Sizing Built-Up Wood Headers

by Robert Randall

Use this table to size headers in conventional wood frames

Selecting the right-size header is a common problem for contractors. Reference tables are available, but they can be long and confusing. Here I have tried to offer a simple reference for sizing standard headers.

There are many definitions of the word "header," but in this article we are talking about main supporting beams that carry vertical loads around openings in walls. These can be door headers, window headers, or headers above portals between columns or posts. Here we are referring exclusively to wood headers in wood frame construction with wooden floor, ceiling, and roof framing running perpendicular to the direction of the header.

Using The Table

The tables are grouped by lumber species. Load capacities are given per linear foot for headers of double and triple 2x4, 2x6, 2x8, 2x10, and 2x12 construction. To use the table:

1. Multiply the building width (eaves-to-eaves) by the *load factor* appropriate to the header location. The load factor has been calculated to take into account how much load is being carried by the wall and header of concern. When you multiply your building width by the appropriate load factor, the result is the uniform load in pounds per linear foot that the wall and header must be able to carry.

2. Look in the appropriate table for the header length you need (rounded up to the next whole foot). Look down that column for the first row with a load capacity equal to or greater than your calculated uniform load. At the left you'll find the size of framing lumber to use. It's as simple as that.

3. Notice the gray shaded area, which indicates increased jack stud requirements. For these loads, you will need two jack studs under the header.

Example

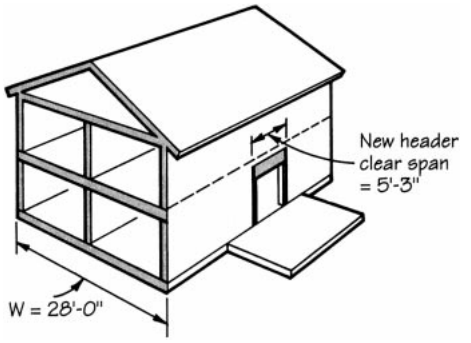
For example, say you are asked to replace the back door of a 28x42-foot colonial with double patio doors. Your new rough opening needs to be 5 feet 3 inches wide. How big should your header be?

First, find the right house type and load factor. In this case, the colonial has two stories, with a bearing wall running down the center of the first and second stories, a framed roof, and a full-width attic used for storage (see illustration at right).

According to the table, this header location has a load factor of 50. Multiplying the load factor (50) by the width of the house (28) gives the pounds per linear foot the header must carry: 1,400.

Now determine the species of wood you'll be building with — in this case, Doug Fir-Larch. Round up the rough opening to 6 feet. Looking in the 6-foot column under "Triple 2x Headers," you find that a triple 2x12 header in Doug Fir-Larch will carry 1,472 pounds per linear foot. Note that the number is in the gray area, which indicates a second jack stud is needed.

Example: Sizing a Header



Step 1. *Multiply load factor (50) by building width (28 ft.) to get load: 50 x 28 = 1400 lbs./lin. ft.*

Step 2. *Round up header span (5'-3") to the next whole foot: 6'*

Step 3. *Look in the 6' column for the size header you need. In this case a triple 2x12 in Doug Fir-Larch is the only header that will do the job; it will need double jack studs.*

Choosing Header Stock

When making headers, particularly deeper sizes such as 2x10 and 2x12, use the driest lumber you can find.

The use of dry lumber for headers is very important because of how dramatically new "kiln-dried" framing lumber can shrink in a short time. With a 2x12 header you can often get over 1/4-inch shrinkage across its 11 1/4-inch width, resulting in a corresponding sag in the top plates. Sometimes the plywood sheathing may carry the loads during the construction period, leaving the header carrying no load at all, and a 1/4-inch gap above. Then during an unusual loading condition, such as heavy snow, sagging may occur, resulting in cracked interior wall finish and trim. Who needs that?

When you don't have dry header stock available, it becomes even more important to use the smallest header that will carry the load. For this reason, I rarely specify headers larger than 2x8s except above garage doors. If 2x6s are adequate, use them: The shrinkage in a 2x6 will be less than half what you'll get with 2x12s. For normal-width doors, you'll usually find the 2x6 headers meet the calculated load capacity requirement, but check to be sure.

