Official Rules

for the following

LOG SCALING

and

GRADING BUREAUS

COLUMBIA RIVER

GRAYS HARBOR

NORTHERN CALIFORNIA

PUGET SOUND

SOUTHERN OREGON

YAMHILL

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GRADING RULES
for the

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(These Rule Books for Sale
by Above Scaling Bureaus)

THE NORTHWEST LOG RULES
ADVISORY GROUP
IS THE DEVELOPER
AND AUTHOR OF THESE

OFFICIAL
LOG SCALING
and
GRADING RULES

IN THE CONSTANT EFFORT
OF ITS MEMBER-ORGANIZATIONS
TO ASSURE THE UNIFORM
USE AND APPLICATION
OF PROPER PROCEDURES.

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PREFACE

These Log Scaling and Grading Rules have been authorized for use by the Bureaus listed on the front cover. They were developed in co-operation with all phases of the Forest Products Industry, including the various public agencies. The rules outlined in this book are designed to reflect the long experience and accepted usage practices that result in proper calculations of board foot volume under the Scribner Log Rule system, using a maximum scaling length of 40 feet. The Scribner Volume table, revised July 1, 1972, is in the back section of this book. It shows the log volumes, rounded to the nearest 10 board feet, that apply to various log lengths and diameters.

Log scaling to determine the Scribner board footage volume in a log is accomplished by measuring gross length and diameter, and reducing these to net measurements for any defect losses, as prescribed by this Rule Book. All log scaling and grading shall conform to these rules, including the classifications for cull logs. Additional special request procedures may be approved by individual Bureaus for use as SPECIAL SERVICES.

SPECIAL SERVICES: Logs may be identified on scale tickets and shown on certificates using procedures in addition to those shown herein only after a special request has been approved for such Special Service by the Bureau. These requests must be made by the parties for whom the scaling is to be done and will be clearly identified on scale certificates. To reduce confusion and conserve time on the part of the scaler, Special Services must be held to a minimum.

CHECK SCALES: Check scales are made to determine whether or not a scaler is meeting the performance standards set by the Bureau. Check scales will be performed by Bureau personnel who have been so authorized. When a check scale shows the scaler is not meeting acceptable standards the Bureau will take whatever action is necessary to promptly correct the situation, in the form of more training and checking or other remedial action. Check scale reports are classified information of the Bureau Management. Check scales shall not be considered a basis for adjustments

of scale or grade, but may be a basis for a RESCALE upon request of the buyer or seller.

RESCALES: Rescales are made to determine whether or not an adjustment is warranted in volume or grade. The following procedures apply to rescales:

1. (a) Either buyer or seller or both may request a rescale.
   (b) Minimum volume for rescale must be three or more loads of logs scaled on trucks or on the ground.
   (c) Request for rescale must be within 48 hours after original scaling.
2. If water scale is involved logs must be rescaled prior to 40 days after original scaling.
3. The Bureau will notify the buyer and seller as to date, time, and location of rescale. Rescales are to be made strictly by authorized Bureau supervisory personnel, without participation of either buyer or seller.
4. Logs scaled and graded in the rescales must be the same logs and must be scaled and graded under the same conditions as existing in the original scaling and grading. For example, logs originally scaled on trucks will not be rescaled on the ground, or logs originally scaled on trucks will not be rescaled in the water.
5. If rescale results show the net volume or grade exceeded a $\pm$ 5% difference from the original net volume or grade the Bureau will pay the cost of such rescale, consider the rescale as final, and issue a new scale certificate showing corrected figures at no additional cost. If the rescale results show the net volume and grade to be within $\pm$ 5% difference from the original net volume and grade the original scale shall be considered final, and the cost of the rescale shall be paid by the person or persons requesting such rescale.

INSTRUCTIONS TO SCALERS: These instructions are developed to help the scaler understand and apply the rules. and not as a training manual. Scalers must

know the rules and apply them without influence from representatives of either buyers or sellers. Any interference of this type must be reported promptly to Bureau management.

The success in obtaining accurate log scaling is dependent upon careful measurement of lengths and diameters. Each log, or log segment, shall be scaled and graded individually and upon its own merits. Each log as it is scaled should be presumed to be perfect until, by careful examination, it is judged to require scaling deductions. Downgrading of a log will occur only after thorough inspection shows that the log will not meet the higher grade specifications within the diameter and length requirements for that grade and species.

The ability to best judge the deduction requirements and the grade possibilities for logs of the various species can be acquired only by taking every opportunity to carefully observe the processing of logs into finished products at various manufacturing mills. These studies at the mills are a very important part of the log scaler's education and should never be neglected.

RULES FOR TAKING LOG SCALING MEASUREMENTS

STARTING DIAMETER AND LENGTH: The starting diameter and length for determining the grade and recovery requirements shall be the GROSS diameter and length with the following exceptions:

Logs having:
Excessive sap decay.
Deep surface checks.

When Sap Rot, Deep Surface Checks, or any combination thereof, exceed 10% of the diameter of the log, the starting diameter shall be measured under the defect. The GROSS diameter of such logs, however, shall include the defective area.

DIAMETERS; An average diameter shall be taken inside the bark, through the true center of the end-area, at the small end of the log.* In obtaining the average diameter by taking two measurements perpendicular to each other, care shall be taken to consider abnormal swelling, breakage, brooming, burls, knots, depressions, and crotched or ill-shaped logs. In

these cases the measurements shall be taken in a manner to obtain the diameter that would have been, had the defect not existed. In measuring or averaging diameters, any fraction over the inch shall be dropped. Extreme care shall be taken to not drop the inch when the inch-mark is flush with the edge of the log.

* (EXCEPTION: In scaling logs in the water, undamaged top end diameters will be taken in one measurement with the scale stick held in a VERTICAL position.)

Where a split log to be measured is definitely a half of an original round log, and the approximate round log diameter can be obtained, use a diameter that produces a gross scale equivalent in log volume to one-half that of the original round log.

Where a split-portion log to be measured is almost square, a diameter taken on a diagonal from one corner to the opposite and used as a round log diameter will approximate the gross board foot content of the piece.

For pieces other than square or half logs, add the average depth of the piece to the average width, divide the total by two and apply the result as a round log diameter. Slab widths shall be taken between points where the slab is not less than 4 inches in thickness.

LENGTHS: Logs shall be scaled in multiples of one foot in length except where a SPECIAL SERVICE request for two foot multiple scaling lengths has been approved by the Bureau.

Gross Length measurement shall be taken from the short side of the scaling cylinder of the log. When logs have one or both ends broken reasonably straight, the gross length shall be taken between points nearest the end or ends where a cut, if made, would reveal a cross diameter of the log. If a broken end is slabbed the gross length shall be taken at a point where the slabbed portion would average a whole cross section of the log.

Trim: No minimum trim shall be required. A maximum of 12" trim shall be allowed on scaled lengths up to and including 40'; 2" additional trim shall be allowed for each 10' of length, or fraction thereof, in

excess of 40'. When scaling in two foot multiples under a SPECIAL SERVICE request, trim shall be required as stated in the SPECIAL SERVICE specifications for two foot multiple scaling.

SEGMENT SCALING AND GRADING OF LONG LOGS — ALL SPECIES: Long logs are defined as being logs which are in excess of 40' in GROSS scaling length.

The scaling or grading of any segment of a long log shall be based entirely on the merits of the segment under consideration. Any segment having defect deductions exceeding 66 2/3% of the gross volume shall be culled.

Long logs shall be scaled and graded as two or more segments. The scale of these segments shall be based on the top diameter of the top segment only. Second, third, and fourth segments shall be scaled by adding to the top diameter an allowance for taper of 1" for each ten feet of length. (See Long Log Segment Detail in back pages of this book).

Long logs from 41 through 80 feet in length shall be scaled as two segments of as nearly equal even gross lengths as possible. In case the two segments are not exactly equal in length, the longer of the two shall carry the smaller diameter.

Long logs from 81 through 120 feet in length shall be scaled in the same manner, except that they shall be scaled as three segments.

SLOPE OF GRAIN shall be measured in the 6-foot longitudinal section that lies equidistant from each end of the log provided the measurement is representative of the log as a whole.

RING COUNT shall be measured at the top end of the log in the outer portion of the log equal to 50% of the GROSS scaled content.

SINKERS (logs in water with only one end showing): Shall be scaled as 32' long, unless the length can be otherwise determined, and shall be given the floating-end diameter with deductions for visible defects only.

DEDUCTIONS FOR DEFECTS

SCALING POLICY: No reduction in scale shall be

made in order to increase the grade of any log. Each log shall first be scaled for volume and then the log will be graded on its merits. Deductions in scale due to defects shall only be made for the purpose of eliminating volume that would be lost in the primary manufacture of veneer or lumber. All deductions shall be made by reducing the diameter and/or length of the log. Deductions will not be made for defects outside the scaling cylinder.

LENGTH DEDUCTIONS shall be made for defects such as end brooming, breakage, crook, stump shake, dry rot, sweep, split, stump rot, pitch spangle, conk, or other advanced decay. Length deductions for defect may be made in multiples of one foot, when necessary, to obtain better accuracy.

DIAMETER DEDUCTIONS shall be made for defects such as sap rot, cat face, roughness, season checks, pitch rings and heart checks.

