

Doors & windows including frames and linings —

Part 1: Wooden doors

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This Code has been prepared by a Committee convened by the Incorporated Association of Architects and Surveyors on behalf of the former Council for Codes of Practice for Buildings, construction and engineering services, formed under the aegis of the Ministry of Works in September, 1942. A draft of this code was published for general comment and was also submitted for specific comment to all professional and trade organizations which are intimately concerned with its subject matter. All comments and views expressed have been taken into consideration in the preparation of the Code. In 1954 agreement was reached between the professional institutions concerned, the British Standards Institution and the former Council for Codes of Practice for Buildings, that a new Council for Codes of Practice should be established within the British Standards Institution. Under the present constitution four Codes of Practice Committees, for buildings, for civil engineering, for electrical engineering and for mechanical engineering, were formed and the subject of Wooden doors was included in the programme of the Codes of Practice Committee for Buildings. The Code, having been approved by the Codes of Practice Committee for Buildings, is now published by the British Standards Institution under the authority of the Council for Codes of Practice. 22 March 1957

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 46 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.

Section 1. General

101 Scope

This code deals with wooden doors of all types for normal purposes and with the different methods employed in hanging doors and fixing frames and linings; doors to fitments, doors for special purposes and door furniture are not dealt with.

102 Definitions

For the purpose of this Code only, the following definitions apply. Terms printed in italics within the definitions are separately defined:—

architrave

a *planted* finishing, frequently moulded, to cover the joint between a door *frame* or *lining* and the wall finishing

back lashing (strapping)

a method of securing two *frames* together with the heads in opposite directions by fixing short pieces of wood across the back faces. This assists in keeping the jambs straight and true during transit or storage

bed moulding

a *planted* moulding at an internal angle. It may be sunk, flush or raised

blockboard

a board with a core made up of strips of wood, each not exceeding 1 in. in width, laid separately, or glued or otherwise joined together to form a slab which is glued between two or more outer *veneers* with the direction of the grain of the core blocks running at right angles to that of the adjacent veneers

boarding

the solid filling, or cladding, in a boarded *door*. When it is tongued and grooved with beaded or V joints, it is known as “match-boarding”

bodying-in

the initial process of preparing a surface with french polish

bolelection moulding

a panel moulding projecting beyond and rebated over the framing; it may be planted on the face of the panel or tongued into the framing when it becomes the member that receives the edges of the panel. The latter form is known as a “tongued bolelection moulding”

bow

a defect involving the curvature of a piece of timber in the direction of its length

brace

a strut fitted diagonally between the *stiles*, *ledges* or *rails* of a boarded door

buck frame (core frame)

a rough *frame*, often unwrought, used to enable wall finishes to be carried out before the main door frame is fixed, thereby eliminating the risk of damage to the finished *frame*

check throating

a groove to intercept water

closing stile

the *stile* which shuts against a frame, linings, or in the case of *sliding doors*, against a stop

counter balancing

a system to neutralize the weight of a *door*, so that it can be easily operated

cover moulding

a *planted* moulding to cover a joint on a flush surface

cramp (lug)

a metal strap attached to the back, or unexposed face, of a *frame* or *linings* and built into the walling at intervals around the opening

door

a barrier, capable of being opened or closed, to an entrance to a building or apartment of a building, or to any opening through a wall, partition, floor, or other structure. Doors dealt with in this code are those of the following types of construction, which are more fully described in Clause 312:—

Unframed Lugged; lugged and braced.

Framed Framed and braced; framed, lugged and braced; panelled.

Flush

dowel

a piece of metal or wood usually cylindrical used for positioning or aligning; it is frequently used instead of a *tenon*

exterior type plywood

plywood in which the adhesive used for bonding has a high degree of resistance to moisture

fanlight

a fixed or opening light above a *door* or *sidelight* and within the same main *frame*

folding door

a *door* consisting of two or more *leaves*, each leaf *side-hung*, that at the *hanging* side of the door hung to a post or jamb, each of the others hung in succession to the leaf before, and folding back on to it. The term is frequently applied also to what is called in this code a pair of *side-hung doors*, *rebated* at their *meeting-styles*

frame

a surround, within an opening, to which a *door* is hung and which has sufficient strength to carry the weight of the door. It may also be designed to incorporate a *fanlight* or sidelights

ground

a strip of wood fixed to a wall or other background to which joinery can be secured

