Appendix to Rule 4123:1-3-07

Table I
Structural Timber – Unit Working Stresses

In Pounds per Square Inch

Species	Bending Extreme Fiber		Horizontal Shear	Compression Perpendicular to Grain		Commpression Parallel with Grain	
	Dry	Wet	Dry or Wet	Dry	Wet	Dry	Wet
Ash White……	1,120	800	100	500	300	880	720
Beech and Birch, Yellow	1,200	800	100	500	300	960	720
Cedar-Red	720	600	64	200	125	560	520
Cedar-White	600	480	56	175	100	440	360
Chestnut	760	560	72	300	150	640	480
Cypress-Southern	1,040	720	80	300	200	880	640
Douglas Fir-Coast Region	1,200	800	72	345	215	880	680
Hemlock Western	1,040	720	60	300	200	720	640
Hickory	1,520	960	112	600	350	1,200	800
Maple-Sugar or Black	1,200	800	110	500	300	960	720
Oak-White or Red	1,120	800	100	500	300	800	640
Pine-Norway	880	640	68	300	150	640	560
Pine-White, Yellow and Sugar	720	600	68	250	125	600	520
Pine-Southern Yellow Dense	1,400	935	103	380	235	1,020	800
Poplar-Yellow	800	640	64	250	125	640	480
Redwood	960	640	56	250	125	800	600
Spruce-Red, White or Sitka	880	640	68	250	125	640	520
Tamarack-Eastern	960	720	76	300	200	800	640

These stresses are for short columns in which "L" is less than 15 d. For longer columns the allowable stress equals allowable bending stress from the table times 1 – L/60d, in which L is length of column; d is least dimension.

Allowable Load Tables – Planks, Beams and Columns.

Tables I and II give the allowable total loads, uniformly distributed, for the more common stock sizes of lumber used as planks and beams for various span lengths. Table III gives the allowable total loads for stock sizes of lumber used as columns with square bearing and central loads. Where these conditions do not exist, proper provisions for eccentric loading shall be made in determining the safe load for the column. The allowable loads in Tables I, II, and III are based on an extreme fiber stress of 1,000 pounds per square inch and the allowable load for lumber for any unit stress other than 1,000 pounds may be readily obtained by proportion. The allowable loads as given by the Tables or proportioned therefrom shall not be exceeded.

Appendix to Rule 4123:1-3-07 - Continued

The formulas used in determining the allowable loads in Tables I and II are as follows:

Formulas for Calculations

Formula for bending $$W = \frac{B\,D^2}{9\,L}\,F$$

Formula for shear $$W = \frac{4\,B\,D\,S}{3}$$

Legend:
W – Allowable total load in pounds uniformly distributed
B – Breadth of beam in inches
D – Depth in beam in inches
L – Length of span in feet
F – Extreme fiber stress in bending in pounds, per square inch
S – Allowable shear in direction of grain in pounds per square inch.
Column Formula 10/12

$$C = F\left(1 - \frac{L}{60\,d}\right)$$

Applies only where column height is 15 or more times the least dimension of the column.

Legend:
C – Allowable unit compressive stress per square inch
F – Extreme fiber stress in bending in pounds per square inch
L – Effective length of column in inches
d – Least dimension of column in inches.

Appendix to Rule 4123:1-3-07 - Continued

Table II
Allowable Loads for Planks

In Pounds

Total allowable uniformly distributed loads for timber planks supported at ends. The allowable concentrated load shall be one-half the distributed load.

Based on unit stress of 1,000 pounds per square inch.

PLANKS								
Nom.Size Inches	**6x2**	**8x2**	**10x2**	**12x2**	**14x2**	**8x3**	**10x3**	**12x3**
Actual Size Inches	**5⅝ x 1⅝**	**7½ x 1⅝**	**9½ x 1⅝**	**11½ x 1⅝**	**13½ x 1⅝**	**7½ x 2⅝**	**9½ x 2⅝**	**11½ x 2⅝**
Area Sq.In.	9.15	12.20	15.45	18.70	21.95	19.70	25.0	30.2
Span In Feet								
4	410	550	700	850	990	1440	1820	2200
5	330	440	560	680	790	1150	1460	1770
6	280	370	470	560	660	960	1220	1470
7	240	320	400	480	570	820	1040	1260
8	210	280	350	420	500	720	910	110
9	180	250	310	380	440	640	810	980
10		220	280	340	400	580	730	880
11		200	250	310	360	520	660	800
12		180	230	280	330	480	610	740
13			220	260	310	440	560	680
14			200	240	280	410	520	630
15			180	230	270	380	490	590
16				210	250	360	460	550
17				200	240	340	430	520
18				200	220	320	400	490
19					210	300	380	460
20					200	290	370	440

Appendix to Rule 4123:1-3-07 - Continued

Table III
Allowable Loads for Beams

In Pounds

Allowable uniformly distributed loads for timber beams supported at ends. The allowable concentrated load shall be one-half (½) the distributed load.
Based on unit stress of 1,000 pounds per square inch.