PITCH RINGS: A pitch ring in a log causes a loss of the lumber or veneer produced according to its location. As a guide the usual practice is as follows:

(a) 1" deduction for each half-ring or less visible in one end of log, 2" deduction when visible in both ends, 2" deduction for complete ring visible in one end of log, 4" deduction when visible in both ends.
Exceptions to the above basic guide are as follows:

(b) A log containing a full pitch ring 3" or less from the perimeter of the log shall be scaled by taking the net diameter inside the ring.

(c) Reduction for volume lost by a full pitch ring located in the inner one-third of the diameter of the log shall be made with:
1" deduction when visible in one end of the log,
2" deduction when visible in both ends.

(d) Reduction for volume lost by an open pitch ring located in the outer one-third diameter of the log may, in the scaler's judgment, be made with:
1" additional deduction when visible in one end of the log,
2" additional deduction when visible in both ends.

HEART CHECKS: As a guide the usual practice is as follows:

1" deduction if in the heart area of both ends.

1" deduction if the check extends into the clear or meat portion of the log in one end, or 2" if in both ends.

2" deduction if the check extends into the sap area of one end, 4" if the check extends into the sap area in both ends.

If, in the scaler's judgment, the extent of the defect causes a smaller or greater loss, deductions shall be made accordingly.

EXCESSIVE SLOPE OF GRAIN: As a guide the usual practice is as follows:

When the slope of grain in a log is more than allowed for a given species No. 2 sawmill grade, a deduction of 1" may be taken for each inch by which the slope of grain exceeds the maximum. If, in the scaler's judgment, the extent of the excessive slope of grain causes a smaller or greater loss, deductions shall be made accordingly. Scaler's judgment must also be used when grading logs with more than the allowable slope of grain in order to properly grade those exceptionally good logs which definitely will meet the recovery requirements of a higher grade.

DEFINITIONS

THE SCALING CYLINDER is an imaginary cylinder extending the length of the log with a diameter equal to that measured, inside the bark, at the small end of the log.

MAXIMUM SCALING LENGTH is the longest nominal length of log that can be scaled with a single diameter scaling cylinder. In these rules the maximum scaling length is 40 feet.

KNOT INDICATORS reveal grown-over knots which may be measured for size by using the heart area of the indicator.

SURFACE CLEAR refers to that portion of the total surface area of a log or segment that must be free of

any knots, knot indicators, burls, etc., as required by certain log grades. Surface clear can best be defined on a quadrant basis, or as a percentage of the log length.

WORM HOLES:
Pin Worm-hole — not over 1/16" in diameter.
Small Worm-hole — not over 1/4" in diameter.
Large Worm-hole — over 1/4" in diameter.

In scaling logs that contain worm-holes the scaler should remember that various grades of lumber admit worm holes.

KNOTS:
Pin — not over 1/2" in diameter.
Small — over 1/2" but not over 3/4".
Medium — over 3/4" but not over 1-1/2".
Large — over 1-1/2".

SOUND TIGHT KNOTS are those containing no decay and are firmly fixed in position in the log.

LOOSE OR ENCASED KNOTS are those not held firmly in position by the surrounding wood and are permissible in the Construction grade of lumber for all species (except Pine) to one-half the size of allowable sound, tight knots.

A KNOT CLUSTER is a group of two or more knots appearing as a unit on the log.

NOTE: Knots are primarily a grade defect and secondarily a scaling problem, and then only when so large and numerous as to affect the scaling cylinder.

CAMPRUN GRADE: Shall consist of the entire log production from the forest of the species or group of species that are better than culls.

SHORT LOG: Any Sawmill Grade log above Cull Grade (except Hardwoods) 8' through 11' in length, containing not less than 10 board feet, net scale. Logs shorter than 8' may be scaled under Special Services.

MINIMUM NET/GROSS RATIOS:
For Peeler grades — 50%.
For Special Mill grade — 50%.
For Sawmill grades — 33 1/3%.
For Cull grades — Less than 33 1/3%.

CULLS: Any log failing to meet the minimum requirements for the lowest sawmill grade. No deductions are to be made on cull logs except under Bureau-approved Special Services.

ROUGH CUT: This rule is to be applied only to extremely rough logs or especially knotty tops. Deductions will be made only when, in the scaler's judgment, the knots are in excess of 3" in diameter inside the scaling cylinder of the log. Deductions for normal roughcut requirements usually are as follows:

Log Dia. (incl.)	Dia. Reductions
6" to 15"	1"
16" to 25"	2"
26" to 35"	3"
36" to 45"	4"
46" & over	Scaler's judgment

SOUND STAIN is a sound wood area of stain not yet deteriorated into deductible rot. It is considered as a grade defect, and not as a scale volume defect.

RECOVERY RULES OF THUMB

FOR LUMBER RECOVERY: Where a diameter reduction is desired to show a fractional net scale the following formulae produce close approximations:

6/10 D = 1/3 scale of a log.
7/10 D + 1" = 1/2 scale of a log.
8/10 D + 1" = 2/3 scale of a log.
(Note: D = Diameter)

LUMBER LENGTHS: Lumber recovery shall be based on lengths of 8' or longer, except when scaling logs less than 8 feet in length under Special Services.

FOR PLYWOOD RECOVERY: The outer portion of the log containing approximately 50% of its total contents has a thickness equal to 1/6 of the log diameter.

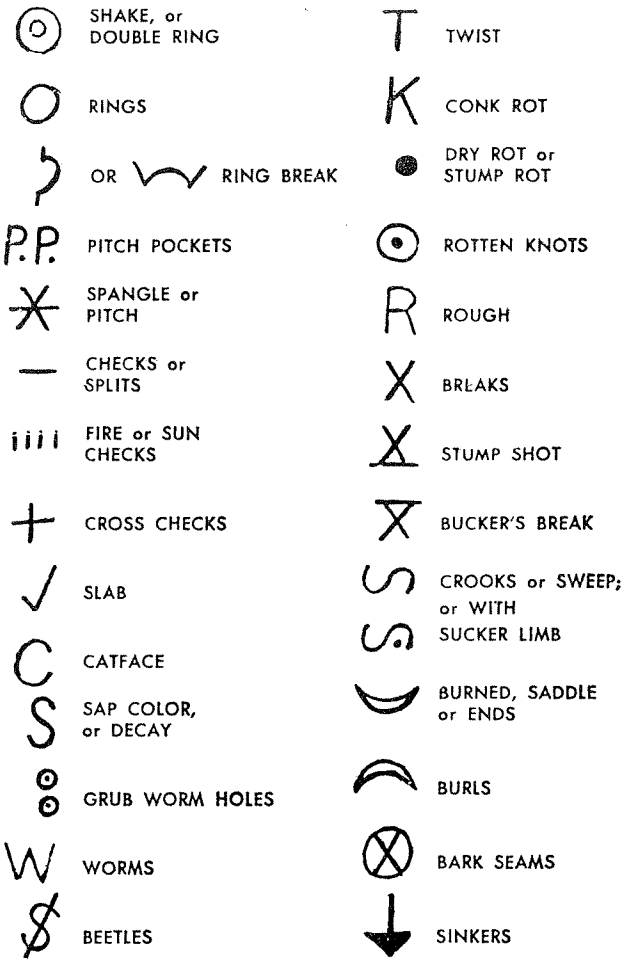
The outer portion of the log containing approximately 35% of its total contents has a thickness equal to 1/10 of the log diameter.

FOR ESTIMATING LOG VOLUME: The following formula will enable calculation of approximate scribner scale volume of a log:

$$\frac{D^2 - 3D}{10} \times \frac{L}{2} = V$$

(Note: D = Diameter in inches; L = Length in feet; V = Volume in board feet.)

DEFECT SYMBOL DESIGNATIONS



RULES FOR GRADING LOGS

SPECIAL MILL

All Species — Except Western Red Cedar

Logs shall be suitable for (1) the manufacture of Select Merchantable and better lumber in an amount of not less than 65% of the NET scale, and (2) for the rotary cutting of veneer center core, cross core, backs and better in an amount of not less than 100% of the NET scale. Such logs shall meet at least the following exterior characteristics:

Gross Diameter — 16 inches.

Gross Length — 17 feet; 16 feet for Ponderosa Pine and Sugar Pine.

Surface — Sound tight knots and knot indicators not to exceed 1-1/2" in diameter, numbering not more than an average of one per foot of log length. Knot indicators 1/2" and under in diameter shall not be considered a determining factor. This grade may include a log with not more than two larger knots.

Annual Ring Count — 6 per inch.

Slope of Grain — Not to exceed:
2" per foot on logs 16" thru 20" diameter.
3" per foot on logs 21" and over.

DOUGLAS FIR PEELER LOGS

(Psuedotsuga menziesii)

No. 1 Peeler Douglas Fir

Logs shall be suitable for rotary cutting of clear, uniform-colored, face stock veneer to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 30 inches.

Gross Length — 17 feet.

Surface — 90% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

Heart off-Center — Allowable to the extent that required recovery can be met.

No. 2 Peeler Douglas Fir

Logs shall be suitable for rotary cutting of clear, uniform-colored, face stock veneer to an amount of not

less than 35% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 30 inches.

Gross Length — 17 feet.

Surface — 75% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

Heart off-Center — Allowable to the extent that required recovery can be met.