hanging

a *door* is said to be hung when it is attached to its *frame* or *linings* or to the structure around the opening in such a manner that it may be opened and closed

hanging stile

the *stile* to which the hinges or pivots of a *door* are attached

hatch door

a small serving *door* in a vertical opening

horn

the extension, beyond the length that would otherwise be required, of a mortised member in a framed joint, to strengthen the wall of the *mortise* while the joint is being wedged up. This extension has been found useful in protecting the corners of a *door* in handling, and is used for this purpose with *dowel* jointed doors although not required for framing-up

interior type plywood

plywood in which the adhesive used in bonding has only a limited degree of resistance to moisture

laminboard

a board having a core of strips, each not exceeding 7 mm (0.28 in.) in thickness, glued together face to face to form a slab which in turn is glued between two or more outer *veneers*, with the direction of the grain of the core strips running at right angles to that of the adjacent veneers

leaf

a section of a multiple *door* formation, each section constructed as a separate door

ledge

a member fixed horizontally across the *boarding* in an unframed boarded *door*; in a framed and ledged door a rail across which the boarding passes

linings

a wooden surround within an opening to which a door can be attached and which at the same time provides a covering to the *reveals* and *soffit* of an opening

lipping

a strip of wood applied to the edge of a *flush-door* to protect the edge of the facings

meeting stiles

the *closing-stiles* in a pair of *doors*

mitre

the intersection at an angle of two pieces of material or two mouldings

moisture content

the amount of moisture in timber, expressed as a percentage of its oven-dry weight

mortise

a hole, usually rectangular, formed in a member to receive a tenon

muntin

an intermediate framing member, usually vertical, framed into the *rails*

overhead door

a *door* in a wall operating vertically to assume, when fully open, a more or less horizontal position near the head of the opening. It may be in one or a number of leaves, according to the method of opening

pallet piece (slip)

a thin strip of wood built into a joint in a wall to provide a fixing for *linings*, *grounds* or other woodwork

panel

a sheet of wood, glass or other material, the edges of which are let into grooves or rebates in the framing members of a *door*

pellet

a small piece of wood, usually circular, cut to match the grain of the main timber, and let into the face of joinery to cover the head of a screw countersunk below the surface

planted

any member, moulding or enrichment is said to be planted when it is applied independently of the structure

plywood

a board formed of three or more layers of *veneer* cemented or glued together, usually with the grain of adjacent veneers running at right angles to each other

rail

a lay framing member framed into the *stiles*

rebate (rabbet)

a step-shaped recess between two surfaces which would otherwise meet to form an external angle. (See Figure 11)

reveal

the exposed part of the vertical side of a recess or opening in a wall

revolving door

a *door* consisting of two, three or four *leaves* connected at a vertical axis of rotation, the door being described according to the number of compartments so formed. A complete unit comprises the leaves, with an enclosure

sag or drop

to change shape within the plane of a *door*, under load

sanding

the operation of rubbing down the surface of wood with sandpaper, or other abrasive, to remove tool marks and to give a smooth finish

side-hung door

a *door* hung at or near one edge, and opening to one side only

sidelight

a fixed or opening light at the side of a *door* and within the same main *frame*

sliding-and-folding door

a *door* consisting of two or more *leaves*, operating horizontally in a manner combining the principles of a *sliding-door* and a *folding-door*

sliding door

a *door* which in opening or closing moves across its opening either horizontally or vertically

soffit(e)

the exposed part of the underside of an opening or of any projecting member. The top member of a set of *door linings*

stable type door

a *door* divided in its height so that the lower part may remain closed while the upper part is open.

stile (style)

one of the side framing members into which the *rails* are framed

stuck moulding (struck)

a moulding worked on the solid, such as on the edge of a framing member of a *door*

swing door

a *door* hung about a vertical axis at or near one edge to open to either side, i.e. to swing through the opening

tenon

the end of a member reduced in section to fit into a *mortise*

threshold

the bottom horizontal member of a *door* opening, *frame* or set of *linings*

trap door

a *door* in an opening in a floor, ceiling or roof

veneer

a thin layer of wood of uniform thickness

warp

the distortion of a piece of timber, or of timber framing, resulting in departure from a plane or true form

weather board or moulding

a projection at the bottom of an external *door* to shed rainwater

103 Exchange of information

Before the detailing and specifying of doors, their frames or linings and other associated items can be done correctly it will be necessary to determine all requirements, including such fundamentals as strength, durability, weather resistance, fire resistance and thermal insulation. It will also be necessary to have all relevant information regarding materials and any proprietary door systems or components that are to be used; this information should be obtained from the supplier or manufacturer. The types of door furniture to be used should also be decided upon before the work is begun, so that provision can be made to accommodate all items.

