R. & Fire Offices Committee
- Metal Window Association Ltd.
- National Federation of Constructional Glass Associations
- War Office.

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Foreword

This standard makes reference to the following British Standards:

BS 565, *Glossary of terms relating to timber and wood-work.*

BS 745, *Animal glue for wood.*

BS 1186, *Quality of timber and workmanship in joinery.*

BS 1204, *Synthetic resin adhesives (phenolic and amino-plastic) for wood — Part 1: Gap-filling adhesives — Part 2: Close-contact adhesives.*

BS 1444, *Cold setting casein glue for wood.*

This British Standard, issued under the authority of the Timber Industry Standards Committee, has been revised to take account of recent changes in the manufacture of double hung sash windows and to incorporate the various amendments that have been issued since the standard was first published.

The principal changes are the following:

Windows having opening sashes four panes wide but only one pane deep are omitted. This change affects two sizes in Table 1 and two in Table 3.

For quality of timber and workmanship, reference is now made to BS 1186, “*Quality of timber and workmanship in joinery*”.

The requirements for adhesives have been based on the experience, gained during a survey over a period of several years, of the effects of weather on a number of casement windows.

A flush sill has been adopted as standard. An alternative detail is given for a projecting sill to be available if specially ordered.

Solid frames may now have mortised and tenoned joints as an alternative to combed joints.

For the convenience of the user the illustrations showing weight operated windows have been separated from those giving dimensions of spring balanced windows.

Venetian frames are now included in the standard.

The names of the members which were formerly described as “draught bead” and “staff bead” although they were not of beaded construction have been changed to “draught stop” and “sash stop”, but the old names have been retained as alternatives in this revision.

NOTE Where metric equivalents have been given, the figures in British units are to be regarded as the standard; the metric conversions are approximate. More accurate conversions should be based on the tables in BS 350, “*Conversion factors and tables*”.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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 24, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard relates to the quality, construction and design of wood double hung sash windows with cased or solid frames. The sashes with cased frames are counter-balanced by means of weights; the sashes with solid frames require the use of spring counter-balancing devices.

2 Definitions

For the purposes of this British Standard the definitions given in BS 565, "*Glossary of terms relating to timber and woodwork*" apply, together with the following:

venetian frame

a three light window with solid mullions, the outer sashes being fixed and the centre sashes hung. When weight operated the cords are carried over the sidelights to weights in boxed jambs

3 General

The cased frame windows shall be supplied with all necessary axle pulleys for the opening lights but not with cords or weights. Sash lifts and fasteners shall be supplied only to the purchaser's order. The solid frame windows shall be supplied with all necessary spring counter-balancing devices.

4 Timber and workmanship

The timber and workmanship shall be in accordance with BS 1186, Part 1 and Part 2, "*Quality of timber and workmanship in joinery*".

5 Adhesives

The adhesive used in the construction of the windows shall conform to BS 745, "*Animal glue for wood*", or to Type WBP or MR of BS 1204, "*Synthetic resin adhesives (phenolic and aminoplastic) for wood*", Part 1, "*Gap-filling adhesives*", or Part 2, "*Close-contact adhesives*", or to BS 1444, "*Cold-setting casein glue for wood*", or it shall be white lead paint, according to the purchaser's requirements.

6 Axle pulleys

Axle pulleys shall have $1\frac{3}{4}$ in. (44 mm.) wheels of material not inferior to cast iron, with steel axles and brass bushes.

7 Types and sizes

The range of types and sizes of cased and solid frame window units shall be that shown in Figure 1 to Figure 12. The sizes of the sash openings in both the cased frame and the solid frame windows shall be similar. Schedules of window sizes, masonry opening sizes, glass sizes and daylight areas are given in Table 1 to Table 4.

The sizes in the glazing rebates shall be $\frac{1}{8}$ in. (3 mm.) greater in width and in height than the glass sizes given in the tables.

8 Tolerances on sizes

The overall sizes of windows shall be subject to a tolerance of $\pm \frac{1}{8}$ in. (3 mm.). The tolerance on sizes of the various members shall be $\pm \frac{1}{32}$ in. (0.8 mm.) and on the width and height inside rebates $\pm \frac{1}{16}$ in. (1.5 mm.).

9 Working clearance

All sliding sashes shall operate freely, but not loosely, in the frame at the time of delivery.

10 Sections

The various wood sections shall be machined accurately to the profiles and sizes shown in Figure 13–Figure 17.

