BRITISH STANDARD

BS EN
942:2007

Timber in joinery — General requirements

The European Standard EN 942:2007 has the status of a British Standard

ICS 79.040

BSI
British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 942:2007. It supersedes BS EN 942:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/543, Round and sawn timber.

A list of organizations represented on B/543 can be obtained on request to its secretary.

National Annex NA contains tables that give information on some species and their suitability for use in joinery. These tables are reproduced from BS 1186-1:1991 which was withdrawn on publication of the 1996 edition of BS EN 942. They were included in the National Annex NA to BS EN 942:1996 and are reproduced here again in this edition for information.

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Timber in joinery - General requirements

Bois dans les menuiseries - Exigences générales

Holz in Tischlerarbeiten - Allgemeine Anforderungen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 942:2007) has been prepared by Technical Committee CEN/TC 175 “Round and sawn timber”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2007, and conflicting national standards shall be withdrawn at the latest by October 2007.

This document supersedes EN 942:1996.

This Standard is one of a package to be implemented on 2007.10.31. The Standards included in the Package are:

	Standard Number	**Title**
1	EN 942 Revised	Timber in joinery - General requirements
2	EN 13307-1	Timber blanks and semi-finished profiles for non-structural uses – Part 1: Requirements
3	EN 14220	Timber and wood-based materials in external windows, external door leaves and external doorframes – Requirements and specifications
4	EN 14221	Timber and wood-based materials in internal windows, internal door leaves and internal doorframes - Requirements and specifications

Explanation

Standards 3 and 4 rely on both Standards 1 and 2, and Standard 2 relies on 1.

The revised EN 942 contains changes which directly affect standards 2, 3 and 4 and therefore must be available before they can be used effectively.

NOTE Following the completion of the Technical Enquiry for prEN 13307-2, Timber blanks and semi-finished profiles for non-structural uses – Part 2: Production control, it has been agreed to remove this Standard from the package. As a result of the necessary changes it has been agreed to offer prEN 13307-2 as a CEN/TS.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

Commercial grades, i.e. the grade given to timber as a raw material, are not appropriate for referencing in joinery specifications. This European Standard specifies the general grading requirements to be used to determine the characteristics and classify, by appearance, the quality of timber in joinery. This method is not appropriate for the purchase specification of timber. This standard provides only recommendations for the moisture content of timber. Specific moisture contents are covered in the specific product standards.

1 Scope

This European Standard specifies the general requirements including in particular the grading and classification by appearance quality of timber in joinery products or individual joinery parts.

This European Standard is intended to be used at the time of manufacture of a product. However this Standard may be used to evaluate products at a later stage, but in these situations storage and service conditions, subsequent to manufacture, shall be taken into account (surface checks).

Where European product standards exist their timber requirements shall take precedence, unless an alternative improved specification is given as identified in Annex D. If reference to this European Standard is made the specific grade and requirements shall be identified.

This European Standard covers solid, finger-jointed, end-jointed, edge-jointed and laminated timber products.

Matters relating to the influence of timber characteristics on strength and durability are not covered in this Standard.

2 Normative references

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

EN 350-2, *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.*

EN 844-3:1995, *Round and sawn timber - Terminology - Part 3: General terms related to sawn timber*

EN 1310*, Round and sawn timber - Method of measurement of features*

EN 13183-1, *Moisture content of a piece of sawn timber – Part 1: Determination by oven dry method*

EN 13183-2, *Moisture content of a piece of sawn timber – Part 2: Estimation by electrical resistance method*

EN 13183-3, *Moisture content of a piece of sawn timber – Part 3: Estimation by capacitance method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 844-3:1995 and the following apply.

3.1
joinery
wood and wood-based products graded for non-structural use within a building

NOTE These grading rules do not apply to wood-based panels covered by EN 13986.

3.2
concealed face
face of a joinery part which, after installation of the joinery is completed, is permanently concealed by other parts of the joinery product, by other parts or by other elements including sheet materials such as veneer, solid plastic or metal

NOTE These faces may be visible before the product is installed.

3.3
semi-concealed face
visible face of a joinery part which cannot be viewed when the product is in the closed position

3.4
visible face
face of a joinery part which, after installation of the joinery is completed, is not permanently concealed or semi-concealed

NOTE 1 An opaque paint finish, does not constitute concealment.

NOTE 2 Faces which are visible when moving parts (e.g. shutters) are open are classified as semi-concealed.

4 Basic principles

4.1 Appearance classes

Timber in joinery shall be classified by referencing a number of basic features which are given in Clause 5 and summarised in Table 1. In addition, a number of other factors shall be taken into account and these are given in the rest of Clause 4.

Any feature is accepted on a concealed face if the serviceability of the product is not impaired.

4.2 Species

Timber in joinery shall be suitable for its intended purpose.

NOTE 1 Guidance on the specification of timber in joinery is given in Annex C and on the selection of timber species in Annex D.

NOTE 2 Durability, a factor influencing the performance of timber, is covered by EN 335-2, EN 350-2, EN 460 and EN 351-1.

NOTE 3 It should be noted that colour variations occur within species as well as between sapwood and heartwood. Any special requirements for colour matching should be by prior agreement.

NOTE 4 If two or more species are used in the same unit or sub-assembly, they should be selected to avoid differential movement resulting in distortion.

4.3 Density

The density of timber used will have a significant effect on mechanical performances. Reference densities for common species are given in EN 350-2.

4.4 Growth rings

Limits on growth rings are not specified within the grading rules. If the number and width of growth rings are to be specified, the measurement method shall be the method given in EN 1310.

