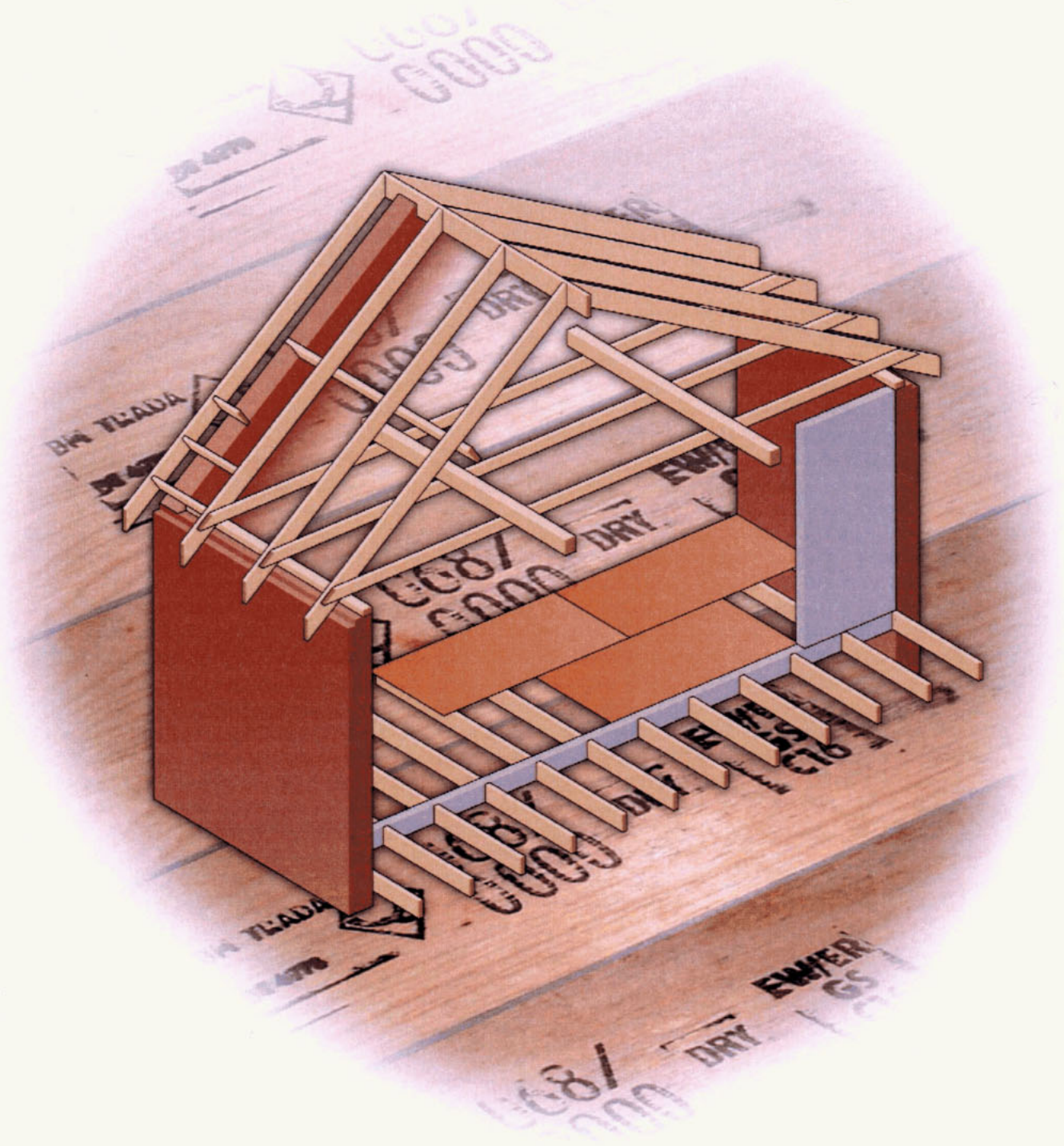




Span tables for solid timber members in floors, ceilings and roofs (excluding trussed rafter roofs) for dwellings



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Chiltern House Stocking Lane
Hughenden Valley High Wycombe
Buckinghamshire HP14 4ND UK
t: +44 (0)1494 569600 f: +44 (0)1494 565487
w: www.trada.co.uk e: information@trada.co.uk



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Preface

These span tables for solid timber members in floors, ceilings and roofs (excluding trussed rafters) for dwellings have been produced by TRADA Technology Ltd in support of the Building Regulations 2000 for England and Wales.

The span tables replace those which were previously included in Approved Document A Structure. They have been calculated in accordance with current Regulations and relevant Standards as detailed in the text.

This document solely deals with the loadbearing capacity of the solid timber members. There are many other aspects which must be considered in designing a floor, ceiling or roof which are not included here. In preparing this document we have assumed that the complete design will be undertaken by a competent person. The appropriate sections of the Regulations and relevant Standards should be consulted for guidance.

An increasing range of structural timber composites and engineered timber components is now available. They have the advantage of being available in long lengths and deep sections for large spans, they combine high strength with light weight and are manufactured to produce consistent structural properties and low moisture contents. Products readily available include:

- Glued laminated timber – Glulam
British Standards cover the manufacture and requirements for glued laminated timber. The design of components manufactured in accordance with these requirements is covered in *BS 5268-2: 2002 Code of practice for structural timber design. Permissible stress design materials and workmanship*.

Proprietary products which are not covered by British Standards, such as those listed below, are approved for use in the UK through European Technical Approvals or through independent third party product certification schemes. Design information is available from the approval certificates or from the manufacturers.

- Laminated veneer lumber – LVL
- Parallel strand lumber – PSL
- Laminated strand lumber - LSL
- Engineered components including components such as I-joists, manufactured with the flanges made of softwood or laminated veneer lumber (LVL) and the webs of plywood, oriented strand board or hardboard. Other configurations which combine timber flanges with metal strutting webs are also available.

TRADA

The Timber Research and Development Association (TRADA) - is an internationally recognised centre of excellence in the specification and use of timber and wood products.

TRADA is a not-for-profit membership-based company limited by guarantee. TRADA's origins go back over 70 years and its name is synonymous with independence and authority. Its position in the industry is unique with a diverse membership encompassing companies and individuals from around the world and across the entire timber supply chain, from producers, merchants and manufacturers, to architects, engineers and end users.

TRADA's aim is to provide members with the highest quality information on timber and wood products to enable them to maximise the benefits that timber can provide. This is achieved through active and on-going programmes of information and research. Information is provided through the website, www.asktrada.co.uk, an extensive collection of printed materials and training courses. Research is largely driven by the desire to update and improve information so that it continues to meet members' needs in the future.

TRADA Technology

TRADA Technology is the leading independent timber research, consultancy and information company for the construction industry. It is a member of the TTL Chiltern Group of companies and is TRADA's appointed provider for its Research and Information Programmes and for the administration of its Membership Services. Prior to 1994 the company was wholly owned by TRADA.

TRADA Technology also provides a wide range of commercial and training services not only to TRADA members but to the timber and construction industries as whole. Clients come from government and local authorities and throughout the construction supply chain, including architects, designers, specifiers, engineers, contractors and builders, in the UK and overseas.

Technical expertise is at the heart of TRADA Technology's business, working with clients to get the most from their timber products. Condition surveys on site, materials and products evaluation and expert witness services in the event of a dispute are all examples of consultancy services available. Specialist services include frameCHECK✓ (timber frame quality assessment) and environmental consultancy, addressing sustainability issues for timber companies and users.

1.0 Introduction

1.0.1

This document gives section sizes and spans of certain timber members for floors, ceilings, traditional pitched roofs (excluding trussed rafter roofs) and flat roofs which support the imposed loads shown in Table 1. It applies to buildings up to three storeys in height above ground level, used as single occupancy dwellings.

Table 1 Imposed loads for floors, ceilings and roofs

Member	Imposed loads not exceeding:	
	UDL (kN/m ²)	Concentrated load (kN)
Floor joists	1.5	1.4
Ceiling joists & binders	0.25	0.9
Rafters & purlins supporting rafters	0.75 or 1.0 *	0.9
Purlins supporting rafters	0.75 or 1.0 *	0.9
Flat roof joists:	Access limited	0.9
	Access unlimited	1.8
Purlins supporting sheeting or cladding	0.75 or 1.0 *	0.9

* See Table 3

1.0.2

The figures and sketches in this document are illustrative only and do not show detailed construction arrangements.



2.0 Timber specifications

2.0.1 Species and grade combinations which satisfy strength classes C16 and C24 to which Tables 6 to 45 relate are shown in Table 2 below and are also given in *BS 5268-2: 2002*.

Table 2 Common species/grade combinations which satisfy the requirements for the strength classes to which Tables 6 to 45 relate						
Species	Origin	Grading rule	C16	C18 †	C22 †	C24
Redwood	Europe	BS 4978	GS			SS
		BS EN 519	machine graded direct to strength class			
Whitewood	Europe	BS 4978	GS			SS
		BS EN 519	machine graded direct to strength class			
Douglas fir	UK	BS 4978		SS		
		BS EN 519	machine graded direct to strength class			
British pine	UK	BS 4978			SS	
		BS EN 519	machine graded direct to strength class			
British spruce	UK	BS 4978		SS		
		BS EN 519	machine graded direct to strength class			
Larch	UK	BS 4978	GS			SS
		BS EN 519	machine graded direct to strength class			
Sitka spruce		BS 4978		SS		
		J & P *	Sel			
Douglas fir-larch	Canada, USA	BS 4978	GS			SS
		J & P *	No1, No2			Sel
		BS EN 519	machine graded direct to strength class			
		NAMSR**	1450f-1.3E			1800f-1.6E
Hem fir	Canada, USA	BS 4978	GS			SS
		J & P *	No1, No2			Sel
		BS EN 519	machine graded direct to strength class			
		NAMSR**	1450f-1.3E			1800f-1.6E
Spruce-pine-fir	Canada, USA	BS 4978	GS			SS
		J & P *	No1, No2			Sel
		BS EN 519	machine graded direct to strength class			
		NAMSR**	1450f-1.3E			1800f-1.6E
Western whitewoods	USA	BS 4978		SS		
		J & P *		Sel		
Southern pine	USA	BS 4978		GS		SS
		J & P *	No3		No1, No2	Sel
		BS EN 519	machine graded direct to strength class			
		NAMSR**	1450f-1.3E			1800f-1.6E
Western red cedar	Canada	BS 4978		SS		

† For C18 or C22 grade timber, the tables for C16 timber should be used.

* J&P : Joist and plank grades to NGLA (National Lumber Grades Authority, Canada) and NGRDL (National Grading Rules for Dimension Lumber, USA) rules.

** NAMSR : North American machine stress-rated lumber.

An explanation of strength classes and strength grading is given in the *TRADA Wood Information Sheets 4 – 7 Timber strength grading and strength classes* and *4 – 29 Dry-graded structural softwood*.

- 2.0.2 A species grade combination from a higher strength class may be used where a lower strength class has been specified.
- 2.0.3 Tables 6 to 45 apply to dry-graded timber in dry environments as defined by service classes 1 or 2 to *BS 5268-2: 2002*. The timber is graded at an average moisture content of 20%, with no reading to exceed 24%. The timber should be transported, stored and installed in the building so that this level of moisture content is not exceeded.
- The timber should be marked with the following information:
- the species or species combination and grade, and/or the strength class
 - information to identify the company responsible for the grading
 - information to identify the certification body overseeing the grading
 - the grading rule eg *BS 4978*, *BS EN 519*
 - the word DRY or if kiln dried, KD - or whether surfaced dry or green in North America.
- 2.0.4 Target sizes and permissible deviations should be in accordance with *BS EN 336: 2003*.

2.1 Timber availability

- 2.1.1 The section sizes shown in Tables 6 – 45 are those listed in the National Annex to *BS EN 336: 2003* as being customary in the UK. However, not all the sizes shown are held in stock at timber and builders' merchants. Designers and specifiers should check on availability before specifying a particular size and should note that non-stock sizes may attract additional cost.

3.0 Design considerations

3.1 Loading

- 3.1.1 The imposed loads indicated in Tables 6 - 45 have been derived in accordance with *BS 6399-1: 1996* and *BS 6399-3: 1998*.
- 3.1.2 In the use of Tables 6 - 45, the snow loading zones applicable to roofs at particular sites are given in Figure 1.
- 3.1.3 The imposed roof loads shown in Table 3 are applicable only to small buildings as defined in *BS 6399-3: 1998* Clause 4.3.2.

Figure 1 Snow roof loading zones

Map reproduced by kind permission of BRE.

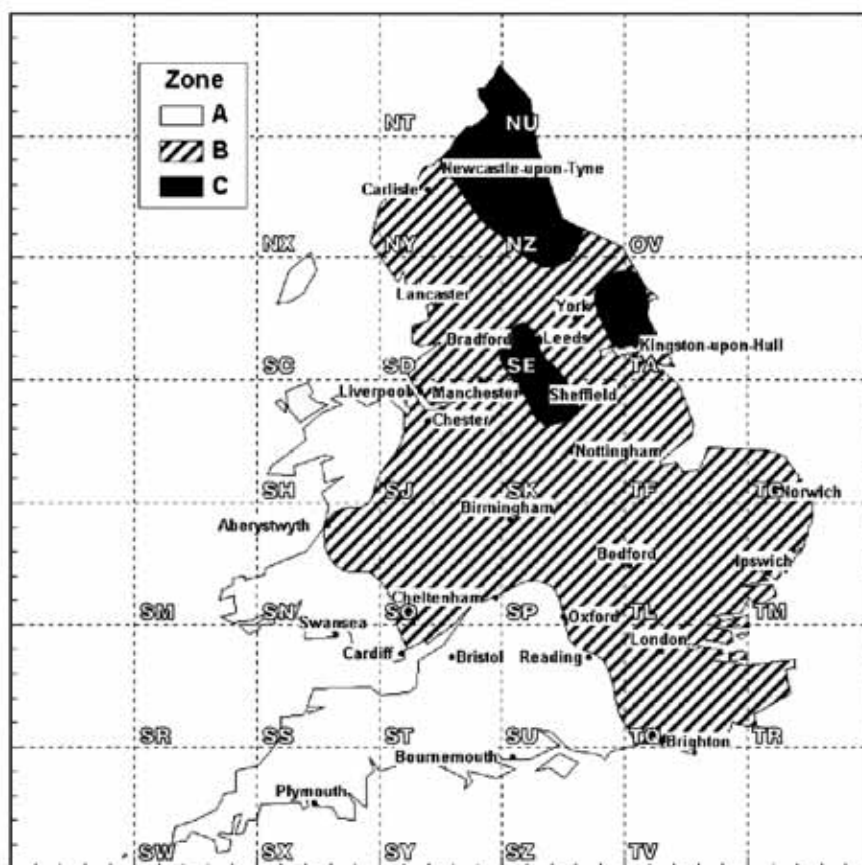


Table 3 Imposed snow roof loads for the zones defined in Figure 1

Zone	Imposed roof loads (kN/m ²)	
	Altitudes not exceeding 100 m	Altitudes exceeding 100 m but not exceeding 200 m
A	0.75	0.75
B	0.75	1.00
C	0.75	Use BS 6399-3

Note : For altitudes greater than 200 m refer to guidance given in *BS 6399-3*.

3.2 Construction and basic workmanship recommendations

- 3.2.1 Workmanship should comply with the relevant requirements of *BS 5268-2: 2002*.
- 3.2.2 Adequate connections between members should be provided, as specified by the building designer.
- 3.2.3 Notches and holes in simply supported floor and ceiling joists should be within the following limits:
- Notches** should be not deeper than 0.125 times the depth of a joist and should not be cut closer to the support than 0.07 of the span, nor further away than 0.25 times the span.
- Holes** should have a diameter not greater than 0.25 times the depth of a joist and should be drilled at the joist centreline. They should be not less than 3 diameters (centre to centre) apart and should be located between 0.25 and 0.4 times the span from the support.
- Notches or holes should not be cut in rafters, purlins or binders unless approved by the building designer.
- Rafters restrained by ceiling ties at eaves level may be birdsmouthed at supports to a depth not exceeding one third of the rafter depth.
- 3.2.4 Floor joists should be restrained at supports and points along the span using timber herringbone strutting or solid timber blocking, positioned as shown in Table 4. Proprietary herringbone strutting systems are also available; they should be used in accordance with the manufacturer's instructions.

