

### 6.4.3 Nail spacing

The end distances, edge distances and spacing of nails should be such as to avoid undue splitting and, unless shown by test to be satisfactory, should not be less than the values given in Table 53.

For all softwoods except Douglas fir, the spacings given in Table 53 for timber-to-timber joints should be multiplied by 0.8. For nails driven at right angles to the glued surface of pre-glued laminated members, the spacings should be further multiplied by 0.9. In no case, however, should the edge distance in the timber be less than  $5d$ .

### 6.4.4 Timber-to-timber joints

#### 6.4.4.1 Basic single shear lateral loads

The basic single shear lateral loads for single round wire nails with a minimum tensile strength of  $600 \text{ N/mm}^2$ , driven at right angles to the side grain of timber in service classes 1 and 2, are given in Table 54.

For nails driven into pre-drilled holes in softwood strength classes C14 to C40 and TR26, the values given in Table 54 may be multiplied by 1.15.

For nails driven into the end grain of timber, the values given in Table 54 should be multiplied by the end grain modification factor  $K_{43}$ , which has a value of 0.7.

For the basic loads in Table 54 to apply, the nails should fully penetrate the tabulated standard values in both the headside member and the member receiving the nail point.

For softwoods where the thicknesses of members or nail penetrations are less than the standard values given in Table 54, the basic load should be multiplied by the smaller of the two ratios:

- a) actual to standard thickness of headside member, or
- b) actual penetration to standard pointside thickness.

No load-carrying capacity should be assumed where the ratios described in a) or b) are less than 0.66 for softwoods and 1.0 for hardwoods. Where improved nails (see 6.4.4.4) are used, the ratios may be reduced to 0.50 for softwoods and 0.75 for hardwoods.

No increase in basic load is permitted for thicknesses or penetrations greater than the standard values.

The basic loads given in this clause for each nail should be modified in accordance with 6.4.9 to determine the permissible load for a joint.

#### 6.4.4.2 Basic multiple shear lateral loads

The basic multiple shear lateral load for each nail should be obtained by multiplying the value given in Table 54 by the number of shear planes, provided that the thickness of the inner member is not less than 0.85 times the standard thickness given in Table 54. Where the outer member thickness or nail penetrations in the outer softwood members are less than the standard value given in Table 54, or where the thickness of the inner softwood member is less than 0.85 of the standard thickness, the basic load should be reduced in accordance with the ratios given in 6.4.4.1.

The basic loads given in this clause for each nail should be modified in accordance with 6.4.9 to determine the permissible load for a joint.

#### 6.4.4.3 Basic withdrawal loads

The basic withdrawal loads for single nails at right angles to the side of timber in service classes 1 and 2 are given in Table 55. These apply to each 1 mm depth of penetration, and for a particular nail should be multiplied by the actual pointside penetration achieved.

The penetration of the nail should be not less than 15 mm.

No withdrawal load should be carried by a nail driven into the end grain of timber.

The basic loads given in this clause for each nail should be modified in accordance with 6.4.9 to determine the permissible load for a joint.

Table 54 — Basic single shear lateral loads for round wire nails in a timber-to-timber joint

Nail diameter mm	Softwoodsnot (pre-drilled)					Hardwoods (pre-drilled)		
	Standard penetration <sup>a</sup> mm	Basic single shear lateral load N				Minimum penetration <sup>a</sup> mm	Basic single shear lateral load N	
		Strength class					Strength class	
		C14	C16/18/22	C24	C27/30/35/40		D30/35/40	D50/60/70
2.65	32	242	251	266	274	21	374	414
3.00	36	297	308	327	336	24	467	517
3.35	40	357	369	392	403	27	569	630
3.75	45	430	444	472	486	30	695	770
4.00	48	478	494	525	540	32	780	864
4.50	54	581	600	638	656	36	961	1 065
5.00	60	691	714	759	781	40	1 159	1 284
5.60	67	833	861	915	941	45	1 417	1 569
6.00	72	934	965	1 026	1 054 <sup>b</sup>	48	1 601	1 773
6.70	80	1 120	1 158	1 230	1 265 <sup>b</sup>	54	1 945	2 154
8.00	96	1 501	1 552	1 649	1 695 <sup>b</sup>	64	2 658	2 944

<sup>a</sup> These values apply to both the headside thickness and pointside penetration.

<sup>b</sup> Holes should be pre-drilled.

Table 55 — Basic withdrawal loads per millimetre of pointside penetration for smooth round wire nails driven at right angles to the grain

Nail diameter mm	Basic withdrawal load N/mm					
	Strength class					
	C14	C16/18/22	C24	C27/30/35/40	D30/35/40	D50/60/70
2.65	1.28	1.50	1.99	2.42	5.86	9.80
3.00	1.45	1.69	2.25	2.74	6.64	11.09
3.35	1.62	1.89	2.52	3.06	7.41	12.39
3.75	1.81	2.12	2.82	3.42	8.30	13.87
4.00	1.93	2.26	3.00	3.65	8.85	14.79
4.50	2.17	2.54	3.38	4.11	9.96	16.64
5.00	2.41	2.82	3.76	4.56	11.06	18.49
5.60	2.70	3.16	4.21	5.11	12.39	20.71
6.00	2.90	3.39	4.51	5.48	13.28	22.19
6.70	3.23	3.78	5.03	6.12	14.82	24.78
8.00	3.86	4.51	6.01	7.30	17.70	29.58