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Author

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U. S. Navy Dept.

RULES

FOR THE

INSPECTION AND MEASUREMENT OF TIMBER,

FOR THE

NAVY OF THE UNITED STATES;

United States

ADOPTED BY

THE BUREAU OF CONSTRUCTION, EQUIPMENT AND REPAIRS, UNDER
THE AUTHORITY OF THE HON. THE SECRETARY
OF THE NAVY, SEPTEMBER, 1848.

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RULES.

LIVE OAK.

All frame or other timber cut to moulds, or got out by diagrams, must be six inches longer at each end than the moulds, or diagrams; and two inches larger each way than the net siding and moulding. The moulds and bevellings are to be applied to each piece by the Inspector.

Keelson pieces may be got out in pairs, or two pieces in one, with an allowance of two inches the siding way, and six inches the moulding way. The allowance of six inches in the moulding size is for the purpose of taking out the pith or centre of the tree. They may have a fair curve of from 10 to 14 inches one way, but they must be lined straight the siding way. Or they may be got in single pieces, with the centre or pith taken out before offered for inspection. In all cases, to be the dimensions called for in the contract.

Beams are to be got to sharp corners, one foot longer, and two inches larger in the siding and moulding, than the net dimensions. No lap or scarph to be cut by the contractor.

Knees are to be got by the directions and proportions of white oak knees, and measured by the inch as white oak knees are measured.—See the table for White Oak knees.

Promiscuous timber must be sided straight to the siding size named in the contract. No wood is to be taken from this kind of timber the moulding way.

Live oak must be clear of rot, splits, ring, and other shakes, worm, or ant holes, and all other defects which may appear. All sap-wood to be excluded from the measurement, except in knees. All live oak to be measured by the cubic foot, except knees.

WHITE OAK.

Keel pieces must be got to sharp corners, (right angles,) and be two feet longer and two inches larger on each side, as squared, than the net dimensions; this allowance will secure the pieces from all sap-wood, which would be injurious. The fore and after pieces must be dug up by the roots; the butt and top ends to be *sawed off* to sound and perfect wood before offered for inspection.

Rudder stocks must be dug up by the roots, and got two feet longer and two inches larger, the siding and moulding way, than the net dimensions. They are to be got to the *form* prescribed in the contract; both ends are to be sawed off square to sound and perfect wood.

Plank stocks. One-half the quantity required by contract, or open purchase, must be *forty-three* feet in length; none of the remaining half shall be less than *thirty-five* feet in length, and the whole quantity shall average *forty-three* feet. The stocks are to be lined straight the siding way, and may be straight, or have a long fair curve, the other way. No sudden crooks will be allowed; both sides may be lined tapering, in conformity with the growth of the tree. The small end must not be under *twelve* inches square, clear of wane. Wane, exceeding one-fourth of the width of the face of the stocks as squared, will be objectionable. At the middle of the length of the stock, the *breadth* and *depth* to be taken, and *considered* the size for *computation*; the ends must be sawed off square, to sound and perfect wood, by the contractor; the sap-wood to be excluded in the measurement.

Promiscuous timber may be got as the trees grow, and of such lengths and sizes as may be required from time to time by contract. When got as rough squared timber, care must be taken to make suitable allowances for axe marks and improper squaring; the mean size to be adopted in the computation. When delivered in the round log, for the measurement take the mean diameter, deduct from this diameter one-fourth, and the remainder will be *considered* the square of the log. The sap-wood to be excluded in the measurement of the rough squared promiscuous timber. The keel pieces, rudder stocks, plank stocks, and promiscuous timber, to be measured by the cubic foot.

White oak plank. One-half of the quantity required to be *forty-three* feet in length, none of the second half to be under *thirty-five* feet in length, and the whole to average *forty-three* feet in length.

The centre or pith of the tree to be taken out. It is to be sawed to *full* and *even* thicknesses. No sudden crooks will be allowed; a long fair curve is admissible.

At the middle of the length of the plank take the breadth and the thickness, which are to be *considered* the sizes for computation; the measurement to be *board measure*. No sap-wood allowed in the measurement.

Gun-carriage timber, thick stuff for caps and trestletrees, must have the centre or pith taken out, to be got to sharp corners, (that is, clear

of wane,) each piece to be one foot longer and two inches larger each way than the net dimensions; this will exclude all sap-wood. To be measured as board measure.

Butts, under twelve inches diameter at the small end, and got in the round log, to be purchased by the piece. All oak butts twelve inches diameter, and upwards, at the small end, (in the round log,) will be called Promiscuous timber, and be measured by the cubic foot.

