Table 2.1 Softwood species/grade* combinations which satisfy the requirements for strength classes: graded to BS 4978 (BS 5268 Part 2 1988 Table 3)

Standard name	Strength class†				
	SC1	SC2	SC3	SC4	SC5‡
Imported					
Parana pine			GS	SS	
Pitch pine (Caribbean)			GS		SS
Redwood			GS/M50	SS	M75
Whitewood			GS/M50	SS	M75
Western red cedar	GS	SS			
Douglas fir-larch (Canada)			GS	SS	
Douglas fir-larch (USA)			GS	SS	
Hem-fir (Canada)			GS/M50	SS	M75
Hem-fir (USA)§			GS	SS	
Spruce-pine-fir (Canada)§			GS/M50	SS/M75	
Sitka spruce (Canada)¶		GS	SS		
Western whitewoods (USA)¶	GS		SS		
Southern pine (USA)			GS	SS	
British grown					
Douglas fir		GS	M50/SS		M75
Larch			GS	SS	
Scots pine			GS/M50	SS	M75
Corsican pine		GS	M50	SS	M75
European spruce¶	GS	M50/SS	M75		
Sitka spruce¶	GS	M50/SS	M75		

* Machine grades MGS and MSS are interchangeable with GS and SS grades respectively. The S6, S8, MS6 and MS8 grades of the ECE 'Recommended standard for stress grading of coniferous sawn timber' (1982) may be substituted for GS, SS, MGS and MSS respectively.

† A species/grade combination from a higher strength class (see Table 9 of BS 5268, here Table 2.2) may be used where a lower strength class is specified.

‡ All softwoods classified as or machine graded to strength class SC5, except pitch pine and southern pine (USA), should use the fastener loads tabulated for strength classes SC3 and SC4.

§ For grades of hem-fir (USA) and spruce-pine-fir (Canada) classified as or machine graded to strength classes other than SC1 and SC2, the values of lateral load perpendicular to the grain for bolts and timber connectors should be multiplied by the joint/class modification factor K_{42} which has the value 0.9.

¶ All grades of British grown Sitka spruce, Canadian Sitka spruce, British grown European spruce and western whitewoods (USA) should use the fastener loads tabulated for strength classes SC1 and SC2.

It may sometimes be necessary to specify a particular species for reasons other than strength. This may be for appearance, durability or other material quality. In such instances the designer, having designed to a particular strength class, can specify the species from within that class which he is prepared to accept.

Table 2.2 Grade stresses and moduli of elasticity for strength classes: for the dry exposure condition (BS 5268 Part 2 1988 Table 9)

Strength class	Bending parallel to grain	Tension parallel to grain	Compression parallel to grain	Compression perpendicular to grain*		Shear parallel to grain	Modulus of elasticity		Approximate density†
							Mean	Minimum	
	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(N/mm^2)	(kg/m^3)
SC1	2.8	2.2‡	3.5	2.1	1.2	0.46	6 800	4 500	540
SC2	4.1	2.5‡	5.3	2.1	1.6	0.66	8 000	5 000	540
SC3	5.3	3.2‡	6.8	2.2	1.7	0.67	8 800	5 800	540
SC4	7.5	4.5‡	7.9	2.4	1.9	0.71	9 900	6 600	590
SC5	10.0	6.0‡	8.7	2.8	2.4	1.00	10 700	7 100	590/760
SC6§	12.5	7.5	12.5	3.8	2.8	1.50	14 100	11 800	840
SC7§	15.0	9.0	14.5	4.4	3.3	1.75	16 200	13 600	960
SC8§	17.5	10.5	16.5	5.2	3.9	2.00	18 700	15 600	1080
SC9§	20.5	12.3	19.5	6.1	4.6	2.25	21 600	18 000	1200

* When the specification specifically prohibits wane at bearing areas, the higher values of compression perpendicular to the grain stress may be used; otherwise the lower values apply.

† Since many species may contribute to any of the strength classes, the values of density given in this table may be considered only crude approximations. When a more accurate value is required it may be necessary to identify individual species and utilize the values given in Appendix A of BS 5268. The higher value for SC5 is more appropriate for hardwoods.

‡ Note the light framing, stud, structural light framing no. 3 and joist and plank no. 3 grades should not be used in tension.

§ Classes SC6, SC7, SC8 and SC9 will usually comprise the denser hardwoods.

2.6 Design stresses

The grade stresses given in Table 2.2 are basic stresses applicable to timber in a dry exposure condition, within certain dimensional and geometrical parameters and subjected to permanent loading. If any of these conditions change then the basic grade stress is affected. Therefore, to obtain the permissible design stresses, modification factors known as K factors are given in BS 5268 to be used when necessary to adjust the grade stress.

A summary of the K factors which are relevant to the designs contained in this manual are as follows:

- K_1 wet exposure geometrical property modification factor
- K_2 wet exposure stress modification factor
- K_3 load duration modification factor
- K_5 notched end shear stress modification factor
- K_7 bending stress, depth modification factor
- K_8 load-sharing modification factor ($= 1.1$)
- K_{12} slenderness ratio modification factor for compression members

The use of these factors will be discussed further in the relevant sections of this chapter.