Wood defects. Select wood carefully for your headers. Plan your cuts to avoid including knots or grain defects at center-span bottom or near ends at mid-height. Do not include cracked pieces or ones with even small splits in the ends. In my inspection work I have seen several cases where a single defective piece of wood necessitated costly ripout and rebuilding at a later date.

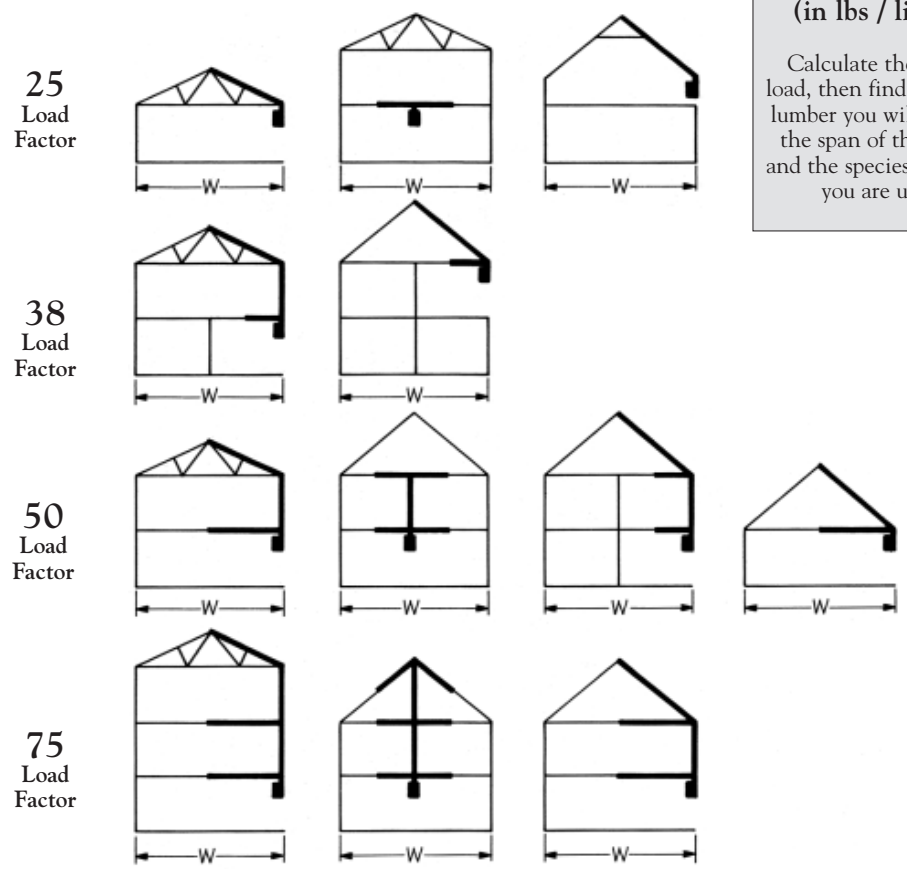
Making The Header

The use of plywood spacers or fillers is a common and effective way to bring the thickness of the header up to the dimension of the wall thickness, and it is quite acceptable. For a double 2x header in a wall with 2x4 studs, this requires a 1/2-inch plywood spacer, which can be placed

Header Load Factors

Load Factor x W = Header Load (in lbs / lin. ft.)

Calculate the header load, then find the size of lumber you will need for the span of the header and the species of lumber you are using.