Table 4 Strutting or blocking of joists

Joist span (m)	Rows of strutting or blocking between supports
Up to 2.5	None
2.5 to 4.5	1 at mid span
Over 4.5	2 at one third span positions

- 3.2.4.1 Timber herringbone strutting should be at least 38 x 38 mm but should not be used where the distance between joists is greater than 3 times their depth.
- 3.2.4.2 Solid blocking should be at least 38 mm thick.
- 3.2.4.3 Strutting and blocking should extend at least three-quarters of the joist depth.
- 3.2.4.4 At each end of a row of strutting the outer joist should be blocked solidly at the perimeter wall.
- 3.2.5 A traditional cut timber roof (ie one made using rafters, purlins and ceiling joists) generally has sufficient built in resistance to instability and wind forces. However, the building designer should consider whether the provision of bracing is appropriate, especially in the case of single-hipped and non-hipped roofs to detached houses with a pitch greater than 40°. Where required, bracing should be equivalent to that recommended for trussed rafter roofs in *BS 5268-3: 1998* or Annex H of *BS 8103-3: 1996*,

4.0 Tables of sizes of timber floor, ceiling and roof members

Figure 2 Key to Tables 6 - 45

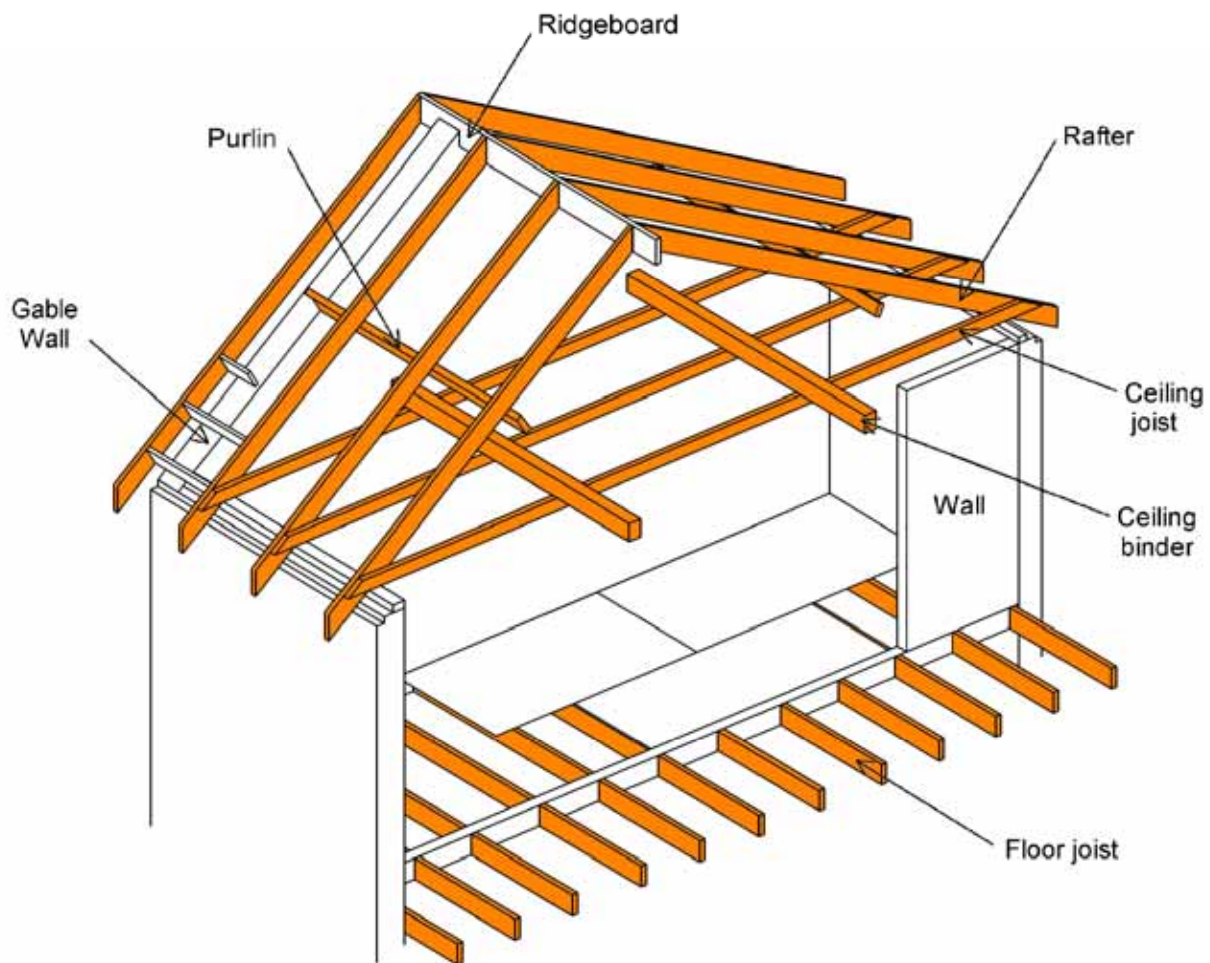


Table 5 Summary of Tables 6 - 45				
Construction	Timber members	Imposed loading not exceeding kN/m²	Strength classes	
			C16	C24
Floors	Joists	1.50	Table 6	Table 7
Ceilings	Joists	0.25	Table 8	Table 9
	Binders	0.25	Table 10	Table 11
Pitched roofs with slope of 15° or more but less than 22.5°	Rafters	0.75	Table 12	Table 13
	Purlins	0.75	Table 14	Table 15
	Rafters	1.00	Table 16	Table 17
	Purlins	1.00	Table 18	Table 19
Pitched roofs with slope of 22.5° or more but less than 30°	Rafters	0.75	Table 20	Table 21
	Purlins	0.75	Table 22	Table 23
	Rafters	1.00	Table 24	Table 25
	Purlins	1.00	Table 26	Table 27
Pitched roofs with slope of 30° to 45°	Rafters	0.75	Table 28	Table 29
	Purlins	0.75	Table 30	Table 31
	Rafters	1.00	Table 32	Table 33
	Purlins	1.00	Table 34	Table 35
Flat roofs: access for maintenance only	Joists	0.75	Table 36	Table 37
		1.00	Table 38	Table 39
Flat roofs: full access allowed		1.50	Table 40	Table 41
Roof sheeting or cladding for roofs with a slope of 10° - 35° inclusive	Purlins	0.75	Table 42	Table 43
		1.00	Table 44	Table 45

4.1 Floor joists

- 4.1.1 Tables 6 and 7 give permissible clear spans of simply supported domestic floor joists of solid timber for specified loadings, sizes and spacings calculated in accordance with *BS 5268- 7-1: 1989*.
- 4.1.2 The method of calculation makes no allowance for any contribution of the flooring to the load resistance of the joists.
- 4.1.3 The sizes, spacing and spans given in Tables 6 and 7 will support the dead loads stated in the tables together with an imposed load not exceeding 1.50 kN/m^2 .
- 4.1.4 Tables 6 and 7 make no allowance for concentrated or line loads applied by partitions, trimmers or other similar causes. Lightweight, non-loadbearing partitions which weigh no more than 0.8 kN (81.5 kg) per metre run and are parallel to the joists may be supported by one or two additional joists placed immediately beneath them. The partitions should be fixed through the floor decking into the joist(s) beneath. For the unshaded areas of Table 6 and 7, one additional joist is sufficient; for the shaded areas, two additional joists are required. For similar lightweight partitions which run at right-angles to the joists, the maximum spans in the Tables should be reduced by 10%. All joists beneath a bath should be doubled. For all other additional loads, joist sizes should be calculated by a competent person.
- 4.1.5 Unless justified by specialist calculation, the minimum bearing length at supports for floor joists should be 40 mm . However, it may sometimes be necessary to provide longer bearing to accommodate fixings or for other practical reasons.
- 4.1.6 Notching and drilling of floor joists should not exceed the limits given in 3.2.3.
- 4.1.7 The section sizes of floor joists given in Tables 6 and 7 should be machined on the width, ie the depth of the joist, or be ALS or CLS; to the tolerance classes specified in *BS EN 336: 2003*, Table NA 3 and NA 4 respectively, to enable floors and ceilings to be laid to a level finish.

Figure 3 Floor joists arrangement

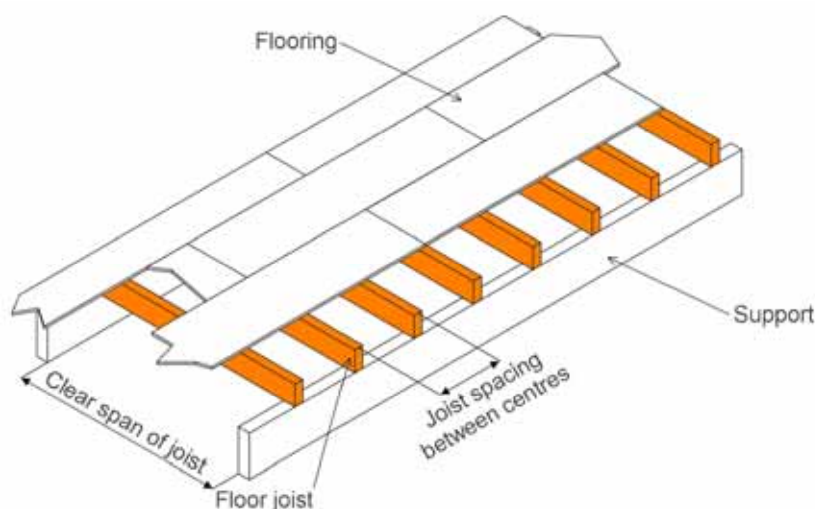


Table 6 Permissible clear spans for domestic floor joistsImposed load not exceeding 1.5 kN/m²

Strength Class C16

Service Class 1 or 2

Size of joist		Dead load (kN/m ²) excluding self-weight of joist								
		Not more than 0.25			More than 0.25 but not more than 0.50			More than 0.50 but not more than 1.25		
		Spacing of joists (mm)								
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600
Maximum clear span (m)										
38	97	1.84	1.70	1.31	1.73	1.56	1.22	1.43	1.31	1.04
38	120	2.45	2.34	1.88	2.33	2.17	1.72	1.91	1.76	1.42
38	145	2.96	2.84	2.49	2.83	2.69	2.30	2.43	2.26	1.84
38	170	3.46	3.33	2.89	3.30	3.12	2.70	2.82	2.66	2.28
38	195	3.96	3.78	3.28	3.75	3.54	3.07	3.21	3.03	2.62
38	220	4.46	4.23	3.67	4.20	3.96	3.44	3.59	3.39	2.93
44	97	1.97	1.86	1.50	1.87	1.77	1.39	1.59	1.46	1.17
44	120	2.58	2.47	2.14	2.46	2.36	1.94	2.12	1.95	1.58
44	145	3.11	2.99	2.68	2.97	2.85	2.51	2.62	2.47	2.05
44	170	3.63	3.49	3.11	3.48	3.34	2.91	3.03	2.86	2.48
44	195	4.16	4.00	3.53	3.98	3.81	3.30	3.45	3.25	2.82
44	220	4.68	4.51	3.95	4.48	4.26	3.70	3.86	3.64	3.16
47	97	2.03	1.92	1.59	1.93	1.82	1.47	1.67	1.53	1.23
47	120	2.63	2.53	2.26	2.52	2.42	2.05	2.22	2.05	1.66
47	145	3.17	3.05	2.77	3.04	2.92	2.59	2.70	2.55	2.15
47	170	3.71	3.57	3.21	3.55	3.42	3.00	3.14	2.96	2.56
47	195	4.25	4.09	3.64	4.07	3.91	3.41	3.56	3.36	2.91
47	220	4.75	4.61	4.08	4.58	4.39	3.82	3.99	3.76	3.26
50	97	2.10	1.98	1.68	1.98	1.88	1.55	1.75	1.61	1.29
50	120	2.69	2.58	2.33	2.57	2.47	2.15	2.29	2.14	1.74
50	145	3.24	3.12	2.83	3.10	2.98	2.67	2.78	2.63	2.24
50	170	3.79	3.65	3.31	3.63	3.49	3.10	3.23	3.05	2.64
50	195	4.34	4.17	3.76	4.15	3.99	3.52	3.67	3.47	3.01
50	220	4.82	4.69	4.20	4.67	4.50	3.94	4.11	3.88	3.36
63	97	2.33	2.21	1.93	2.20	2.09	1.83	1.94	1.85	1.54
63	120	2.90	2.79	2.54	2.78	2.67	2.42	2.50	2.40	2.05
63	145	3.50	3.36	3.06	3.35	3.22	2.92	3.01	2.89	2.56
63	170	4.09	3.93	3.58	3.91	3.77	3.42	3.52	3.39	2.97
63	195	4.67	4.50	4.10	4.48	4.31	3.92	4.03	3.88	3.37
63	220	5.10	4.96	4.61	4.94	4.80	4.41	4.54	4.34	3.77
75	120	3.07	2.96	2.69	2.94	2.83	2.57	2.65	2.54	2.29
75	145	3.70	3.56	3.24	3.54	3.41	3.10	3.19	3.07	2.78
75	170	4.32	4.16	3.79	4.14	3.99	3.63	3.73	3.59	3.23
75	195	4.87	4.73	4.34	4.72	4.56	4.15	4.27	4.11	3.67
75	220	5.32	5.17	4.82	5.15	5.01	4.67	4.77	4.63	4.11
ALS/CLS										
38	140	2.86	2.74	2.41	2.73	2.60	2.18	2.34	2.16	1.76
38	184	3.74	3.58	3.11	3.56	3.36	2.91	3.04	2.87	2.48
38	235	4.73	4.50	3.91	4.46	4.21	3.66	3.82	3.60	3.12
89	184	4.86	4.73	4.33	4.71	4.55	4.15	4.27	4.11	3.73
89	235	5.80	5.65	5.28	5.63	5.47	5.11	5.22	5.07	4.72
		See Clause 4.1.4								

Table 7 Permissible clear spans for domestic floor joistsImposed load not exceeding 1.5 kN/m²