It is also important that information should be given in advance to all other trades or specialists whose work will be affected, so that they can make what provisions are necessary in time to avoid alterations after their work has been done.

The drawings and specifications together should give all the information necessary for supplying or making the doors and hanging them, together with the provision of their frames or linings, finishings and furniture, including the work of other contractors where it is affected, and should clearly express the intention of the designer. It is recommended that a detailed schedule should be prepared, in which each door is numbered and can be identified with a corresponding number on the relevant drawings, and giving all necessary information as to type, size, frames or linings, timber species and quality, glazing, hanging, ironmongery, and other relevant matters.

104 Time schedule

In preparing a time schedule, the manufacture and the installation of doors should be considered in relation to the time schedule of the whole contract or project, so that the installation of the frames and hanging of doors and the work of other trades will not interfere one with the other.

A time schedule covering the manufacture and the fixing of doors should provide for the following:—

- a) The supply of drawings in sufficient time to allow for the selection and supply and, where necessary, conditioning of materials and components, so that the doors may be ready and available when required.
- b) Frames, steps, sills, lintels and some types of surrounds will probably require to be built in with other work and their fixing should, therefore, be timed accordingly.
- c) Doors should not be taken into the building until all wet operations are completed and a reasonable drying out period has been allowed.
- d) The fixing of doors, fitting of ironmongery and the completion (polishing, painting, etc.) of doors in relation to the general finishing and decorative work.

Section 2. Materials, and components

201 Timber

In addition to the well-known joinery timbers, there are many others of recent introduction which are comparatively little known. Guidance as to the suitability of some timbers will be found in BS 1186, *“Quality of timber and workmanship: Part I, Quality of timber”*; for information on others not included in that British Standard, reference should be made to the appropriate publications listed in the Bibliography in Clause 801 or direct to the authorities issuing them.

Timber should be thoroughly seasoned to the moisture content appropriate to the work as prescribed in BS 1186-I.

202 Timber sizes and weights

The actual sizes of unwrought timber will vary from the nominal, the amount of variation differing according to the species and the country of origin. The reduction in size that should be allowed for surfacing is given in the Standard Method of Measurement of Building Works as $\frac{1}{8}$ in. for each wrought face.

Variations in moisture content will affect size; as an example of the extent of this variation across the grain, drying from 25 per cent to 12 per cent moisture content may cause shrinkage in this direction of as much as $1\frac{1}{4}$ in. per ft in extreme cases. No appreciable change in length generally occurs. Further information on this subject will be found in some of the relevant publications mentioned in Clause 801 or may be obtained from the authorities responsible for them.

The weight of timber varies according to the species and its moisture content; the weights of individual pieces of the same species may be expected to differ, in some cases substantially, from the average weight usually given in works of reference. Variation in weight due to moisture content is small in seasoned timber and, for practical purposes, may be disregarded.

203 Timber quality

The requirements set forth in BS 1186-I, serve as a general guide in selecting timber, including plywood of suitable quality. That standard is concerned with joinery intended for housing and similar structures; for better class work, the special requirements it gives for timber “selected for staining” may be adopted.

Reference should also be made to BS 1445, *“Plywood manufactured from tropical hardwood”*.

204 Adhesives

Suitable adhesives for joiners’ work are the animal glues complying with BS 745, *“Animal glue for wood”*, casein glues complying with BS 1444, *“Cold-setting casein glue for wood”*, or synthetic resin adhesives complying with BS 1204, *“Cold-setting synthetic resin adhesives for constructional work in wood”*. For flush doors and other forms of construction that rely mainly upon the adhesive, and particularly where exposure conditions are severe and prolonged dampness is likely to occur, one of the more moisture-resistant types should be employed, the choice depending on the severity of the conditions to which the work will be exposed.

Most forms of casein glue can cause staining. Some of the hardeners used with synthetic-resin adhesive also stain the timber or alter the texture of the surface, causing difficulties in polishing.