No. 3 Peeler Douglas Fir

Logs shall be suitable for the rotary cutting of veneer center core, cross core, backs and better to an amount equal to 100% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 17 feet.

Surface — Limited to knot indicators, not more than 1 1/2" in diameter. The maximum number of knot indicators should not exceed an average of one per foot of log length. Knot indicators 1/2 inch and under in diameter shall not be considered a determining factor. This grading may include a log with not more than two knots.

Annual Ring Count — 6 per inch.

Slope of Grain — Not to exceed 3" per foot.

Heart off-Center — Allowable to the extent that required recovery can be met.

DOUGLAS FIR PEELER BLOCKS

Logs of Peeler quality under 17' but not less than 4' in length shall be graded as Peeler Blocks with the volume extended on log scale basis. No. 1, No. 2, and No. 3 Peeler Blocks must meet the same grade requirements as the similar grade of Peeler logs as to minimum diameter, annual ring count, slope of grain, and grade recovery requirements.

DOUGLAS FIR SAWMILL LOGS

No. 1 Sawmill Douglas Fir

Logs shall be suitable for the manufacture of B and Better lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 30 inches.

Gross Length — 16 feet.

Surface — 90% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

No. 2 Sawmill Douglas Fir

Logs shall be suitable for the manufacture of (1) Construction and Better grades of lumber to an amount of not less than 65% of NET scale, **or** (2) B and Better or equivalent grades of lumber to an amount of not less than 25% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 12 inches.

Gross Length — 12 feet.

Minimum Volume — 60 board feet NET scale.

Surface — Sound, tight knots, not to exceed 2 1/2" in diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Slope of Grain — Not to exceed:
2" per foot on logs 12" thru 20".
3" per foot on logs 21" thru 35".
4" per foot on logs 36" thru 50".
5" per foot on logs 51" and over.

No. 3 Sawmill Douglas Fir

Logs shall be suitable for the manufacture of Standard and Better grades of lumber to an amount of not less than 33 1/3% of the GROSS scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.

Gross Length — 12 feet.

Minimum Volume — 50 board feet NET scale.

Surface — Sound, tight knots, not to exceed 3" in diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Slope of Grain — May include logs having "excessive slope of grain" with proper deduction.

No. 4 Sawmill Douglas Fir

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 3, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

SITKA SPRUCE SAWMILL LOGS

(Picea sitchenis)

Select Sawmill Sitka Spruce

Logs shall be suitable for the manufacture of B and Better lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 30 inches.

Gross Length — 16 feet.

Surface — 90% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

No. 1 Sawmill Sitka Spruce

Logs shall be suitable for the manufacture of B and Better lumber to an amount of not less than 25% of NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 12 feet.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

No. 2 Sawmill Sitka Spruce

Logs shall be suitable for the manufacturer of Construction and Better lumber to an amount of not less

than 65% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 12 inches.

Gross Length — 12 feet.

Minimum Volume — 60 board feet NET scale.

Surface — Sound, tight knots, not to exceed 2 1/2" in diameter. Any larger knots, knot clusters, and burls must be so distributed as to permit the required recovery.

Slope of Grain — Not to exceed:
2" per foot on logs 12" thru 20".
3" per foot on logs 21" thru 35".
4" per foot on logs 36" thru 50".
5" per foot on logs 51" and over.

No. 3 Sawmill Sitka Spruce

Logs shall be suitable for the manufacture of Standard and Better lumber to an amount of not less than 33 1/3% of the GROSS scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.

Gross Length — 12 feet.

Minimum Volume — 50 board feet NET scale.

Surface — Sound, tight knots, not to exceed 3" in diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Slope of Grain — May include logs having "excessive slope of grain" with proper deduction.

No. 4 Sawmill Sitka Spruce

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 3, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

WESTERN HEMLOCK LOGS

(Tsuga heterophylla)

Peeler Western Hemlock

Logs shall be suitable for rotary cutting and shall be capable of producing not less than (1) 50% of the

NET scaled content in Clear Face stock veneer of uniform quality, **or** (2) 50% of the NET scaled content in B and Better lumber of uniform quality. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 17 feet.

Slope of Grain — Not to exceed 3" per foot.

No. 1 Sawmill Western Hemlock

Logs shall be suitable for the manufacture of B and Better lumber to an amount of not less than 35% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 16 feet.

Slope of Grain — Not to exceed 3" per foot.

No. 2 Sawmill Western Hemlock

Logs shall be suitable for the manufacture of Construction and Better lumber to an amount of not less than 65% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 12 inches.

Gross Length — 12 feet.

Minimum Volume — 60 board feet NET scale.

Surface — Sound, tight knots, not to exceed 2 1/2" in diameter. Any larger knots, knot clusters, and burls must be so distributed as to permit the required recovery.

Slope of Grain — Not to exceed:
2" per foot on logs 12" thru 20".
3" per foot on logs 21" thru 35".
4" per foot on logs 36" thru 50".
5" per foot on logs 51" and up.

No. 3 Sawmill Western Hemlock

Logs shall be suitable for the manufacture of Standard and Better lumber to an amount of not less than 33 1/3% of the GROSS scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.

Gross Length — 12 feet.

Minimum Volume — 50 board feet NET scale.

Surface — Sound, tight knots, not to exceed 3" in diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Slope of Grain — May include logs having "excessive slope of grain", with proper deduction.

No. 4 Sawmill Western Hemlock

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 3, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

WESTERN RED CEDAR LOGS

(Thuja plicata)

No. 1 Sawmill Western Red Cedar

Logs shall be suitable for the manufacture of B and Better lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — Logs 28".
Slabs to square not less than 12".

Gross Length — 16 feet.

Minimum volume — Slabs 500 board feet NET scale.

Surface — 90% clear.

Slope of Grain — Not to exceed 3" per foot.

No. 2 Sawmill Western Red Cedar

Logs shall be suitable for the production of No. 1 and No. 2 — 16" Shingles to an amount of not less than 50% of the NET scale. The required minimum recovery from the NET scale shall be based on 10 squares of 5/2" — 16" No. 1 and No. 2 shingles per 1000 board feet, of which at least 50% must be No. 1 shingles. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — Logs 20 inches.
Slabs to square not less than 4".

Gross Length — 12 feet.

Minimum Volume — Logs 210 board feet NET scale. Slabs 60 board feet NET scale.

Surface — Knots shall be spaced to leave clear cutting 24" between knots lengthwise and 10" between knots crosswise, to the extent that the required recovery can be met.

Slope of Grain — Not to exceed:
3" per foot on logs 20" thru 35".
4" per foot on logs 36" thru 50".
5" per foot on logs 51" and over.

No. 3 Sawmill Western Red Cedar

Logs shall be suitable for the manufacture of Standard and Better lumber to an amount of not less than 33 1/3% of the GROSS scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.

Gross Length — 12 feet.

Minimum Volume — 50 board feet NET scale.

Surface — Sound, tight knots, not to exceed 3" diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Slope of Grain — May include logs having "excessive slope of grain" with proper deduction.

No. 4 Sawmill Western Red Cedar

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 3, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

Note: General Rules Applying to Cedar:

1. **Out-of-Round Cedar Logs,** with a diameter variation of 4" or more, when scaled in the water, must be given an average gross diameter.

2. **Wormy Cedar Culls** are logs not meeting the requirements of No. 4 or Better Cedar Logs because of excessive worm holes, and shall be shown on the scale bill or certificate as "Wormy Cedar Culls".

ALASKA CEDAR LOGS

(Chamaecyparis nootkatensis)

Peeler Alaska Cedar

Logs shall be suitable for rotary cutting, and shall be capable of producing not less than 50% of the NET scaled content in No. 2 Clear and Better lumber of uniform quality. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 17 feet.

Slope of Grain — Not to exceed 3" per foot.

No. 1 Sawmill Alaska Cedar

Logs shall be suitable for the manufacture of "C" Clear and Better lumber to an amount of not less than 25% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 16 feet.

Surface — Sound, tight knots, not to exceed 1/2" diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Slope of Grain — Not to exceed 3" per foot.

No. 2 Sawmill Alaska Cedar

Logs shall be suitable for the manufacture of Sterling and Better lumber to an amount of not less than 65% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 12 inches.

Gross Length — 12 feet.

Surface — Sound, tight knots, not to exceed 2 1/2" diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Slope of Grain — Not to exceed:
2" per foot on logs 12" thru 20".
3" per foot on logs 21" thru 35".
4" per foot on logs 36" thru 50".
5" per foot on logs 51" and over.

No. 3 Sawmill Alaska Cedar

Logs shall be suitable for the manufacture of Stand-

ard and Better lumber in an amount of not less than 33 1/3% of the GROSS scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.

Gross Length — 12 feet.

Surface — Sound, tight knots, not to exceed 3" diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.

Minimum Volume — 50 board feet NET scale.

Slope of Grain — May include logs having "excessive slope of grain" with proper deduction.

No. 4 Sawmill Alaska Cedar

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 3, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

PONDEROSA AND SUGAR PINE LOGS

(Pinus ponderosa and Pinus lambertiana)

Peeler Ponderosa & Sugar Pine

Logs shall be old growth and suitable for the rotary cutting of clear, uniform-colored face stock veneer to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 30 inches.