The standard sills shall be the flush sills $5\frac{5}{16}$ in. (13.5 cm.) wide as shown in Figure 15. Where projecting sills are specially ordered, they shall be $6\frac{3}{4}$ in. (17.2 cm.) wide, as shown in the same figure. Sills shall be grooved for window boards as shown unless otherwise ordered.

11 Construction

a) *Cased frames* (see Figure 13 to Figure 16). All two-light windows shall have boxed centre mullions and all three-light windows shall have fixed side lights and solid mullions.

The various members shall be framed together in the manner described below in order to secure rigidity throughout the frame.

Pulley stiles and heads shall be tongued at least $\frac{1}{8}$ in. (3 mm.) deep into grooves in the outside and inside linings. Pulley stiles shall also be trenched at least $\frac{1}{4}$ in. (6 mm.) deep into the heads and sills.

Outside linings shall be nailed securely, scribed or mitred at their intersections, and shaped at the junction with the sills so as to prevent the formation of water pockets. In windows with projecting sills, the outside linings shall be scribed to them. With flush sills, the outside linings, and, in all cases, the inside linings shall be carried to the bottom of the sills and nailed securely, the sills being recessed to receive them.

The inside head linings of venetian frames shall extend from pulley stile to pulley stile across the mullions. Mullions shall be trenched or tenoned with tenons not less than $\frac{3}{4}$ in. (19 mm.) thick into the heads and sills. The angles between the head and the inside and outside linings shall be glue-blocked and pinned at not more than 18 in. (45.75 cm.) centres. Pulley stiles shall be provided with removable pocket pieces for access to weights and sash lines as necessary and shall be mortised and fitted with axle pulleys fixed with the axle not more than $4\frac{1}{2}$ in. (11.4 cm.) and not less than $3\frac{1}{2}$ in. (8.9 cm.) from the head except on venetian flames. Pulley stiles and heads shall be grooved $\frac{1}{4}$ in. (6 mm.) deep and provided (except at the head of the fixed lights of venetian flames), with parting beads.

In venetian flames the solid mullions and pulley stiles shall be fitted with axle pulleys, arranged to take cords across the fixed lights immediately under the head. The top rail of the fixed outer sash, shall be deeply grooved to allow the passing of the cord, and a deep cover fillet, also deeply grooved to allow the passing of the cord, shall be fitted to the head between the sash stop (staff bead) and the top rail of the fixed outer sash.

All sash openings shall be provided with sash stops (staff beads), mitred at angles and pinned loosely into position. Draught stops (draught beads) shall be tongued into sills with tongues not less than $\frac{1}{4}$ in. (6 mm.) thick.

The cased flames shall be provided with timber or plywood parting slips and with back linings to jambs which shall be fixed into rebates in the outside linings.

b) *Solid frames (see Figure 17 and Figure 18).* All three-light windows shall have fixed side lights, only the centre sashes being-made to open.

The jambs, heads and sills shall be scribed and flamed together with either combed joints or mortised and tenoned joints.

Combed joints shall be close fitting, with not fewer than three laminations per member, and shall be glued and pinned together with hardwood dowels not less than $\frac{5}{16}$ in. (8 mm.) in diameter or with non-ferrous metal star dowels of not less than $\frac{1}{4}$ in. (6 mm.) diameter. Dowels shall engage with all laminations of the joint and no lamination shall be less than $\frac{7}{16}$ in. (11 mm.) thick. The mullions shall be trenched or tenoned into the heads and sills. Where trenched they shall be secured with nails or where tenoned by means of wood dowels, or non-ferrous metal star dowels as described above.

Mortised and tenoned joints shall be close fitting with projecting horns to head and sill not less than $1\frac{1}{2}$ in. (3.8 cm.) long. The tenons of all joints shall be not less than $\frac{1}{2}$ in. (13 mm.) thick and shall be the full width of the member.

Tenons shall be glued into the mortises. Through tenons shall, in addition, be pinned with wood dowels of not less than $\frac{5}{16}$ in. (8 mm.) diameter. Alternatively, through tenons may be wedged if the mortises are tapered.

The jambs, heads and mullions shall be grooved not less than $\frac{1}{4}$ in. (6 mm.) deep and provided with parting beads, and sash openings shall be provided with sash stops (staff beads) mitred or scribed at angles and pinned loosely in position; draught stops (draught beads) shall be tongued into sills with tongues not less than $\frac{1}{4}$ in. (6 mm.) thick.

