

Strength Graded Timber and Span Tables

A Step-By-Step Guide

Strength Grading and Class

- BSW construction products are frequently used timbers for loadbearing situations such as floor joists and wall studs (sometimes referred to as “carcassing”). In order to comply with the Building Regulations they must always be strength graded: they are then usually put into a Strength Class.
- Strength Grading of BSW construction timbers is often done by machine to British Standard EN 14081 to classes C16 or C24. There are actually 12 Strength Classes available in Europe, but the UK mainly uses C16 and C24.
- BSW construction timbers are clearly marked with a legally required stamp to help you identify that the products have been graded. The picture below explains the stamp markings.
- In your project if strength graded timber is cut to length, there will be no problem - its grade is unaffected. However, if a piece of graded timber is resawn in its cross-section, then its original strength grade is destroyed. Both of the resawn sections must be re-graded before being used for any structural purpose.
- The Strength Class of the timber is very important when determining which joist to use for your project. It will help you identify which dimensions of timber to use for a particular span and loading situation.

Joist Spans and Supports

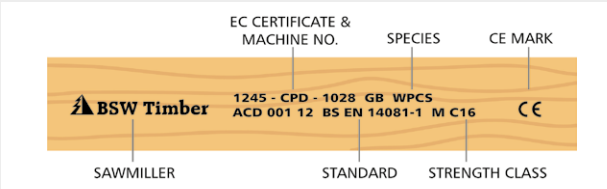
- A “joist span” means the “clear” distance that it carries over, rather than the overall length of the piece of joist timber. But of course, as well as the distance to be “bridged”, both ends of the joist must be properly supported. For example, a clear span of 3 metres will actually require a timber member in the order of 3.3 metres long. This will have 100-150mm of timber at each end, resting on some form of support: and this may be a wall made of brick or block, or maybe a timber stud frame – or it could be a joist hanger.
- A joist hanger is a specially-made metal “shoe” designed to cradle the joist end which provides support plus a rigid fixing. By nailing the joist into the hanger, it prevents rotation of the joist and therefore limits overall deflection.

BSW machined kiln dried strength graded construction timbers are available in the following sizes:

Nominal Sizes (mm)	Finished Sizes (mm)	Lengths (mm)
47 x 75*	45 x 70	2400
47 x 100	45 x 95	3000
47 x 125	45 x 120	3600
47 x 150	45 x 145	4200
47 x 175	45 x 170	4800
47 x 200	45 x 195	6000
47 x 225	45 x 220	
75 x 100	72 x 95	
75 x 150	72 x 145	
75 x 175	72 x 170	
75 x 200	72 x 195	
75 x 225	72 x 220	

*47 x 75 KD Ungraded

Illustration of the grade stamp



- Span tables are used to select which BSW joist is needed for a particular span. The four key factors for selecting what timber to use are shown in the diagram below; joist size, joist centres, loading and distance to be spanned.

		Spans primarily for ground floors				
C/C Joist		Less than 0.25kN/m²				LOADING
JOIST SIZE	Joist centres	400	450	480	600	JOIST CENTRES
	45 x 95mm	1930	1824	1766	1473	
	45 x 120mm	2593	2492	2438	2183	
	45 x 145mm	3127	3006	2941	2705	
	45 x 170mm	3659	3518	3443	3138	DISTANCE TO BE SPANNED
	45 x 195mm	4189	4029	3943	3565	
	45 x 220mm	4698	4537	4441	3988	