Adhesives are discussed by R. A. G. Knight, in his “Requirements and properties of adhesives for wood”.

205 Nails and screws

For joiners’ work, wire-nails — oval, chequered head, lost-head round or panel pins — complying with BS 1202, *“Wire nails and cut nails for building purposes”*, or wood screws in accordance with BS 1210, are suitable. The gauge of nail or screw used should be suited to the woods being fixed and to which a fixing is being made, and the length should be such as will give a sufficiently strong and secure fixing.

Certain timbers, notably oak, sweet chestnut and western red cedar, can, under moist conditions, become stained and disfigured by reaction with ferrous metals. This reaction between metal and wood is negligible in dry wood but may become serious if the moisture content of the wood in contact with the metal exceeds about 20 per cent. Information on the liability of any particular timber to react in this way may be obtained on application to the Director, Forest Products Research Laboratory, Princes Risborough, Bucks.

All nails and screws used with such reactive timbers should be of non-ferrous metal, or should be protected in some manner before use if the woodwork is likely to be subjected to moist conditions as it would be, for example, in an external door.

206 Preservatives

In selecting a preservative its suitability in the following respects should be carefully considered:—

Effectiveness in preventing decay over a long period; its effect on the appearance of the timber; reaction with metal fittings; and, if necessary, compatibility with paint and other materials.

Information on the properties of the various types of preservatives, together with guidance on methods of applying preservatives appropriate to various conditions, will be found in BS 1282, “*Classification of wood preservatives*”. Swelling of dry timber may occur if a water soluble type of preservative is employed and thorough re-drying will be necessary to bring the timber back to its original dimensions.

Clause 207 deleted in accordance with amendment issued July, 1965

208 Hinges

A range of cast iron, steel and brass, butt and tee hinges and various types of hooks and bands suitable for doors in houses is specified in BS 1227, “*Hinges*”. Hinges of the types and classes covered by the standard should be in accordance with it.

Section 3. Design

301 Function

The primary function of a door is to provide a movable barrier to an opening. Many types have been developed to meet the requirements of differing circumstances; various methods of opening have also been developed and there is a wide choice of fastenings and other accessories.

302 Weather protection

a) EXCLUSION OF RAIN.

i) *Doors and frames.* External doors and their frames may need special provision for the exclusion of rain, especially those doors that open directly into habitable rooms in dwellings and other buildings and in buildings on exposed sites.

The bottom of a door is particularly vulnerable to driving rain. A certain amount of protection against its entry can be given by a weather board on the outer face at the bottom of the door. It should project well beyond the face of the door and should be weathered off, to throw water clear of the gap under the door; it should preferably extend the full width of the door, the frame being scribed over it. Further protection can take the form of a metal water bar let into a groove in the sill or threshold and projecting about ½ in. above it; or, if the door opens outwards, a rebated and check-throated sill may be used instead, with the bottom of the rebate weathered off. Suitable metals for water bars are aluminium alloy, brass, bronze wrought iron or steel, the latter should be heavily galvanized. The bar should extend the full width of the door and should be set in its groove with white lead (if the groove is in wood), neat Portland cement (if in stone or concrete) or in a suitable water resisting mastic. It is not always possible to make a weather board effective on an outward-opening door; wherever possible a rebated threshold should be used or a water bar located, preferably, about the middle of the thickness of the door, and the bottom edge of the door rebated so as to close against it.

Outward-opening door, unless the frame is set well back from the outer face of the wall or is otherwise protected, by a projecting hood for example, should be provided with a projecting weather fillet along the head of the frame. It should be weathered off on its top edge, throated on its underside.

The edges of the meeting stiles of doors hung in pairs, or folding, should wherever possible be rebated together. Interlocking joints should be avoided, for, however well they may fit when made, swelling of the wood or the addition of successive coats of paint will make them jam and prevent the doors closing. If more protection is required than a single rebate will give, the stiles, if thick enough, may be double rebated, or a small cover fillet may be planted on one or both sides.

