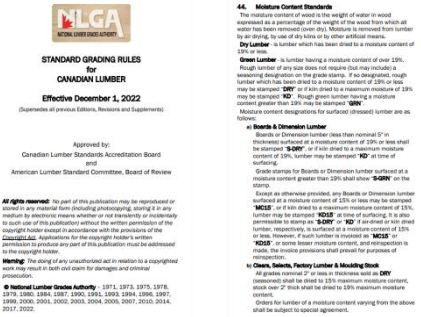


Moisture Content – Lesson 10

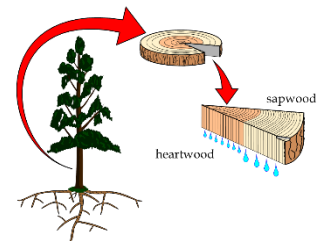
I. Moisture Content Lesson:

- Based on NLGA Standard Grading Rules, paragraphs 44 and 44-a.
- Moisture content varies by species, sapwood amount, climate, growing site, log harvesting time, and storage.



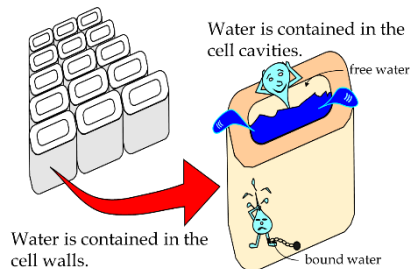
II. Expressing Moisture Content:

- Percentage of oven-dry weight.
- Example: 10% moisture content = 10 pounds of water per 100 pounds of dry wood fiber.



III. Moisture in Wood:

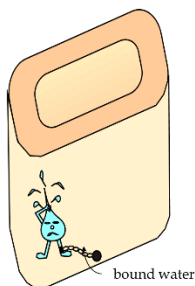
- Free water:** In cell cavities.
- Bound water:** In cell walls.



IV. Drying Process:

- Moisture leaves cell cavities first (fiber saturation point: 23-30% moisture content).
- Shrinkage occurs below fiber saturation point.
- Shrinkage mainly in width and thickness, not length.
- More shrinkage across tangential flat grain face than radial vertical grain face.

V. Equilibrium Moisture Content:



- When wood dries water leaves the cell cavities first.
- The *fibre saturation point* is when the cell cavities are empty but the cell walls are still saturated.

- Lumber absorbs moisture until in equilibrium with the atmosphere.
- Swells with re-absorption, shrinks when moisture is removed below fiber saturation point.

VI. Reasons for Seasoning Lumber:

- a) Minimize shrinkage, checking, and warping.
- b) Reduce weight.
- c) Reduce susceptibility to stain, decay, and insect attack.
- d) Increase strength and stiffness.
- e) Improve appearance.
- f) Improve painting and gluing qualities.
- g) Improve machining and finishing qualities.

VII. Shrinkage and Expansion:

- a) Average 4% from fiber saturation point to normal dry conditions.
- b) Allowance: 1% (0.7% for western red cedar) reduction in size for each 4% reduction in moisture content.

VIII. Calculating Shrinkage:

- a) Formula: Width/thickness × denominator of fraction × percentage allowed.
- b) Example: 12-inch-wide piece, 4% shrinkage, nearest 32nds = 15/32-inch shrinkage.

$$\frac{\text{WIDTH OF PIECE} \times \text{FRACTION} \times 4}{100}$$
$$\frac{12 \times 32 \times 4}{100} = 15.36 = 15/32$$

IX. Moisture Content Calculation:

- a) Formula: (Original weight - oven-dry weight) × 100 / oven-dry weight = original moisture content.
- b) Alternate: (Wet weight - dry weight) / dry weight × 100 = original moisture content percentage.

$$\frac{\text{ORIGINAL WEIGHT} - \text{OVEN DRY WEIGHT}}{\text{OVEN DRY WEIGHT}} \times 100$$

OR

$$\frac{\text{WET} - \text{DRY}}{\text{DRY}} \times 100$$

X. NLGA Definitions:

- a) **Dry lumber:** ≤ 19% moisture content.
- b) **S-DRY:** Surfaced ≤ 19% moisture content.
- c) **KD:** Kiln-dried ≤ 19% moisture content.
- d) **MC15:** Surfaced ≤ 15% moisture content.
- e) **KD-15:** Kiln-dried ≤ 15% moisture content.
- f) **Green lumber:** > 19% moisture content.