Gross Length — 17 feet.

Surface — 100% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed:
1 1/2" per foot on logs 30" thru 50" diameter.
2 1/2" per foot on logs 51" and over.

Peeler Blocks Ponderosa & Sugar Pine

Logs of Peeler Quality under 17' in length shall be graded as Peeler Blocks with the volume extended on the log scale basis. Peeler Blocks shall meet all the

other minimum specifications required of Peeler grade logs.

No. 1 Sawmill Ponderosa & Sugar Pine

Logs shall be old growth and suitable for the manufacture of D select and Better lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 30 inches.

Gross Length — 16 feet.

Surface — 90% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed:
1 1/2" per foot on logs 30" thru 50" diameter.
2 1/2" per foot on logs 51" and over.

No. 2 Sawmill Ponderosa & Sugar Pine

Logs shall be old growth and suitable for the manufacturer of D Select and Better lumber to an amount of not less than 35% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 12 feet.

Surface — 75% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

No. 3 Sawmill (Shop Grade) Ponderosa & Sugar Pine

Logs shall be old growth and suitable for the manufacturer of No. 2 Shop and Better lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 12 feet.

Surface — 50% clear (collectively), with knots spaced to allow 6'-long clear cuttings

Annual Ring Count — 8 per inch.

Slope of Grain — Not excessive.

No. 4 Sawmill Ponderosa & Sugar Pine

Logs shall be suitable for the manufacture of No. 2 Common (Sterling) and Better lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 12 inches.

Gross Length — 12 feet.

Surface — Sound, tight knots, not to exceed 2 1/2" diameter. Any larger knots shall be spaced same as No. 3 Sawmill (Shop) logs.

No. 5 Sawmill Ponderosa & Sugar Pine

Logs shall be suitable for the manufacture of No. 3 Common (Standard) and Better lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.

Gross Length — 12 feet.

No. 6 Sawmill Ponderosa & Sugar Pine

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 5, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

WESTERN WHITE PINE

(Pinus monticola)

Peeler Western White Pine

Logs shall be old growth and suitable for the rotary cutting of clear, uniform-colored, face stock veneer, **or** for the manufacture of Supreme (B and Better) lumber, to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.

Gross Length — 17 feet.

Surface — 90% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

No. 1 Sawmill Western White Pine

Logs shall be suitable for the manufacture of Choice ("C" Select) and Better lumber to an amount of not less than 25% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 20 inches.

Gross Length — 16 feet.

Surface — 75% clear.

Annual Ring Count — 8 per inch.

Slope of Grain — Not to exceed 3" per foot.

No. 2 Sawmill Western White Pine

Logs shall be suitable for the manufacture of Sterling and Better lumber to an amount of not less than 65% of the NET scale, **or** Shop lumber to an amount of not less than 50% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 12 inches.

Gross Length — 12 feet.

Surface — 50% clear in aggregate areas. Other areas may contain sound, tight knots, not to exceed 2 1/2" diameter for Sterling grades of lumber, **or** larger knots properly spaced to allow Shop grade cuttings.

Slope of Grain — Not to exceed:
2" per foot on logs 12" thru 20".
3" per foot on logs 21" thru 35".
4" per foot on logs 36" thru 50".
5" per foot on logs 51" and over.

No. 3 Sawmill Western White Pine

Logs shall be suitable for the manufacture of Standard and Better lumber to an amount of not less than 33 1/3% of the GROSS scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.
Gross Length — 12 feet.
Minimum Volume — 50 board feet NET scale.
Slope of Grain — May include logs with "excessive slope of grain" with proper deduction.

No. 4 Sawmill Western White Pine

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 3, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

COTTONWOOD LOGS
(Populus trichocarpa)

Note: See SPECIAL SERVICES for scaling in two foot multiples with trim required.

Peeler Cottonwood

Logs shall be suitable for rotary cutting of veneer. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 24 inches.
Gross Length — 8 feet.

No. 1 Sawmill Cottonwood

Logs shall be suitable for the sawing of lumber, and shall meet at least the following minimum exterior characteristics:

Gross Diameter — 10 inches.
Gross Length — 8 feet.
Surface — Not to exceed 4 knots per log.

No. 2 Sawmill Cottonwood

Logs shall be suitable for the sawing of lumber, and shall meet at least the following minimum exterior characteristics:

Gross Diameter — 6 inches.
Gross Length — 8 feet.

No. 4 Sawmill Cottonwood

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 2, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

RED ALDER LOGS
(Alnus rubra)

Note: See SPECIAL SERVICES for scaling in two foot multiples with trim required.

No. 1 Sawmill Red Alder

Logs shall be suitable for the manufacture of No. 1 Shop and Better lumber to an amount of not less than 50% of NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 16 inches.
Gross Length — 8'
Surface — 75% clear.

No. 2 Sawmill Red Alder

Logs shall be suitable for the manufacture of No. 1 Shop and Better lumber to an amount of not less than 33 1/3% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 12 inches.
Gross Length — 8 feet.
Surface — 50% clear.

No. 3 Sawmill Red Alder

Logs shall be suitable for the manufacture of No. 2 Shop and Better lumber to an amount of not less than 33 1/3% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:

Gross Diameter — 10 inches.
Gross Length — 8 feet.

No. 4 Sawmill Red Alder

Logs having less than the minimum required GROSS diameter and/or NET volume which prevents grading them as No. 3, but which have a NET scale of not less than 33 1/3% of the GROSS scale, nor less than 10 board feet.

OTHER SPECIES

A number of log species do not have individually separate scaling and grading rules. These "Other Species" are to be scaled and graded by the "Primary Species" rules designated below:

Apply this Primary Species Rule	To these Other Species
1. Douglas Fir (Psuedotsuga menziesii)	Port Orford Cedar (Chamaecyparis lawsoniana)
2. Sitka Spruce (Picea sitchensis)	None Other
3. Western Hemlock (Tsuga heterophylla)	White Fir (Abies concolor) Shasta Red Fir (Abies magnifica) Alpine Fir (Abies lasiocarpa) Pacific Silver Fir (Abies amabalis) Grand Fir (Abies grandis) Noble Fir (Abies procera) Western Larch (Larix occidentalis) Mountain Hemlock (Tsuga mertensiana)
4. Western Red Cedar (Thuja plicata)	None Other
5. Alaska (Yellow) Cedar (Chamaecyparis nootkatensis)	None Other

Apply this Primary Species Rule	To these Other Species
6. Ponderosa Pine & Sugar Pine (Pinus ponderosa & Pinus lambertiana)	Jeffrey Pine (Pinus jeffreyi) Incense Cedar (Libocedrus decurrens)
7. Western White Pine (Pinus monticola)	Knob Cone Pine (Pinus attentuata) Lodge Pole Pine (Pinus contorta) Engelmann Spruce (Picea engelmanni) Brewer Spruce (Picea breweriana)
8. Cottonwood (Populus trichocarpa)	None Other
9. Red Alder (Alnus rubra)	Maple (Acer macrophyllum) Madrona (Arbutus menziesii) Yew (Taxus brevifolia) Tanoak (Lithocarpus densiflorus) Oregon Ash (Fraxinus oregona) Oaks (Quercus "family") Golden Chinquapin (Castonopis chrysophylla) Oregon Myrtle (Umbellularia Californica) Birches (Betula "family") Miscellaneous un-named hardwoods of limited commercial value can be scaled by this rule.

APPROVED "SPECIAL SERVICES" SCALING IN MULTIPLES OF TWO FEET WITH MINIMUM TRIM REQUIRED

LENGTHS: Logs shall be scaled in even multiples of two feet in length, plus all logs 17 feet in length.

SEGMENT SCALING AND GRADING OF LONG LOGS – ALL SPECIES: Long logs are defined as being logs which are 42 feet, plus trim, and over in GROSS length.

Long logs from 42 through 80 feet in length shall be scaled as two segments of as nearly equal gross length in even feet as possible. In case the two segments are not exactly equal in length in even feet, the longer of the two shall carry the smaller diameter.

Long logs from 82 through 120 feet in length shall be scaled in the same manner, except that they shall be scaled as three segments.

TRIM: Minimum trim required on all log lengths shall be 8" for logs 40' and shorter EXCEPT where specifically stated otherwise. For logs over 40' add 2" trim for each additional 10' in length or part thereof.

Douglas Fir Peeler Blocks – Minimum Length:

4' plus 6" trim (54")	10' plus 6" trim (126")
5' plus 6" trim (66")	12' plus 8" trim
6' plus 6" trim (78")	14' plus 8" trim
7' plus 6" trim (90")	16' plus 8" trim
8' plus 6" trim (102")	

Ponderosa and Sugar Pine Peeler Blocks – Trim allowance shall be at least six inches.

Cottonwood Logs – All logs shall be cut at least 8' in length, plus 4" over length to allow for trim.

Red Alder Logs – Minimum trim shall be 3" per 8' segment. Maximum trim through 40' log length shall be 12". Logs over 40' allowed 2" more for each additional 10' of log length.

APPROVED "SPECIAL SERVICES" AVAILABLE FOR CULL LOGS

Utility (Pulp) Logs – All Species

Shall be logs that do not meet the minimum requirements of Peeler or Sawmill grades, but are suitable for the production of Firm Usable Pulp Chips to an amount of not less than 50% of the GROSS scale.

