

## ALLOWABLE UNIT STRESSES AND LOADS IN ACCORDANCE WITH THE BUILDING LAWS OF VARIOUS CITIES.

Allowable Unit Stresses for Steel and Iron.	New York.	Chicago.	Philadelphia.	Boston.
	1900.	1898.	1899.	1899.
	Pounds per Square Inch.			
<b>COMPRESSION: Rolled Steel</b> . . . . .	16 000	. . .	14 500†	. . .
Rolled Steel . . . . .	“	. . .	16 250‡	. . .
Cast “ . . . . .	16 000	. . .	. . .	8 000
Wrought Iron . . . . .	12 000	. . .	12 500	. . .
Cast “ (in Short Blocks) . . . . .	16 000	. . .	17 500	. . .
Steel Pins and Rivets (Bearing) . . . . .	20 000	20 000	. . .	18 000
Wrought Iron Pins and Rivets (Bearing) . . . . .	15 000	15 000	. . .	15 000
<b>TENSION: Rolled Steel</b> . . . . .	16 000	15 000	14 500†	15 000
Rolled Steel . . . . .	“	“	16 250‡	. . .
Cast “ . . . . .	16 000	. . .	. . .	. . .
Wrought Iron . . . . .	12 000	12 000	12 500	12 000
Cast “ . . . . .	3 000	. . .	. . .	. . .
<b>EXTREME FIBER STRESS—BENDING</b>				
Rolled Steel Beams . . . . .	16 000	16 000	. . .	16 000
“ “ Pins, Rivets and Bolts . . . . .	20 000	22 500	. . .	22 500
Riveted “ Beams (Net Flange Section) . . . . .	14 000	15 000	. . .	. . .
Rolled Wrought Iron Beams . . . . .	12 000	12 000	. . .	12 000
“ “ “ Pins, Rivets & Bolts . . . . .	15 000	18 000	. . .	18 000
Riveted “ “ Beams (Net Flange Section) . . . . .	12 000	10 000	. . .	. . .
Cast Iron—Compression Side . . . . .	16 000	. . .	. . .	8 000
“ “ Tension “ . . . . .	3 000	2 500	3 750	2 500
Compression in Flanges of Built Beams, Steel . . . . .	. . .	. . .	. . .	12 000
Compression in Flanges of Built Beams, Wrought Iron . . . . .	. . .	. . .	. . .	10 000
<b>SHEAR: Steel Web Plates</b> . . . . .	9 000	. . .	8 750†	10 000
Steel Web Plates . . . . .	“	. . .	10 000‡	“
“ Shop Rivets and Pins . . . . .	10 000	10 000	8 750†	“
“ “ “ “ . . . . .	“	“	10 000‡	“
“ Field “ “ “ . . . . .	8 000	“	8 750†	“
“ “ “ “ . . . . .	“	“	10 000‡	“
“ “ Bolts . . . . .	7 000	. . .	8 750†	“
“ “ “ . . . . .	“	. . .	10 000‡	“
Wrought Iron Web Plates . . . . .	6 000	. . .	7 500	9 000
“ “ Shop Rivets and Pins . . . . .	7 500	7 500	“	“
“ “ Field “ . . . . .	6 000	“	“	“
“ “ “ Bolts . . . . .	5 500	. . .	“	“
Cast Iron . . . . .	3 000	. . .	. . .	. . .
			14 500	
<b>COLUMNS: Mild Steel</b> . . . . .	15 200-58	L R 15 000*	L <sup>2</sup>	12 000*
			1+ 13 500R <sup>2</sup>	
			16 250	
Medium Steel . . . . .	“	“	L <sup>2</sup>	“
			1+ 11 000R <sup>2</sup>	
			12 500	
Wrought Iron . . . . .	14 000-80	L R 12 000*	L <sup>2</sup>	10 000*
			1+ 15 000D <sup>2</sup>	
			17 500	
Cast Iron . . . . .	11 300-30	L R 10 000†	L <sup>2</sup>	See Section 19 of Boston Building Laws
			1+ 400D <sup>2</sup>	

\* Reduced by approved modern formula. † Mild. ‡ Medium.

‡ Reduced by Gordon's formula. Reduced for eccentric loads.