BEAMS

Nom.Size Inches	**2x4**	**2x6**	**2x8**	**2x10**	**2x12**	**2x14**	**4x4**	**4x6**	**6x6**
Actual Size Inches	**5⅝x1⅝**	**7½x1⅝**	**9½x1⅝**	**11½x1⅝**	**13½x1⅝**	**7½x2⅝**	**9½x2⅝**	**11½x2⅝**	**5½x5½**
Area Sq.In.	5.90	9.15	12.20	15.45	18.70	21.95	13.15	20.4	30.2
Span In Feet									
4	600	1430	2540	4070	5970	8230	1330	3190	4600
5	480	1140	2030	3260	4780	6580	1060	2550	3690
6	400	950	1700	2720	3980	5490	890	2120	3080
7	340	820	1450	2320	3410	4700	760	1820	2630
8	300	710	1270	2040	2990	4110	660	1590	2300
9		630	1130	1810	2650	3660	590	1420	2050
10		570	1010	1630	2390	3290	530	1270	1840
11		520	290	1480	2170	3000	480	1160	1670
12		470	840	1360	1990	2740	440	1060	1530
13			780	1250	1840	2530	560	980	1410
14			720	1160	1710	2350	520	910	1310
15			670	1090	1590	2190	490	850	1220
16			630	1020	1490	2060	460	800	1150
17				960	1400	1930	430	750	1080
18				900	1320	1820	400	710	1020
19				860	1260	1730	380	670	970
20				810	1200	1640	370	640	930
Allowable Load For Shear at 100 lb./sq.in	800	1230	1640	2080	2520	2950	1770	2740	4050

* Allowable load for any other value of unit shear may be obtained by proportion.

Table IV
ALLOWABLE LOADS FOR COLUMNS
In Pounds

Based on unit stress of 1,000 pounds per square inch

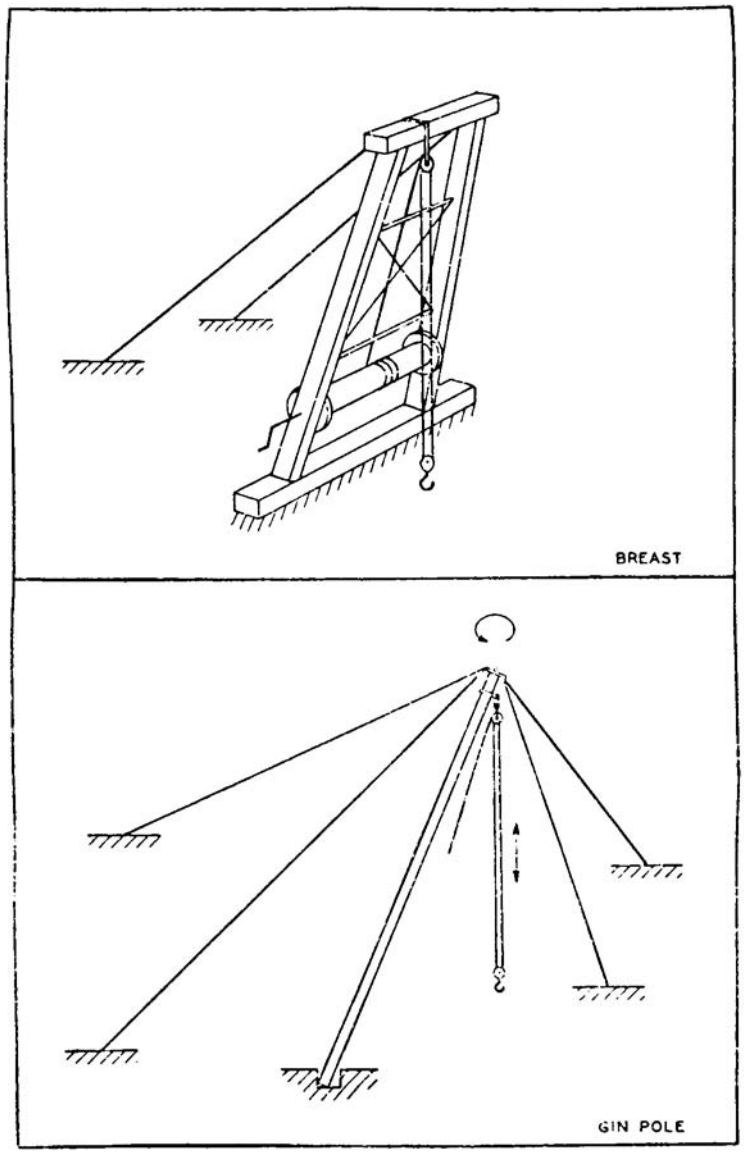
COLUMNS							
Nom. Size Inches	**2 × 4**	**2 × 6**	**2 × 8**	**4 × 4**	**4 × 6**	**6 × 6**	**8 × 8**
Actual Size Inches	**1⅝ × 3⅝**	**1⅝ × 1⅝**	**1⅝ × 7½**	**3⅝ × 3⅝**	**3⅝ × 5⅝**	**5½ × 5½**	**7½ × 7½**
Area Sq. In.	**5.90**	**9.15**	**12.20**	**13.15**	**20.4**	**30.2**	**56.2**
Unbraced Height In Feet							
4	3,000	4,600	6,200	.....	.....	.....	.....
6	1,500	2,400	3,200	8,800	13,700	.....	.....
8	100	150	200	7,300	11,400	21,400	.....
10	.....	.....	.....	5,900	9,100	19,200	41,000
12	.....	.....	.....	4,400	6,900	17,100	38,000
14	.....	.....	.....	3,000	4,700	14,800	35,000
16	.....	.....	.....	1,500	2,300	12,700	32,000
18	.....	.....	.....	.....	.....	10,400	29,000
20	.....	.....	.....	.....	.....	8,300	26,000