Minimum Gross Diameter – 6 inches.

Minimum Gross Length – 12 feet (or other length on Bureau-approved request).

Minimum Recovery Requirements – 100% of Adjusted GROSS scale* in Firm Usable Pulp Chips.

*(Note: Adjusted GROSS Scale is the GROSS scale less deductions for defect not suitable for the production of Firm Usable Pulp Chips. Such deductible defects shall not exceed 50% of GROSS scale).

Note: A log that is burned or charred, or that is not mechanically barkable, shall not qualify as a Utility (Pulp) Log. A log, or part of a log, shall be considered barkable if it will not fall apart when subjected to the barking process and is 90% barkable.

The above rules for Utility (pulp) grade may be applied to other designated logs upon special request.

Special (Peelable) Cull – All Species

Shall be logs that do not meet the minimum requirements of Peeler or Sawmill grades, but are suitable for rotary cutting of Firm White Speck and Better veneer, to an amount of not less than 50% of the GROSS scale.

Minimum Adjusted Gross Diameter* – 16 inches.

Minimum Adjusted Gross Length* – 8 feet.

*(Note: Adjusted Gross Measurements are those remaining after deductions are made for defects not suitable for the production of Firm White Speck and Better veneer.)

Surface – Knot size shall not exceed 2 1/2" diameter. Such logs may include one or two larger knots.

Minimum Recovery Requirement – 100% of Adjusted GROSS scale** in usable material of Firm White Speck and Better Veneer.

**(Note: Adjusted GROSS scale is the GROSS scale less deductions for defect not suitable for the production of Firm White Speck and Better Veneer. Such deductible defects shall not exceed 50% of the GROSS scale.)

APPROVED "SPECIAL SERVICES" CUBIC FOOT LOG SCALING RULE

In addition to the information now being recorded for the Scribner board foot rule it will be necessary to take the diameter of the large end of the log and to make an estimate of that portion of the log that is not good enough to make chips. This information will make it possible to determine the volume of the log that is suitable for the manufacture of lumber and/or veneer, suitable for chips, and the volume of culls and voids. The unit of measure is the cubic foot.

The volume will be summarized by grade and species as is the procedure under the Scribner board foot rule.

Except for butt logs that are irregularly shaped, the measurement of the diameter of the large end of each log will be accomplished in a manner identical to the method used for taking small end diameters under the Scribner board foot rule. With respect to irregularly shaped butt logs, the scaler will project the sides of the log through the large end and take the diameter where it emerges from the log.

An estimate of that portion of the log that is not good enough to make chips will be recorded expressed as a percentage of the gross cubic volume of the log.

The volume of each segment will be calculated using the formula for the cubic volume of the frustum of a cone. To compensate for dropped fractions in taking diameters, 0.7 inch will be added in the formula to all diameters. To compensate for trim that is not included in recorded lengths, 0.67 foot will be added to logs 16 feet and shorter, and 1.0 foot will be added to logs 17 feet and longer.

The formula is as follows:

$$V = .005454\ (L+0.67)^{*} \times \left[\frac{(D_S+0.7)^2+(D_L+0.7)^2+(D_S+0.7)\ (D_L+0.7)}{3}\right]$$

WHERE: V = volume (cubic feet)
L = scaled length (feet)
D_S = scaled small-end diameter (inches)
D_L = scaled large-end diameter (inches)

* When logs are 17' and longer in length substitute (L+1.00) for (L+0.67)

The computer program will be written to produce a report (in addition to the present Scribner volume, gross and net) giving gross cubic, cubic volume of that portion of the log suitable for lumber and/or veneer (corresponding to Scribner net scale, hereinafter referred to as "net merch."), cubic volume of that portion of the log suitable for chips, and the cubic volume of that portion of the log not good enough to make chips.

The cubic volume suitable for manufacture of lumber and/or veneer will be computed by reducing the recorded gross dimensions of the log by the defect deductions shown for Scribner. For example, a 40' log having diameters of 30" and 34" has a deduction for defect of 10' in length and 2" in diameter. To compute the net merch cubic, the length will be reduced to 30', The diameters will be reduced from 30" and 34" by 2", down to 28" and 32", and further adjusted to compensate for the reduction in length of 10', taking 5' from each end of the log. A taper of 4" (gross diameters of 30" and 34") in gross length of 40' equals 1" taper in 10', or ½" taper in 5', thereby increasing the small end adjusted diameter from 28" to 28.5", and decreasing the large end adjusted diameter from 32" to 31.5". The net merch cubic volume will then be calculated for a cone having a length of 30' and diameters of 28.5" and 31.5". Cubic volume of segmented logs will be calculated for each individual segment on its own dimensions and its own deductions. The large diameter of the top segment, which is the same as the small diameter of the bottom segment, will be calculated using the actual taper of the log. Lengths of segments will be determined in accordance with the present scaling rule for segmenting long logs.

The cubic volume of that portion of the log not good enough for chips will be calculated from the data entered by the scaler which indicates the percentage of the gross volume of the log in that category.

The cubic volume of that portion of the log suitable for the manufacture of chips is calculated by subtracting from the gross cubic the net merch cubic and the cubic volume of that portion not good enough for chips.

APPROVED "SPECIAL SERVICES" FAST GROWTH RULES FOR DOUGLAS FIR AND SITKA SPRUCE SAWMILL GRADES

All Fast Growth Sawmill logs shall have an Annual Ring Count of LESS THAN SIX (6) PER INCH. In all other features such logs will have the same specifications and recovery requirements as the correspondingly numbered regular Douglas Fir and Sitka Spruce Sawmill log grades 2, 3, and 4.

APPROVED "SPECIAL SERVICES" WORMY CEDAR LOGS

Wormy Cedar Logs, otherwise meeting the requirements of the No. 4 or Better Cedar Logs, will be shown separately on the scale bill or certificate as "Wormy Cedar Logs" upon special request.

APPENDIX

ACTUAL LOG LENGTHS SHALL BE SHOWN AS THESE RECORDED LENGTHS WHEN SCALING IN ONE FOOT MULTIPLES

Actual Meas. Length		Recorded Length		Actual Meas. Length		Recorded Length	
40′-1″	thru	40′-12″	40′	80′-9″	thru	81′-10″	80′
41′-1″	″	42′2″	41′	81′-11″	″	82′-10″	81′
42′-3″	″	43′-2″	42′	82′-11″	″	83′-10″	82′
43′-3″	″	44′-2″	43′	83′-11″	″	84′-10″	83′
44′-3″	″	45′-2″	44′	84′-11″	″	85′-10″	84′
45′-3″	″	46′-2″	45′	85′-11″	″	86′-10″	85′
46′-3″	″	47′-2″	46′	86′-11″	″	87′-10″	86′
47′-3″	″	48′-2″	47′	87′-11″	″	88′-10″	87′
48′-3″	″	49′-2″	48′	88′-11″	″	89′-10″	88′
49′-3″	″	50′-2″	49′	89′-11″	″	90′-10″	89′
50′-3″	″	51′-4″	50′	90′-11″	″	92′	90′
51′-5″	″	52′-4″	51′	92′-1″	″	93′	91′
52′-5″	″	53′-4″	52′	93′-1″	″	94′	92′
53′-5″	″	54′-4″	53′	94′-1″	″	95′	93′
54′-5″	″	55′-4″	54′	95′-1″	″	96′	94′
55′-5″	″	56′-4″	55′	96′-1″	″	97′	95′
56′-5″	″	57′-4″	56′	97′-1″	″	98′	96′
57′-5″	″	58′-4″	57′	98′-1″	″	99′	97′
58′-5″	″	59′-4″	58′	99′-1″	″	100′	98′
59′-5″	″	60′-4″	59′	100′-1″	″	101′	99′
60′-5″	″	61′-6″	60′	101′-1″	″	102′-2″	100′
61′-7″	″	62′-6″	61′	102′-3″	″	103′-2″	101′
62′-7″	″	63′-6″	62′	103′-3″	″	104′-2″	102′
63′-7″	″	64′-6″	63′	104′-3″	″	105′-2″	103′
64′-7″	″	65′-6″	64′	105′-3″	″	106′-2″	104′
65′-7″	″	66′-6″	65′	106′-3″	″	107′-2″	105′
66′-7″	″	67′-6″	66′	107′-3″	″	108′-2″	106′
67′-7″	″	68′-6″	67′	108′-3″	″	109′-2″	107′
68′-7″	″	69′-6″	68′	109′-3″	″	110′-2″	108′
69′-7″	″	70′-6″	69′	110′-3″	″	111′-2″	109′
70′-7″	″	71-8″	70′	111′-3″	″	112′-4″	110′
71′-9″	″	72′-8″	71′	112′-5″	″	113′-4″	111′
72′-9″	″	73′-8″	72′	113′-5″	″	114′-4″	112′
73′-9″	″	74′-8″	73′	114′-5″	″	115′-4″	113′
74′-9″	″	75′-8″	74′	115′-5″	″	116′-4″	114′
75′-9″	″	76′-8″	75′	116′-5″	″	117′-4″	115′
76′-9″	″	77′-8″	76′	117′-5″	″	118′-4″	116′
77′-9″	″	78′-8″	77′	118′-5″	″	119′-4″	117′
78′-9″	″	79′-8″	78′	119′-5″	″	120′-4″	118′
79′-9″	″	80′-8″	79′	120′-5″	″	121′-4″	119′