NOTE Where the width and number of growth rings may affect the mechanical performance of a product or the fabrication of glued components (laminated profiles), reference should be made to the appropriate product standard.

4.5 Surface quality

The surface of timber in visible faces shall be able to accept a coating system without any further operation other than light sanding.

4.6 Moisture content

The measurement of the moisture content of the timber in a product is applicable at the completion time of the product manufacture and prior to the application of any coating. The moisture content (percent) of the timber shall be in accordance with the relevant product standard or national requirements.

NOTE 1 Where a relevant product standard or national requirement does not exist, the guidance on moisture content given in Annex B is recommended.

The moisture content shall be estimated using, either the method described in EN 13183-2, or EN 13183-3. In the case of a dispute the method to be used shall be the method described in EN 13183-1 (Destructive method).

NOTE 2 The more accurate method described in EN 13183-1 is a destructive method and may not always be appropriate.

4.7 Finger-jointing, butt-jointing, edge-jointing and laminating

Unless otherwise agreed, finger-jointing, butt-jointing and edge-jointing shall be permitted in classes J10, J20, J30, J40 and J50 according to Table 1 but shall not be permitted in class J2 and J5, unless accepted by a product standard. The distance between the centres of finger-joints and butt-joints shall be at least 150 mm.

Laminating sections in any class shall be permitted unless otherwise agreed.

5 Classification of features

5.1 General

The appearance classes in Table 1 are independent of the species. The limits set in Table 1 for each feature relative to the specific class shall not be exceeded when a specific class is specified. The classification of features can be missed subject to the declaration of the class for each feature as given in Table D.1 (See example in Table D.2).

Table 1 shows where and to what extent the presence of the following features shall be permitted at the time of handover, for the various classes of timber.

NOTE 1 Handover relates to the time the joinery is supplied by the manufacturer to the first purchaser.

NOTE 2 The classes in Table 1 generally apply to visible faces. Unless otherwise specified semi-concealed faces, in the same product, may be graded up to two classes lower and concealed faces may be any lower class.

The following features are identified in Table 1:

- spiral grain;
- slope of grain;
- loose or unsound knots;
- knots;
- resin pockets;
- bark pockets;
- fissures, shakes;

- exposed pith;

- discoloured sapwood;

- ambrosia beetle damage.

Where remedial work on the part of the manufacturer is permitted in Table 1, it shall be carried out in accordance with clause 6.

The measurement of features shall be carried out in accordance with the «general method» given in EN 1310.

NOTE See also the guidance given in C.2.

The following features are generally not permitted :

- reaction wood;

- splits;

- biological attack;

- wane.

5.2 Knots and knot clusters

5.2.1 Types

Knots and knot clusters shall be limited in size and distribution, according to 5.2.2 and 5.2.3.

Loose or unsound knots shall not be present except on concealed faces. When they occur on a visible face, the timber shall be repaired in accordance with clause 6.

Arris knots shall comply with the requirements of both faces on which they appear.

NOTE Arris knots may be impossible to repair unless extremely sound.

5.2.2 Size

Unless otherwise specified in the relevant product standard or specification, the limit on size shall be expressed as a percentage of the overall width or thickness of the finished piece on which the knot or knot cluster occurs and a maximum knot size.

Annex A illustrates the measurement of dimensions of finished pieces.

No individual knot or knot cluster shall exceed the size limit shown in Table 1, as appropriate for:

a) class of timber;

b) face category (visible, semi-concealed or concealed).

These size limits apply even if a piece of timber is laminated or edge jointed.

5.2.3 Distribution

On visible faces, knots or knot clusters larger than 10 mm shall be distributed at centres no closer than 150 mm on average, measured over the length of the piece.

For all classes, when considering distribution, knots of 10 mm or less shall be disregarded.

6 Remedial work

6.1 Plugs and fillers

Where indicated in Table 1, the following shall be repaired by the manufacturer with a plug or filler:

- loose or unsound knots;
- shakes greater than 0,5 mm in width;
- resin pockets;
- bark pockets;
- exposed pith;
- ambrosia beetle attack.

NOTE It is impractical to fill shakes narrower than 0,5 mm.

Repair to visible faces in J2 and J5 classes according to Table 1 is not permitted, remedial work to semi-concealed faces of J2 and J5 is acceptable.

6.2 Requirements

Any plug shall:

a) be of the same or similar species as the surrounding timber;

b) be well secured by an appropriate adhesive;

c) be within the moisture content range recommended by the adhesive manufacturer;

d) occupy the depth of the hole whenever possible;

e) whenever possible lie with its grain in the same general direction as the grain of the piece into which it is inserted;

NOTE 1 It is possible that a plug may be produced from ‘branch material’ to create the appearance of a knot.

f) be of a dimension not greater than 6 mm above the maximum limit of knot size for the specified class; (the width of a non-cylindrical plug shall be not more than 30 mm);

g) have at least 2/3 of its diameter within the face when occurring at an arris.

In the case of an abnormally elongated knot or defect not more than two plugs shall be used. Not more than one plug shall be used for a single repair below a translucent coating.

NOTE 2 The intersecting of plugs is permitted.

NOTE 3 A plug need not necessarily be cylindrical.

The repair of a knot shall be classified as a sound intergrown knot.

Where surfaces or defects are required to be filled the filler shall be compatible with the end use of the timber and shall completely fill the hole or shake. Fillers used in weather exposed faces shall be weather-resistant.

NOTE 4 Consideration should be given to the compatibility of a filler with any applied coating.