**ALLOWABLE UNIT STRESSES AND LOADS  
IN ACCORDANCE WITH  
THE BUILDING LAWS OF VARIOUS CITIES.**

**Live Loads for Floors in Different  
Classes of Buildings, Exclusive  
of the Weight of the Materials  
of Construction.**

	New York. 1900.	Chicago. 1898.	Philadelphia. 1899.	Boston. 1899.
	Pounds per Square Foot.			
Dwellings, Apartment Houses, Hotels, Tenement Houses or Lodging Houses . . .	60	40	70	50
Office Buildings—First Floor . . . . .	150	100	100	100
“ “ above First Floor . . . . .	75	100	100	100
Schools or Places of Instruction . . . . .	75	“	“	80
Stables or Carriage Houses . . . . .	75	{ 40*	“	“
Buildings for Public Assembly . . . . .	90	{ 100†	“	“
“ “ Ordinary Stores, Light Manu- facturing and Light Storage . . . . .	120	100	120	“
Stores for Heavy Materials, Warehouses and Factories . . . . .	150	“	150	250
Roofs—Pitch less than 20° . . . . .	50	25	30	25†
“ “ more “ 20° . . . . .	30	25	30	25‡
Sidewalks . . . . .	300	“	“	“
Public Buildings, except Schools . . . . .	“	“	“	150

**Allowable Unit Stresses for Ma-  
sonry and Building Materials.**

	Pounds per Square Inch.			
<b>COMPRESSION.</b>				
Concrete (Portland) Cement, 1; Sand, 2; Stone, 4 . . . . .	230	55	208	“
Concrete (Portland) Cement, 1; Sand, 2; Stone, 5 . . . . .	208	“	“	“
Concrete (Rosendale or equal) Cement, 1; Sand, 2; Stone, 4 . . . . .	125	“	“	“
Concrete (Rosendale or equal) Cement, 1; Sand, 2; Stone, 5 . . . . .	111	“	“	“
Rubble Stonework, Portland Cement Mortar . . . . .	140	“	139	“
“ “ Rosendale “ “ . . . . .	111	“	“	“
“ “ Lime and “ “ . . . . .	97	“	111	“
“ “ Lime Mortar . . . . .	70	“	69½	“
Brickwork in Portland Cement Mortar; Cement, 1; Sand, 3 . . . . .	250	“	208	“
Brickwork in Rosendale, or equal, Cement Mortar; Cement, 1; Sand, 3 . . . . .	208	“	“	“
Brickwork in Lime and Cement Mortar; Cement, 1; Lime, 1; Sand, 6 . . . . .	160	“	167	“
Brickwork in Lime Mortar; Lime, 1; Sand, 4 . . . . .	111	“	111	“
Dimension Stones in Cement Mortar . . . . .	“	70	“	“
“ “ “ “ , Dressed . . . . .	“	“	“	“
Beds . . . . .	“	97	“	“
Granites (according to Test) . . . . .	1000 to 2400	“	“	“
Greenwich Stone . . . . .	1200	“	“	“
Gneiss (New York City) . . . . .	1300	“	“	“
Limestone (according to Test) . . . . .	700 to 2300	“	“	“
Marble { “ “ “ } . . . . .	600 to 1200	“	“	“
Sandstone { “ “ “ } . . . . .	400 to 1600	“	“	“
Bluestone (North River) . . . . .	2000	“	“	“
Brick (Haverstraw, Flatwise) . . . . .	300	“	“	“
Slate . . . . .	1000	“	“	“

\* Stables less than 500 Square Feet in Area.

† “ over 500 “ “ “ “

‡ Make proper allowance for Wind at 30 lbs. per Square Foot Horizontal.