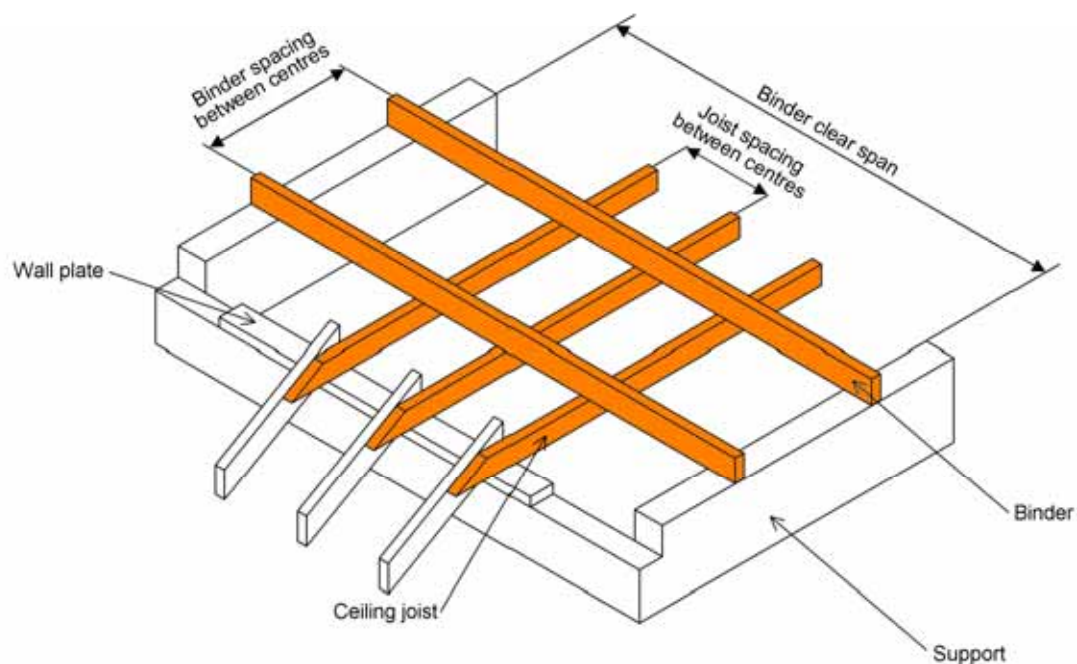
Strength Class C24

Service Class 1 or 2

Size of joist		Dead load (kN/m ²) excluding self-weight of joist								
		Not more than 0.25			More than 0.25 but not more than 0.50			More than 0.50 but not more than 1.25		
		Spacing of joists (mm)								
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600
		Maximum clear span (m)								
38	97	2.03	1.91	1.66	1.92	1.82	1.58	1.70	1.62	1.36
38	120	2.63	2.52	2.25	2.51	2.41	2.12	2.22	2.11	1.83
38	145	3.17	3.05	2.76	3.03	2.91	2.64	2.72	2.61	2.36
38	170	3.71	3.56	3.23	3.55	3.41	3.09	3.18	3.06	2.74
38	195	4.24	4.08	3.71	4.06	3.90	3.54	3.65	3.50	3.12
38	220	4.75	4.60	4.17	4.57	4.40	3.99	4.11	3.95	3.49
44	97	2.17	2.06	1.79	2.05	1.95	1.70	1.82	1.72	1.52
44	120	2.76	2.65	2.41	2.64	2.54	2.27	2.36	2.25	1.99
44	145	3.33	3.20	2.90	3.18	3.06	2.77	2.86	2.75	2.49
44	170	3.89	3.74	3.40	3.72	3.58	3.25	3.35	3.21	2.91
44	195	4.45	4.28	3.89	4.26	4.10	3.72	3.83	3.68	3.34
44	220	4.92	4.78	4.39	4.76	4.62	4.19	4.32	4.15	3.75
47	97	2.24	2.12	1.85	2.12	2.01	1.75	1.87	1.78	1.56
47	120	2.82	2.71	2.46	2.70	2.59	2.34	2.42	2.31	2.05
47	145	3.40	3.27	2.97	3.25	3.13	2.84	2.92	2.81	2.54
47	170	3.98	3.83	3.48	3.81	3.66	3.32	3.42	3.29	2.98
47	195	4.55	4.38	3.98	4.36	4.19	3.81	3.92	3.77	3.41
47	220	5.00	4.86	4.48	4.84	4.70	4.29	4.41	4.24	3.85
50	97	2.31	2.18	1.90	2.18	2.06	1.81	1.92	1.82	1.61
50	120	2.88	2.77	2.51	2.75	2.65	2.40	2.47	2.37	2.10
50	145	3.47	3.34	3.03	3.32	3.19	2.90	2.98	2.87	2.60
50	170	4.06	3.90	3.55	3.88	3.74	3.39	3.49	3.36	3.04
50	195	4.64	4.47	4.06	4.45	4.28	3.89	4.00	3.85	3.49
50	220	5.07	4.93	4.58	4.91	4.77	4.38	4.51	4.33	3.93
63	97	2.52	2.42	2.13	2.41	2.29	2.01	2.12	2.01	1.78
63	120	3.11	2.99	2.72	2.97	2.86	2.60	2.67	2.57	2.32
63	145	3.74	3.60	3.28	3.58	3.45	3.13	3.22	3.10	2.81
63	170	4.37	4.21	3.83	4.19	4.03	3.67	3.77	3.63	3.29
63	195	4.91	4.77	4.39	4.76	4.61	4.20	4.32	4.15	3.77
63	220	5.36	5.21	4.86	5.19	5.05	4.71	4.81	4.67	4.25
75	120	3.29	3.16	2.88	3.15	3.03	2.75	2.83	2.73	2.47
75	145	3.96	3.81	3.47	3.79	3.65	3.32	3.42	3.29	2.98
75	170	4.62	4.45	4.06	4.43	4.27	3.88	4.00	3.84	3.49
75	195	5.12	4.98	4.64	4.96	4.82	4.45	4.57	4.40	4.00
75	220	5.59	5.43	5.07	5.41	5.26	4.91	5.02	4.88	4.51
ALS/CLS										
38	140	3.06	2.94	2.67	2.93	2.81	2.55	2.63	2.52	2.25
38	184	4.01	3.85	3.50	3.83	3.69	3.34	3.44	3.31	2.95
38	235	4.98	4.84	4.46	4.82	4.68	4.26	4.39	4.21	3.71
89	184	5.11	4.97	4.64	4.95	4.81	4.44	4.57	4.40	4.00
89	235	6.09	5.93	5.55	5.91	5.75	5.37	5.49	5.33	4.97
		See Clause 4.1.4								

4.2 Ceiling joists and binders supporting ceiling joists

- 4.2.1 Tables 8 - 11 give permissible clear spans of simply supported ceiling joists and single span ceiling binders of solid timber used in traditional pitched roof constructions (ie excluding trussed rafter roofs) under specified loading, sizing and spacing conditions.
- 4.2.2 Permissible clear spans have been calculated in accordance with *BS 5268-7-3: 1989* and *BS 5268-7-4: 1989*. The ceiling joists may be continuous or composed of shorter lengths joined at the binder.
- 4.2.3 The method of calculating ceiling joist sizes does not take account of trimming (eg around flues) or other loads (eg water tanks).
- 4.2.4 The sizes, spacing and spans given in Tables 8 -11 will support the dead loads stated in the tables together with an imposed load not exceeding 0.25 kN/m^2 and a concentrated load of 0.9 kN , acting together.
- 4.2.5 Lateral support should be provided in accordance with *BS 5268-2: 2002*, Table 19. Therefore, unless additional is provided, eg boarding fastened to the upper surface of the ceiling joists, the depth to breadth ratio of the joists and binders should not exceed 4:1.
- 4.2.6 The minimum bearing length at supports for ceiling joists and binders should be 35 mm. However it is normal for ceiling joists to run across at least the full width of the wallplate to accommodate the fixings between ceiling joist and rafters.
- 4.2.7 Notching or drilling of ceiling joists and binders should not be carried out unless justified by specialist calculation.
- 4.2.8 The section sizes and tolerance classes of ceiling joists given in Tables 8 and 9 should be machined on the width, ie the depth of the joist, or be ALS or CLS, to the tolerance classes specified in *BS EN 336: 2003*, Table NA 3 and NA 4 respectively.
- 4.2.9 The section sizes of ceiling binders given in Tables 10 and 11 should be sawn sections; or be machined on the width, ie the depth of the binder, or be ALS or CLS; to the tolerance classes specified in *BS EN 336: 2003*, Table NA2, NA 3 and NA 4 respectively.

Figure 4 Ceiling joists and binders arrangement**Table 8 Permissible clear spans for ceiling joists**Imposed load not exceeding 0.25 kN/m^2

Strength Class C16 Service Class 1 or 2

		Dead load (kN/m ²) excluding self-weight of joist					
		Not more than 0.25			More than 0.25 but not more than 0.5		
Size of joist		Spacing of joists (mm)					
Breadth	Depth	400	450	600	400	450	600
(mm)	(mm)	Maximum clear span (m)					
38	72	1.15	1.14	1.11	1.11	1.10	1.06
38	97	1.74	1.72	1.67	1.67	1.65	1.58
38	120	2.33	2.29	2.21	2.21	2.17	2.08
38	145	2.98	2.94	2.82	2.82	2.76	2.62
38	170	3.66	3.60	3.43	3.43	3.36	3.18
38	195	4.34	4.26	4.05	4.05	3.97	3.74
38	220	5.03	4.93	4.68	4.68	4.57	4.30
47	72	1.27	1.26	1.23	1.23	1.22	1.18
47	97	1.93	1.90	1.84	1.84	1.81	1.74
47	120	2.56	2.52	2.43	2.43	2.38	2.27
47	145	3.27	3.22	3.08	3.08	3.02	2.87
47	170	4.00	3.93	3.74	3.74	3.67	3.46
47	195	4.73	4.64	4.41	4.41	4.31	4.07
47	220	5.47	5.36	5.08	5.08	4.96	4.67
ALS/CLS							
38	89	1.55	1.53	1.49	1.49	1.47	1.41
38	140	2.85	2.81	2.69	2.69	2.64	2.51
38	184	4.04	3.97	3.78	3.78	3.70	3.49

Table 9 Permissible clear spans for ceiling joists								
Imposed load not exceeding 0.25 kN/m ²								
Strength Class C24		Service Class 1 or 2.						
Size of joist		Dead loads (kN/m ²) excluding self-weight of joist						
		Not more than 0.25			More than 0.25 but not more than 0.5			
		Spacing of joists (mm)						
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	
		Maximum clear span (m)						
	38	72	1.27	1.26	1.23	1.23	1.21	1.17
	38	97	1.92	1.90	1.83	1.83	1.81	1.73
	38	120	2.55	2.52	2.42	2.42	2.38	2.27
	38	145	3.26	3.21	3.07	3.07	3.01	2.86
	38	170	3.99	3.92	3.74	3.74	3.66	3.46
	38	195	4.73	4.64	4.40	4.40	4.31	4.06
	38	220	5.46	5.36	5.08	5.08	4.96	4.66
	47	72	1.41	1.39	1.36	1.36	1.34	1.29
	47	97	2.12	2.09	2.02	2.02	1.99	1.90
	47	120	2.80	2.76	2.65	2.65	2.60	2.48
	47	145	3.57	3.51	3.36	3.36	3.29	3.12
	47	170	4.35	4.27	4.07	4.07	3.98	3.76
	47	195	5.14	5.04	4.78	4.78	4.68	4.40
	47	220	5.93	5.81	5.50	5.50	5.37	5.05
ALS/CLS								
	38	89	1.71	1.69	1.64	1.64	1.61	1.55
	38	140	3.12	3.07	2.94	2.94	2.89	2.74
	38	184	4.40	4.32	4.11	4.11	4.02	3.79

Table 10 Permissible clear spans for ceiling binders													
Imposed load 0.25 kN/m ²													
Strength Class C16 Service Class 1 or 2.													
Size of binder		Dead load (kN/m ²) excluding self-weight of binder and ceiling joist											
		Not more than 0.25						More than 0.25 but not more than 0.5					
		Spacing of binders (mm)											
		Maximum clear span (m)											
Breadth (mm)	Depth (mm)	1200	1500	1800	2100	2400	2700	1200	1500	1800	2100	2400	2700
47	150	2.20	2.08	1.99	1.91	1.84		2.01	1.89	1.80			
47	175	2.63	2.49	2.37	2.27	2.19	2.11	2.39	2.25	2.14	2.04	1.96	1.89
63	125	2.00	1.90	1.82				1.84					
63	150	2.48	2.35	2.24	2.15	2.07	2.00	2.26	2.13	2.03	1.94	1.86	
63	175	2.95	2.79	2.66	2.55	2.46	2.37	2.69	2.53	2.40	2.29	2.20	2.12
63	200	3.43	3.24	3.08	2.95	2.84	2.74	3.11	2.92	2.77	2.65	2.54	2.45
63	225	3.91	3.68	3.50	3.35	3.22	3.11	3.54	3.32	3.14	3.00	2.88	2.77
75	125	2.15	2.04	1.95	1.88	1.81		1.97	1.86				
75	150	2.65	2.51	2.40	2.30	2.22	2.15	2.42	2.28	2.17	2.07	1.99	1.92
75	175	3.16	2.98	2.84	2.72	2.62	2.54	2.87	2.70	2.56	2.45	2.35	2.27
75	200	3.66	3.45	3.29	3.15	3.03	2.93	3.32	3.12	2.96	2.83	2.71	2.62
75	225	4.16	3.93	3.73	3.57	3.44	3.32	3.77	3.54	3.36	3.20	3.07	2.96

Table 11 Permissible clear spans for ceiling binders													
Imposed load 0.25 kN/m ² Strength Class C24 Service Class 1 or 2													
Size of binder Breadth Depth (mm) (mm)		Dead load (kN/m ²) excluding self-weight of binder and ceiling joist											
		Not more than 0.25						More than 0.25 but not more than 0.5					
		Spacing of binders (mm)											
		1200	1500	1800	2100	2400	2700	1200	1500	1800	2100	2400	2700
Maximum clear span (m)													
47	150	2.39	2.27	2.16	2.08	2.00	1.94	2.19	2.06	1.96	1.87	1.80	
47	175	2.86	2.70	2.57	2.46	2.37	2.29	2.60	2.45	2.32	2.22	2.13	2.05
63	125	2.18	2.07	1.98	1.90	1.83		2.00	1.89				
63	150	2.69	2.54	2.43	2.33	2.24	2.17	2.45	2.31	2.20	2.10	2.02	1.95
63	175	3.20	3.02	2.88	2.76	2.66	2.57	2.91	2.74	2.60	2.48	2.38	2.30
63	200	3.71	3.50	3.33	3.19	3.07	2.96	3.37	3.16	3.00	2.86	2.75	2.65
63	225	4.22	3.97	3.78	3.62	3.48	3.36	3.82	3.59	3.40	3.24	3.11	3.00
75	125	2.33	2.21	2.12	2.03	1.96	1.90	2.14	2.02	1.92	1.84		
75	150	2.87	2.72	2.59	2.49	2.40	2.32	2.62	2.47	2.35	2.25	2.16	2.08
75	175	3.41	3.23	3.07	2.94	2.84	2.74	3.11	2.92	2.77	2.65	2.55	2.46
75	200	3.95	3.73	3.55	3.40	3.27	3.16	3.59	3.37	3.20	3.05	2.93	2.83
75	225	4.49	4.23	4.03	3.85	3.71	3.58	4.07	3.82	3.62	3.46	3.32	3.20

4.3 Rafters and purlins supporting rafters

- 4.3.1 Tables 12 to 35 give permissible clear spans of simply supported rafters and purlins of solid timber used in traditional pitched roof constructions with a slope from 15° to 45° under specified loading, sizing and spacing conditions.
- 4.3.2 The span tables do not apply to trussed rafter roofs.
- 4.3.3 Permissible clear spans have been calculated in accordance with *BS 5268-7-5: 1990*, and *BS 5268-7-6: 1990*. It is assumed that the rafters are non-continuous over the purlins, but they may be continuous. It is assumed that the purlins are single span members but they may be continuous over a support.
- 4.3.4 When the spans of the rafters or purlins are unequal the section sizes should be determined by the longest span.
- 4.3.5 For Tables 12 to 35 the values have been calculated according to *BS 5268-7* with an upper limit on the roof slope of 75° for the imposed snow load. This is not in accordance with *BS 6399-3* which sets the upper limit at 60°.
- 4.3.6 The method of calculation makes no allowance for any contribution of other parts of the roof structure or covering to the load carrying capacity of the rafters although it is assumed that the tiling battens are capable of providing lateral load distribution and lateral support.
- 4.3.7 The span tables cover “canted” purlins installed perpendicular to the slope of the roof. Horizontal thrust transmitted by the rafters is assumed to be restrained by the ceiling joists or other suitable means.
- 4.3.8 The sizes, spacing and spans given in Tables 12 - 35 will support the dead loads stated in the tables together with either an imposed load of 0.75 kN/m² or 1.0 kN/m² or a concentrated load of 0.9 kN.

See Figure 1 and Table 3 for guidance on the snow load relevant for a particular site.
- 4.3.9 For the purlins lateral support should be provided in accordance with *BS 5268-2: 2002*, Table 19. Therefore, unless additional support is provided, their depth to breadth ratio should not exceed 4:1.
- 4.3.10 Notching or drilling of rafters and purlins should not be carried out unless justified by specialist calculation.
- 4.3.11 Unless justified by specialist calculation, the minimum bearing length at supports for rafters should be 35 mm and 50mm for purlins. However it may sometimes be necessary to provide longer bearing to accommodate fixings or for practical reasons.
- 4.3.12 The section sizes of rafters and purlins given in Tables 12 - 35 should be sawn sections; or be machined on the width, ie the depth of the rafter or purlin, or be ALS or CLS; to the tolerance classes specified in *BS EN 336: 2003*, Table NA2, NA 3 and NA 4 respectively.