Table 1 — Limits of timber features according to class and face

Features		Classes						
		J2	J5	J10	J20	J30	J40	J50
		A	B	C	D	E	F	G
1	Spiral grain	Not permitted	Not permitted	≤ 10 mm/m	≤ 10 mm/m	≤ 10 mm/m	≤ 20 mm/m	≤ 20 mm/m
2	Slope of grain[c]	≤ 20 mm/m	≤ 20 mm/m	≤ 50 mm/m	≤ 50 mm/m	≤ 50 mm/m	≤ 100 mm/m	No limit
3	Knots[a]							
	Max % of the face or --- max. diameter	10 --- 2 mm	20 --- 5 mm	30 --- 10 mm	30 --- 20 mm	30 --- 30 mm	40 --- 40 mm	50 --- 50 mm
4	Resin pockets, bark pockets(if more than one per metre total length shall not exceed length given for class)	Not Permitted	≤ 3 mm x 30 mm per 2 m length	≤ 3 mm x 75 mm per 2 m length	≤ 3 mm x 75 mm per 2 m length	≤ 3 mm in width No limits is applied to length	≤ 3 mm in width No limits is applied to length	≤ 3 mm in width No limits is applied to length
5	Fissures, shakes	Not permitted	Not permitted					
	Max. width			0,5 mm	0,5 mm	1,5 mm	1,5 mm	1,5 mm
	Max. individual length of fissure			50 mm	100 mm	200 mm	300 mm	300 mm
	Max. aggregate length of fissures as a percentage of the length of each face			10 %	10 %	25 %	50 %	50 %
6	Exposed pith	Not permitted	Not permitted	Not permitted	Not permitted	permitted	permitted	permitted
7	Discoloured sapwood (inc.blue stain)[b]	Not permitted	Not permitted	Not permitted	Not permitted	Permitted if repaired	Permitted if repaired	Permitted if repaired
8	Ambrosia beetle damage	Not permitted	Not permitted	Permitted if repaired	Permitted if repaired	Permitted if repaired	Permitted if repaired	Permitted if repaired

[a] The limit on knot size is expressed as a percentage of the overall width or thickness of piece on which the knot or knot cluster occurs (see Annex A) subject to a maximum knot size expressed in mm.

[b] In classes J30-J50 blue stain may be concealed by the application of a specific treatment (e.g. lightly coloured varnish).

[c] Slope of grain is measured in an undisturbed area.

NOTE Any feature is accepted on a concealed face if the serviceability of the product is not impaired.

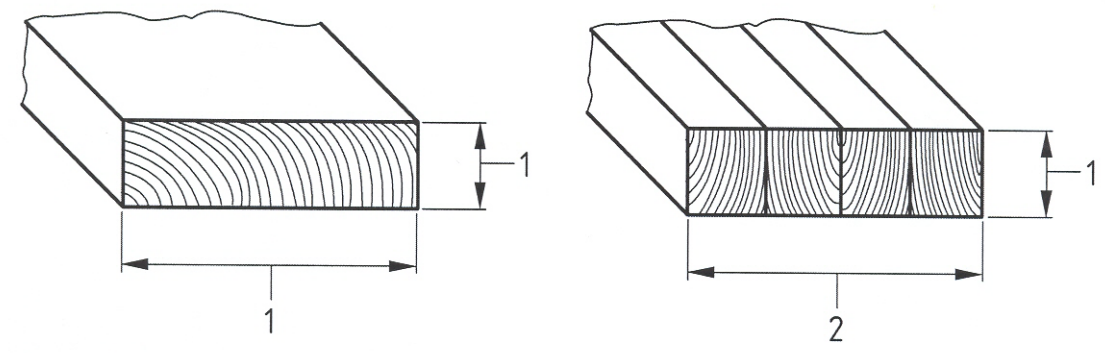
Table 1 sets limits for each feature relative to the specific class declared. These limits shall not be exceeded when a specific class is specified. For example, for Class J20 criteria D1 to D8 shall not be exceeded.

Where the same class is not required for each relevant feature the manufacturer shall declare the difference using Table D.1 (See example given in Table D.2).

Annex A
(normative)