Swing doors cannot close into a rebate and cannot be made weathertight; an external door, therefore, should only be hung in this way when the need for a swing door outweighs this disadvantage.

ii) *Around the opening in the wall.* Care is needed in design to exclude rain at the junction of a door frame with the structure in which the opening occurs. This matter is discussed in codes dealing with the various forms of walling; the basic principles are illustrated in CP 121.101, "Brickwork".

b) DRAUGHT EXCLUSION. Gaps between external doors and their frames are the main source of draughts. Precautions that should be taken to avoid these include careful fitting of the door into the rebates in the frame, rebating the edges of meeting stiles in doors hung in pairs or folding, and care in fitting them together. Additional protection can be given by the use of draught-stripping around all edges of the door. Rubber or felt is sometimes used for the purpose, but neither will remain effective for long and their use is not recommended as a permanent measure. Several proprietary systems are available which use a resilient metal strip (usually bronze) and one of these is to be preferred.

303 Precautions against fire

a) GENERAL. Precautions against fire in buildings are of two kinds: those intended to reduce the risk of an outbreak and, if an outbreak does occur, to restrict the spread of the fire within the building and between adjoining buildings (structural fire precautions); and those intended to protect the occupants of buildings in the event of an outbreak and to enable them to leave in safety (means of escape).

Requirements for structural precautions are laid down in building byelaws: in London, the "London building (constructional) by-laws" of the London County Council; throughout the rest of England and Wales, the building byelaws of local authorities, generally based on the "Model byelaws, Series IV, Buildings", of the Ministry of Housing and Local Government; in Scotland, the building byelaws of those local authorities that have adopted the "Model building byelaws" of the Department of Health for Scotland. Local authorities also have power to control means of escape where necessary; requirements are included in the Scottish model building byelaws; and the London County Council issues a code of practice, "Means of escape in case of fire", for guidance within its jurisdiction. The Ministry of Education issues a bulletin for guidance in the design of educational establishments, "Bulletin No. 7, Fire and the design of schools", which covers both aspects.

The "Code of functional requirements of buildings", CP 3:Chapter IV:1948, *"Precautions against fire"*, makes recommendations for houses and flats of not more than two storeys. They are mainly confined to precautions for restricting the spread of fire, but a more comprehensive version is projected.

b) DOORS IN RELATION TO PRECAUTIONS AGAINST FIRE.

i) *Structural precautions.* A doorway is always a weak point in a wall or partition which, without it, would be an effective barrier to the spread of fire. The passage of fire through a small door (of up to about 20 sq. ft in area), however, can usually be controlled by the fire-fighting services and it is primarily for this reason that regulations, where they prescribe requirements for the fire resistance of walls for the purpose of localizing a possible outbreak of fire, frequently impose less stringent requirements for doors than for the walls in which they occur.

ii) *Means of escape.* Doors are of great importance in connection with means of escape. Requirements as to their number, size and positioning, the degree of protection, the way in which they are hung and other things, will differ according to circumstances. For details from which these requirements can be assessed, reference should be made to the publications mentioned in Sub-clause a).

c) **FIRE RESISTANCE OF WOODEN DOORS.** The standard test for fire resistance of elements of structure, including doors, is prescribed in BS 476-1, "*Fire test on building materials and structures*". To satisfy the test a door must meet certain requirements for resistance to collapse and the passage of flame; a third requirement, for insulation, which is prescribed in the British Standard for some elements of structure is not applied to doors because combustible material is unlikely to be placed against them.

Failure is generally first manifested by the appearance of flame at the top edge of the door; although with a panelled door having thin panels the flame may first appear through a panel. Tests have shown that the fire resistance of hardwood doors is not significantly greater than that of softwood doors of similar construction and thickness.

Doors constructed basically of wood but with added protection from other materials, such as plasterboard and asbestos board, can have greater fire resistance than those of wood alone. BS 459-3, "*Fire-check flush doors and frames*" specifies two such doors having fire resistances of ½ hour and 1 hour respectively. A substantial frame (if of wood) with a deeper rebate than that normally used is essential for the proper performance of these doors. The British Standard prescribes a rebate 1 in. deep in a wooden frame and, for the "1 hour" door, worked out of the solid; or a rebate ¾ in. deep in a metal frame. The doors should be as close a fit in the rebate as is practicable.

Small vision panels, if suitably designed and glazed, would not materially interfere with the fire resistance. Reference should be made to CP . . . , "*Glass and glazing*".¹⁾

d) **SPREAD OF FLAME.** The rate of spread of flame across the surface of a door may sometimes be important in connection with means of escape. Although the spread of flame characteristic of any of the materials is not taken into account in testing for fire resistance, that of the surfacing material of a door will affect its ease of ignition and therefore its behaviour in fire.

¹⁾ In preparation.