Figure 5 Typical rafters and purlin arrangement

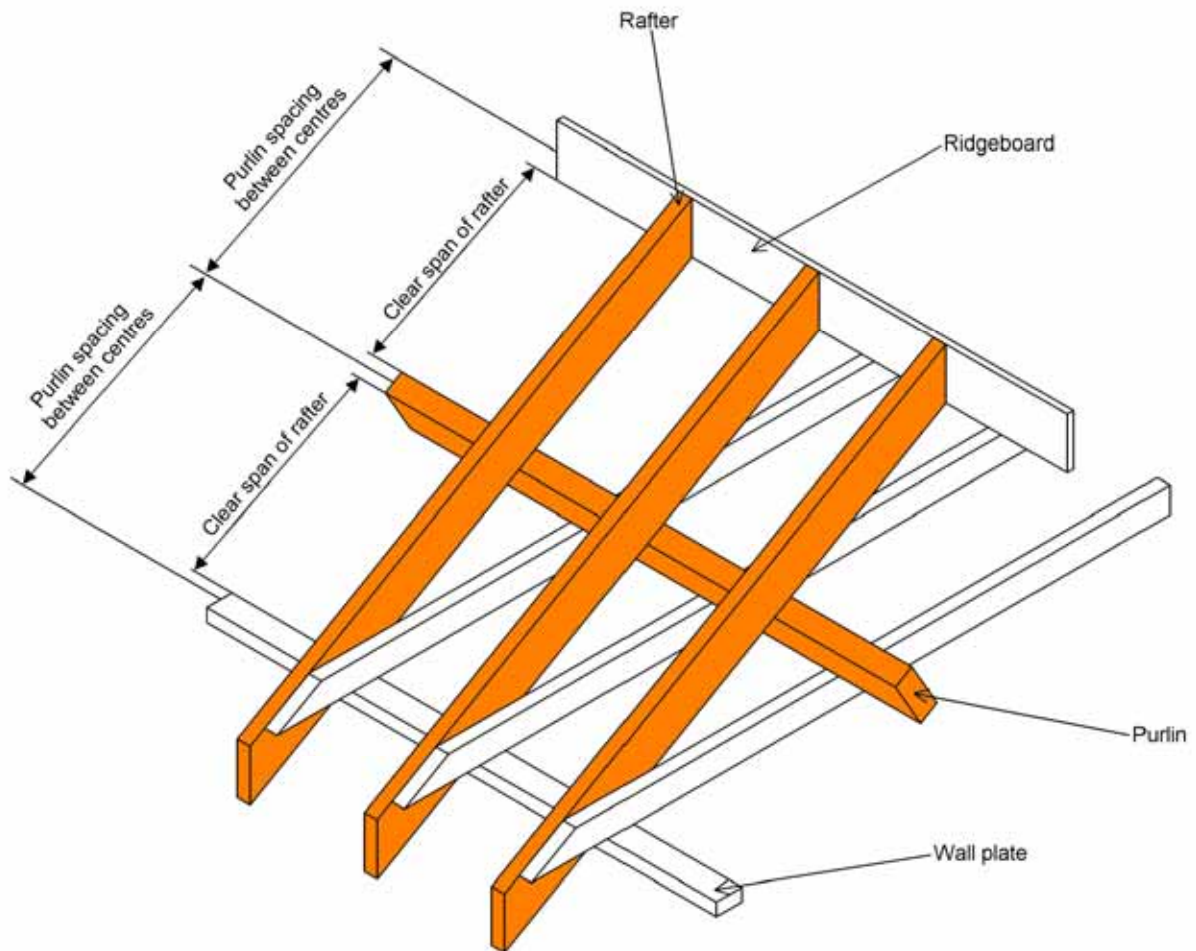


Table 12 Permissible clear spans for common or jack rafters											
Slope of roof 15° or more but less than 22.5°						Imposed load 0.75 kN/m ²					
Strength Class C16			Service Class 1 or 2.								
Size of rafter			Dead load (kN/m ²) excluding self weight of rafter								
			Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00		
			Spacing of rafters (mm)								
Breadth (mm)	Depth (mm)		400	450	600	400	450	600	400	450	600
Maximum clear span (m)											
	38	100	2.11	2.06	1.94	1.94	1.89	1.75	1.81	1.75	1.62
	38	125	2.91	2.80	2.54	2.65	2.57	2.35	2.45	2.37	2.16
	38	150	3.49	3.35	3.05	3.28	3.15	2.80	3.10	2.98	2.59
	47	100	2.48	2.41	2.19	2.27	2.20	2.04	2.11	2.04	1.88
	47	125	3.12	3.01	2.73	2.94	2.83	2.57	2.79	2.68	2.42
	47	150	3.74	3.60	3.27	3.52	3.38	3.08	3.34	3.21	2.87
ALS/CLS											
	38	89	1.76	1.73	1.63	1.63	1.59	1.49	1.53	1.49	1.38
	38	140	3.26	3.13	2.85	3.06	2.95	2.62	2.84	2.74	2.42

Table 13 Permissible clear spans for common or jack rafters											
Slope of roof 15° or more but less than 22.5°						Imposed load 0.75 kN/m ²					
Strength Class C24			Service Class 1 or 2								
Size of rafter			Dead load (kN/m ²) excluding self weight of rafter								
			Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00		
			Spacing of rafters (mm)								
Breadth (mm)	Depth (mm)		400	450	600	400	450	600	400	450	600
			Maximum clear span (m)								
	38	100	2.50	2.41	2.18	2.35	2.26	2.05	2.23	2.14	1.95
	38	125	3.12	3.00	2.73	2.93	2.82	2.56	2.78	2.68	2.43
	38	150	3.73	3.59	3.27	3.51	3.38	3.07	3.33	3.21	2.91
	47	100	2.68	2.58	2.35	2.52	2.43	2.20	2.40	2.30	2.09
	47	125	3.34	3.22	2.93	3.15	3.03	2.75	2.99	2.87	2.61
	47	150	4.00	3.85	3.50	3.76	3.62	3.29	3.58	3.44	3.13
ALS/CLS											
	38	89	2.23	2.14	1.95	2.10	2.01	1.83	1.95	1.89	1.73
	38	140	3.49	3.35	3.05	3.28	3.15	2.87	3.11	2.99	2.72

Table 14 Permissible clear spans for purlins supporting rafters

Slope of roof 15° or more but less than 22.5°

Imposed load 0.75 kN/m²

Strength Class C16 Service Class 1 or 2.

		Dead load (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.09	1.95	1.85				1.96	1.83					1.85					
63	175	2.43	2.28	2.15	2.05	1.97	1.89	2.28	2.14	2.02	1.92	1.84		2.16	2.02	1.91	1.82		
63	200	2.78	2.60	2.46	2.34	2.24	2.16	2.61	2.44	2.31	2.20	2.10	2.00	2.47	2.31	2.18	2.07	1.95	1.85
63	225	3.12	2.92	2.77	2.64	2.52	2.43	2.93	2.74	2.59	2.47	2.35	2.23	2.77	2.60	2.45	2.31	2.18	2.06
63	275	3.81	3.57	3.38	3.22	3.08	2.95	3.58	3.35	3.17	3.01	2.84	2.69	3.39	3.17	2.99	2.79	2.63	2.49
75	125	1.85																	
75	150	2.22	2.08	1.97	1.88			2.08	1.95	1.85				1.97	1.85				
75	175	2.58	2.42	2.29	2.19	2.10	2.02	2.43	2.28	2.15	2.05	1.96	1.89	2.30	2.15	2.04	1.94	1.86	
75	200	2.95	2.77	2.62	2.50	2.39	2.30	2.77	2.60	2.46	2.34	2.24	2.16	2.63	2.46	2.33	2.21	2.12	2.02
75	225	3.32	3.11	2.95	2.81	2.69	2.59	3.12	2.92	2.76	2.63	2.52	2.42	2.95	2.77	2.62	2.49	2.38	2.26

Table 15 Permissible clear spans for purlins supporting rafters

Slope of roof 15° or more but less than 22.5°

Imposed load 0.75 kN/m²

Strength Class C24 Service Class 1 or 2.

Size of purlin		Dead load (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.24	2.10	1.99	1.90	1.82		2.11	1.98	1.87				2.00	1.87				
63	175	2.62	2.45	2.32	2.21	2.12	2.04	2.46	2.30	2.18	2.08	1.99	1.91	2.33	2.18	2.06	1.96	1.88	1.80
63	200	2.99	2.80	2.65	2.53	2.42	2.33	2.81	2.63	2.49	2.37	2.27	2.18	2.66	2.49	2.36	2.24	2.15	2.06
63	225	3.36	3.15	2.98	2.84	2.72	2.62	3.16	2.96	2.80	2.67	2.55	2.45	2.99	2.80	2.65	2.52	2.41	2.32
63	275	4.10	3.84	3.64	3.47	3.32	3.20	3.85	3.61	3.42	3.25	3.12	3.00	3.65	3.42	3.23	3.08	2.95	2.83
75	125	1.99	1.87					1.87											
75	150	2.38	2.24	2.12	2.02	1.94	1.87	2.24	2.10	1.99	1.90	1.82		2.13	1.99	1.89			
75	175	2.78	2.61	2.47	2.36	2.26	2.17	2.61	2.45	2.32	2.21	2.12	2.04	2.48	2.32	2.20	2.09	2.00	1.93
75	200	3.17	2.98	2.82	2.69	2.58	2.48	2.98	2.80	2.65	2.53	2.42	2.33	2.83	2.65	2.51	2.39	2.29	2.20
75	225	3.57	3.35	3.17	3.03	2.90	2.79	3.35	3.15	2.98	2.84	2.72	2.62	3.18	2.98	2.82	2.69	2.57	2.48

Table 16 Permissible clear spans for common or jack rafters											
Slope of roof 15° or more but less than 22.5°					Imposed load 1.00 kN/m ²						
Strength Class C16		Service Class 1 or 2.									
		Dead load (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.11	2.06	1.91	1.94	1.89	1.75	1.81	1.75	1.62
	38	125	2.74	2.64	2.36	2.60	2.50	2.18	2.45	2.35	2.04
	38	150	3.29	3.16	2.80	3.12	2.99	2.59	2.96	2.80	2.42
	47	100	2.36	2.27	2.06	2.24	2.15	1.95	2.11	2.04	1.83
	47	125	2.94	2.83	2.57	2.79	2.69	2.42	2.67	2.57	2.27
	47	150	3.52	3.39	3.08	3.35	3.22	2.88	3.20	3.08	2.69
ALS/CLS											
	38	89	1.76	1.73	1.63	1.63	1.59	1.49	1.53	1.49	1.38
	38	140	3.07	2.95	2.63	2.91	2.80	2.43	2.78	2.62	2.27

Table 17 Permissible clear spans for common or jack rafters										
Slope of roof 15.0° or more but less than 22.5°					Imposed load 1.00 kN/m ²					
Strength Class C24		Service Class 1 or 2.								
		Dead load (kN/m ²) excluding self weight of rafter								
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00		
Size of rafter		Spacing of rafters (mm)								
Breadth	Depth	400	450	600	400	450	600	400	450	600
(mm)	(mm)	Maximum clear span (m)								
38	100	2.36	2.27	2.06	2.24	2.15	1.95	2.14	2.05	1.86
38	125	2.94	2.83	2.57	2.79	2.68	2.43	2.66	2.56	2.32
38	150	3.52	3.38	3.07	3.34	3.21	2.91	3.19	3.07	2.78
47	100	2.53	2.43	2.21	2.40	2.31	2.09	2.29	2.20	2.00
47	125	3.15	3.03	2.76	2.99	2.88	2.61	2.86	2.75	2.50
47	150	3.77	3.63	3.30	3.58	3.45	3.13	3.43	3.29	2.99
ALS/CLS										
38	89	2.10	2.02	1.83	1.99	1.91	1.74	1.90	1.83	1.66
38	140	3.29	3.16	2.87	3.12	3.00	2.72	2.98	2.87	2.60

Table 18 Permissible clear spans for purlins supporting rafters

Slope of roof 15° or more but less than 22.5°

Imposed load 1.00 kN/m²

Strength Class C16 Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	1.96	1.84					1.86											
63	175	2.29	2.14	2.02	1.93	1.84		2.16	2.03	1.91	1.82			2.06	1.93	1.82			
63	200	2.61	2.45	2.31	2.20	2.10	2.00	2.47	2.31	2.19	2.08	1.95	1.85	2.36	2.20	2.08	1.94	1.82	
63	225	2.94	2.75	2.60	2.47	2.36	2.24	2.78	2.60	2.46	2.32	2.18	2.07	2.65	2.48	2.32	2.17	2.04	1.93
63	275	3.58	3.36	3.17	3.02	2.85	2.70	3.39	3.18	3.00	2.80	2.64	2.50	3.24	3.03	2.80	2.62	2.46	2.33
75	150	2.09	1.96	1.85				1.98	1.85					1.89					
75	175	2.43	2.28	2.16	2.05	1.97	1.89	2.30	2.16	2.04	1.94	1.86		2.20	2.06	1.94	1.85		
75	200	2.78	2.60	2.46	2.35	2.25	2.16	2.63	2.47	2.33	2.22	2.12	2.03	2.51	2.35	2.22	2.11	2.00	1.89
75	225	3.12	2.93	2.77	2.64	2.53	2.43	2.96	2.77	2.62	2.49	2.39	2.26	2.82	2.64	2.50	2.37	2.23	2.11

Table 19 Permissible clear spans for purlins supporting rafters

Slope of roof 15° or more but less more than 22.5°

Imposed load 1.00 kN/m²

Strength Class C24 Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.11	1.98	1.87				2.00	1.87					1.91					
63	175	2.46	2.31	2.18	2.08	1.99	1.91	2.33	2.19	2.07	1.97	1.88	1.81	2.23	2.08	1.97	1.87		
63	200	2.81	2.64	2.49	2.38	2.27	2.19	2.67	2.50	2.36	2.25	2.15	2.06	2.54	2.38	2.25	2.14	2.04	1.96
63	225	3.16	2.96	2.80	2.67	2.56	2.46	3.00	2.81	2.65	2.53	2.42	2.32	2.86	2.68	2.53	2.40	2.30	2.20
63	275	3.86	3.62	3.42	3.26	3.12	3.00	3.66	3.43	3.24	3.08	2.95	2.84	3.49	3.27	3.09	2.94	2.81	2.69
75	125	1.87																	
75	150	2.25	2.11	1.99	1.90	1.82		2.13	2.00	1.89				2.03	1.90	1.80			
75	175	2.62	2.46	2.32	2.22	2.12	2.04	2.48	2.33	2.20	2.10	2.01	1.93	2.37	2.22	2.10	2.00	1.91	1.84
75	200	2.99	2.80	2.66	2.53	2.42	2.33	2.84	2.66	2.51	2.40	2.29	2.21	2.71	2.54	2.40	2.28	2.18	2.10
75	225	3.36	3.15	2.99	2.85	2.73	2.62	3.19	2.99	2.83	2.69	2.58	2.48	3.04	2.85	2.70	2.57	2.46	2.36

Table 20 Permissible clear spans for common or jack rafters											
Slope of roof 22.5° or more but less than 30.0°						Imposed load 0.75 kN/m ²					
Strength Class C16		Service Class 1 or 2									
		Dead load (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.19	2.14	2.02	2.02	1.96	1.83	1.88	1.83	1.69
	38	125	2.98	2.87	2.61	2.76	2.68	2.44	2.55	2.47	2.26
	38	150	3.57	3.44	3.12	3.35	3.23	2.93	3.18	3.06	2.73
	47	100	2.57	2.47	2.24	2.36	2.29	2.10	2.20	2.13	1.96
	47	125	3.20	3.08	2.80	3.01	2.89	2.63	2.85	2.74	2.49
	47	150	3.83	3.68	3.35	3.60	3.46	3.15	3.41	3.28	2.98
ALS/CLS											
	38	89	1.83	1.80	1.70	1.70	1.66	1.55	1.60	1.55	1.44
	38	140	3.34	3.21	2.92	3.13	3.01	2.73	2.96	2.86	2.56