Measurement of dimensions of finished pieces

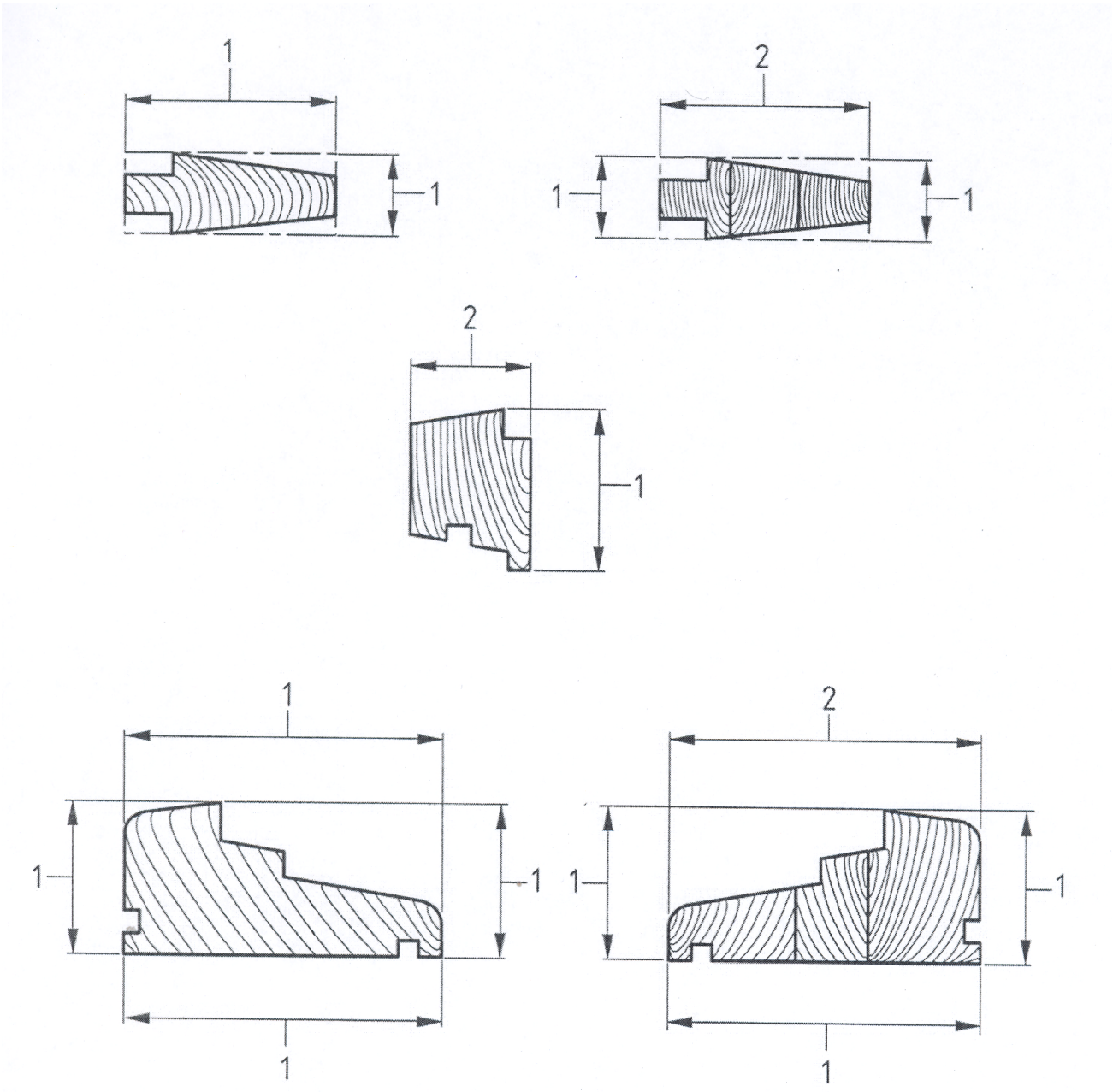
For the purpose of determining the size of a knot in relation to the face on which it occurs, the dimensions of finished pieces shall be measured as shown in Figure A.1 and A.2.



Key

1 Dimension of the finished piece
2 Dimension of the finished piece

Figure A.1 — Dimensions of finished rectangular sections



Key

1 Dimensions of the finished piece
2 Dimension of the finished piece

Figure A.2 — Dimensions of finished moulded sections

Annex B
(informative)

Guide to moisture content in joinery

Table B.1 — Moisture content of solid timber by categories related to in service climates

Category	Sub-category based on intended in-service climates	Moisture content range in %
External joinery		12 to 19
Internal joinery	For unheated buildings	12 to 16
	For buildings with heating providing room temperatures of 12 °C to 21 °C	9 to 13
	For buildings with heating providing room temperatures in excess of 21 °C	6 to 10
NOTE 1 These values cover general European requirements. More restrictive values may be requested for particular destinations or applications. NOTE 2 Joinery at an average of 6 % to 10 % moisture content may only be available by special order or agreement and should be the subject of special protection and storage to maintain its condition		

Annex C
(informative)

Guide to specifying timber in joinery

C.1 information to be supplied

The following should be stipulated:

a) common and scientific names of the species required;

b) required class or classes of timber according to Table 1, taken from the choices offered;

c) required subcategory of moisture content selected from the relevant product standard or Annex B;

d) purpose for which the joinery is intended when installed;

e) whether finishes are to be translucent or opaque.

C.2 Identifying characteristics, techniques or remedies and their acceptability with visible surfaces

Where it is intended that joinery will have a visible surface, it should be considered whether any of the following are unacceptable.

a) The use of:
   1) laminating without end or finger jointing in the laminations;
   2) laminating with end or finger jointing in the laminations;
   3) finger-jointing of solid sections;
   4) edge-jointing.

b) The use of remedial work where the following natural features occur:
   1) loose or unsound knots;
   2) shakes;
   3) resin pockets or bark pockets;
   4) exposed pith;
   5) damage arising from ambrosia beetle attack.

NOTE 1 The specifier should be aware that identifying the unacceptability of any of the foregoing will almost certainly result in increased cost. Where too stringent a restriction is imposed it may be more economical to select a higher class of timber.

NOTE 2 In joinery, when filled shakes are not acceptable, a class of timber higher than class J40 should be specified.

c) discoloured sapwood.

d) timber with areas of high absorption.

Where some species are to be finished with a decorative stain or varnish, it is necessary to specify that there should be no significant surface area of high porosity.

NOTE 3 Where logs have been stored in water or spayed with water for long periods, areas of irregular surface absorption may be caused which may affect the application of a decorative stain or varnish.

Annex D
(informative)

The selection of timber species for use in joinery

D.1 General

The selection of timber species for a particular item of joinery requires considering several criteria such as aesthetic, commercial, mechanical, durability, serviceability and workability criteria.

A list of possible criteria is given below, however, for a particular application, not all of the criteria's need to be considered and of those which are relevant, some are of more importance than others.

