Two-by-four lumber for nail-glued roof trusses must be graded in accordance with its strength characteristics rather than its appearance. Southern yellow pine 2 x 4's are graded by the Southern Pine Inspection Bureau, and some grades of West Coast Douglas fir and West Coast hemlock 2 x 4's are also graded; however, the grades of West Coast 2 x 4's most commonly available from lumber yards are not.

This instruction sheet presents a method of selecting from Construction grade West Coast Douglas fir and hemlock lumber 2 x 4's which can be given a stress rating of 1500 f. The reselection method is in accordance with ASTM Standards D190-77, Tentative Methods for Establishing Structural Grades of Lumber.

The grading procedure consists of six steps which are outlined on this sheet. If a piece of lumber fails to meet the specifications at any step, it must be rejected. Splits, checks, knots and holes, however, may exceed the limits as stated if they are completely covered by at least one nail-glued Tenon or 90 degree plate as specified in the roof-truss design developed by the University of Illinois Small Homes Council and the Purdue University Wood Research Laboratory.

This reselection method applies only to lumber which bears the grade stamp, Construction, of the West Coast Lumber Inspection Bureau. After experience is gained in grading, it will not be necessary to make measurements in detail.

**STEP I:** Identify the piece as Douglas fir or Western hemlock.
- Douglas fir has a slightly orange cast which is in contrast with hemlock. Growth rings in Douglas fir are prominent, while in hemlock they are hard to see. Failure to identify gives no cause for rejection; it merely means that both Douglas fir and hemlock restrictions must be met.

**STEP II:** Inspect holes and knots.
- All holes are treated the same as knots since their effect upon strength is approximately the same as that of knots.
- Knots along the length of the 2 x 4 must not be closer together than 6 inches.
- Knot clusters (two or more knots grouped together) are not permitted.
- Knots on 4-inch faces only (Applies only to Western hemlock). Knots on the 4-inch faces of hemlock which are not in contact with an edge, must not be larger than 1 1/4" average diameter. (Unless the knot is perfectly spherical and lies exactly along the edge of the piece.)
- Knots on 4-inch faces only (Applies only to Western hemlock). Knots on the 4-inch faces of hemlock which are not in contact with an edge, must not be larger than 1 1/4" average diameter. (Unless the knot is perfectly spherical and lies exactly along the edge of the piece.)
- Knots on 4-inch faces only (Applies only to Western hemlock). Knots on the 4-inch faces of hemlock which are not in contact with an edge, must not be larger than 1 1/4" average diameter. (Unless the knot is perfectly spherical and lies exactly along the edge of the piece.)
- Knot clusters (two or more knots grouped together) are not permitted.

**STEP III:** Inspect slope of grain on all four faces of the 2 x 4.
- For strength, the 2 x 4 should have grain that is straight — that is, the wood fibers should run as nearly parallel as possible. Southern yellow pine 2 x 4's are graded by the Southern Pine Inspection Bureau, and some grades of West Coast Douglas fir and West Coast hemlock 2 x 4's are also graded; however, the grades of West Coast 2 x 4's most commonly available from lumber yards are not.

**STEP IV:** Inspect rate of growth if the 2 x 4 is Douglas fir.
- Growth rings at the end of a Douglas fir 2 x 4 must average four or more rings per inch.

**STEP V:** Inspect for splits.
- No split (an opening which runs through the entire thickness of the 2 x 4 in its end) can be longer than 1/4 inch.
- If the 2 x 4 is to extend as a roof overhang, the above split limitations may be disregarded.

**STEP VI:** Inspect surface cracks.
- Wood fiber separations which do not extend all the way through the piece cannot be deeper than 3/8 inch. The sum of the depth of two cracks in direct alignment and on opposite face cannot be more than 3/8 inch. The cracks should be measured only in the middle one-half of the 4-inch face (the shaded area of the illustrations).

**RESELECTION OF LUMBER FOR ROOF TRUSSES**

How to Reselect 2" x 4" Material from Construction Grade Douglas Fir and Western Hemlock for Nail-Gluing

**INSTRUCTION SHEET 12**

**SCRIBE IN USE**

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Ruben A. Jones, Registered Architect
Donald H. Pancielo, Wood Technologist
Robert H. Perkins

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