Actual Meas. Length		Recorded Length		Actual Meas. Length		Recorded Length	
121′-5″	thru	122′-6″	120′	137′-9″	thru	138′-8″	136′
122′-7″	″	123′-6″	121′	138′-9″	″	139′-8″	137′
123′-7″	″	124-6″	122′	139′-9″	″	140′-8″	138′
124′-7″	″	125′-6″	123′	140′-9″	″	141-8″	139′
125′-7″	″	126′-8″	124′	141′-9″	″	142′-10″	140′
126′-7″	″	127′-6″	125′	142′-11″	″	143′-10″	141′
127′-7″	″	128′-6′	126′	143′-11″	″	144′-10″	142′
128′-7″	″	129′ 6″	127′	144′-11″	″	145′-10″	143′
129′-7″	″	130′-6″	128′	145′-11″	″	146′-10″	144′
130′-7″	′	131′-6″	129′	146′-11″	″	147′-10″	145′
131′-7″	″	132′-8″	130′	147′-11″	″	148′-10″	146′
132′-9″	″	133′-8″	131′	148′-11″	″	149′-10″	147′
133′-9″	″	134′-8″	132′	149′-11″	″	150′-10″	148′
134′-9″	″	135′-8″	133′	150′-11″	″	151′-10″	149′
135′-9″	″	136′-8″	134′	151′-11″	″	153′	150′
136′-9″	″	137′-8″	135′				

RECORDED LOG LENGTHS SHALL REQUIRE THESE TRIM ALLOWANCES WHEN SCALING IN TWO FOOT MULTIPLES

Log Lengths	Trim Required	Log Lengths	Trim Required
40′ & shorter	08″	91′-100′	20″
41′-50′	10″	101′-110′	22″
51′-60′	12″	111′-120′	24″
61′-70′	14″	121′-130′	26″
71′-80′	16″	131′-140	28″
81′-90′	18″	141′-150′	30″

LONG LOG DISTRIBUTION OF SEGMENT LENGTHS AND DIAMETERS

Lgth. Log	Lgth. Segs	Dia. Inc.	Lgth. Log	Lgth. Segs	Dia. Inc.	Lgth. Log	Lgth. Segs	Dia. Inc.	Lgth. Log	Lgth. Segs	Dia. Inc.
41—21			**55**—28			**69**—35			**83**—28		
	20—2″			27—2″			34—3″			28—2″	
										27—3″	
42—22			**56**—28			**70**—36			**84**—28		
	20—2″			28—2″			34—3″			28—2″	
										28—3″	
43—22			**57**—29			**71**—36			**85**—29		
	21—2″			28—2″			35—3″			28—2″	
										28—3″	
44—22			**58**—30			**72**—36			**86**—30		
	22—2″			28—3″			36—3″			28—3″	
										28—2″	
45—23			**59**—30			**73**—37			**87**—30		
	22—2″			29—3″			36—3″			29—3″	
										28—2″	
46—24			**60**—30			**74**—38			**88**—30		
	22—2″			30—3″			36—3″			30—3″	
										28—3″	
47—24			**61**—31			**75**—38			**89**—30		
	23—2″			30—3″			37—3″			30—3″	
										29—3″	
48—24			**62**—32			**76**—38			**90**—30		
	24—2″			30—3″			38—3″			30—3″	
										30—3″	
49—25			**63**—32			**77**—39			**91**—31		
	24—2″			31—3″			38—3″			30—3″	
										30—3″	
50—26			**64**—32			**78**—40			**92**—32		
	24—2″			32—3″			38—4″			30—3″	
										30—3″	
51—26			**65**—33			**79**—40			**93**—32		
	25—2″			32—3″			39—4″			31—3″	
										30—3″	
52—26			**66**—34			**80**—40			**94**—32		
	26—2″			32—3″			40—4″			32—3″	
										30—3″	
53—27			**67**—34			**81**—28			**95**—32		
	26—2″			33—3″			27—2″			32—3″	
							26—3″			31—3″	
54—28			**68**—34			**82**—28			**96**—32		
	26—2″			34—3″			28—2″			32—3″	
							26—3″			32—3″	

LONG LOG DISTRIBUTION OF SEGMENT LENGTHS AND DIAMETERS

Lgth. Log	Lgth. Segs	Inc. Dia.	Lgth. Log	Lgth. Segs	Dia. Inc.	Lgth. Log	Lgth. Segs	Dia. Inc.	Lgth. Log	Lgth. Segs	Dia. Inc.
97—33			**108**—36			**119**—40			**130**—34		
	32—3″			36—3″			40—4″			32—3″	
	32—3″			36—4″			39—4″			32—3″	
										32—3″	
98—34			**109**—37			**120**—40			**131**—34		
	32—3″			36—3″			40—4″			33—3″	
	32—3″			36—4″			40—4″			32—3″	
										32—3″	
99—34			**110**—38			**121**—31			**132**—34		
	33—3″			36—3″			30—3″			34—3″	
	32—3″			36—4″			30—3″			32—3″	
							30—3″			32—4″	
100—34			**111**—38			**122**—32			**133**—34		
	34—3″			37—3″			30—3″			34—3″	
	32—3″			36—4″			30—3″			33—3″	
							30—3″			32—4″	
101—34			**112**—38			**123**—32			**134**—34		
	34—3″			38—3″			31—3″			34—3″	
	33—3″			36—4″			30—3″			34—3″	
							30—3″			32—4″	
102—34			**113**—38			**124**—32			**135**—34		
	34—3″			38—3″			32—3″			34—3″	
	34—3″			37—4″			30—3″			34—3″	
							30—3″			33—4″	
103—35			**114**—38			**125**—32			**136**—34		
	34—3″			38—3″			32—3″			34—3″	
	34—3″			38—4″			31—3″			34—3″	
							30—3″			34—4″	
104—36			**115**—39			**126**—32			**137**—35		
	34—3″			38—3″			32—3″			34—3″	
	34—4″			38—4″			32—3″			34—3″	
							30—3″			34—4″	
105—36			**116**—40			**127**—32			**138**—36		
	35—3″			38—4″			32—3″			34—3″	
	34—4″			38—3″			32—3″			34—4″	
							31—3″			34—3″	
106—36			**117**—40			**128**—32			**139**—36		
	36—3″			39—4″			32—3″			35—3″	
	34—4″			38—3″			32—3″			34—4″	
							32—3″			34—3″	
107—36			**118**—40			**129**—33			**140**—36		
	36—3″			40—4″			32—3″			36—3″	
	35—4″			38—4″			32—3″			34—4″	
							32—3″			34—3″	

FACTORS FOR COMPUTING LOG VOLUMES, SCRIBNER TABLE AS REVISED 7/1/72 FOR LOGS 1′ THROUGH 40′ IN LENGTH

	Dia.	Factor	Dia.	Factor	Dia.	Factor
	1″	0.000	39″	70.000	81″	317.360
	2	0.143	40	75.240	82	325.790
	3	0.390	41	79.480	83	334.217
	4	0.676	42	83.910	84	343.290
———	5	1.070	43	87.190	85	350.785
	6	1.160*	44	92.501	86	359.120
1′	7	1.400*	45	94.990	87	368.380
thru	8	1.501*	46	99.075	88	376.610
15′	9	2.084*	47	103.501	89	385.135
	10	3.126*	48	107.970	90	393.380
———	11	3.749*	49	112.292	91	402.499
	6	1.249*	50	116.990	92	410.834
16′	7	1.608*	51	121.650	93	419.166
thru	8	1.854*	52	126.525	94	428.380
31′	9	2.410*	53	131.510	95	437.499
	10	3.542*	54	136.510	96	446.565
———	11	4.167*	55	141.610	97	455.010
	6	1.570*	56	146.912	98	464.150
32′	7	1.800*	57	152.210	99	473.430
thru	8	2.200*	58	157.710	100	482.490
40′	9	2.900*	59	163.288	101	491.700
	10	3.815*	60	168.990	102	501.700
———	11	4.499*	61	174.850	103	511.700
	12	4.900	62	180.749	104	521.700
	13	6.043	63	186.623	105	531.700
	14	7.140	64	193.170	106	541.700
	15	8.880	65	199.120	107	552.499
	16	10.000	66	205.685	108	562.501
	17	11.528	67	211.810	109	573.350
	18	13.290	68	218.501	110	583.350
	19	14.990	69	225.685	111	594.150
	20	17.499	70	232.499	112	604.170
	21	18.990	71	239.317	113	615.010
	22	20.880	72	246.615	114	625.890
	23	23.510	73	254.040	115	636.660
	24	25.218	74	261.525	116	648.380
	25	28.677	75	269.040	117	660.000
	26	31.249	76	276.630	118	671.700
	27	34.220	77	284.260	119	683.330
	28	36.376	78	292.501	120	695.011
	29	38.040	79	300.655		
	30	41.060	80	308.970		
	31	44.376				
	32	45.975				
	33	48.990				
	34	50.000				
	35	54.688				
	36	57.660				
	37	64.319				
	38	66.731				

* Special Note:

Logs having diameters 6″ through 11″ have a separate diameter factor for lengths 1′ through 15′, 16′ through 31′, and 32′ through 40′.