D.2 Aesthetic criteria

- Colour;
- Figure;
- Suitability to accept finishes;
- Texture: fine, medium or coarse.

D.3 Commercial criteria

- Availability: regular, variable or limited;
- Availability in veneer form;
- Cost: low, medium or high;
- Dimensions normally available.

D.4 Mechanical criteria

- Density;
- Hardness: resistance to surface abrasion;
- Rate of growth;
- Slope of grain;
- Strength.

D.5 Durability criteria

- Natural durability: defined in EN 460;

- Treatability by preservatives: defined in EN 350 –2

D.6 Serviceability criteria

- Dimensional movement: small, medium or large (shrinkage coefficient);

D.7 Workability criteria

- Ease of bending: very good to poor;

- Kilning: easy to difficult/fast to slow;

- Machining: good, medium, difficult.

- Gluing: good or variable;

Detailed information on the characteristics of particular timber species is available from a number of sources. Such information may also refer to characteristics of certain species such as the possibility of resin exudation occurring, the presence of mineral deposits, odour, and the likelihood of staining occurring when in contact with other materials in damp conditions.

Guidance on the relative importance of the technical criteria included above is given in the relevant product standards.

Table D1 may be used to select the classification of individual features for a particular species, product or specification. Copying of this form is permitted. The classes to be selected for each feature should be those given in Table 1 of this document. Where a product or component is covered by a specific Product Standard and it is intended to deviate from the grading requirements for some of the features of that Product Standard, the classes which are unaltered should be identified in the table. An example is given in Table D.2.

Table D.1 — Timber grading for a particular product

	Type of product				
	Product Standard	**No**	**yes**	**EN number**	
	Timber species (EN 13556)				
	Minimum density kg/m^3				
	Moisture content				
		Classes as described in EN 942 Table 1			
	Features (See EN 942 Table 1)	**Visible face**	**Semi-concealed face** [c]	**concealed face** [c]	**Product standard – Classes/requirements**
1	Spiral grain				
2	Slope of grain				
3	**Knots**[a] Max % of the face or Max. diameter				
4	Resin pockets, bark pockets (if more than one per metre total length shall be not exceed length given for class)				
5	**Fissures, shakes** Max. width Max. individual length of fissure Max. aggregate length of fissures as a percentageof the length of each face				
6	Exposed pith				
7	Discoloured sapwood (incl. Blue stain)[b]				
8	Ambrosia beetle damage				
	Additional characteristics ***Acceptable/non acceptable***				
9	Sapwood				
10	Growth rings				
11	Finger jointing				

(Continued)

12	End jointing				
13	Edge jointing				
14	Laminating				

[a] The limit on knot size is expressed as a percentage of the overall width or thickness of the piece on which the knot or knot cluster occurs (see Annex A) subject to a maximum knot size expressed in mm.

[b] In classes J30-J50 blue stain may be concealed by the application of a specific treatment (e.g. lightly coloured varnish).

[c] Unless otherwise indicated, semi-concealed face in the same product may be graded to one class lower and concealed faces may be any class.

NOTE Any feature is accepted on a concealed face if the serviceability of the product is not impaired.

Table D.2 — Example of table use

	Type of product	**Internal timber screen**			
	Product standard	**No**	**Yes**	**EN number**	**N/a**
	Timber species	**Sweet chestnut**			
	Minimum density kg/m^3				
	Maximum moisture	**15 %**			
		Classes as described in EN 942 – Table 1			
	Feature (see EN 942 – Table 1)	**Visible face**	**Semi-concealed face**	**concealed face**	**Product/stand. Classes/requirements.**
1	Spiral grain	J20 (D1)*	J20 (D1)	J40 (F1)	
2	Slope of grain	J20 (D2)			
3	**Knots**	J5 (A3)	J30 (E3)		
	Max % of the face or	20			
	Max.diameter	5 mm			
4	Resin pockets, bark pockets (if more than one per metre total length shall be not exceed length given for class	J 10 (C4)		J3 (E4)	
5	**Fissures, shakes**				
	Max. width	J20 (D5)			
	Max. individual length of fissure	J40 (F5)		J40 (E5)	
	Max. aggregate length of fissures as a percentage of the length of each face	J30 (E5)		J40 (E5)	
6	Exposed pith	J2 (A6)			
7	Discoloured sapwood (inc.blue stain)	J30 (E7)			
8	Ambrosia damage	J2 (A8)			
9	Sapwood	Not permitted			
10	Growth rings	10 cm			
11	Finger jointing	Not permitted		Permitted	
12	End jointing	Not permitted		Permitted	
13	Edge jointing	Not permitted	Permitted		
14	Laminating	Permitted			

* Designation in brackets (e.g.(D1)) indicates column and row from Table 1

Bibliography

[1] EN 335-2, *Durability of wood and wood-based products - Definition of use classes - Part 2: Application to solid wood*

[2] EN 351-1, *Durability of wood and wood-based products - Preservative-treated solid wood - Part 1: Classification of preservative penetration and retention*

[3] EN 460, *Durability of wood and wood-based products - Natural durability of solid wood - Guide to the durability requirements for wood to be used in hazard classes*

[4] EN 13556, *Round and sawn timber – Nomenclature of timbers used in Europe*

[5] EN 13986, *Wood-based for use in construction - Characteristics, evaluation of conformity and marking*

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

[7] prCEN/TS 13307-2*, Timber blanks and semi-finished profiles for non-structural uses – Part 2: Production control and testing*

[8] EN 14220*, Timber and wood-based materials in external windows, external door leaves and external doorframes – Requirements and specifications*

[9] EN 14221*, Timber and wood-based materials in internal windows, internal door leaves and internal doorframes - Requirements and specifications*

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National annex NA (informative)
Some species and their suitability for use in joinery

Table NA.1 gives guidance on some species of softwood and their suitability for use in joinery.