White oak staves and heading, are to be the lengths, breadths, and thickness, agreeably to contract. All staves and heading are to be *riven*, and not sawed to their breadths and thickness. They are purchased by the net thousand.

The inadmissible defects in white oak are the bunch worms, (for which see the drawing,) large worm holes that will injure, ant holes, wind and ring shakes, splits, rot, sap-wood, uneven thickness in plank, cross or diagonal grain. Old brittle oak is not fit for the navy. The average lengths must be attended to, and the bark must be removed from all white oak, except from the small butts required for the cooper.

White oak knees are to be received agreeably to the following table and directions; the price may be changed by contract for each sided inch, but the system is continued as adopted by the Bureau of "Construction, Equipment and Repairs," on the 26th June, 1847. Live oak and hachmetac knees will be measured by the same rule of measurement. The prices of white oak knees are included in the table, to show the ratio of prices which should govern in regard to the length of the body and arm.

TABLE.

SIDED.	Length of body.	Length of arm.	Value per sided inch per foot, of the		Total value per sided inch.	Total value per knee.	
			Body.	Arm.			
			Cents.	Cents.	Cents.		
5 inch -	4 to 6 feet.	3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ feet.	3.1	5.9	33 to 45	\$1 65	\$2 25
6 " -	4 $\frac{1}{2}$ " 6 "	4 " 5 "	3.6	7.6	47 " 60	2 82	3 60
7 " -	5 " 7 "	4 $\frac{1}{4}$ " 5 $\frac{1}{4}$ "	4.0	9.3	60 " 77	4 20	5 29
8 " -	5 " 7 "	4 $\frac{3}{4}$ " 5 $\frac{1}{4}$ "	4.3	10.5	71 " 85	5 68	6 80
9 " -	5 $\frac{1}{2}$ " 7 $\frac{1}{2}$ "	5 " 5 $\frac{1}{2}$ "	4.5	11.6	83 " 98	7 47	8 82
10 " -	6 " 7 $\frac{1}{2}$ "	5 $\frac{1}{4}$ " 5 $\frac{3}{4}$ "	4.7	12.2	92 " 105	9 20	10 50
11 " -	6 $\frac{1}{2}$ " 8 "	5 $\frac{1}{2}$ " 6 "	4.8	12.6	100 " 114	11 00	12 54
12 " -	6 $\frac{3}{4}$ " 8 "	5 $\frac{1}{2}$ " 6 "	4.8	12.7	101 " 115	12 12	13 80

In the above table an increased price is given in proportion to the length of the arm and body. No extra price will be allowed for any increase of length, of less than six inches in the body and three inches in the arm, from the lengths above given; nor must any be received of less length than the shortest in the table.

The body to be sided to the diameter of the arm, the siding way taken at the middle of the length of the arm.

Three-fourths of the smallest diameter of the arm, at two-thirds of its length clear of the body, is to be considered the net siding, to which the knee must work, and which will be paid for. The length of the arm to be measured from the centre of the body.

The moulding size of the end of the body must be equal to the net siding of the knee; and the throat, to the angle, must not be more than three times, nor less than twice and one-half, the rough siding of the knee, and must not be wounded.*

Care must be taken that the end of the body above the arm be not cut too short, or the knee cannot be received. Limb knees, in all cases, will be preferred.

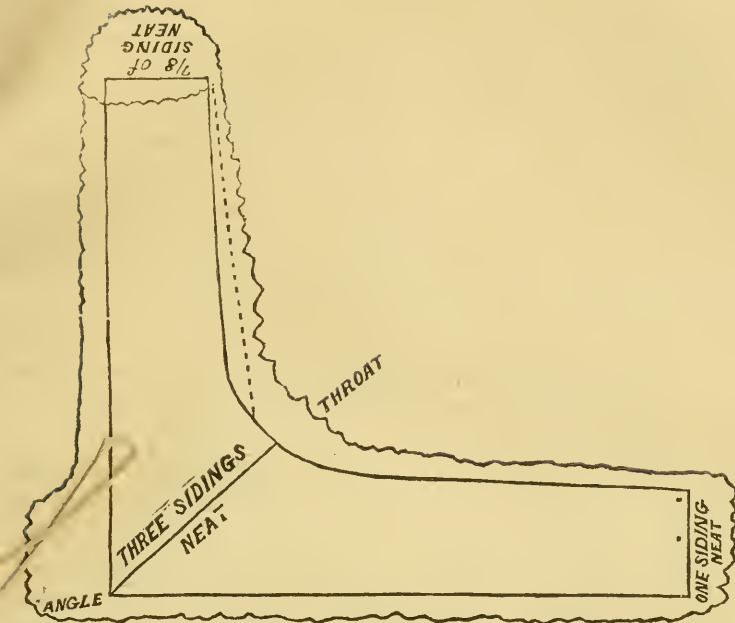
The price above given is for square and insquare knees. Outsquare knees must not exceed 16 degrees, for which the price will be three-fourths of the square knees.