SCRIBNER VOLUME TABLE

Revised July 1, 1972

☆ ☆ ☆

Diameters 1″ to 60″

Lengths 1′ to 40′

DIAMETER — Inches

Lgth.	1"	2"	3"	4"	5"	6"	7"
1′	0	0	0	0	0	0	0
2′	0	0	0	0	0	0	0
3′	0	0	0	0	0	0	0
4′	0	0	0	0	0	0	10
5′	0	0	0	0	10	10	10
6′	0	0	0	0	10	10	10
7′	0	0	0	0	10	10	10
8′	0	0	0	10	10	10	10
9′	0	0	0	10	10	10	10
10′	0	0	0	10	10	10	10
11′	0	0	0	10	10	10	20
12′	0	0	0	10	10	10	20
13′	0	0	10	10	10	20	20
14′	0	0	10	10	10	20	20
15′	0	0	10	10	20	20	20
16′	0	0	10	10	20	20	30
17′	0	0	10	10	20	20	30
18′	0	0	10	10	20	20	30
19′	0	0	10	10	20	20	30
20′	0	0	10	10	20	20	30
21′	0	0	10	10	20	30	30
22′	0	0	10	10	20	30	40
23′	0	0	10	20	20	30	40
24′	0	0	10	20	30	30	40
25′	0	0	10	20	30	30	40
26′	0	0	10	20	30	30	40
27′	0	0	10	20	30	30	40
28′	0	0	10	20	30	30	50
29′	0	0	10	20	30	40	50
30′	0	0	10	20	30	40	50
31′	0	0	10	20	30	40	50
32′	0	0	10	20	30	50	60
33′	0	0	10	20	40	50	60
34′	0	0	10	20	40	50	60
35′	0	10	10	20	40	50	60
36′	0	10	10	20	40	60	60
37′	0	10	10	30	40	60	70
38′	0	10	10	30	40	60	70
39′	0	10	20	30	40	60	70
40′	0	10	20	30	40	60	70
Lgth.	1"	2"	3"	4"	5"	6"	7"

DIAMETER — Inches

Lgth.	8"	9"	10"	11"	12"	13"	14"
1′	0	0	0	0	0	10	10
2′	0	0	10	10	10	10	10
3′	0	10	10	10	10	20	20
4′	10	10	10	10	20	20	30
5′	10	10	20	20	20	30	40
6′	10	10	20	20	30	40	40
7′	10	10	20	30	30	40	50
8′	10	20	30	30	40	50	60
9′	10	20	30	30	40	50	60
10′	20	20	30	40	50	60	70
11′	20	20	30	40	50	70	80
12′	20	30	40	40	60	70	90
13′	20	30	40	50	60	80	90
14′	20	30	40	50	70	80	100
15′	20	30	50	60	70	90	110
16′	30	40	60	70	80	100	110
17′	30	40	60	70	80	100	120
18′	30	40	60	80	90	110	130
19′	40	50	70	80	90	110	140
20′	40	50	70	80	100	120	140
21′	40	50	70	90	100	130	150
22′	40	50	80	90	110	130	160
23′	40	60	80	100	110	140	160
24′	40	60	90	100	120	150	170
25′	50	60	90	100	120	150	180
26′	50	60	90	110	130	160	190
27′	50	70	100	110	130	160	190
28′	50	70	100	120	140	170	200
29′	50	70	100	120	140	180	210
30′	60	70	110	130	150	180	210
31′	60	70	110	130	150	190	220
32′	70	90	120	140	160	190	230
33′	70	100	130	150	160	200	240
34′	70	100	130	150	170	210	240
35′	80	100	130	160	170	210	250
36′	80	100	140	160	180	220	260
37′	80	110	140	170	180	220	260
38′	80	110	140	170	190	230	270
39′	90	110	150	180	190	240	280
40′	90	120	150	180	200	240	290
Lgth.	8"	9"	10"	11"	12"	13"	14"

DIAMETER — Inches

Lgth.	15″	16″	17″	18″	19″	20″	21″
1′	10	10	10	10	10	20	20
2′	20	20	20	30	30	30	40
3′	30	30	30	40	40	50	60
4′	40	40	50	50	60	70	80
5′	40	50	60	70	70	90	90
6′	50	60	70	80	90	100	110
7′	60	70	80	90	100	120	130
8′	70	80	90	110	120	140	150
9′	80	90	100	120	130	160	170
10′	90	100	120	130	150	170	190
11′	100	110	130	150	160	190	210
12′	110	120	140	160	180	210	230
13′	120	130	150	170	190	230	250
14′	120	140	160	190	210	240	270
15′	130	150	170	200	220	260	280
16′	140	160	180	210	240	280	300
17′	150	170	200	230	250	300	320
18′	160	180	210	240	270	310	340
19′	170	190	220	250	280	330	360
20′	180	200	230	270	300	350	380
21′	190	210	240	280	310	370	400
22′	200	220	250	290	330	380	420
23′	200	230	270	310	340	400	440
24′	210	240	280	320	360	420	460
25′	220	250	290	330	370	440	470
26′	230	260	300	350	390	450	490
27′	240	270	310	360	400	470	510
28′	250	280	320	370	420	490	530
29′	260	290	330	390	430	510	550
30′	270	300	350	400	450	520	570
31′	280	310	360	410	460	540	590
32′	280	320	370	430	480	560	610
33′	290	330	380	440	490	580	630
34′	300	340	390	450	510	590	650
35′	310	350	400	470	520	610	660
36′	320	360	420	480	540	630	680
37′	330	370	430	490	550	650	700
38′	340	380	440	510	570	660	720
39′	350	390	450	520	580	680	740
40′	360	400	460	530	600	700	760
Lgth.	15″	16″	17″	18″	19″	20″	21″

DIAMETER — Inches

Lgth.	22″	23″	24″	25″	26″	27″	28″
1′	20	20	30	30	30	30	40
2′	40	50	50	60	60	70	70
3′	60	70	80	90	90	100	110
4′	80	90	100	110	120	140	150
5′	100	120	130	140	160	170	180
6′	130	140	150	170	190	210	220
7′	150	160	180	200	220	240	250
8′	170	190	200	230	250	270	290
9′	190	210	230	260	280	310	330
10′	210	240	250	290	310	340	360
11′	230	260	280	320	340	380	400
12′	250	280	300	340	370	410	440
13′	270	310	330	370	410	440	470
14′	290	330	350	400	440	480	510
15′	310	350	380	430	470	510	550
16′	330	380	400	460	500	550	580
17′	350	400	430	490	530	580	620
18′	380	420	450	520	560	620	650
19′	400	450	480	540	590	650	690
20′	420	470	500	570	620	680	730
21′	440	490	530	600	660	720	760
22′	460	520	550	630	690	750	800
23′	480	540	580	660	720	790	840
24′	500	560	610	690	750	820	870
25′	520	590	630	720	780	860	910
26′	540	610	660	750	810	890	950
27′	560	630	680	770	840	920	980
28′	580	660	710	800	870	960	1020
29′	610	680	730	830	910	990	1050
30′	630	710	760	860	940	1030	1090
31′	650	730	780	890	970	1060	1130
32′	670	750	810	920	1000	1100	1160
33′	690	780	830	950	1030	1130	1200
34′	710	800	860	980	1060	1160	1240
35′	730	820	880	1000	1090	1200	1270
36′	750	850	910	1030	1120	1230	1310
37′	770	870	930	1060	1160	1270	1350
38′	790	890	960	1090	1190	1300	1380
39′	810	920	980	1120	1220	1330	1420
40′	840	940	1010	1150	1250	1370	1460
Lgth.	22″	23″	24″	25″	26″	27″	28″

DIAMETER — Inches

Lgth.	29″	30″	31″	32″	33″	34″	35″
1′	40	40	40	50	50	50	50
2′	80	80	90	90	100	100	110
3′	110	120	130	140	150	150	160
4′	150	160	180	180	200	200	220
5′	190	210	220	230	240	250	270
6′	230	250	270	280	290	300	330
7′	270	290	310	320	340	350	380
8′	300	330	360	370	390	400	440
9′	340	370	400	410	440	450	490
10′	380	410	440	460	490	500	550
11′	420	450	490	510	540	550	600
12′	460	490	530	550	590	600	660
13′	490	530	580	600	640	650	710
14′	530	570	620	640	690	700	770
15′	570	620	670	690	730	750	820
16′	610	660	710	740	780	800	880
17′	650	700	750	780	830	850	930
18′	680	740	800	830	880	900	980
19′	720	780	840	870	930	950	1040
20′	760	820	890	920	980	1000	1090
21′	800	860	930	970	1030	1050	1150
22′	840	900	980	1010	1080	1100	1200
23′	870	940	1020	1060	1130	1150	1260
24′	910	990	1070	1100	1180	1200	1310
25′	950	1030	1110	1150	1220	1250	1370
26′	990	1070	1150	1200	1270	1300	1420
27′	1030	1110	1200	1240	1320	1350	1480
28′	1070	1150	1240	1290	1370	1400	1530
29′	1100	1190	1290	1330	1420	1450	1590
30′	1140	1230	1330	1380	1470	1500	1640
31′	1180	1270	1380	1430	1520	1550	1700
32′	1220	1310	1420	1470	1570	1600	1750
33′	1260	1350	1460	1520	1620	1650	1800
34′	1290	1400	1510	1560	1670	1700	1860
35′	1330	1440	1550	1610	1710	1750	1910
36′	1370	1480	1600	1660	1760	1800	1970
37′	1410	1520	1640	1700	1810	1850	2020
38′	1450	1560	1690	1750	1860	1900	2080
39′	1480	1600	1730	1790	1910	1950	2130
40′	1520	1640	1780	1840	1960	2000	2190
Lgth.	29″	30″	31″	32″	33″	34″	35″