Table NA.2 gives similar guidance on some species of hardwood.

Table NA.1 — Some species of softwood and their suitability for use in joinery

Item	**Species** (see note 1)	**Characteristics** (see note 2)	**Average density at 15 % moisture content**	**Workability**	**Dimensional movement**	**Suitability**		
						External joinery (see note 3)		**Internal joinery**
						Sills and thresholds for door frames	**Other**	
			kg/m^3					
1	Douglas fir (*Pseudotsuga menziesii*)	Pale reddish brown heartwood, paler sapwood. Growth rings clearly defined and inclined to show through paint. Discolours in contact with ferrous metal. Non-ferrous fittings and fastenings are recommended. Long clear lengths available.	530	B	S	SW	SW	SW
2	Hemlock, western (*Tsuga heterophylla*)	Pale brown in colour. Growth rings distinguishable. Straight grain, fine even texture. Shipments include amabilis fir (less dense, less strong). Good paint performance in service. Long clear lengths available.	470 to 500	A	S	SPC	SP	SW
3	Parana pine (*Araucaria angustifolia*)	Golden brown sometimes with red streaks. Straight grain, fine uniform texture, generally available knot free. Liable to distort on machining. Good paint performance in service.	550	A	M	X	X	SW
4	Pine, lodgepole (*Pinus contorta*)	Heartwood yellow to pale brown tinged with red, paler sapwood. Where present, knots are small and tight. Resinous smell. Fine even texture, straight grained. Paints well.	470	A	S	SPC	SP	SW

Table NA.1 — Some species of softwood and their suitability for use in joinery

Item	**Species** (see note 1)	**Characteristics** (see note 2)	**Average density at 15 % moisture content**	**Workability**	**Dimensional movement**	**Suitability**		
						External joinery (see note 3)		**Internal joinery**
						Sills and thresholds for door frames	**Other**	
			kg/m^3					
5	Pine, ponderosa (*Pinus ponderosa*)	Very wide pale yellow sapwood. Dark yellow to reddish brown heartwood, with fine prominent resin ducts. Paints well, but resin exudation can be troublesome.	480	A	S	SPC	SP	SW
6	Pine, southern (*Pinus echinata P. taeda* and others)	Yellowish/reddish brown resinous heartwood, paler sapwood. Growth rings distinct, coarse appearance. Paints fairly satisfactorily.	590	A	M	SP	SP	SW
7	Pine, sugar (*Pinus lambertiana*)	Pale straw to reddish brown heartwood, white sapwood. Soft even texture. Paints well.	430	A	S	SPC	SP	SW
8	Redwood: Scots pine (*Pinus sylvestris*)	Pale yellowish brown to red brown heartwood, pale sapwood. Medium texture. Growth rings clearly marked. Good paint performance in service.	510	B	M	SPC	SP	SW
9	Western red cedar (*Thuja plicata*)	Variable reddish brown heartwood, distinct white sapwood. Straight grain, coarse texture. Discolours in contact with ferrous metal if damp. Non-ferrous fittings and fastenings are recommended. Good paint performance in service. Particularly suited to exterior use.	390	B	S	SWC	SW	SW

Table NA.1 — Some species of softwood and their suitability for use in joinery

Item	Species (see note 1)	Characteristics (see note 2)	Average density at 15 % moisture content	Workability	Dimensional movement	Suitability		
						External joinery (see note 3)		Internal joinery
						Sills and thresholds for door frames	Other	
			kg/m^3					
10	Whitewood (*Picea abies and Abies alba*)	White to pale yellowish brown. Straight grain, rather fine texture. Good paint performance in service.	470	A	M	SPC	SP	SW

NOTE 1 This is not a comprehensive list of suitable species. There are other species which are suitable for joinery but which may not be readily available in the UK. Timbers are listed in alphabetical order and are not in order of importance or according to extent of use.

NOTE 2 The characteristics described are for information only and do not form part of the requirements of this standard.

NOTE 3 Where sapwood is present in external joinery, preservative treatment is necessary even where it is shown as suitable without preservative treatment (SW).

NOTE 4 The key for workability is as follows:

A easily worked on bench or machine

B average workability

The key for dimensional (moisture related) movement is as follows:

S small

M medium

The key for external and internal joinery is as follows:

SW suitable without preservative treatment

SWC suitable without preservative treatment if covered (see note 5)

SP suitable if preservative treated in accordance with BS 5589

SPC suitable if preservative treated in accordance with BS 5589 and if covered (see note 5)

X unsuitable

NOTE 5 Specifies marked as SWC or SPC are suitable for sills and thresholds of external doors if fitted with a suitably designed protective cover over the area where shoes are likely to land.

NOTE 6 Dark finishes absorb more heat than pale finishes, hence dark finishes are more likely to cause resin exudation, shakes and increased timber movement.

NOTE 7 Even those timbers shown as suitable for external use can suffer photo-degradation of exposed external surfaces if a non-opaque finish is applied.

NOTE 8 It should be noted that colour variations in timber occur.

NOTE 9 More detailed information can be found in *"A Handbook of Softwoods"*, 1977, published by and available from the Building Research Establishment, Garston, Watford, Herts WD2 7JR.