Example of the price per inch—

8-inch knee, shortest body 5 feet, at 4 cts. 3 mills per foot,	cts. 21.5
shortest arm $4\frac{3}{4}$ feet, at 10 cts. 5 mills per foot,	49.8
	71.3
Per sided inch - - - - -	
8-inch knee, longest body 7 feet, at 4 cts. 3 mills per foot,	- 30.1
longest arm $5\frac{1}{4}$ feet, at 10 cts. 5 mills per foot,	55.1
	85.2
Per sided inch - - - - -	cts. 85.2

* That is, no timber to be taken from the throat of the knee. This note is intended for contractors.

View of an eight inch knee.



The same proportions and ratio of prices will govern for "boat knees."

FINE GRAIN SOUTHERN YELLOW PINE.

Beams are to be got by a mould, or to the sweep or spring, agreeably to contract, and are to be lined straight the siding way. To be got one foot longer, and two inches larger in the moulding and siding, than the net dimensions. When dressed to their net sizes, there is to be no sap-wood on them. When the beam is to be made of more than one piece, no scarp or lap to be cut by the contractor. To be measured by the cubic foot, and the ends sawed off square to sound and perfect wood.

Plank stocks must average forty-five feet, and no piece shall be under thirty-five feet in length. Two sides must be lined straight, but may retain the natural taper of the tree. The other two sides may be lined of parallel breadths, or with the natural taper; either will allow the pith or centre to be taken out, which should be done; a long fair curve will not be objectionable, but no sudden crooks will be allowed. The small end shall not be less than *four-fifths* of the butt

end, and the small end shall not be less than twelve inches square clear of waue. No more sap-wood than one-eighth of the breadth of the face from each corner will be allowed on the stocks; the sap-wood to be excluded in the measurement; axe marks and improper squaring to be noticed, and allowances made for them. Both ends to be sawed off square to sound and perfect wood, before offered for inspection. To be measured by the cubic foot.

Promiscuous timber is to be rough squared as the trees grow, and to such diameters as the contract may specify. Care must be taken to make suitable allowances for axe marks and improper squaring; the sap-wood to be excluded from the measurement. To be measured by the cubic foot.

Plank must be square edged, and sawed to an even thickness. To average forty-five feet; and no plank to be under thirty-five feet in length; the width at top end to be *one-fifth* less than the width of butt end; the top end never to be under ten inches wide; the thickness and breadth to be named in the contract. To be measured as board measure.

Masts and bowsprits, topmasts, topgallant masts, booms, yards, and half yards. All the pieces required to make the above masts and spars are to be got two feet longer and two inches larger each way than the net dimensions; the net dimensions to be named in the contract. No more sap-wood than one-eighth of the breadth of the face from each corner will be allowed on the pieces. The sap-wood to be excluded in the measurement. All the pieces are to be got out to the form required, viz: when intended for lower masts, to be lined and got out as pieces for lower masts should be; and when for topmasts, topgallant masts, booms, and yards, to be lined and got out accurately to the form required for such pieces. All such timber to be got square, to be properly hewed; the ends to be sawed off to sound and perfect wood before offered for inspection. To be measured by the cubic foot.

The defects in yellow pine are as follows: large sound and rotten knots, rot, splits, shakes, *double heart*, cross grain pieces, which have been *tapped* for the purpose of getting the turpentine. Plank stocks and plank are to be clear of knots and all defects. Mast, spar pieces, and promiscuous pine, are to be clear of all knots that will constitute a defect; none but the very best quality will be received.

WHITE PINE.

Plank stocks are to be clear of knots, splits, shakes, rot, and all other defects; the average lengths and sizes to be as the contract may require. No more sap-wood than one-eighth of the breadth of the face from each corner will be allowed on the pieces offered for inspection. The sap-wood to be excluded in the measurement. The small end shall not be less than *four-fifths* the size of the butt end; both sides to be lined straight; the ends sawed off to square sound wood.

There are to be but *three* qualities of white pine boards and plank.

No. 1, or first quality, shall be all white pine plank and boards which are perfectly clear of all defects; such as knots, rot, stains, splits, shakes, coarseness of quality, sap-wood, holes, and uneven sawing.