Table 21 Permissible clear spans for common or jack rafters											
Slope of roof 22.5° or more but less than 30.0°						Imposed load 0.75 kN/m ²					
Strength Class C24		Service Class 1 or 2									
		Dead load (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.56	2.46	2.24	2.40	2.31	2.10	2.28	2.19	1.99
	38	125	3.19	3.07	2.79	3.00	2.88	2.62	2.84	2.73	2.48
	38	150	3.82	3.68	3.34	3.59	3.45	3.14	3.41	3.28	2.97
	47	100	2.75	2.64	2.40	2.58	2.48	2.25	2.45	2.35	2.14
	47	125	3.42	3.29	3.00	3.22	3.09	2.81	3.05	2.94	2.67
	47	150	4.09	3.94	3.59	3.85	3.70	3.37	3.65	3.52	3.19
ALS/CLS											
	38	89	2.28	2.19	1.99	2.14	2.06	1.87	2.03	1.95	1.77
	38	140	3.57	3.44	3.12	3.35	3.23	2.93	3.18	3.06	2.78

Table 22 Permissible clear spans for purlins supporting rafters

Slope of roof 22.5° or more but less than 30.0°

Imposed load 0.75 kN/m²

Strength Class C16 Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.14	2.00	1.90	1.81			2.00	1.88					1.90					
63	175	2.49	2.34	2.21	2.11	2.02	1.94	2.34	2.19	2.07	1.97	1.88	1.81	2.21	2.07	1.95	1.86		
63	200	2.84	2.67	2.52	2.41	2.30	2.22	2.67	2.50	2.36	2.25	2.15	2.06	2.52	2.36	2.23	2.12	2.01	1.91
63	225	3.20	3.00	2.84	2.70	2.59	2.49	3.00	2.81	2.66	2.53	2.42	2.31	2.84	2.66	2.51	2.39	2.25	2.13
63	275	3.90	3.66	3.46	3.30	3.16	3.04	3.66	3.43	3.24	3.09	2.94	2.79	3.47	3.24	3.07	2.89	2.72	2.57
75	125	1.90																	
75	150	2.27	2.13	2.02	1.92	1.84		2.13	2.00	1.89	1.80			2.02	1.89				
75	175	2.65	2.48	2.35	2.24	2.15	2.07	2.48	2.33	2.20	2.10	2.01	1.93	2.35	2.20	2.08	1.98	1.90	1.83
75	200	3.02	2.84	2.69	2.56	2.46	2.36	2.84	2.66	2.52	2.40	2.30	2.21	2.69	2.52	2.38	2.27	2.17	2.09
75	225	3.40	3.19	3.02	2.88	2.76	2.66	3.19	2.99	2.83	2.70	2.58	2.48	3.02	2.83	2.68	2.55	2.44	2.33

Table 23 Permissible clear spans for purlins supporting rafters

Slope of roof 22.5° or more but less than 30.0°

Imposed load 0.75 kN/m²

Strength Class C24. Service Class 1 or 2.

		Dead loads (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.30	2.16	2.04	1.95	1.87		2.16	2.02	1.91	1.82			2.04	1.91	1.81			
63	175	2.68	2.51	2.38	2.27	2.18	2.09	2.52	2.36	2.23	2.13	2.04	1.96	2.38	2.23	2.11	2.01	1.92	1.85
63	200	3.06	2.87	2.72	2.59	2.48	2.39	2.87	2.69	2.55	2.43	2.33	2.24	2.72	2.55	2.41	2.30	2.20	2.11
63	225	3.44	3.23	3.06	2.91	2.79	2.69	3.23	3.03	2.87	2.73	2.61	2.51	3.06	2.87	2.71	2.58	2.47	2.37
63	275	4.20	3.94	3.73	3.56	3.41	3.28	3.94	3.70	3.50	3.33	3.19	3.07	3.73	3.50	3.31	3.15	3.02	2.90
75	125	2.04	1.91	1.81				1.91						1.81					
75	150	2.44	2.29	2.17	2.07	1.99	1.91	2.29	2.15	2.04	1.94	1.86		2.17	2.04	1.93	1.84		
75	175	2.85	2.67	2.53	2.42	2.32	2.23	2.67	2.51	2.38	2.26	2.17	2.09	2.53	2.38	2.25	2.14	2.05	1.97
75	200	3.25	3.05	2.89	2.76	2.65	2.55	3.05	2.87	2.71	2.59	2.48	2.38	2.89	2.71	2.57	2.45	2.34	2.25
75	225	3.65	3.43	3.25	3.10	2.97	2.86	3.43	3.22	3.05	2.91	2.79	2.68	3.25	3.05	2.89	2.75	2.64	2.53

Table 24 Permissible clear spans for common or jack rafters										
Slope of roof 22.5° or more but less than 30.0°					Imposed load 1.00 kN/m ²					
Strength Class C16		Service Class 1 or 2								
		Dead load (kN/m ²) excluding self weight of rafter								
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00		
Size of rafter		Spacing of rafters (mm)								
Breadth	Depth	400	450	600	400	450	600	400	450	600
(mm)	(mm)	Maximum clear span (m)								
38	100	2.19	2.14	1.97	2.02	1.96	1.83	1.88	1.83	1.69
38	125	2.81	2.70	2.45	2.67	2.56	2.31	2.54	2.44	2.15
38	150	3.37	3.24	2.94	3.19	3.07	2.74	3.05	2.93	2.56
47	100	2.42	2.33	2.11	2.29	2.21	2.00	2.19	2.10	1.91
47	125	3.02	2.90	2.64	2.86	2.75	2.50	2.73	2.63	2.38
47	150	3.61	3.48	3.16	3.43	3.29	2.99	3.27	3.15	2.85
ALS/CLS										
38	89	1.83	1.80	1.70	1.70	1.66	1.55	1.60	1.55	1.44
38	140	3.15	3.03	2.75	2.98	2.87	2.57	2.85	2.73	2.40

Table 25 Permissible clear spans for common or jack rafters											
Slope of roof 22.5° or more but less than 30.0°					Imposed load 1.00 kN/m ²						
Strength Class C24		Service Class 1 or 2									
		Dead loads (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.42	2.32	2.11	2.29	2.20	2.00	2.18	2.10	1.90
	38	125	3.01	2.90	2.63	2.86	2.74	2.49	2.73	2.62	2.38
	38	150	3.61	3.47	3.15	3.42	3.29	2.99	3.26	3.14	2.85
ALS/CLS	47	100	2.59	2.49	2.26	2.46	2.36	2.14	2.35	2.25	2.05
	47	125	3.23	3.11	2.83	3.06	2.95	2.68	2.93	2.81	2.55
	47	150	3.87	3.72	3.38	3.67	3.53	3.21	3.50	3.37	3.06
	38	89	2.15	2.07	1.88	2.04	1.96	1.78	1.95	1.87	1.69
	38	140	3.37	3.24	2.94	3.19	3.07	2.79	3.05	2.93	2.66

Table 26 Permissible clear spans for purlins supporting rafters

Slope of roof 22.5° or more but less than 30.0°

Imposed load 1.00 kN/m²

Strength Class C16 Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.01	1.89					1.90						1.81					
63	175	2.35	2.20	2.08	1.98	1.89	1.82	2.22	2.08	1.96	1.87			2.11	1.98	1.87			
63	200	2.68	2.51	2.37	2.26	2.16	2.08	2.53	2.37	2.24	2.13	2.02	1.92	2.41	2.26	2.13	2.01	1.89	
63	225	3.01	2.82	2.67	2.54	2.43	2.32	2.85	2.67	2.52	2.40	2.26	2.14	2.71	2.54	2.40	2.24	2.11	2.00
63	275	3.68	3.45	3.26	3.10	2.96	2.80	3.48	3.26	3.08	2.90	2.73	2.59	3.31	3.10	2.90	2.71	2.55	2.41
75	150	2.14	2.01	1.90	1.81			2.03	1.90					1.93	1.81				
75	175	2.50	2.34	2.21	2.11	2.02	1.94	2.36	2.21	2.09	1.99	1.91	1.83	2.25	2.11	1.99	1.89	1.81	
75	200	2.85	2.67	2.53	2.41	2.31	2.22	2.70	2.53	2.39	2.28	2.18	2.09	2.57	2.41	2.27	2.16	2.07	1.96
75	225	3.20	3.00	2.84	2.71	2.60	2.50	3.03	2.84	2.69	2.56	2.45	2.34	2.89	2.71	2.56	2.43	2.31	2.19

Table 27 Permissible clear spans for purlins supporting rafters

Slope of roof 22.5° or more but less than 30.0°

Imposed load 1.00 kN/m²

Strength Class C24 Service Class 1 or 2

		Dead loads (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.17	2.03	1.92	1.83			2.05	1.92	1.82				1.96	1.83				
63	175	2.53	2.37	2.24	2.14	2.05	1.97	2.39	2.24	2.12	2.02	1.93	1.86	2.28	2.13	2.02	1.92	1.84	
63	200	2.89	2.71	2.56	2.44	2.34	2.25	2.73	2.56	2.42	2.30	2.21	2.12	2.60	2.44	2.30	2.19	2.10	2.01
63	225	3.24	3.04	2.88	2.74	2.63	2.53	3.07	2.88	2.72	2.59	2.48	2.38	2.93	2.74	2.59	2.46	2.36	2.26
63	275	3.96	3.71	3.51	3.35	3.21	3.08	3.75	3.51	3.32	3.16	3.03	2.91	3.57	3.35	3.16	3.01	2.88	2.77
75	125	1.92	1.80					1.82											
75	150	2.30	2.16	2.05	1.95	1.87		2.18	2.05	1.94	1.84			2.08	1.95	1.84			
75	175	2.69	2.52	2.39	2.27	2.18	2.10	2.54	2.39	2.26	2.15	2.06	1.98	2.43	2.27	2.15	2.05	1.96	1.88
75	200	3.07	2.88	2.73	2.60	2.49	2.40	2.91	2.72	2.58	2.46	2.35	2.26	2.77	2.60	2.46	2.34	2.24	2.15
75	225	3.45	3.23	3.06	2.92	2.80	2.69	3.27	3.06	2.90	2.76	2.65	2.54	3.12	2.92	2.76	2.63	2.52	2.42

Table 28 Permissible clear spans for common or jack rafters											
Slope of roof 30.0° to 45.0°					Imposed load 0.75 kN/m ²						
Strength Class C16		Service Class 1 or 2									
		Dead load (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.30	2.24	2.11	2.11	2.06	1.91	1.97	1.91	1.77
	38	125	3.09	2.97	2.70	2.89	2.78	2.52	2.67	2.58	2.36
	38	150	3.70	3.56	3.23	3.46	3.33	3.03	3.28	3.15	2.86
ALS/CLS	47	100	2.66	2.55	2.32	2.47	2.39	2.17	2.29	2.22	2.04
	47	125	3.31	3.18	2.90	3.10	2.98	2.71	2.94	2.83	2.57
	47	150	3.96	3.81	3.47	3.71	3.57	3.25	3.52	3.39	3.08
	38	89	1.92	1.88	1.78	1.78	1.74	1.63	1.67	1.63	1.51
	38	140	3.45	3.32	3.02	3.24	3.11	2.83	3.06	2.95	2.67

Table 29 Permissible Clear Spans for Common or Jack Rafters											
Slope of roof 30.0° to 45.0°					Imposed load 0.75 kN/m ²						
Strength Class C24		Service Class 1 or 2									
		Dead loads (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.65	2.55	2.32	2.48	2.39	2.17	2.35	2.26	2.05
	38	125	3.30	3.18	2.89	3.10	2.98	2.71	2.93	2.82	2.56
	38	150	3.95	3.81	3.46	3.71	3.57	3.24	3.51	3.38	3.07
ALS/CLS	47	100	2.84	2.73	2.49	2.66	2.56	2.33	2.52	2.43	2.20
	47	125	3.54	3.41	3.10	3.32	3.20	2.91	3.15	3.03	2.75
	47	150	4.23	4.08	3.71	3.97	3.82	3.48	3.77	3.62	3.29
	38	89	2.36	2.27	2.06	2.21	2.13	1.93	2.09	2.01	1.83
	38	140	3.69	3.56	3.23	3.46	3.33	3.03	3.28	3.16	2.86

Table 30 Permissible clear spans for purlins supporting rafters

Slope of roof 30.0° to 45.0°

Imposed load 0.75 kN/m²

Strength Class C16

Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.21	2.08	1.97	1.87			2.07	1.94	1.84				1.96	1.83				
63	175	2.58	2.42	2.29	2.18	2.09	2.01	2.42	2.26	2.14	2.04	1.95	1.88	2.28	2.14	2.02	1.92	1.84	
63	200	2.95	2.76	2.62	2.49	2.39	2.30	2.76	2.59	2.45	2.33	2.23	2.14	2.61	2.44	2.31	2.20	2.10	2.00
63	225	3.31	3.11	2.94	2.80	2.69	2.59	3.10	2.91	2.75	2.62	2.51	2.41	2.93	2.75	2.60	2.47	2.36	2.23
63	275	4.04	3.79	3.59	3.42	3.28	3.16	3.79	3.55	3.36	3.20	3.06	2.92	3.58	3.35	3.17	3.02	2.85	2.70
75	125	1.96	1.84					1.84											
75	150	2.35	2.21	2.09	1.99	1.91	1.84	2.20	2.07	1.96	1.86			2.08	1.95	1.85			
75	175	2.74	2.57	2.44	2.33	2.23	2.15	2.57	2.41	2.28	2.17	2.08	2.00	2.43	2.28	2.15	2.05	1.96	1.89
75	200	3.13	2.94	2.78	2.66	2.55	2.45	2.93	2.75	2.60	2.48	2.38	2.29	2.78	2.60	2.46	2.34	2.24	2.16
75	225	3.52	3.30	3.13	2.99	2.86	2.76	3.30	3.09	2.93	2.79	2.67	2.57	3.12	2.92	2.77	2.64	2.52	2.43

Table 31 Permissible clear spans for purlins supporting rafters

Slope of roof 30.0° to 45.0°

Imposed load 0.75 kN/m²

Strength Class C24

Service Class 1 or 2

		Dead loads (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.38	2.24	2.12	2.02	1.93	1.86	2.23	2.09	1.98	1.89	1.81		2.11	1.98	1.87			
63	175	2.78	2.61	2.47	2.35	2.26	2.17	2.60	2.44	2.31	2.20	2.11	2.03	2.46	2.31	2.18	2.08	1.99	1.91
63	200	3.17	2.97	2.82	2.69	2.58	2.48	2.97	2.79	2.64	2.51	2.41	2.32	2.81	2.63	2.49	2.37	2.27	2.18
63	225	3.56	3.34	3.17	3.02	2.90	2.79	3.34	3.13	2.96	2.83	2.71	2.60	3.16	2.96	2.80	2.67	2.55	2.46
63	275	4.35	4.08	3.87	3.69	3.54	3.40	4.07	3.82	3.62	3.45	3.31	3.18	3.86	3.61	3.42	3.26	3.12	3.00
75	125	2.11	1.98	1.88				1.98	1.86					1.87					
75	150	2.53	2.38	2.25	2.15	2.06	1.98	2.37	2.23	2.11	2.01	1.93	1.85	2.25	2.11	1.99	1.90	1.82	
75	175	2.95	2.77	2.62	2.50	2.40	2.31	2.76	2.59	2.46	2.34	2.25	2.16	2.62	2.45	2.32	2.21	2.12	2.04
75	200	3.37	3.16	3.00	2.86	2.74	2.64	3.16	2.96	2.81	2.68	2.56	2.47	2.99	2.80	2.65	2.53	2.42	2.33
75	225	3.78	3.55	3.37	3.21	3.08	2.97	3.55	3.33	3.15	3.01	2.88	2.78	3.36	3.15	2.98	2.84	2.72	2.62