DIAMETER — Inches

Lgth.	36″	37″	38″	39″	40″	41″	42″
1′	60	60	70	70	80	80	80
2′	120	130	130	140	150	160	170
3′	170	190	200	210	230	240	250
4′	230	260	270	280	300	320	340
5′	290	320	330	350	380	400	420
6′	350	390	400	420	450	480	500
7′	400	450	470	490	530	560	590
8′	460	510	530	560	600	640	670
9′	520	580	600	630	680	720	760
10′	580	640	670	700	750	790	840
11′	630	710	730	770	830	870	920
12′	690	770	800	840	900	950	1010
13′	750	840	870	910	980	1030	1090
14′	810	900	930	980	1050	1110	1170
15′	860	960	1000	1050	1130	1190	1260
16′	920	1030	1070	1120	1200	1270	1340
17′	980	1090	1130	1190	1280	1350	1430
18′	1040	1160	1200	1260	1350	1430	1510
19′	1100	1220	1270	1330	1430	1510	1590
20′	1150	1290	1330	1400	1500	1590	1680
21′	1210	1350	1400	1470	1580	1670	1760
22′	1270	1420	1470	1540	1660	1750	1850
23′	1330	1480	1530	1610	1730	1830	1930
24′	1380	1540	1600	1680	1810	1910	2010
25′	1440	1610	1670	1750	1880	1990	2100
26′	1500	1670	1740	1820	1960	2070	2180
27′	1560	1740	1800	1890	2030	2150	2270
28′	1610	1800	1870	1960	2110	2230	2350
29′	1670	1870	1940	2030	2180	2300	2430
30′	1730	1930	2000	2100	2260	2380	2520
31′	1790	1990	2070	2170	2330	2460	2600
32′	1850	2060	2140	2240	2410	2540	2690
33′	1900	2120	2200	2310	2480	2620	2770
34′	1960	2190	2270	2380	2560	2700	2850
35′	2020	2250	2340	2450	2630	2780	2940
36′	2080	2320	2400	2520	2710	2860	3020
37′	2130	2380	2470	2590	2780	2940	3100
38′	2190	2440	2540	2660	2860	3020	3190
39′	2250	2510	2600	2730	2930	3100	3270
40′	2310	2570	2670	2800	3010	3180	3360
Lgth.	36″	37″	38″	39″	40″	41″	42″

DIAMETER — Inches

Lgth.	43″	44″	45″	46″	47″	48″	49″
1′	90	90	90	100	100	110	110
2′	170	190	190	200	210	220	220
3′	260	280	280	300	310	320	340
4′	350	370	380	400	410	430	450
5′	440	460	470	500	520	540	560
6′	520	560	570	590	620	650	670
7′	610	650	660	690	720	760	790
8′	700	740	760	790	830	860	900
9′	780	830	850	890	930	970	1010
10′	870	930	950	990	1040	1080	1120
11′	960	1020	1040	1090	1140	1190	1240
12′	1050	1110	1140	1190	1240	1300	1350
13′	1130	1200	1230	1290	1350	1400	1460
14′	1220	1300	1330	1390	1450	1510	1570
15′	1310	1390	1420	1490	1550	1620	1680
16′	1400	1480	1520	1590	1660	1730	1800
17′	1480	1570	1610	1680	1760	1840	1910
18′	1570	1670	1710	1780	1860	1940	2020
19′	1660	1760	1800	1880	1970	2050	2130
20′	1740	1850	1900	1980	2070	2160	2250
21′	1830	1940	1990	2080	2170	2270	2360
22′	1920	2040	2090	2180	2280	2380	2470
23′	2010	2130	2180	2280	2380	2480	2580
24′	2090	2220	2280	2380	2480	2590	2700
25′	2180	2310	2370	2480	2590	2700	2810
26′	2270	2410	2470	2580	2690	2810	2920
27′	2350	2500	2560	2680	2790	2920	3030
28′	2440	2590	2660	2770	2900	3020	3140
29′	2530	2680	2750	2870	3000	3130	3260
30′	2620	2780	2850	2970	3110	3240	3370
31′	2700	2870	2940	3070	3210	3350	3480
32′	2790	2960	3040	3170	3310	3460	3590
33′	2880	3050	3130	3270	3420	3560	3710
34′	2960	3150	3230	3370	3520	3670	3820
35′	3050	3240	3320	3470	3620	3780	3930
36′	3140	3330	3420	3570	3730	3890	4040
37′	3230	3420	3510	3670	3830	3990	4150
38′	3310	3520	3610	3760	3930	4100	4270
39′	3400	3610	3700	3860	4040	4210	4380
40′	3490	3700	3800	3960	4140	4320	4490
Lgth.	43″	44″	45″	46″	47″	48″	49″

DIAMETER — Inches

Lgth.	50″	51″	52″	53″	54″	55″	56″
1′	120	120	130	130	140	140	150
2′	230	240	250	260	270	280	290
3′	350	360	380	390	410	420	440
4′	470	490	510	530	550	570	590
5′	580	610	630	660	680	710	730
6′	700	730	760	790	820	850	880
7′	820	850	890	920	960	990	1030
8′	940	970	1010	1050	1090	1130	1180
9′	1050	1090	1140	1180	1230	1270	1320
10′	1170	1220	1270	1320	1370	1420	1470
11′	1290	1340	1390	1450	1500	1560	1620
12′	1400	1460	1520	1580	1640	1700	1760
13′	1520	1580	1640	1710	1770	1840	1910
14′	1640	1700	1770	1840	1910	1980	2060
15′	1750	1820	1900	1970	2050	2120	2200
16′	1870	1950	2020	2100	2180	2270	2350
17′	1990	2070	2150	2240	2320	2410	2500
18′	2110	2190	2280	2370	2460	2550	2640
19′	2220	2310	2400	2500	2590	2690	2790
20′	2340	2430	2530	2630	2730	2830	2940
21′	2460	2550	2660	2760	2870	2970	3090
22′	2570	2680	2780	2890	3000	3120	3230
23′	2690	2800	2910	3020	3140	3260	3380
24′	2810	2920	3040	3160	3280	3400	3530
25′	2920	3040	3160	3290	3410	3540	3670
26′	3040	3160	3290	3420	3550	3680	3820
27′	3160	3280	3420	3550	3690	3820	3970
28′	3280	3410	3540	3680	3820	3970	4110
29′	3390	3530	3670	3810	3960	4110	4260
30′	3510	3650	3800	3950	4100	4250	4410
31′	3630	3770	3920	4080	4230	4390	4550
32′	3740	3890	4050	4210	4370	4530	4700
33′	3860	4010	4180	4340	4500	4670	4850
34′	3980	4140	4300	4470	4640	4810	5000
35′	4090	4260	4430	4600	4780	4960	5140
36′	4210	4380	4550	4730	4910	5100	5290
37′	4330	4500	4680	4870	5050	5240	5440
38′	4450	4620	4810	5000	5190	5380	5580
39′	4560	4740	4930	5130	5320	5520	5730
40′	4680	4870	5060	5260	5460	5660	5880
Lgth.	50″	51″	52″	53″	54″	55″	56″

DIAMETER — Inches

Lgth.	57"	58"	59"	60"
1′	150	160	160	170
2′	300	320	330	340
3′	460	470	490	510
4′	610	630	650	680
5′	760	790	820	840
6′	910	950	980	1010
7′	1070	1100	1140	1180
8′	1220	1260	1310	1350
9′	1370	1420	1470	1520
10′	1520	1580	1630	1690
11′	1670	1730	1800	1860
12′	1830	1890	1960	2030
13′	1980	2050	2120	2200
14′	2130	2210	2290	2370
15′	2280	2370	2450	2530
16′	2440	2520	2610	2700
17′	2590	2680	2780	2870
18′	2740	2840	2940	3040
19′	2890	3000	3100	3210
20′	3040	3150	3270	3380
21′	3200	3310	3430	3550
22′	3350	3470	3590	3720
23′	3500	3630	3760	3890
24′	3650	3790	3920	4060
25′	3810	3940	4080	4220
26′	3960	4100	4250	4390
27′	4110	4260	4410	4560
28′	4260	4420	4570	4730
29′	4410	4570	4740	4900
30′	4570	4730	4900	5070
31′	4720	4890	5060	5240
32′	4870	5050	5230	5410
33′	5020	5200	5390	5580
34′	5180	5360	5550	5750
35′	5330	5520	5720	5910
36′	5480	5680	5880	6080
37′	5630	5840	6040	6250
38′	5780	5990	6200	6420
39′	5940	6150	6370	6590
40′	6090	6310	6530	6760

Lgth.	57"	58"	59"	60"