**ALLOWABLE UNIT STRESSES AND LOADS  
IN ACCORDANCE WITH  
THE BUILDING LAWS OF VARIOUS CITIES.**

<b>Allowable Unit Stresses for Masonry.</b>	New York. 1900.	Chicago. 1898.	Philadelphia. 1899.	Boston. 1899.
<b>EXTREME FIBRE STRESS—BENDING</b>	Pounds per Square Inch.			
Granite . . . . .	180	•••	•••	•••
Greenwich Stone . . . . .	150	•••	•••	•••
Gneiss (New York City) . . . . .	150	•••	•••	•••
Limestone . . . . .	150	•••	•••	•••
Slate . . . . .	400	•••	•••	•••
Marble . . . . .	120	•••	•••	•••
Sandstone . . . . .	100	•••	•••	•••
Bluestone—North River . . . . .	300	•••	•••	•••
Concrete (Portland) Cement, 1; Sand, 2; Stone, 4 . . . . .	30	•••	•••	•••
Concrete (Portland) Cement, 1; Sand, 2; Stone, 5 . . . . .	20	•••	•••	•••
Concrete (Rosendale or equal) Cement, 1; Sand, 2; Stone, 4 . . . . .	16	•••	•••	•••
Concrete (Rosendale or equal) Cement, 1; Sand, 2; Stone, 5 . . . . .	10	•••	•••	•••
Brick (Common) . . . . .	50	•••	•••	•••
Brickwork (in Cement) . . . . .	30	•••	•••	•••
<b>Allowable Unit Stresses for Timber.</b>				
<b>COMPRESSION :</b>				
Oak, with Grain . . . . .	900	•••	•••	•••
“ across “ . . . . .	800	•••	•••	250
Yellow Pine, with Grain . . . . .	1000	•••	750	•••
“ “ across “ . . . . .	600	•••	91 $\frac{2}{3}$	250
White “ with “ . . . . .	800	•••	•••	•••
“ “ across “ . . . . .	400	•••	•••	150
Spruce, with Grain . . . . .	800	•••	500	•••
“ across “ . . . . .	400	•••	50	150
Locust, with “ . . . . .	1200	•••	•••	•••
“ across “ . . . . .	1000	•••	•••	•••
Hemlock, with “ . . . . .	500	•••	350	•••
“ across “ . . . . .	500	•••	41 $\frac{2}{3}$	•••
Chestnut, with “ . . . . .	500	•••	•••	•••
“ across “ . . . . .	1000	•••	•••	•••
<b>TENSION :</b>				
Yellow Pine . . . . .	1200	•••	1800	•••
White “ . . . . .	800	•••	•••	•••
Spruce . . . . .	800	•••	1250	•••
Oak . . . . .	1000	•••	•••	•••
Hemlock . . . . .	600	•••	1000	•••

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**ALLOWABLE UNIT STRESSES AND LOADS  
IN ACCORDANCE WITH  
THE BUILDING LAWS OF VARIOUS CITIES.**

Allowable Unit Stresses for Timber.	New York. 1900.	Chicago 1898.	Philadelphia. 1899.	Boston. 1899.
<b>EXTREME FIBER STRESS— BENDING:</b>	Pounds Per Square Inch.			
Yellow Pine . . . . .	1200	1250	1600	1250
White " . . . . .	800	750	. . . .	750
Spruce . . . . .	800	750	1100	750
Oak . . . . .	1000	1000	. . . .	1000
Locust . . . . .	1200	. . . .	. . . .	. . . .
Hemlock . . . . .	600	. . . .	900	. . . .
Chestnut . . . . .	800	. . . .	. . . .	. . . .
<b>Wooden Columns or Posts with Flat Ends.</b>				
Yellow Pine (Long Leaf) . . . . .	$1000-18\frac{L}{D}$	. . . .	$\frac{U}{6} \times \frac{L^*}{100D}$	. . . .
White Pine, Norway Pine and Spruce	$800-15\frac{L}{D}$	. . . .	"	. . . .
Oak . . . . .	$900-17\frac{L}{D}$	. . . .	"	. . . .
Chestnut and Hemlock . . . . .	$\frac{5}{8}(800-15\frac{L}{D})$	. . . .	"	. . . .
Locust . . . . .	$1\frac{1}{2}(\text{ " })$	. . . .	"	. . . .
<b>SHEAR:</b> Yellow Pine, with Fiber .	70	100	$66\frac{2}{3}$	100
Yellow Pine, across fiber . . . . .	500	250	750	
White " with " . . . . .	40	80	. . . .	80
" " across " . . . . .	250	150	. . . .	
Spruce, with Fiber . . . . .	50	80	50	80
" across " . . . . .	320	150	500	
Oak, with " . . . . .	100	150	. . . .	150
" across " . . . . .	600	250	. . . .	
Locust with " . . . . .	100	. . . .	. . . .	
" across " . . . . .	720	. . . .	. . . .	
Hemlock, with " . . . . .	40	. . . .	$41\frac{1}{2}$	
" across " . . . . .	275	. . . .	$416\frac{2}{3}$	
Chestnut, " " . . . . .	150	. . . .	. . . .	

\*  $\frac{U}{6}$  = Allowable Compression in Lbs. per Sq. Inch and  $\frac{L}{D}$  = Ratio of Length to Diameter in Inches.

**Allowable Unit Stresses for Timber Columns in Accordance with  
the Building Laws of Boston and Chicago.**

**For Posts with Flat Ends.**

The Stresses given in the following table, in which L = Length of Post,  
D = Least Diameter of Post, and S = Stress per Square Inch.

White Pine and Spruce.		Long-Leafed Yellow Pine.		White Oak.
$\frac{L}{D}$	S	$\frac{L}{D}$	S	S
0 to 10	625	0 to 15	1000	750
10 " 35	500	15 " 30	875	650
35 " 45	375	30 " 40	750	560
45 " 50	250	40 " 45	625	470
		45 " 50	500	375

For information not given in these tables, see Complete Building Laws of the  
Various Cities.