Table 32 Permissible clear spans for common or jack rafters											
Slope of roof 30.0° to 45.0°						Imposed load 1.00 kN/m ²					
Strength Class C16			Service Class 1 or 2								
		Dead load (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.30	2.24	2.04	2.11	2.06	1.91	1.97	1.91	1.77
	38	125	2.92	2.80	2.55	2.76	2.65	2.40	2.63	2.52	2.27
	38	150	3.49	3.36	3.05	3.30	3.18	2.88	3.15	3.03	2.70
	47	100	2.51	2.41	2.19	2.37	2.28	2.07	2.26	2.17	1.97
	47	125	3.13	3.01	2.73	2.96	2.85	2.58	2.82	2.71	2.46
	47	150	3.74	3.60	3.28	3.54	3.41	3.10	3.38	3.25	2.95
ALS/CLS											
	38	89	1.92	1.88	1.78	1.78	1.74	1.63	1.67	1.63	1.51
	38	140	3.26	3.14	2.85	3.08	2.97	2.69	2.94	2.83	2.53

Table 33 Permissible clear spans (mm) for common or jack rafters											
Slope of roof 30.0° to 45.0°					Imposed load 1.00 kN/m ²						
Strength Class C24			Service Class 1 or 2								
		Dead load (kN/m ²) excluding self weight of rafter									
		Not more than 0.5			More than 0.5 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of rafter		Spacing of rafters (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	100	2.50	2.41	2.19	2.37	2.28	2.07	2.26	2.17	1.97
	38	125	3.12	3.00	2.73	2.95	2.84	2.58	2.82	2.71	2.45
	38	150	3.74	3.60	3.27	3.54	3.40	3.09	3.37	3.24	2.94
	47	100	2.69	2.58	2.35	2.54	2.44	2.22	2.42	2.33	2.11
	47	125	3.35	3.22	2.93	3.17	3.05	2.77	3.02	2.91	2.64
	47	150	4.01	3.86	3.51	3.79	3.65	3.32	3.62	3.48	3.16
ALS/CLS											
	38	89	2.23	2.14	1.95	2.11	2.03	1.84	2.01	1.93	1.75
	38	140	3.49	3.36	3.05	3.30	3.18	2.88	3.15	3.03	2.75

Table 34 Permissible clear spans for purlins supporting rafters

Slope of roof 30.0° to 45.0°

Imposed load 1.00 kN/m²

Strength Class C16

Service Class 1 or 2

		Dead loads (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.09	1.96	1.85				1.97	1.85					1.88					
63	175	2.44	2.28	2.16	2.06	1.97	1.89	2.30	2.15	2.04	1.94	1.85		2.19	2.05	1.93	1.84		
63	200	2.78	2.61	2.47	2.35	2.25	2.16	2.63	2.46	2.33	2.21	2.12	2.02	2.50	2.34	2.21	2.10	1.98	1.88
63	225	3.13	2.93	2.77	2.64	2.53	2.43	2.95	2.77	2.61	2.49	2.38	2.25	2.81	2.63	2.48	2.35	2.22	2.10
63	275	3.82	3.58	3.39	3.23	3.09	2.96	3.60	3.38	3.19	3.04	2.87	2.72	3.43	3.21	3.03	2.84	2.68	2.53
75	125	1.85																	
75	150	2.22	2.08	1.97	1.88	1.80		2.10	1.97	1.86				2.00	1.87				
75	175	2.59	2.43	2.30	2.19	2.10	2.02	2.45	2.29	2.17	2.07	1.98	1.90	2.33	2.18	2.06	1.96	1.88	1.81
75	200	2.96	2.77	2.63	2.50	2.40	2.31	2.79	2.62	2.48	2.36	2.26	2.17	2.66	2.49	2.36	2.24	2.15	2.06
75	225	3.32	3.12	2.95	2.81	2.70	2.59	3.14	2.94	2.79	2.65	2.54	2.44	2.99	2.80	2.65	2.52	2.41	2.30

Table 35 Permissible clear spans for purlins supporting rafters

Slope of roof 30.0° to 45.0°

Imposed load 1.00 kN/m²

Strength Class C24

Service Class 1 or 2

		Dead loads (kN/m ²) excluding self weight of purlin and rafters																	
		Not more than 0.5						More than 0.5 but not more than 0.75						More than 0.75 but not more than 1.00					
Size of purlin		Spacing of purlins (mm)																	
B	D	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000	1500	1800	2100	2400	2700	3000
(mm)	(mm)	Maximum clear span (m)																	
63	150	2.25	2.11	2.00	1.90	1.82		2.13	1.99	1.88				2.02	1.89				
63	175	2.62	2.46	2.33	2.22	2.13	2.04	2.48	2.32	2.20	2.09	2.00	1.93	2.36	2.21	2.09	1.99	1.90	1.83
63	200	2.99	2.81	2.66	2.53	2.43	2.34	2.83	2.65	2.51	2.39	2.29	2.20	2.69	2.52	2.39	2.27	2.17	2.09
63	225	3.37	3.16	2.99	2.85	2.73	2.63	3.18	2.98	2.82	2.69	2.57	2.47	3.03	2.84	2.68	2.55	2.44	2.35
75	125	1.99	1.87					1.89											
75	150	2.39	2.24	2.12	2.03	1.94	1.87	2.26	2.12	2.01	1.91	1.83		2.15	2.02	1.91	1.82		
75	175	2.79	2.62	2.48	2.36	2.26	2.18	2.64	2.47	2.34	2.23	2.14	2.06	2.51	2.35	2.23	2.12	2.03	1.95
75	200	3.18	2.99	2.83	2.70	2.59	2.49	3.01	2.82	2.67	2.55	2.44	2.35	2.87	2.69	2.54	2.42	2.32	2.23
75	225	3.58	3.36	3.18	3.03	2.91	2.80	3.38	3.17	3.00	2.86	2.74	2.64	3.22	3.02	2.86	2.72	2.61	2.51

4.4 Flat roof joists

- 4.4.1 Tables 36 to 41 give permissible clear spans of joists for flat roofs with a slope of up to 10° from the horizontal.
- 4.4.2 Permissible clear spans have been calculated in accordance with *BS 5268-7-2: 1989*.
- 4.4.3 The sizes, spacing and spans given will support the dead and imposed loads stated in the tables. In addition, where access is limited to maintenance and repair purposes, they will support the dead loads stated and a concentrated load of 0.9kN. Where access is not limited to maintenance and repair purposes, they will support the dead loads stated and a concentrated load of 1.8kN.
- 4.4.4 Lateral support should be provided in accordance with *BS 5268-2: 2002*, Table 19. In the absence of printed guidance from the manufacturer, it should be assumed that expanded polyurethane and other low density insulating materials will not provide such support, so with these materials the depth to breadth ratio should not exceed 4:1.
- 4.4.5 Unless justified by specialist calculation, the minimum bearing length at supports should be 40 mm. It may be necessary to provide longer bearing to accommodate fixings or for practical reasons.
- 4.4.6 Notching and drilling of flat roof joists should not exceed the limits given in 3.2.3.
- 4.4.7 The section sizes of joists given in Tables 36-41 should be machined on the width, ie the depth of the joist, or be ALS or CLS; to the tolerance classes specified in *BS EN 336: 2003*, Table NA 3 and NA 4 respectively.

Figure 6 Typical flat roof joists arrangement

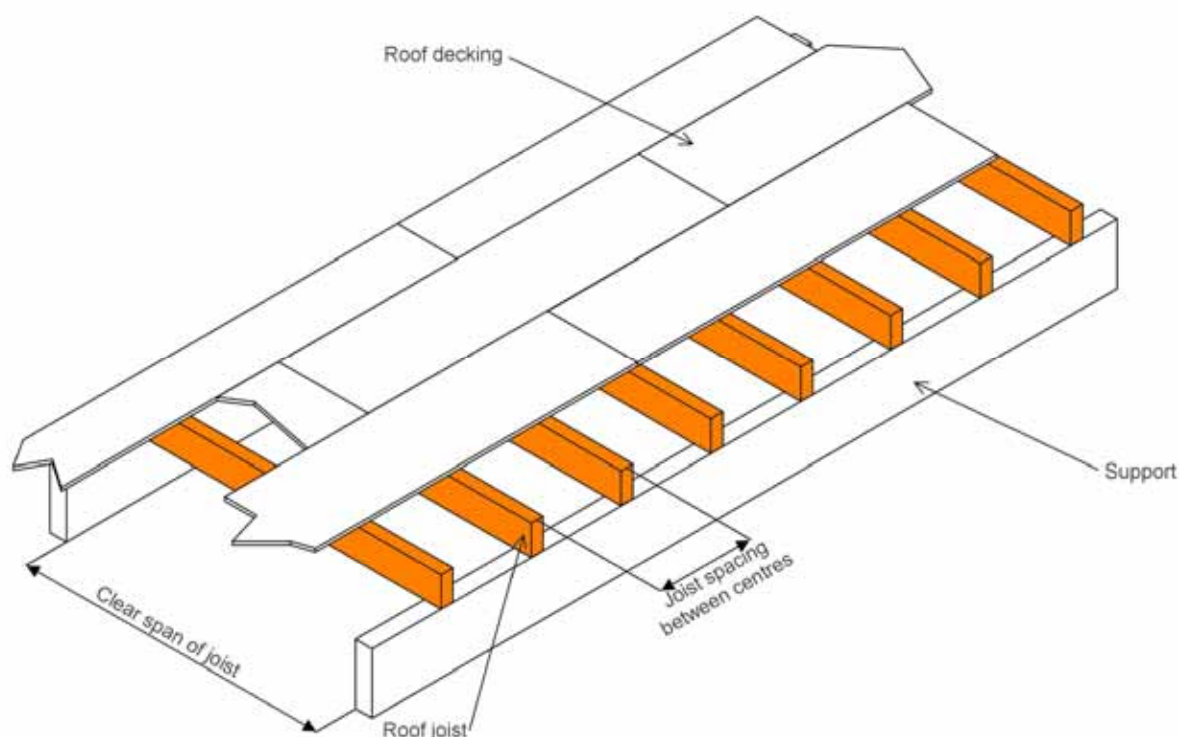


Table 36 Permissible clear spans for joists for flat roofs with access for maintenance and repair only											
Imposed load 0.75 kN/m ² .											
Strength Class C16		Service Class 1 or 2									
		Dead loads (kN/m ²) excluding self-weight of joist									
		Not more than 0.50			More than 0.50 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of joist		Spacing of joists (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	97	1.74	1.72	1.67	1.67	1.65	1.58	1.61	1.58	1.51
	38	120	2.33	2.30	2.21	2.21	2.17	2.08	2.12	2.08	1.97
	38	145	2.98	2.94	2.82	2.82	2.76	2.63	2.68	2.63	2.48
	38	170	3.66	3.60	3.38	3.43	3.36	3.18	3.26	3.18	2.99
	38	195	4.34	4.26	3.88	4.06	3.97	3.65	3.83	3.74	3.46
	38	220	4.99	4.80	4.37	4.68	4.52	4.11	4.42	4.30	3.90
	47	97	1.93	1.90	1.84	1.84	1.81	1.74	1.77	1.74	1.66
	47	120	2.56	2.52	2.43	2.43	2.39	2.27	2.32	2.27	2.16
	47	145	3.27	3.22	3.08	3.08	3.02	2.87	2.93	2.87	2.70
	47	170	4.00	3.93	3.63	3.75	3.67	3.42	3.55	3.47	3.25
	47	195	4.73	4.57	4.16	4.41	4.31	3.92	4.17	4.07	3.72
	47	220	5.34	5.14	4.68	5.04	4.85	4.41	4.79	4.61	4.19
	63	97	2.20	2.17	2.10	2.10	2.06	1.98	2.01	1.98	1.88
	63	120	2.91	2.87	2.75	2.75	2.70	2.57	2.63	2.57	2.43
	63	145	3.70	3.64	3.42	3.48	3.41	3.22	3.30	3.23	3.04
	63	170	4.50	4.39	4.00	4.21	4.12	3.77	3.98	3.89	3.58
	63	195	5.21	5.02	4.58	4.92	4.74	4.31	4.66	4.51	4.10
	63	220	5.85	5.64	5.15	5.53	5.33	4.86	5.27	5.07	4.62
	75	120	3.13	3.08	2.96	2.96	2.90	2.76	2.82	2.76	2.61
	75	145	3.97	3.90	3.62	3.72	3.65	3.41	3.53	3.45	3.24
	75	170	4.81	4.64	4.23	4.50	4.38	3.99	4.25	4.15	3.79
	75	195	5.50	5.30	4.84	5.19	5.01	4.57	4.95	4.77	4.34
	75	220	6.17	5.96	5.45	5.84	5.63	5.14	5.57	5.36	4.89
ALS/CLS											
	38	140	2.85	2.81	2.69	2.69	2.64	2.51	2.57	2.51	2.38
	38	184	4.04	3.97	3.66	3.78	3.70	3.44	3.58	3.49	3.27
	38	235	5.32	5.12	4.66	5.02	4.83	4.38	4.76	4.59	4.16

Table 37 Permissible clear spans for joists for flat roofs with access for maintenance and repair only											
Imposed load 0.75 kN/m ²											
Strength Class C24		Service Class 1 or 2									
		Dead loads (kN/m ²) excluding self-weight of joist									
		Not more than 0.50			More than 0.50 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of joist		Spacing of joists (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	97	1.92	1.90	1.84	1.84	1.81	1.73	1.76	1.73	1.65
	38	120	2.55	2.52	2.42	2.42	2.38	2.27	2.31	2.27	2.15
	38	145	3.26	3.21	3.07	3.07	3.01	2.86	2.92	2.86	2.70
	38	170	3.99	3.92	3.63	3.74	3.66	3.41	3.54	3.46	3.24
	38	195	4.73	4.56	4.15	4.41	4.30	3.91	4.16	4.06	3.71
	38	220	5.33	5.14	4.68	5.03	4.84	4.40	4.78	4.60	4.18
	47	97	2.12	2.09	2.02	2.02	1.99	1.90	1.94	1.90	1.81
	47	120	2.80	2.76	2.65	2.65	2.61	2.48	2.53	2.48	2.35
	47	145	3.57	3.51	3.33	3.36	3.29	3.12	3.19	3.12	2.94
	47	170	4.35	4.27	3.89	4.07	3.98	3.66	3.85	3.76	3.48
	47	195	5.07	4.89	4.45	4.78	4.61	4.19	4.52	4.38	3.98
	47	220	5.71	5.50	5.01	5.39	5.19	4.72	5.13	4.93	4.49
	63	97	2.41	2.38	2.29	2.29	2.26	2.16	2.20	2.16	2.05
	63	120	3.18	3.13	3.00	3.00	2.94	2.80	2.86	2.80	2.64
	63	145	4.03	3.96	3.66	3.78	3.70	3.45	3.58	3.50	3.28
	63	170	4.87	4.69	4.28	4.56	4.43	4.03	4.31	4.20	3.84
	63	195	5.56	5.36	4.90	5.25	5.06	4.62	5.00	4.82	4.39
	63	220	6.25	6.03	5.51	5.91	5.69	5.20	5.63	5.42	4.94
	75	120	3.42	3.36	3.22	3.22	3.16	3.00	3.06	3.00	2.83
	75	145	4.31	4.24	3.87	4.04	3.96	3.65	3.83	3.74	3.47
	75	170	5.14	4.95	4.53	4.85	4.68	4.27	4.60	4.46	4.06
	75	195	5.86	5.66	5.17	5.55	5.35	4.88	5.29	5.09	4.65
	75	220	6.58	6.36	5.82	6.23	6.01	5.49	5.94	5.73	5.23
ALS/CLS											
	38	140	3.12	3.07	2.94	2.94	2.89	2.74	2.80	2.74	2.59
	38	184	4.40	4.31	3.92	4.11	4.02	3.69	3.89	3.79	3.50
	38	235	5.69	5.48	4.99	5.37	5.17	4.70	5.10	4.91	4.46