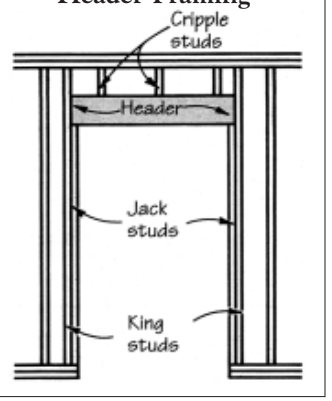


			Max. Load (lbs./lin. ft.) For Double 2x Header — Span of Header										Max. Load (lbs./lin. ft.) For Triple 2x Header — Span of Header									
			3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'
No. 2 S. Pine, Doug. Fir-Larch E=1,600,000 F_b=1,200 F_v=90	Nom. Lumber Size	2x4	521	306	195								781	459	293							
		2x6	950	642	483	336	246						1425	963	725	504	370	283				
		2x8	1458	935	688	544	429	328	259	210			2187	1403	1032	817	643	492	389	315	254	196
		2x10	2280	1353	962	746	609	515	422	342	282	237		2030	1443	1119	914	773	633	513	424	356
		2x12		1905	1296	981	790	661	568	498	418	351			1944	1472	1185	991	852	747	627	527
No. 2 Hem-Fir E=1,400,000 F_b=1,000 F_v=75	Nom. Lumber Size	2x4	434	255									651	382	244							
		2x6	792	535	403	280	205						1188	802	604	420	308	236				
		2x8	1215	779	573	454	357	273	216				1822	1169	860	681	536	410	324	262	217	
		2x10	1900	1128	802	622	508	430	352	285	235	198		1692	1203	933	762	645	528	427	353	297
		2x12		1588	1080	818	658	551	473	415	348	292		2382	1620	1227	987	826	710	623	522	439
Spruce-Pine-Fir E=1,300,000 F_b=875 F_v=70	Nom. Lumber Size	2x4	396	223	142								595	334	214							
		2x6	739	499	353	245	180						1108	749	529	367	270	206				
		2x8	1134	727	535	423	312	239	189				1701	1091	803	635	469	359	283	229		
		2x10	1773	1052	748	580	474	389	308	249	206			1579	1122	871	711	584	462	374	309	259
		2x12		1482	1008	763	614	514	442	369	305	256		2223	1512	1145	921	771	663	553	457	384

Additional notes on the table:

- The "load factors" are based on a total design load (live plus dead load) of 50 pounds per square foot. This yields conservative header design in most residential situations where uniform loading is involved. If you are working in a building where floor or roof live loads exceed 40 psf, or where point loads or other unusual loading is involved, do not use this table.
- Loads of greater than 2,000 pounds per linear foot will very rarely be encountered. They are tabulated here for reference, but if you come up with such large numbers, check your arithmetic.
- Note that the required load capacity can be as much as three times more for some building types as for others.
- The guidance provided in this article is intended to apply to a wide variety of standard header situations. When the words "standard header" don't apply, it is time to consult the experts: Call a licensed engineer. You may be surprised how helpful he or she can be.

Header Framing



Fasten headers by end-nailing through the king studs using 20d nails. Jack studs, which must be nailed securely to the king studs, carry header loads to the floor. With longer spans or particularly heavy loads, double jack studs may be required.

frequently encountered myth is that the plywood is a major factor in increasing the strength of the header. This is really not true. For the standard header just discussed, a good grade plywood, installed with the face grain parallel to the header's grain, would add at most only about 8% to the strength — hardly major.

For northern climates, it's just as wise to include rigid foam insulation on the outside between the header and the exterior sheathing and to forget about the plywood.

To nail the individual 2xs to each other, you should use no less than two 16d nails every 16 inches. For 2x12s use rows of three nails. With triple 2x construction use 20d nails.

At the ends, the header should be attached with 20d nails spiked through the first full-height stud. Use at least one 20d nail for every 2x3 equivalent: Thus, for a double 2x6 there would be the equivalent of four 2x3s, and you would use four nails at each end. Where proper nailing cannot be accomplished for some reason, use galvanized steel header hangers or framing clips. Don't leave a header secured with only a couple of toenails.

When Wood Won't Work

There are some cases where built-up wood headers are not appropriate. They typically include situations with unusually long spans, heavy loadings, or both. Also, a transom light, palladian window, or other feature may occasionally make the depth of a standard wood header unacceptable. In such cases, consider using glulams, laminated veneer lumber, steel flitchplates, or structural steel beams. Choosing the right option will involve evaluation of the strength and stiffness requirements and is generally best left to the professional engineer. ■

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