No. 2, or second quality, shall be such white pine plank and boards as shall not have more than *three* medium size knots within the *surface* of fifteen feet; to be clear of other knots, sap-wood, rot, shakes, splits, holes, and uneven sawing.

No. 3, or third quality, shall be white pine plank and boards fit for stage plank, and sheathing for house tops to receive a slate roof. No knots in the stage plank shall be close together, and branch off diagonally so as to weaken the plank. The stage plank is to be sound and strong, and the boards are to have no knots that will come out, and not enough to injure them for the purpose intended. All plank and boards to be measured by board measure. -

Mast and bowsprits, when to be made of more than one piece, the pieces are to be nicely hewed straight, and square; each to be two feet longer and two inches larger than the net dimensions named in the contract. If one piece, for a mizen-mast, it may be got in the round, but of due proportions, and two feet longer and two inches larger than the net size. No sap-wood will be allowed to be on the pieces when brought to the net size. Should the bowsprit be in one piece, it should hold its size one-third from the heel or butt; the *bottom* and sides must have a regular curve; the upper side lined straight; the same allowance for workmanship as above. On none of the pieces are there to be knots that will constitute a defect; the whole to be clear of shakes, splits, rot, chafes, to be fresh cut, and in all respects agreeably to contract. To be measured by the cubic foot.

SPRUCE SPARS

Are to be straight. Such as measure from *four to ten* inches, both sizes inclusive, are to be considered measurement spars, and are to be

measured by the inch, taking the diameter clear of bark one-third of their length from the butt ends.

Those under four inches are to be considered *poles*, and are purchased by the piece. All spruce spars, the diameter of which is above ten inches, one-third of their lengths from the butt ends, are to be called *piece sticks*, and are purchased by the piece. All spruce spars of *seven inches* diameter, *and less*, must have five feet of lengths for every inch in diameter; all *above* seven inches diameter, must have four feet of lengths for each inch in diameter. The whole are to have the bark *on*, and to be fresh and sound, clear of rot, shakes, and splits, and to hold their sizes well up.

RED CEDAR.

Red cedar should be knotty when intended for timbers; the knots to be hard and solid, and be clear of rot, splits, shakes, and all other defects. When in the round log to be measured as other round logs; in all cases to be measured by the cubic foot.

YELLOW LOCUST,

To be of a "greenish yellow color;" to be clear of rot, splits, shakes, worm holes, and all other defects. To be measured by the cubic foot in the round log or square.

WHITE ASH LOGS,

To be young and tough, clear of rot, knots, splits, shakes, red or other stains; if old and brittle it will be rejected. To be got to the lengths and diameters agreeably to contract, and to be measured by the cubic foot.

WHITE ASH PLANK AND BOARDS,

To be clear of rot, knots, shakes, splits, cross grain, red or other stains; to be sawed to even thicknesses. To be measured by board measure.

WHITE ASH OAR RAFTERS,

To be got to the dimensions named in the contract. They are to be young and tough, straight grained, clear of knots, splits, stains, rot, and all other defects. To be measured by the lineal foot, to be riven, and to be clear of centre pith.

HICKORY, OR WHITE WALNUT,

Is to be young and tough, clear of rot, splits, shakes, and all other defects. It is seldom used, except for capstan bars and handspikes; they are to be riven and hewn, not sawed, to dimensions; to be purchased by the piece, and got out agreeably to such dimensions as may be called for from time to time. To be got square, to prevent springing.

HACMETAC KNEES,

Are to be clear of splits, shakes, and rot, and to be got agreeably to the table for white oak knees.

BLACK WALNUT,

To be clear of rot, splits, shakes, and knots. When got in the round log to be measured as round timber. See the measurement of promiscuous white oak in the round log. All plank and boards to be of the same good quality, and sawed to even thicknesses. To be measured as board measure.

MAHOGANY,

Of all kinds, is to be clear of rot, splits, shakes, and all other defects. To be measured as board measure.

ELM,

Gun carriage timber, is to be clear of centre pith, rot, splits, and shakes, *yellow* and other stains.

Plank and boards also to be clear of the above defects, and sawed to even thickness. The *centre* or *pith* in all timber is a *defect*, and should be taken out in all cases when it can be done to advantage, especially all timber intended for keelsons, capstans, caps, trestletrees, combings for hatches, and all pieces for gun carriages, &c.

The following computations and remarks are intended as a guide for *contractors*, who have not made themselves acquainted with the mensuration of timber, plank, and boards. It is considered fair to measure round timber as follows: take the *mean diameter* of the log, *clear of bark*, deduct from this diameter one-fourth, and the remainder is to be *considered* the square of the log.

