

The following Table gives a summary of the results obtained for Douglas Fir:—

Beam.	Dimensions in inches.			Weight in lbs. per cubic foot at date of test.	Maximum skin stress in lbs. per sq. in.	Co-efficient of elasticity in lbs.
NEW TIMBER, SPECIALLY SELECTED.						
III.	66	$\times$ 5.375	$\times$ 4.125		10,411	2,178,100
XIX.	138	$\times$ 12.1	$\times$ 9.1	41.22	9,043	1,934,500
VII.	69	$\times$ 6	$\times$ 5.8125	39.92	8,712	2,044,115
XV.	198	$\times$ 13	$\times$ 6.125	39.92	8,020	1,989,400
NEW TIMBER, FIRST QUALITY.						
X	198	$\times$ 14.875	$\times$ 6	37.50	1,027	1,629,616
XI	204	$\times$ 14.875	$\times$ 8.6875	36.99	5,658	1,770,563
IX	204	$\times$ 14.875	$\times$ 9	35.76	7,694	1,764,939
VIII	69	$\times$ 5.125	$\times$ 5.5	35.74	8,382	1,584,692
XVIII	138	$\times$ 17.8	$\times$ 8.76	35.59	5,196	1,329,900
XVII	138	$\times$ 15.125	$\times$ 9	35.17	4,907	1,259,600
XX	138	$\times$ 12	$\times$ 8.88	34.92	6,559	1,571,150
XII	204	$\times$ 14.875	$\times$ 8.8125	34.79	7,645	1,678,300
XIII	204	$\times$ 14.75	$\times$ 6	34.13	6,912	1,643,193
XXI	138	$\times$ 8.98	$\times$ 5.95	30.83	7,784	1,588,406
VI	69	$\times$ 6.125	$\times$ 6	30.23	7,116	1,489,215
I	96	$\times$ 12.125	$\times$ 9		4,897	1,138,500
II	66	$\times$ 12.125	$\times$ 5.625		1,378	1,146,900
V	69	$\times$ 9.125	$\times$ 5	29.18	5,869	946,270
IV	69	$\times$ 9.125	$\times$ 5	28.27	4,156	926,500
OLD TIMBER.						
XXIII	186	$\times$ 14.35	$\times$ 8.78	39.59	7,339	1,878,950
XXII	162	$\times$ 15.6875	$\times$ 7.75	33.75	7,086	1,665,560
XXV	144	$\times$ 15.65	$\times$ 8.2	33.11	4,613	947,720
XXIV	132	$\times$ 16.2	$\times$ 7.75	32.8	6,135	1,201,620

The following data may be adopted in practice:—

In the case of specially selected timber, free from knots, with sound clear and straight grain, and cut out of the log at a distance from the heart:

Average weight in lbs. per cubic foot = 40.

Average co-efficient of elasticity in lbs. per sq. in. = 2,000,000.

Average maximum skin stress in lbs. per square inch = 9000.

Safe working skin stress in lbs. per square inch = 3000 lbs.

In the case of first quality timber, such as is ordinarily found in the market:

Average weight in lbs. per cubic foot = 34.

Average co-efficient of elasticity in lbs. per square inch = 1,430,000.

Average maximum skin stress in lbs. per square inch = 6000.

Safe working skin stress in lbs. per square inch = 2000.

In specifying these data it will be observed that 3 is adopted as the factor of safety. Upon this hypothesis the factor of safety for the stick giving the minimum skin stress in more than 2, and this, in the opinion of the author, is an ample factor for a material which experience and all experiments show, may be strained without danger very nearly up to the point of fracture.

Further, the results obtained in the experiments with the old stringers show that the strength of the timber had been retained to a very large extent, and that the rotting had not extended to such a depth below the skin as to sensibly affect the efficiency of the sticks, which still possessed ample strength for the work they were designed to do.

Thus in Beam XXII a diminution in the skin stress of 1058 lbs. per square inch, which is equivalent to a diminution in the effective depth of $\frac{15.6875 \times 1058}{2 \times 7088} = 1.076$ ins., would still leave 6000 lbs. per square inch as the skin stress. Thus if the rotting had extended to depth of 1.176 ins., the factor of safety would still remain 3.