Table 38 Permissible clear spans for joists for flat roofs with access for maintenance and repair only											
Imposed load 1.0 kN/m ²											
Strength Class C16 Service Class 1 or 2											
		Dead loads (kN/m ²) excluding self-weight of joist									
		Not more than 0.50			More than 0.50 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of joist		Spacing of joists (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	97	1.74	1.72	1.67	1.67	1.65	1.58	1.61	1.58	1.51
	38	120	2.33	2.30	2.21	2.21	2.17	2.08	2.12	2.08	1.97
	38	145	2.98	2.94	2.72	2.82	2.76	2.58	2.68	2.63	2.46
	38	170	3.65	3.51	3.18	3.43	3.33	3.02	3.26	3.18	2.88
	38	195	4.17	4.02	3.65	3.97	3.81	3.46	3.79	3.65	3.31
	38	220	4.70	4.52	4.11	4.47	4.30	3.90	4.27	4.11	3.73
	47	97	1.93	1.90	1.84	1.84	1.81	1.74	1.77	1.74	1.66
	47	120	2.56	2.52	2.42	2.43	2.39	2.27	2.32	2.27	2.16
	47	145	3.27	3.22	2.92	3.08	3.02	2.77	2.93	2.87	2.65
	47	170	3.91	3.76	3.42	3.72	3.58	3.25	3.55	3.42	3.10
	47	195	4.47	4.31	3.92	4.26	4.09	3.72	4.07	3.92	3.55
	47	220	5.04	4.85	4.41	4.79	4.61	4.19	4.59	4.41	4.01
	63	97	2.20	2.17	2.10	2.10	2.06	1.98	2.01	1.98	1.88
	63	120	2.91	2.87	2.67	2.75	2.70	2.54	2.63	2.57	2.43
	63	145	3.68	3.54	3.22	3.48	3.37	3.06	3.30	3.22	2.93
	63	170	4.30	4.14	3.77	4.09	3.94	3.58	3.92	3.77	3.43
	63	195	4.92	4.74	4.31	4.68	4.51	4.10	4.48	4.31	3.92
	63	220	5.53	5.33	4.86	5.27	5.07	4.62	5.05	4.86	4.42
	75	120	3.13	3.08	2.83	2.96	2.90	2.69	2.82	2.76	2.57
	75	145	3.89	3.75	3.41	3.70	3.56	3.24	3.53	3.41	3.10
	75	170	4.54	4.38	3.99	4.33	4.17	3.79	4.15	3.99	3.63
	75	195	5.19	5.01	4.57	4.95	4.77	4.34	4.74	4.57	4.16
	75	220	5.84	5.63	5.14	5.57	5.36	4.89	5.34	5.14	4.68
ALS/CLS											
	38	140	2.85	2.81	2.63	2.69	2.64	2.49	2.57	2.51	2.38
	38	184	3.94	3.79	3.44	3.75	3.60	3.27	3.58	3.44	3.12
	38	235	5.02	4.83	4.38	4.77	4.59	4.16	4.56	4.38	3.98

Table 39 Permissible clear spans for joists for flat roofs with access for maintenance and repair only											
Imposed load 1.0 kN/m ²											
Strength Class C24 Service Class 1 or 2											
		Dead loads (kN/m ²) excluding self-weight of joist									
		Not more than 0.50			More than 0.50 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of joist		Spacing of joists (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
Maximum clear span (m)											
	38	97	1.92	1.90	1.84	1.84	1.81	1.73	1.76	1.73	1.65
	38	120	2.55	2.52	2.42	2.42	2.38	2.27	2.31	2.27	2.15
	38	145	3.26	3.21	2.91	3.07	3.01	2.77	2.92	2.86	2.64
	38	170	3.90	3.76	3.41	3.71	3.57	3.24	3.54	3.41	3.09
	38	195	4.47	4.30	3.91	4.25	4.09	3.71	4.06	3.91	3.55
	38	220	5.03	4.84	4.40	4.78	4.60	4.18	4.58	4.40	4.00
	47	97	2.12	2.09	2.02	2.02	1.99	1.90	1.94	1.90	1.81
	47	120	2.80	2.76	2.60	2.65	2.61	2.46	2.53	2.48	2.35
	47	145	3.57	3.44	3.13	3.36	3.27	2.97	3.19	3.12	2.84
	47	170	4.18	4.03	3.66	3.98	3.83	3.48	3.81	3.66	3.33
	47	195	4.79	4.61	4.19	4.55	4.38	3.98	4.36	4.19	3.81
	47	220	5.39	5.19	4.72	5.13	4.93	4.49	4.91	4.72	4.29
	63	97	2.41	2.38	2.29	2.29	2.26	2.16	2.20	2.16	2.05
	63	120	3.18	3.13	2.86	3.00	2.94	2.72	2.86	2.80	2.60
	63	145	3.93	3.79	3.45	3.74	3.60	3.28	3.58	3.45	3.14
	63	170	4.60	4.43	4.03	4.38	4.21	3.84	4.19	4.03	3.67
	63	195	5.25	5.06	4.62	5.00	4.82	4.39	4.80	4.62	4.20
	63	220	5.91	5.69	5.20	5.63	5.42	4.94	5.40	5.20	4.73
	75	120	3.42	3.33	3.03	3.22	3.16	2.88	3.06	3.00	2.76
	75	145	4.16	4.01	3.65	3.96	3.81	3.47	3.79	3.65	3.32
	75	170	4.85	4.68	4.27	4.63	4.46	4.06	4.43	4.27	3.89
	75	195	5.55	5.35	4.88	5.29	5.09	4.65	5.07	4.88	4.45
	75	220	6.23	6.01	5.49	5.94	5.73	5.23	5.70	5.49	5.01
ALS/CLS											
	38	140	3.12	3.07	2.81	2.94	2.89	2.67	2.80	2.74	2.55
	38	184	4.22	4.06	3.69	4.01	3.86	3.50	3.84	3.69	3.35
	38	235	5.37	5.17	4.70	5.10	4.91	4.46	4.89	4.70	4.27

Table 40 Permissible clear spans for joists for flat roofs with unlimited access											
Imposed load 1.50 kN/m ²											
Strength Class C16 Service Class 1 or 2											
		Dead loads (kN/m ²) excluding self-weight of joist									
		Not more than 0.50			More than 0.50 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of joist		Spacing of joists (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
Maximum clear span (m)											
	38	97	1.21	1.20	1.18	1.18	1.17	1.13	1.15	1.13	1.09
	38	120	1.76	1.74	1.69	1.69	1.67	1.61	1.64	1.61	1.54
	38	145	2.31	2.29	2.24	2.24	2.21	2.14	2.17	2.14	2.05
	38	170	2.89	2.86	2.78	2.78	2.75	2.65	2.69	2.65	2.54
	38	195	3.49	3.45	3.31	3.35	3.30	3.17	3.22	3.17	3.03
	38	220	4.11	4.06	3.73	3.92	3.86	3.58	3.77	3.70	3.45
	47	97	1.44	1.43	1.41	1.41	1.40	1.36	1.38	1.36	1.31
	47	120	1.96	1.95	1.90	1.90	1.89	1.83	1.86	1.83	1.77
	47	145	2.56	2.54	2.48	2.48	2.45	2.37	2.40	2.37	2.28
	47	170	3.19	3.16	3.07	3.07	3.03	2.92	2.97	2.92	2.79
	47	195	3.85	3.80	3.55	3.68	3.63	3.41	3.54	3.48	3.29
	47	220	4.52	4.41	4.01	4.30	4.24	3.85	4.13	4.05	3.71
	63	97	1.67	1.66	1.63	1.63	1.62	1.58	1.59	1.58	1.53
	63	120	2.26	2.24	2.19	2.19	2.17	2.11	2.13	2.11	2.03
	63	145	2.94	2.92	2.84	2.84	2.80	2.71	2.75	2.71	2.60
	63	170	3.65	3.61	3.43	3.50	3.45	3.29	3.38	3.32	3.17
	63	195	4.38	4.31	3.92	4.18	4.12	3.77	4.02	3.95	3.64
	63	220	5.05	4.86	4.42	4.86	4.67	4.25	4.67	4.51	4.10
	75	120	2.46	2.44	2.38	2.38	2.35	2.28	2.31	2.28	2.20
	75	145	3.19	3.16	3.07	3.07	3.03	2.92	2.97	2.92	2.80
	75	170	3.95	3.90	3.63	3.78	3.72	3.49	3.64	3.58	3.37
	75	195	4.72	4.57	4.16	4.50	4.39	4.00	4.32	4.24	3.86
	75	220	5.34	5.14	4.68	5.14	4.95	4.50	4.97	4.78	4.35
ALS/CLS											
	38	140	2.20	2.18	2.13	2.13	2.11	2.04	2.07	2.04	1.95
	38	184	3.22	3.19	3.10	3.10	3.05	2.94	2.99	2.94	2.81
	38	235	4.48	4.38	3.98	4.27	4.20	3.82	4.10	4.02	3.67

Table 41 - Permissible clear spans for joists for flat roofs with unlimited access											
Imposed load 1.50 kN/m ²											
Strength Class C24 Service Class 1 or 2											
		Dead loads (kN/m ²) excluding self-weight of joist									
		Not more than 0.50			More than 0.50 but not more than 0.75			More than 0.75 but not more than 1.00			
Size of joist		Spacing of joists (mm)									
Breadth (mm)	Depth (mm)	400	450	600	400	450	600	400	450	600	
		Maximum clear span (m)									
	38	97	1.43	1.42	1.40	1.40	1.39	1.36	1.37	1.36	1.32
	38	120	1.95	1.94	1.90	1.90	1.88	1.83	1.85	1.83	1.77
	38	145	2.55	2.53	2.47	2.47	2.44	2.36	2.39	2.36	2.27
	38	170	3.19	3.15	3.06	3.06	3.02	2.91	2.96	2.91	2.79
	38	195	3.84	3.79	3.55	3.67	3.62	3.41	3.53	3.47	3.28
	38	220	4.51	4.40	4.00	4.29	4.22	3.84	4.12	4.04	3.70
	47	97	1.60	1.59	1.56	1.56	1.55	1.51	1.53	1.51	1.47
	47	120	2.17	2.15	2.10	2.10	2.08	2.02	2.05	2.02	1.95
	47	145	2.83	2.80	2.73	2.73	2.69	2.60	2.64	2.60	2.50
	47	170	3.51	3.48	3.33	3.37	3.32	3.20	3.25	3.20	3.06
	47	195	4.22	4.17	3.81	4.03	3.97	3.66	3.87	3.80	3.53
	47	220	4.91	4.72	4.29	4.70	4.54	4.13	4.51	4.39	3.98
	63	97	1.85	1.84	1.80	1.80	1.78	1.74	1.76	1.74	1.68
	63	120	2.50	2.48	2.42	2.42	2.39	2.31	2.35	2.31	2.23
	63	145	3.24	3.20	3.11	3.11	3.07	2.96	3.01	2.96	2.84
	63	170	4.01	3.96	3.67	3.83	3.78	3.53	3.69	3.63	3.41
	63	195	4.79	4.62	4.20	4.57	4.44	4.04	4.38	4.29	3.90
	63	220	5.40	5.20	4.73	5.20	5.00	4.55	5.02	4.83	4.39
	75	120	2.71	2.68	2.62	2.62	2.59	2.50	2.54	2.50	2.41
	75	145	3.50	3.46	3.32	3.36	3.32	3.19	3.25	3.19	3.06
	75	170	4.32	4.27	3.89	4.13	4.07	3.74	3.97	3.90	3.61
	75	195	5.07	4.88	4.45	4.88	4.70	4.28	4.70	4.54	4.13
	75	220	5.70	5.49	5.01	5.49	5.29	4.82	5.31	5.11	4.66
ALS/CLS											
	38	140	2.43	2.41	2.35	2.35	2.32	2.25	2.28	2.25	2.17
	38	184	3.55	3.51	3.35	3.40	3.35	3.22	3.28	3.22	3.08
	38	235	4.89	4.70	4.27	4.67	4.52	4.10	4.47	4.36	3.95

4.5 Purlins supporting roof sheeting or cladding

- 4.5.1 Tables 42 to 45 give permissible clear spans for “canted” purlins supporting roof sheeting or cladding where the roof slope is from 10° to 35° inclusive.
- 4.5.2 Permissible clear spans have been calculated in accordance with *BS 5268-7-7: 1990*.
- 4.5.3 The sizes, spacing and spans given will support the dead and imposed loads stated in the tables and a concentrated load of 0.9 kN.
- 4.5.4 Lateral support should be provided in accordance with *BS 5268-2: 2002*, Table 19. In the absence of printed guidance from the manufacturer, it should be assumed that expanded polyurethane and other low density insulating materials will not provide such support, so that with these materials the depth to breadth ratio of the purlins should not exceed 4:1.
- 4.5.5 Unless justified by specialist calculation, the minimum bearing length at supports for purlins should be 50 mm. It may be necessary to provide longer bearing to accommodate fixings or for practical reasons.
- 4.5.6 Notching or drilling of purlins should not be carried out unless justified by specialist calculation.
- 4.5.7 The section sizes of purlins given in Tables 42 - 45 should be sawn sections; or be machined on the width, ie the depth of the binder, or be ALS or CLS; to the tolerance classes specified in *BS EN 336: 2003*, Table NA2, NA 3 and NA 4 respectively.

Figure 7 Purlins supporting roof sheeting or cladding

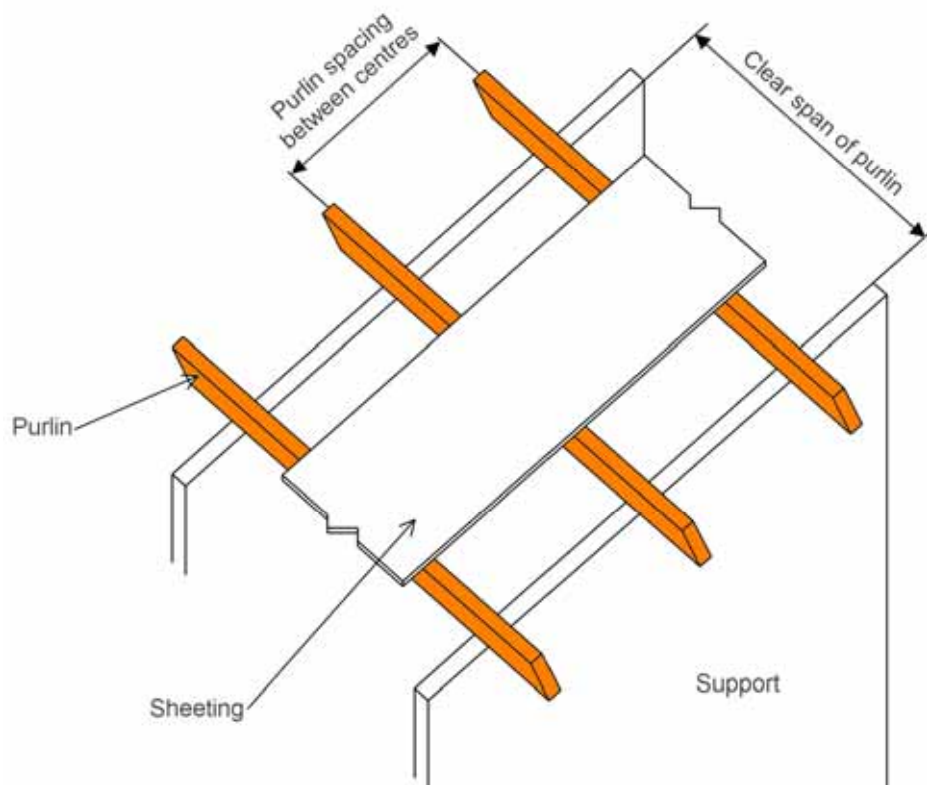


Table 42 Permissible clear spans for purlins supporting roof sheeting or cladding