EXAMPLES.

Mean diameter 20 inches.
Deduct $\frac{1}{4}$ th 5 "

15 supposed square.
15

75
15

225

43 feet in length

675

900

12)9675

12)806.3

67.2.3 = Sixty-seven cubic feet, two inches, and three parts.

The *true square* of the above piece would be about fourteen inches. In the above computation, all the timber will be paid for that should be used in ship building. To measure a piece of round timber as a cylinder, would produce more solid feet than could be useful.

All square and unequal sided timber, such as frames for ships, mast and spar pieces, beams, plank stocks, and rough squared promiscuous timber, are to be measured as follows: the length, mean breadth, and thickness being attained, the computation will be agreeably to the following examples:

Say a first futtock, the length of which is 20 feet, *mean*, moulded breadth $17\frac{1}{2}$ inches, siding size or thickness, 15 inches.

FIRST EXAMPLE.

Length.
20 feet, $17\frac{1}{2}$ in. by 15 in.

$17\frac{1}{2}$

140

20

10

350

15

1750

350

12)5250

12)437.6

36.5.6

SECOND EXAMPLE, BY PRACTICE.

4 is $\frac{1}{3}$ | 20 — $17\frac{1}{2}$ in. by 15 in.

6.8

1 is $\frac{1}{4}$ | 1.8

$\frac{1}{2}$ is $\frac{1}{2}$ | 0.10

29.2

3 is $\frac{1}{4}$ | 7.3.6

36.5.6

Or a plank stock, mast piece, or beam:

$$\begin{array}{r}
 43 \text{ 17 by 15.} \\
 17 \\
 \hline
 301 \\
 43 \\
 \hline
 731 \\
 15 \\
 \hline
 3655 \\
 731 \\
 \hline
 144)10965
 \end{array}$$

$$\begin{array}{r}
 \text{Or thus, 4 is } \frac{1}{2} \quad | \quad 43 \text{ 17 by 15.} \\
 1 \text{ is } \frac{1}{4} \quad | \quad 14.4 \\
 3 \text{ is } \frac{1}{3} \quad | \quad 3.7 \\
 \hline
 60.11 \\
 15.2.9 \\
 \hline
 76.1.9
 \end{array}$$

76.1.9 Seventy-six cubic feet, one inch, and nine parts.

The two sides are never to be added together, and the one-half taken as the mean size. To find the *solidity* of timber, multiply the *breadth* by the *depth*, and that product by the *length*, as above.

All plank and boards, all gun carriage timber, thick stuff for caps and trestletrees, combings for hatches, and mahogany of all dimensions, will hereafter be measured by the computation known as *board measure*.

To find the *measure* of plank, boards, &c., above named, proceed as in the following examples:

$ \begin{array}{r} 16 \text{ feet in length, 12 inches wide, 1 inch thick, or under 1 inch thick.} \\ 12 \\ \hline 12)192 \\ \hline 16 \text{ feet board measure.} \end{array} $	$ \begin{array}{r} 16 \text{ feet long, 12 in. by } 1\frac{1}{8} \text{ in. thick.} \\ 12 \\ \hline 192 \\ 1\frac{1}{8} \\ \hline 192 \\ 24 \\ \hline 12)216 \\ \hline 18 \text{ feet board measure.} \end{array} $
$ \begin{array}{r} 16 \text{ feet long, 12 by } 1\frac{1}{2}. \\ 12 \\ \hline 192 \\ 1\frac{1}{2} \\ \hline 192 \\ 96 \\ \hline 12)288 \\ \hline 24 \text{ feet board measure.} \end{array} $	$ \begin{array}{r} 16 \text{ feet long, 12 by } 1\frac{1}{4}. \\ 12 \\ \hline 192 \\ 1\frac{1}{4} \\ \hline 192 \\ 48 \\ \hline 12)240 \\ \hline 20 \text{ feet board measure.} \end{array} $

16 feet long, 12 in. by 3 in. thick.

$$\begin{array}{r} 12 \\ \hline 192 \\ 3 \\ \hline 12)576 \end{array}$$

48 feet board measure.

And thus the computation, by an increase of thickness, advances in quantity. It will be seen by the contractor, that the *three* inch plank contains *twice* as much in quantity as the plank *one and a half inch thick*. Twelve feet board measure will make one cubic foot.

CHAS. WM. SKINNER,

Chief of Bureau of Construction, Equipment, and Repairs.

Approved :

JOHN Y. MASON.

A

Bunch Worm.







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