Outside linings, shall be nailed securely to jambs, heads and mullions, and shall be mitre-shouldered or scribed at their intersections. For multi-light windows, the head linings shall extend from pulley stile to pulley stile across mullions. All outside linings shall be shaped at the junction with the sill so as to prevent the formation of water pockets.

When specially ordered, windows with solid frames shall be supplied with wider linings so that the overall sizes of such windows shall agree with the overall size of the cased frame types.

c) *Sashes (see Figure 13 to Figure 16).* All corner joints shall be scribed and framed together with combed joints or mortised and tenoned joints.

Combed joints shall have not less than two laminations on each member to be joined and shall be glued and pinned together with at least one non-ferrous metal or sherardized or galvanized steel pin of the lost-head type to each joint. Alternatively, $\frac{1}{4}$ in. (6 mm.) hardwood dowels shall be used. The pins or dowels shall engage with all laminations of the joint and no lamination shall be less than $\frac{1}{4}$ in. (6 mm.) thick.

In mortise and tenon joints the tenons shall be haunched and shall be wedged in tapered mortises or pinned with a wood dowel or a pin of sherardized, galvanized or non-ferrous metal.

The meeting faces of the meeting rails shall be splayed and rebated.

Sashes shall be grooved at the back as necessary for sash cords or for spring sash balances.

Glazing bars shall be scribed and tenoned into mortises in the sashes with tenons not less than $\frac{5}{16}$ in. (8 mm.) thick; vertical bars shall be through tenoned and wedged, or through tenoned in tight parallel mortises and pinned, horizontal bars shall be stub-tenoned. Joints between glazing bars shall be scribed and mortised and tenoned or halved and mitred; if tenoned, the tenons shall be not less than $\frac{5}{16}$ in. (8 mm.) thick and shall meet in the centre of the mortise. The gap between the stub-tenons shall not exceed $\frac{1}{8}$ in. (3 mm.) and shall be in the centre of the mortise.

d) *General*. All frames and sashes shall be assembled accurately and clamped together so as to be square and flat.

12 Knotting and priming

This British Standard relates to joinery “in the white”. If the purchaser wishes it to be knotted and primed or otherwise finished he should specify his requirements in detail.

NOTE It is essential that joinery supplied “in the white” be handled and stored under dry conditions. It should be knotted and primed immediately after delivery and should receive further coats of paint within a reasonable period. Any surfaces subsequently cut, particularly those exposing end grain, should be primed before the joinery is fixed in position.

Table 1 — Schedule of sizes, areas, etc. weight balanced type with glazing bars

Window No.	Window size						Number of panes (8½ in. × 11½ in.) (21.9 cm. × 29.5 cm.)	Daylight area	
	Width			Height				sq. ft	m ²
	ft	in.	cm.	ft	in.	cm.			
16W39B	1	6	45.7	3	9½	114.6	3	1.88	0.175
23W39B	2	3	68.5	3	9½	114.6	6	3.77	0.350
30W39B	3	0	91.4	3	9½	114.6	9	5.65	0.525
511W39B	5	11¾	182.2	3	9½	114.6	18	11.29	1.049
53W39B	5	3	160.0	3	9½	114.6	15	9.42	0.875
16W49B	1	6	45.7	4	9½	145.1	4	2.51	0.233
23W49B	2	3	68.5	4	9½	145.1	8	5.09	0.473
30W49B	3	0	91.4	4	9½	145.1	12	7.53	0.70
39W49B	3	9	114.3	4	9½	145.1	16	10.04	0.933
511W49B	5	11¾	182.2	4	9½	145.1	24	15.06	1.399
53W49B	5	3	160.0	4	9½	145.1	20	12.55	1.166
60W49B	6	0	182.8	4	9½	145.1	24	15.06	1.399
16W59B	1	6	45.7	5	9½	175.6	5	3.14	0.292
23W59B	2	3	68.5	5	9½	175.6	10	6.28	0.583
30W59B	3	0	91.4	5	9½	175.6	15	9.42	0.875
39W59B	3	9	114.3	5	9½	175.6	20	12.55	1.166
511W59B	5	11¾	182.2	5	9½	175.6	30	18.83	1.750
53W59B	5	3	160.0	5	9½	175.6	25	15.69	1.457
60W59B	6	0	182.8	5	9½	175.6	30	18.83	1.750

NOTE 1 For masonry sizes add ¼ in. (6 mm.) to width and height of window sizes.

