Table 2.4 Geometrical properties of sawn softwoods (BS 5268 Part 2 1988 Table 98) (continued)

Basic size*	Area	Section modulus		Second moment of area		Radius of gyration	
		About x–x	About y–y	About x–x	About y–y	About x–x	About y–y
(mm)	(10^3 mm^2)	(10^3 mm^3)	(10^3 mm^3)	(10^6 mm^4)	(10^6 mm^4)	(mm)	(mm)
75 × 100	7.50	125	93.8	6.25	3.52	28.9	21.7
75 × 125	9.38	195	117	12.2	4.39	36.1	21.7
75 × 150	11.3	281	141	21.1	5.27	43.3	21.7
75 × 175	13.1	383	164	33.5	6.15	50.5	21.7
75 × 200	15.0	500	188	50.0	7.03	57.7	21.7
75 × 225	16.9	633	211	71.2	7.91	65.0	21.7
75 × 250	18.8	781	234	97.7	8.79	72.2	21.7
75 × 300	22.5	1130	281	169	10.5	86.6	21.7
100 × 100	10.0	167	167	8.33	8.33	28.9	28.9
100 × 150	15.0	375	250	28.1	12.5	43.3	28.9
100 × 200	20.0	667	333	66.7	16.7	57.7	28.9
100 × 250	25.0	1040	417	130	20.8	72.2	28.9
100 × 300	30.0	1500	500	225	25.0	86.6	28.9
150 × 150	22.5	563	563	42.2	42.2	43.3	43.3
150 × 200	30.0	1000	750	100	56.3	57.7	43.3
150 × 300	45.0	2250	1130	338	84.4	86.6	43.3
200 × 200	40.0	1330	1330	133	133	57.7	57.7
250 × 250	62.5	2600	2600	326	326	72.2	72.2
300 × 300	90.0	4500	4500	675	675	86.6	86.6

* Basic size measured at 20 per cent moisture content.

Table 2.5 Modification factor K_1 by which the geometrical properties of timber for the dry exposure condition should be multiplied to obtain values for the wet exposure condition (BS 5268 Part 2 1988 Table 2)

Geometrical property	Value of K_1
Thickness, width, radius of gyration	1.02
Cross-sectional area	1.04
First moment of area, section modulus	1.06
Second moment of area	1.08

value is permitted by multiplying it by a load sharing modification factor K_8 of 1.1.

2.11 Types of member

There are certain design considerations which apply specifically to either flexural members (such as beams) or compression members (such as posts). These will be explained in greater detail in the following sections.

Table 2.6 Modification factor K_3 for duration of loading (BS 5268 Part 2 1988 Table 17)

Duration of loading	Value of K_3
Long term (e.g. dead + permanent imposed*)	1.00
Medium term (e.g. dead + snow, dead + temporary imposed)	1.25
Short term (e.g. dead + imposed + wind,† dead + imposed + snow + wind†)	1.50
Very short term (e.g. dead + imposed + wind‡)	1.75

* For uniformly distributed imposed floor loads $K_3 = 1$ except for type 2 and type 3 buildings in Table 5 of BS 6399 Part 1 1984 (here Table 1.5) where, for corridors, hallways, landings and stairways only, K_3 may be assumed to be 1.5.

† For wind, short term category applies to class C (15 s gust) as defined in CP 3 Chapter V Part 2.

‡ For wind, very short term category applies to classes A and B (3 s or 5 s gust) as defined in CP 3 Chapter V Part 2.

2.12 Flexural members

Flexural members are those subjected to bending, for example beams, rafters, joists and purlins. The main design considerations for which flexural members should be examined are

(a) Bending (including lateral buckling)

(b) Deflection

(c) Shear

(d) Bearing.

Generally, bending is the critical condition for medium span beams, deflection for long span beams, and shear for heavily loaded short span beams or at notched ends.

Let us now examine how we consider each of these in design.

2.12.1 Bending (including lateral buckling)

For designs based on permissible stress philosophy, bending is checked by applying the basic theory of bending principles. In relation to timber design this must also take into account the relevant modification factors for exposure, load duration, load sharing and so on.

From the theory of bending we know that $M = fZ$, where $Z = bd^2/6$ for rectangular sections. Knowing the applied loads, the maximum bending moment M may be calculated. Hence the required section modulus Z about the x–x axis may be obtained:

$$Z_{xx} \text{ required} = \frac{M}{f}$$