Slope of roof 10° to 35°

Imposed load 0.75 kN/m²

Strength Class C16

Service Class 1 or 2

		Dead loads (kN/m ²) excluding self weight of purlin																	
		Not more than 0.25						More than 0.25 but not more than 0.50						More than 0.50 but not more than 0.75					
Size of purlin		Spacing of purlins (mm)																	
B	D	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400
(mm)	(mm)	Maximum clear span (m)																	
47	100	1.64	1.59	1.48	1.39	1.31	1.25	1.51	1.44	1.37	1.28	1.21	1.15	1.41	1.34	1.28	1.20	1.13	1.08
47	125	2.21	2.00	1.85	1.73	1.64	1.56	2.01	1.85	1.71	1.60	1.51	1.44	1.86	1.73	1.60	1.50	1.41	1.34
47	150	2.64	2.39	2.22	2.08	1.97	1.87	2.45	2.21	2.05	1.92	1.81	1.73	2.30	2.08	1.92	1.79	1.69	1.61
47	175	3.08	2.79	2.58	2.42	2.29	2.19	2.85	2.58	2.39	2.23	2.11	2.01	2.68	2.42	2.23	2.09	1.98	1.88
47	200	3.51	3.18	2.95	2.77	2.62	2.50	3.25	2.95	2.72	2.55	2.41	2.30	3.05	2.76	2.55	2.39	2.26	2.15
47	225	3.94	3.58	3.31	3.11	2.94	2.81	3.65	3.31	3.06	2.87	2.71	2.58	3.43	3.10	2.87	2.68	2.54	2.41
63	100	1.88	1.77	1.64	1.54	1.46	1.39	1.72	1.64	1.52	1.42	1.35	1.28	1.61	1.52	1.42	1.33	1.26	1.20
63	125	2.43	2.21	2.05	1.92	1.82	1.74	2.26	2.04	1.89	1.78	1.68	1.60	2.11	1.92	1.77	1.66	1.57	1.50
63	150	2.91	2.65	2.45	2.30	2.18	2.08	2.70	2.45	2.27	2.13	2.01	1.92	2.54	2.30	2.13	1.99	1.89	1.80
63	175	3.39	3.08	2.86	2.68	2.54	2.43	3.15	2.86	2.64	2.48	2.35	2.24	2.96	2.68	2.48	2.32	2.20	2.09
63	200	3.87	3.52	3.26	3.06	2.90	2.77	3.59	3.26	3.02	2.83	2.68	2.56	3.38	3.06	2.83	2.65	2.51	2.39
63	225	4.34	3.95	3.66	3.44	3.26	3.11	4.03	3.66	3.39	3.18	3.02	2.87	3.79	3.44	3.18	2.98	2.82	2.69

Table 43 Permissible clear spans for purlins supporting roof sheeting or cladding

Slope of roof 10° to 35°

Imposed load 0.75 kN/m²

Strength Class C24

Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin																	
		Not more than 0.25						More than 0.25 but not more than 0.50						More than 0.50 but not more than 0.75					
Size of purlin		Spacing of purlins (mm)																	
B	D	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400
(mm)	(mm)	Maximum clear span (m)																	
47	100	1.82	1.72	1.60	1.50	1.42	1.35	1.66	1.59	1.47	1.38	1.31	1.25	1.55	1.47	1.38	1.29	1.22	1.16
47	125	2.37	2.15	1.99	1.87	1.77	1.69	2.20	1.99	1.84	1.73	1.63	1.56	2.04	1.87	1.73	1.62	1.53	1.45
47	150	2.84	2.58	2.39	2.24	2.12	2.02	2.63	2.39	2.21	2.07	1.96	1.87	2.47	2.24	2.07	1.94	1.83	1.74
47	175	3.31	3.00	2.78	2.61	2.47	2.36	3.07	2.78	2.57	2.41	2.28	2.18	2.88	2.61	2.41	2.26	2.14	2.03
47	200	3.78	3.43	3.18	2.98	2.83	2.70	3.50	3.17	2.94	2.76	2.61	2.49	3.29	2.98	2.75	2.58	2.44	2.32
47	225	4.24	3.85	3.57	3.35	3.18	3.03	3.93	3.57	3.30	3.10	2.93	2.79	3.70	3.35	3.10	2.90	2.74	2.61
63	100	2.08	1.91	1.77	1.66	1.57	1.50	1.89	1.76	1.63	1.53	1.45	1.38	1.76	1.66	1.53	1.44	1.36	1.30
63	125	2.62	2.38	2.20	2.07	1.96	1.87	2.43	2.20	2.04	1.91	1.81	1.73	2.28	2.07	1.91	1.79	1.70	1.62
63	150	3.13	2.85	2.64	2.48	2.35	2.25	2.91	2.64	2.44	2.29	2.17	2.07	2.73	2.48	2.29	2.15	2.04	1.94
63	175	3.65	3.32	3.08	2.89	2.74	2.62	3.39	3.07	2.85	2.67	2.53	2.42	3.18	2.89	2.67	2.51	2.37	2.26
63	200	4.16	3.78	3.51	3.30	3.13	2.99	3.86	3.51	3.25	3.05	2.89	2.76	3.63	3.30	3.05	2.86	2.71	2.59
63	225	4.67	4.25	3.94	3.71	3.52	3.36	4.34	3.94	3.65	3.43	3.25	3.10	4.08	3.70	3.43	3.22	3.05	2.91

Table 44 Permissible clear spans for purlins supporting roof sheeting or cladding

Slope of roof 10° to 35°

Imposed load 1.0 kN/m²

Strength Class C16

Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin																	
		Not more than 0.25						More than 0.25 but not more than 0.50						More than 0.50 but not more than 0.75					
Size of purlin		Spacing of purlins (mm)																	
B	D	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400
(mm)	(mm)	Maximum clear span (m)																	
47	100	1.64	1.48	1.37	1.28	1.21	1.15	1.51	1.39	1.28	1.20	1.13	1.08	1.41	1.31	1.21	1.13	1.07	1.01
47	125	2.04	1.85	1.71	1.60	1.51	1.44	1.92	1.73	1.60	1.50	1.41	1.35	1.82	1.64	1.51	1.41	1.33	1.27
47	150	2.45	2.22	2.05	1.92	1.81	1.73	2.30	2.08	1.92	1.79	1.70	1.61	2.18	1.96	1.81	1.69	1.60	1.52
47	175	2.85	2.58	2.39	2.24	2.12	2.01	2.68	2.42	2.24	2.09	1.98	1.88	2.54	2.29	2.11	1.98	1.87	1.77
47	200	3.26	2.95	2.73	2.56	2.42	2.30	3.06	2.76	2.55	2.39	2.26	2.15	2.90	2.62	2.41	2.26	2.13	2.01
47	225	3.66	3.31	3.07	2.87	2.72	2.59	3.43	3.11	2.87	2.69	2.54	2.42	3.25	2.94	2.71	2.54	2.40	2.24
63	100	1.81	1.64	1.52	1.42	1.35	1.28	1.70	1.54	1.42	1.33	1.26	1.20	1.61	1.46	1.35	1.26	1.19	1.13
63	125	2.26	2.05	1.89	1.78	1.68	1.60	2.12	1.92	1.78	1.66	1.57	1.50	2.01	1.82	1.68	1.57	1.49	1.42
63	150	2.71	2.45	2.27	2.13	2.02	1.92	2.54	2.30	2.13	2.00	1.89	1.80	2.41	2.18	2.01	1.89	1.78	1.70
63	175	3.15	2.86	2.65	2.48	2.35	2.24	2.96	2.68	2.48	2.33	2.20	2.10	2.81	2.54	2.35	2.20	2.08	1.98
63	200	3.59	3.26	3.02	2.84	2.69	2.56	3.38	3.06	2.83	2.66	2.51	2.39	3.20	2.90	2.68	2.51	2.38	2.26
63	225	4.04	3.66	3.40	3.19	3.02	2.88	3.80	3.44	3.18	2.99	2.83	2.69	3.60	3.26	3.01	2.82	2.67	2.54

Table 45 Permissible clear spans for purlins supporting roof sheeting or cladding

Slope of roof 10° to 35°

Imposed load 1.0 kN/m²

Strength Class C24

Service Class 1 or 2

		Dead load (kN/m ²) excluding self weight of purlin																	
		Not more than 0.25						More than 0.25 but not more than 0.50						More than 0.50 but not more than 0.75					
Size of purlin		Spacing of purlins (mm)																	
B	D	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400	900	1200	1500	1800	2100	2400
(mm)	(mm)	Maximum clear span (m)																	
47	100	1.76	1.60	1.48	1.38	1.31	1.25	1.65	1.50	1.38	1.29	1.22	1.17	1.55	1.42	1.31	1.22	1.16	1.10
47	125	2.20	1.99	1.84	1.73	1.64	1.56	2.07	1.87	1.73	1.62	1.53	1.46	1.96	1.77	1.63	1.53	1.44	1.37
47	150	2.64	2.39	2.21	2.07	1.96	1.87	2.48	2.24	2.07	1.94	1.83	1.75	2.35	2.12	1.96	1.83	1.73	1.65
47	175	3.07	2.78	2.58	2.42	2.29	2.18	2.88	2.61	2.41	2.26	2.14	2.04	2.73	2.47	2.28	2.14	2.02	1.92
47	200	3.51	3.18	2.94	2.76	2.61	2.49	3.29	2.98	2.76	2.58	2.44	2.33	3.12	2.82	2.61	2.44	2.31	2.19
47	225	3.94	3.57	3.31	3.10	2.94	2.80	3.70	3.35	3.10	2.90	2.75	2.62	3.51	3.17	2.93	2.74	2.59	2.47
63	100	1.95	1.77	1.64	1.53	1.45	1.39	1.83	1.66	1.53	1.44	1.36	1.30	1.74	1.57	1.45	1.36	1.29	1.23
63	125	2.43	2.20	2.04	1.92	1.82	1.73	2.28	2.07	1.92	1.80	1.70	1.62	2.17	1.96	1.81	1.70	1.61	1.53
63	150	2.91	2.64	2.45	2.30	2.18	2.08	2.74	2.48	2.30	2.15	2.04	1.94	2.60	2.35	2.17	2.04	1.93	1.84
63	175	3.39	3.08	2.85	2.68	2.54	2.42	3.19	2.89	2.68	2.51	2.38	2.27	3.02	2.74	2.53	2.38	2.25	2.14
63	200	3.87	3.51	3.26	3.06	2.90	2.76	3.64	3.30	3.05	2.87	2.71	2.59	3.45	3.13	2.89	2.71	2.57	2.45
63	225	4.34	3.94	3.66	3.44	3.26	3.11	4.08	3.71	3.43	3.22	3.05	2.91	3.88	3.51	3.25	3.05	2.89	2.75

References

British Standards

- BS 4978: 1996 Specification for softwood grades for structural use.
- BS 5268-2: 2002 Structural use of timber. Code of practice for permissible stress design, materials and workmanship.
- BS 5268-7.1: 1989 Structural use of timber. Recommendations for the calculation basis for span tables. Domestic floor joists.
- BS 5268-7.2: 1989 Structural use of timber. Recommendations for the calculation basis for span tables. Joists for flat roofs.
- BS 5268-7.3: 1989 Structural use of timber. Recommendations for the calculation basis for span tables. Ceiling joists.
- BS 5268-7.4: 1989 Structural use of timber. Recommendations for the calculation basis for span tables. Ceiling binders.
- BS 5268-7.5: 1990 Structural use of timber. Recommendations for the calculation basis for span tables. Domestic rafters.
- BS 5268-7.6: 1990 Structural use of timber. Recommendations for the calculation basis for span tables. Purlins supporting rafters.
- BS 5268-7.7: 1990 Structural use of timber. Recommendations for the calculation basis for span tables. Purlins supporting sheeting or decking.
- BS 6399-1: 1996 Loading for buildings. Code of practice for dead and imposed loads.
- BS 6399-3: 1988 Loading for buildings. Code of practice for imposed roof loads.
- BS 8103-3: 1996 Structural design of low-rise buildings. Code of practice for timber floors and roofs for housing.
- BS EN 336: 2003 Structural timber - Coniferous and poplar - Sizes - Permissible deviations.
- BS EN 338: 2003 Structural timber. Strength classes.
- BS EN 519: 1995 Structural timber. Grading. Requirements for machine strength graded timber and grading machines.

Other publications

- TRADA Wood Information Sheet 1 - 25 Structural use of timber: An introduction to BS 5268-2.
- TRADA Wood Information Sheet 4 - 7 Timber strength grading and strength classes.
- TRADA Wood Information Sheet 4 – 29 Dry-graded structural softwood.

Appendix 1

Explanatory notes: FAQs

These Explanatory Notes answer some Frequently Asked Questions received following publication of the 2004 edition of these Span Tables.

1. *In Section 4.1.3, why is a concentrated load of 1.4 kN not checked as an alternative to the 1.5 kN/m² imposed load, as required by BS 6399-1 ?*

The span tables follow exactly the procedure set out in BS 5268-7-1, as stated in Section 4.1.1. When BS 5268-7-1 was published the loading code BS 6399-1 said that for domestic floors the point load could be ignored, so BS 5268-7-1 does not apply this. The exemption was probably because for spans over 2.4 m the 1.5 kN point load never governs the span with domestic floor loading. For spans less than 2.4 m BS 5268-7-1 uses a more onerous UDL called a "slab load".

2. *In Tables 6 and 7 for floor joists why are the shaded areas (which mean that 2 extra joists are required to support a partition load) on the left-hand side of the table?*

On the extreme left-hand side of the tables, where joist spacings are at 400 mm, the dead load and imposed udl are only 0.7 kN/m. This is because each joist only has to carry 400 mm of floor load. At the tabulated spans, 0.7 kN/m + the self-weight of the joist is the maximum load that one of these joists can support. Since a partition can weigh 0.8 kN/m, one additional joist will not be strong enough to support it plus its own self-weight, so two additional joists are needed. However, at 600 mm spacing, each joist is supporting over 1.1 kN/m so one similar additional joist is easily able to support a partition weighing 0.8 kN/m.

3. *Which dead load should be used for floors – 0.25, 0.5 or 1.25 kN/m²?*

The traditional assumption was that:

0.25 kN/m² was for suspended ground floors with no plasterboard or partition allowance;

0.5 kN/m² was for intermediate floors with no partition allowance;

1.25 kN/m² was for party or compartment floors with no partition allowance.

However, with modern materials and insulation requirements it is likely that today's floors weigh more than the above, eg 0.6 kN/m² for an intermediate floor. Calculate the actual weight of the floor and use the appropriate column in Table 6 or 7.

TRADA's Timber Sizer software allows the exact weight of floor to be entered or a partition to be included, to produce the most economical solution. The software can be purchased and downloaded via the askTRADA website. Go to www.trada.co.uk/software. (A 'lite' version is available free of charge to TRADA members.)

4. *Why does Section 4.1.4 say that joists beneath a bath should be doubled?*

The udl produced by a full bath can exceed the 1.5 kN/m² imposed load for which normal floor joists are designed.

5. *In Table 9 (permissible clear spans for ceiling joists) how is the clear span defined?*

It is the largest of: the clear distance between the first wall plate and first binder, the clear distances between binders, and the clear distance between last binder and second wall plate.

6. *In Figure 4 (ceiling joists and binders arrangement), do the binders support the joists or the joists support the binders?*

The binders support the joists, so the connections between them need to be designed and installed properly to ensure that half the load on the two adjacent spans of joist can be transferred to the binder where it crosses the joists. Suitable nailed metal plate fixtures are recommended to ensure a good fixing.

7. *In the rafter and purlin tables, is the dead load measured on slope or on plan?*

It is measured on slope.

8. *In the rafter and purlin tables, is the snow load measured on slope or on plan?*

It is measured on plan.

9. *In the purlin span tables, how is the clear span of the purlins defined?*

For a purlin spanning between two supporting walls, it is the clear distance between the walls. For a purlin with an intermediate post, it is the larger of the clear distance between one wall and the post and the clear distance between the post and the other wall.

10. *Why are the spans different from those in the old Building Regulations Approved Document A and in BS 8103-3 (the small buildings code)?*

The old tables were calculated using the strength and stiffness properties for timber strength classes SC3 and SC4 (even though BS 8103-3 says the classes used are C16 and C24).

TRADA's tables use the current European C16 and C24 strength classes, defined in *BS EN 338: 2003 Structural timber - Strength classes*, in which one or two properties are slightly better, hence some of the spans are a little greater than before.



TRADA Technology Ltd
Chiltern House Stocking Lane Hughenden Valley
High Wycombe Buckinghamshire HP14 4ND UK
t +44 (0) 1494 569600 f +44 (0) 1494 565487
e information@trada.co.uk w www.trada.co.uk