NOTE 2 It should be noted that measurements are given in accordance with the “Standard Method of Measurement of Building Works”, which puts the width dimension before the height dimension.

It is important when ordering panes of glass, to follow the practice observed in the glass industry, and give these dimensions in reverse order, i.e., the height dimension before the width dimension.

Table 2 — Schedule of sizes, areas, etc. weight balanced type without glazing bars

Window No.	Window size						Glass size				No of panes	Daylight area	
	Width			Height			Width Height			Width Height		sq. ft	m ²
	ft	in.	cm.	ft	in.	cm.	ft	in.	ft in.	cm.			
16W39N	1	6	45.7	3	9½	114.6	0	8½ × 1	5½	21.9 × 44.7	2	1.93	0.179
23W39N	2	3	68.5	3	9½	114.6	1	5½ × 1	5½	44.7 × 44.7	2	4.07	0.378
30W39N	3	0	91.4	3	9½	114.6	2	2½ × 1	5½	67.6 × 44.7	2	6.21	0.577
39W39N	3	9	114.3	3	9½	114.6	2	11½ × 1	5½	90.5 × 44.7	2	8.35	0.776
511W39N	5	11¾	182.2	3	9½	114.6	2	2½ × 1	5½	67.6 × 44.7	4	12.42	1.154
53W39N	5	3	160.0	3	9½	114.6	{ 0	8½ × 1	5½	21.9 × 44.7	4	10.08	0.936
							{ 2	2½ × 1	5½	67.6 × 44.7	2		
60W39N	6	0	182.8	3	9½	114.6	{ 0	8½ × 1	5½	21.9 × 44.7	4	12.22	1.35
							{ 2	11½ × 1	5½	90.5 × 44.7	2		
16W49N	1	6	45.7	4	9½	145.1	0	8½ × 1	11½	21.9 × 60.0	2	2.61	0.242
23W49N	2	3	68.5	4	9½	145.1	1	5½ × 1	11½	44.7 × 60.0	2	5.50	0.511
30W49N	3	0	91.4	4	9½	145.1	2	2½ × 1	11½	67.6 × 60.0	2	8.39	0.779
39W49N	3	9	114.3	4	9½	145.1	2	11½ × 1	11½	90.5 × 60.0	2	11.28	1.048
511W49N	5	11¾	182.2	4	9½	145.1	2	2½ × 1	11½	67.6 × 60.0	4	16.78	1.558
53W49N	5	3	160.0	4	9½	145.1	{ 0	8½ × 1	11½	21.9 × 60.0	4	13.61	1.264
							{ 2	2½ × 1	11½	67.6 × 60.0	2		
60W49N	6	0	182.8	4	9½	145.1	{ 0	8½ × 1	11½	21.9 × 60.0	4	16.50	1.533
							{ 2	11½ × 1	11½	90.5 × 60.0	2		
16W59N	1	6	45.7	5	9½	175.6	0	8½ × 2	5½	21.9 × 75.3	2	3.29	0.306
23W59N	2	3	68.5	5	9½	175.6	1	5½ × 2	5½	44.7 × 75.3	2	6.79	0.631
30W59N	3	0	91.4	5	9½	175.6	2	2½ × 2	5½	67.6 × 75.3	2	10.97	1.019
39W59N	3	9	114.3	5	9½	175.6	2	11½ × 2	5½	90.5 × 75.3	2	14.21	1.320
511W59N	5	11¾	182.2	5	9½	175.6	2	2½ × 2	5½	67.6 × 75.3	4	21.13	1.963
53W59N	5	3	160.0	5	9½	175.6	{ 0	8½ × 2	5½	21.9 × 75.3	4	17.14	1.492
							{ 2	2½ × 2	5½	67.6 × 75.3	2		
60W59N	6	0	182.8	5	9½	175.6	{ 0	8½ × 2	5½	21.9 × 75.3	4	20.78	1.931
							{ 2	11½ × 2	5½	90.5 × 75.3	2		

NOTE 1 For masonry sizes add ¼ in. (6 mm.) to width and height of window sizes.

NOTE 2 It should be noted that measurements are given in accordance with the "Standard Method of Measurement of Building Works", which puts the width dimension before the height dimension.

It is important, when ordering panes of glass, to follow the practice observed in the glass industry, and give these dimensions in reverse order, i.e., the height dimension before the width dimension.