Allowable loads given in this table are for column lengths where $\frac{L}{D}$ exceeds 15 and are computed by the formula

$$W = \text{Area} \times 1{,}000 \left[1 - \frac{L}{60d} \right]$$

For shorter columns, allowable loads are obtained as product of column area and allowable compressive stress.

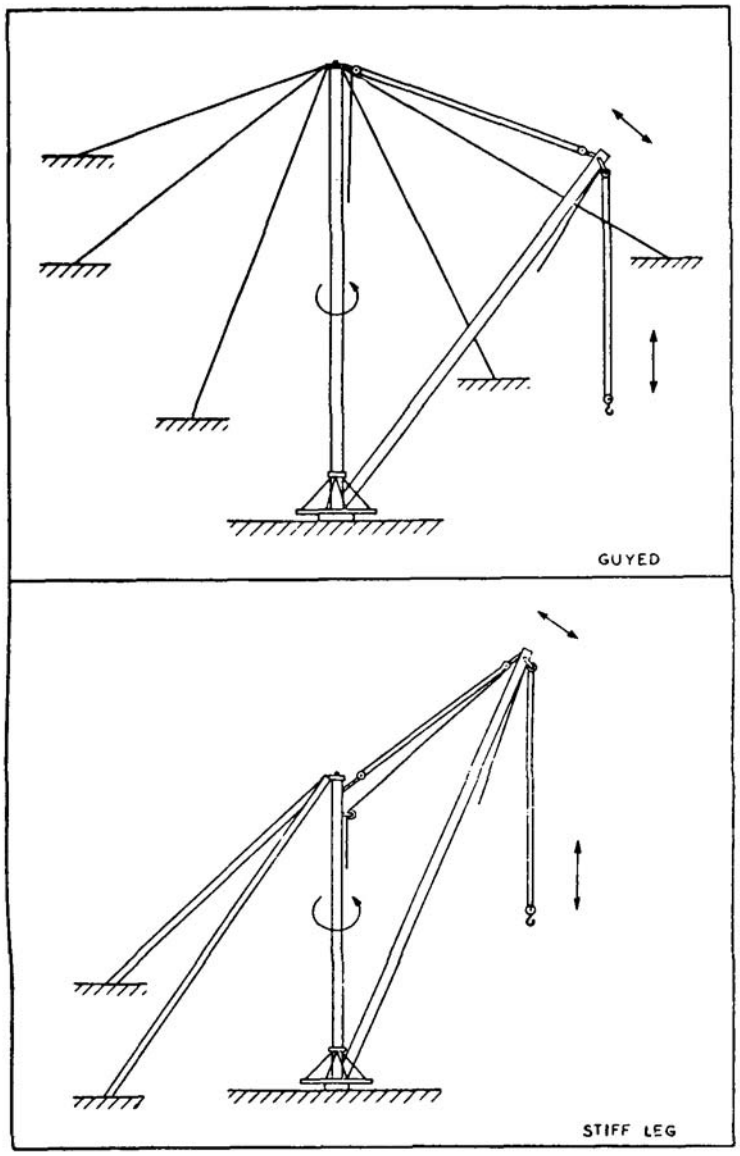
APPENDIX TO RULE 4121:1-3-07—Continued
Types of Derricks



