

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

| Allowable Unit Stresses for Steel and Iron. | New York. 1902. | Chicago. 1902. | Philadelphia. 1902. | Boston. 1902. |
|---|-------------------------|-------------------|----------------------------|--|
| | Pounds per Square Inch. | | | |
| COMPRESSION: Rolled Steel | 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 |
| TENSION: Rolled Steel | 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 | .. . . | .. . . | .. . . |
| EXTREME FIBER STRESS—BENDING | | | | |
| 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 |
| SHEAR: Steel Web Plates | 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 | |
| COLUMNS: Mild Steel | 15 200-58 $\frac{L}{R}$ | 15 000* | 1+ $\frac{L^2}{13 500R^2}$ | 12 000* |
| | | | 16 250 | |
| Medium Steel | “ | “ | 1+ $\frac{L^2}{11 000R^2}$ | “ |
| | | | 12 500 | |
| Wrought Iron | 14 000-80 $\frac{L}{R}$ | 12 000* | 1+ $\frac{L^2}{15 000D^2}$ | 10 000* |
| | | | 17 500 | |
| Cast Iron | 11 300-30 $\frac{L}{R}$ | 10 000† | 1+ $\frac{L^2}{400D^2}$ | See Section 19 of Boston Building Laws |

* Reduced by approved modern formulæ. † Mild. || Medium.
‡ Reduced by Gordon's formula. Reduced for eccentric loads.

**ALLOWABLE UNIT STRESSES AND LOADS
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| Live Loads for Floors in Different Classes of Buildings, Exclusive of the Weight of the Materials of Construction. | New York. 1902. | Chicago. 1902. | Philadelphia. 1902. | Boston. 1902. |
|---|-------------------------|-------------------|------------------------|------------------|
| | 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† | 120 | 150 |
| “ “ Ordinary Stores, Light Manufacturing 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 Masonry and Building Materials. | | | | |
| COMPRESSION. | | | | |
| Pounds per Square Inch. | | | | |
| 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.

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| Allowable Unit Stresses for Masonry. | New York. 1902. | Chicago. 1902. | Philadelphia. 1902. | Boston. 1902. |
|---|-------------------------|-------------------|------------------------|------------------|
| EXTREME FIBRE STRESS—BENDING | 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 | ••• | ••• | ••• |
| Allowable Unit Stresses for Timber. | | | | |
| COMPRESSION : | | | | |
| 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 | ••• | ••• | ••• |
| TENSION : | | | | |
| Yellow Pine | 1200 | ••• | 1800 | ••• |
| White “ | 800 | ••• | ••• | ••• |
| Spruce | 800 | ••• | 1250 | ••• |
| Oak | 1000 | ••• | ••• | ••• |
| Hemlock | 600 | ••• | 1000 | ••• |

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

* $\frac{U}{6}$ = 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-Leaf 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.