NOTE 10 See BS 7359:1991 *Nomenclature of commercial timbers including sources of supply.*

Table NA.2 — Some species of hardwood and their suitability for use in joinery

Item	**Species** (see note 1)	**Characteristics** (see note 2)	**Average density at 15 % moisture content**	**Workability**	**Dimensional movement**	**Suitability**		
						External joinery (see note 3)		**Internal joinery**
						Sills and thresholds for door frames	**Other**	
			kg/m^3					
1	Abura (*Hallea ciliata*)	Pale brownish coloured heartwood and sapwood, plain appearance. Medium/fine texture. Tendency to split on nailing. Stains well.	580	B	S	X	X	SW
2	Afrormosia (*Pericopsis elata*)	Deep brown heartwood, pale brown sapwood. Medium/fine texture. Discolours in contact with ferrous metal if damp. Pre-bore for nailing.	710	B	S	SW	SW	SW
3	Afzelia (*Afzelia spp.*)	Reddish brown timber, straw coloured sapwood. Grain often interlocked, texture coarse. Pre-bore for nailing. Can stain masonry and textiles if damp.	830	C	S	SW	SW	SW
4	Agba (*Gossweilerodendron balsamiferum*)	Pale pinkish brown heartwood of uniform appearance, sapwood slightly paler (border sometimes indistinct) (see also note 3). Medium texture. Resin, resinous odour frequent.	510	B	S	SWC	SW	SW
5	Ash, American (*Fraxinus americana, F. nigra* and others)	Coarse texture, Sapwood nearly white, White ash heartwood greyish brown, tough. Black ash darker, lower density, less tough.	660	B	S	X	X	SW
6	Ash, European (*Braxinus excelsior*)	Generally white to pale brown. Medium/coarse texture. Very good bending timber, very tough.	710	B	M	X	X	SW
7	Beech, European (*Fagus sylvatica*)	Pale reddish brown; if steamed, pink. Fine even texture. Good bending. Stains, polishes well.	720	A/B	L	X	X	SW

Table NA.2 — Some species of hardwood and their suitability for use in joinery

Item	Species (see note 1)	Characteristics (see note 2)	Average density at 15 % moisture content	Workability	Dimensional movement	Suitability		
						External joinery (see note 3)		Internal joinery
						Sills and thresholds for door frames	Other	
			kg/m^3					
8	Birch, yellow (*Betula alleghaniensis*)	Wide variation in colour from cream to reddish brown, can include sweet birch (denser, darker). Fine even texture. Stains and polishes well.	700	B	L	X	X	SW
9	Cedar, Central and South American (*Cedrela odorata, C. fissilis*)	Colour (pale to dark reddish brown) and properties highly variable. Very low density. Occasional interlocked grain, coarse texture. Fragrant odour. Resin exudation, resin pockets may occur.	480	B	S	SWC	SW	SW
10	Cherry, American (*Prunus serotina*)	Colour varies from pale straw to reddish brown. Straight fine grain, fine texture. Pith flecks and small gum pockets are common. Stains, polishes well.	590	B	M	X	X	SW
11	Chestnut, sweet (*Castanea sativa*)	Yellowish brown heartwood, similar to oak. Sapwood distinct. Coarse texture, tendency to spiral grain. Discolours in contact with ferrous metal if damp. Non-ferrous fittings or fastenings are recommended.	560	B	S	SW	SW	SW
12	Elm (*Ulmus spp.*)	Pale greyish brown. Straight but sometimes interlocked grain, coarse texture. Good bending properties.	580	B	M	X	X	SW
13	Guarea a) *(Guarea cedrate)* b) *(Guarea thompsonii)*	Can be bought separately. Pinkish brown colour, sapwood pale. Fine texture, often interlocked grain. a) occasionally exudes resin.	a) 590 b) 640	B B	S S	SW SW	SW SW	SW SW

Table NA.2 — Some species of hardwood and their suitability for use in joinery

Item	**Species** (see note 1)	**Characteristics** (see note 2)	**Average density at 15 % moisture content**	**Workability**	**Dimensional movement**	**Suitability**		
						External joinery (see note 3)		**Internal joinery**
						Sills and thresholds for door frames	**Other**	
			kg/m^3					
14	Fdigbo (*Terminalia ivorensis*)	Yellowish to pale yellowish brown colour heartwood, sapwood somewhat paler (see note 3). Coarse texture. Discolours in contact with ferrous metal, can stain masonry if damp. Non-ferrous fittings or fastenings are recommended.	560	B	S	SW	SW	SW
15	Iroko (*Milicia excelsa and m. regia*)	Colour varies from yellowish brown to dark brown, with pale yellow sapwood. Interlocked grain, coarse texture. Very hard, strong.	660	B/C	S	SW	SW	SW
16	Keruing (*Dipterocarpus spp.*)	Numerous species of similar characteristics. Pinkish brown to dark brown heartwood, plain appearance. Sapwood grey. Straight grain, occasionally interlocked. Exudes resin, sometimes making finishing troublesome. Prone to severe distortion during drying.	740	B	M/L	SW	SW	X
17	Lauan, Meranti, Seraya (*Shorea spp. Parashorea spp.*)	Name depends on origin: Philippines, Malaysia/Indonesia, Sabah respectively. Produced from numerous species, the timber is sold in a wide variety of colour (dark red, red, light red, yellow, white) with widely varying characteristics. Those with higher density are generally stronger, stiffer and more durable than those with lower density. Interlocked grain, coarse texture.	Dark red 710 Light red 550	A/B A/B	S S	SP SP	SP SP	SW SW
18	Mahogany, African (*Khaya spp.*)	Reddish brown heartwood, yellowish brown sapwood. Interlocked grain, moderately coarse texture.	530	B	S	SW	SW	SW