BREAST AND GIN POLE

APPENDIX TO RULE 4121:1-3-07—Continued

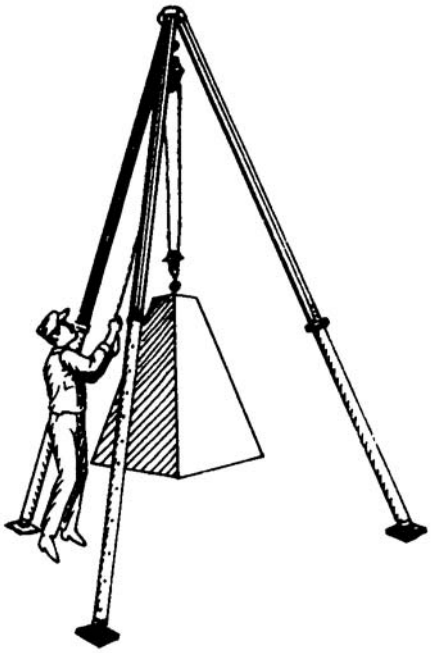
Types of Derricks



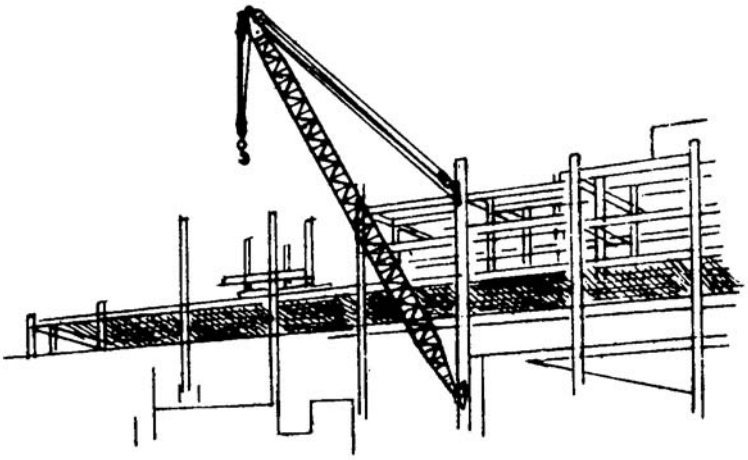
GUYED AND STIFF LEG

APPENDIX TO RULE 4121:1-3-07—Continued

Types of Derricks



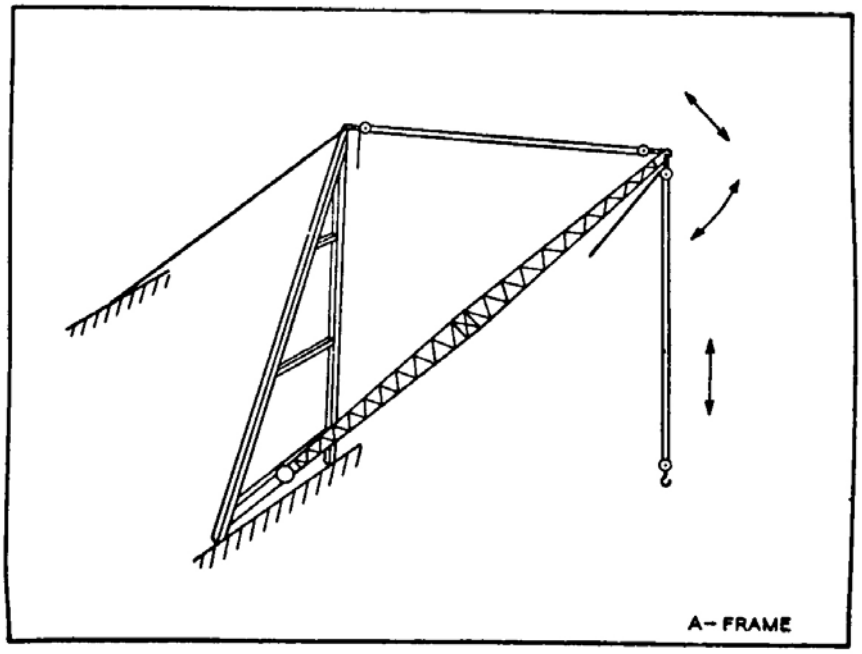
Tripod Derrick



Chicago Boom Derrick

APPENDIX TO RULE 4121:1-3-07—Concluded

Types of Derricks



A-FRAME