C16 Span Table

	Dead load kN/m² excluding self weight of joist															
C/C Joist	Spans primarily for ground floors				Spans for first floor/intermediate floors of Buildings:				Spans primarily for I Joists				Spans for apartments and flats to enhance acoustic benefits as they need to be deeper joist for sound prevention			
	Less than 0.25kN/m²				0.25 - 0.5kN/m²				0.5 - 0.75kN/m²				0.75 - 1.25kN/m²			
Joist centres	400	450	480	600	400	450	480	600	400	450	480	600	400	450	480	600
45 x 95mm	1930	1824	1766	1473	1833	1734	1650	1363	1753	1617	1536	1278	1572	1439	1371	1152
45 x 120mm	2593	2492	2438	2183	2479	2382	2312	1974	2382	2260	2163	1822	2153	1983	1894	609
45 x 145mm	3127	3006	2941	2705	2990	2873	2811	2531	2873	2754	2667	2387	2643	2493	2414	2079
45 x 170mm	3659	3518	3443	3138	3500	3364	3279	2937	3364	3194	3094	2770	3066	2892	2801	2505
45 x 195mm	4189	4029	3943	3565	4007	3845	3726	3338	3845	3629	3516	3148	3484	3287	3184	2848
45 x 220mm	4698	4537	4441	3988	4514	4300	4167	3734	4300	4060	3933	3523	3898	3678	3563	3188
72 x 120mm	3031	2915	2854	2650	2900	2789	2731	2534	2789	2683	2625	2435	2609	2508	2454	2252
72 x 145mm	3651	3513	3440	3196	3495	3363	3292	3057	3363	3234	3166	2938	3147	3026	2960	2731
72 x 170mm	4267	4108	4023	3739	4087	3933	3852	3577	3933	3784	3704	3439	3682	3541	3465	3167
72 x 195mm	4822	4700	4603	4280	4676	4501	4407	4096	4501	4332	4241	3938	4215	4055	3968	3599
72 x 220mm	5265	5119	5041	4775	5100	4957	4880	4612	4957	4818	4742	4439	4721	4566	4487	4025

Permissible clear spans (mm) for domestic floor joists for timber machined on all four sides in accordance with BS EN 336. Imposed load not exceeding 1.50kN/m². Strength class C16. Service class 1 or 2.

C24 Span Table

C/C Joist	Dead load kN/m² excluding self weight of joist															
	Spans primarily for ground floors				Spans for first floor/intermediate floors of Buildings:				Spans primarily for I Joists				Spans for apartments and flats to enhance acoustic benefits as they need to be deeper joist for sound prevention			
	Less than 0.25kN/m²				0.25 - 0.5kN/m²				0.5 - 0.75kN/m²				0.75 - 1.25kN/m²			
Joist centres	400	450	480	600	400	450	480	600	400	450	480	600	400	450	480	600
45 x 72mm	1421	1340	1297	1157	1364	1288	1247	1115	1315	1243	1204	1084	1236	1170	1136	987
45 x 95mm	2173	2055	1991	1786	2054	1946	1888	1698	1960	1859	1804	1626	1815	1724	1675	1524
45 x 120mm	2758	2651	2595	2406	2637	2534	2480	2269	2534	2435	2382	2157	2363	2249	2188	1987
45 x 145mm	3325	3198	3129	2903	3181	3058	2992	2773	3058	2938	2875	2664	2857	2745	2684	2485
45 x 170mm	3890	3741	3663	3398	3722	3579	3502	3248	3579	3440	3366	3119	3345	3214	3144	2911
45 x 195mm	4453	4284	4193	3892	4262	4098	4011	3721	4098	3940	3855	3574	3832	3682	3602	3352
45 x 220mm	4918	4777	4722	4385	4759	4616	4518	4193	4616	4438	4343	4028	4317	4149	4059	3752
72 x 120mm	3242	3120	3055	2839	3104	2987	2924	2715	2987	2873	2813	2610	2795	2688	2630	2439
72 x 145mm	3904	3760	3681	3423	3740	3600	3524	3274	3600	3464	3390	3148	3370	3241	3172	2942
72 x 170mm	4563	4394	4304	4003	4372	4209	4122	3831	4209	4051	3966	3684	3942	3792	3712	3444
72 x 195mm	5068	4928	4852	4581	4910	4773	4699	4386	4773	4635	4540	4218	4513	4341	4249	3945
72 x 220mm	5532	5381	5299	5023	5362	5213	5132	4862	5213	5068	4989	4724	4967	4826	4750	4445

Permissible clear spans (mm) for domestic floor joists for timber machined on all four sides in accordance with BS EN 336. Imposed load not exceeding 1.50kN/m². Strength class C24. Service class 1 or 2.

Note - The spans are based on a deflection criteria of 0.003 times span, or 14mm, whichever is the lesser. This deflection criterion assumes that strutting is present for spans greater than 2500mm. This strutting may comprise either timber herringbone strutting (of minimum cross-section 38mm x 28mm) or sold timber blocking (of minimum thickness 38mm and minimum depth of 0.75 times the joist depth). Source: Timbersolve April 2010.



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