Table NA.2 — Some species of hardwood and their suitability for use in joinery

Item	Species (see note 1)	Characteristics (see note 2)	Average density at 15 % moisture content	Workability	Dimensional movement	Suitability		
						External joinery (see note 3)		Internal joinery
						Sills and thresholds for door frames	Other	
			kg/m^3					
19	Mahogany, American (*Swietenia spp.*)	Pale to dark reddish brown. Some interlocked grain, texture slightly coarse; gives excellent finish	560	B	S	SW	SW	SW
20	Makoré (*Tieghemella heckelii*)	Lustrous, pinkish brown to dark red heartwood, paler sapwood. Straight grain, fine texture. Discolours in contact with ferrous metal. Tends to split on nailing.	640	C	S	SW	SW	SW
21	Maple rock (*Acer saccharum*)	Pale brown heartwood, white sapwood. Straight gain, fine texture. A strong, taut timber, bends well. Stains, polishes well.	740	B	M	X	X	SW
22	Maple, soft (*Acer rubrum A. Saccharinum*)	Creamy white heartwood, sapwood indistinct. Similar to rock maple but softer, less strong	610	B	M	X	X	SW
23	Niangon (*Heritiera utilis, H. densiflora*)	Pale sapwood, pink to reddish-brown heartwood. Interlocked grain gives stripey appearance, affects machining.	640	B	M	SW	SW	SW
24	Oak (*Quercus spp.*) a) American, red b) American, white c) European d) Japanese	Colour varies, depending on species, from pale yellow brown to reddish mid brown. Sapwood distinct, paler. Straight grain, all species medium texture except c), which may be coarse. Discolours in contact with ferrous metals. Non-ferrous fittings and fastenings are required. Nailing difficult, pre bore. Difficult to dry, tendency to check, split and honeycomb.	 a) 790 b) 770 c) 720 d) 670	 B B B B	 M M M H	 X SW SW X	 X SW SW X	 SW SW SW SW
25	Obeche (*Triplochiton scleroxylon*)	Pale straw coloured. Interlocked grain, moderately coarse even texture. A stable, lightweight, easy to work timber. Stains well. Not suitable for stairs.	390	A	S	X	X	SW

Table NA.2 — Some species of hardwood and their suitability for use in joinery

Item	**Species** (see note 1)	**Characteristics** (see note 2)	**Average density at 15 % moisture content**	**Workability**	**Dimensional movement**	**Suitability**		
						External joinery (see note 3)		**Internal joinery**
						Sills and thresholds for door frames	**Other**	
			kg/m^3					
26	Poplar American, yellow (*Liriodendron tulipifera*)	Yellowish to olive brown heartwood with some dark streaks, whitish sapwood. Straight grain, fine even texture. Smooth finish, good nailing and staining.	510	A	M	X	X	SW
27	Ramin (*Gonystylus spp.*)	White to pale straw colour. Straight grain, fine texture. Splits on nailing. Stains well. Not suitable for stairs.	670	A	L	X	X	SW
28	Sapele (*Entandrophragma cylindricum*)	Medium to dark reddish brown heartwood with a pronounced stripe. Sapwood whitish. Interlocked grain, fine texture.	640	B	M	SW	SW	SW
29	Sycamore (*Acer pseudoplatanus*)	White to yellowish, lustrous. Generally straight grain, fine even texture.	630	B	M	X	X	SW
30	Teak (*Tectona grandis*)	Golden brown heartwood sometimes with dark markings, pale yellowish brown sapwood. Straight or wavy gain, coarse texture. Very stable. Pre-boring recommended for nailing.	660	C	S	SW	SW	SW
31	Utile (*Entandrophragma utile*)	Reddish or purplish brown heartwood, pale sapwood. Interlocked grain, open texture.	660	B	M	SW	SW	SW
32	Walnut, African (*Lovoa trichilioides*)	Bronze brown heartwood, with occasional black streaks, distinct buff coloured sapwood. Interlocked grain, fine texture.	560	B	S	SW	SW	SW
33	Walnut, American (*Juglans nigra*)	Rich dark brown heartwood, pale sapwood. Grain varies from straight to curly, texture coarse.	660	B	SM	SW	SW	SW

Table NA.2 — Some species of hardwood and their suitability for use in joinery

Item	Species (see note 1)	Characteristics (see note 2)	Average density at 15 % moisture content	Workability	Dimensional movement	Suitability		
						External joinery (see note 3)		Internal joinery
						Sills and thresholds for door frames	Other	
			kg/m^3					
34	Wengé (*Millettia laurentii*)	Sapwood whitish, heartwood dark brown with fine blackish veining. Straight grained, coarse texture. Difficult to polish.	880	B	S	SW	SW	SW

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NOTE 3 Where sapwood is present in external joinery, preservative treatment is necessary even where it is shown as suitable without preservative treatment (SW).

NOTE 4 The key for workability is as follows:

A easily worked on bench or machine

B average workability

C difficult to work on bench

The key for dimensional (moisture related) movement is as follows:

S small

M medium

L large

The key for external and internal joinery is as follows:

SW suitable without preservative treatment

SP suitable when preservative treated in accordance with BS 5589

X unsuitable

SWC suitable without preservative treatment if covered (see note 5)

SPC suitable if preservative treated in accordance with BS 5589 and if covered (see note 5)

NOTE 5 Specifies marked as SWC or SPC are suitable for sills and thresholds of external doors if fitted with a suitably designed protective cover over the area where shoes are likely to land.

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