

UNIT III - BUILDING CONSTRUCTION

Lesson 3: Building Materials

Competency/Objective: Identify and select building materials.

Study Questions

1. What are the different types of building materials?
2. What are the types and grades of dimension lumber?
3. What are the types and grades of sheathing materials?

References

1. *Agricultural Structures (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1999.
2. Transparency Master
 - a) TM 3.1: Typical APA Plywood Grade-Trademark
3. Activity Sheet
 - a) AS 3.1: Construction Materials

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TEACHING PROCEDURES

B. ***Review***

Lesson 2 discussed different types of building designs. Lesson 4 describes the types of building materials that may be used to build these designs, with an emphasis on wood products. This lesson discusses the types of materials available and how to determine the quality of the material by its grade.

C. ***Motivation***

Pass around a few samples of scrap dimensional lumber and small pieces of sheathing. Samples can be acquired from local lumber yards or possibly construction sites. Try to get a variety of common sizes in short lengths of a foot or so. Also, obtain a few small examples of plywood in different thickness and of nonveneered samples, such as particle board and oriented strand board. As these materials are being passed around, tell the class the focus of this lesson will be on identifying and understanding the grades of these types of materials.

D. ***Assignment***

E. ***Supervised Study***

F. ***Discussion***

1. Discuss the types of building materials available.

What are the different types of building materials?

- a) Wood products, including boards and plywood
 - b) Metals, such as steel and aluminum
 - c) Concrete products
 - d) Clay bricks and tiles
 - e) Vinyl, plastics, glass, and fiberglass
2. Discuss the different types and grades of dimension lumber. Have the samples used for the motivation available to provide examples during the discussion.

What are the types and grades of dimension lumber?

- a) Dimension lumber - Wooden building material sawn in lengths, usually starting at eight feet and increasing in increments of two feet, and uniform in thickness and width
- b) Types of dimension lumber
 - 1) Softwood is lumber from evergreen trees.
 - 2) Hardwood is from deciduous trees.
 - 3) Treated lumber is chemically treated for preservation.
 - 4) Green lumber is lumber with a high moisture content.
 - 5) Kiln-dried lumber is dried in a kiln, a sort of oven in which the lumber is heated to reduce moisture to a desired point.
- c) Grades of lumber

- 1) The American Lumber Standards Committee sets certain standards for grading lumber that are generally applied, and often expanded or detailed, by regional associations such as the Western Wood Products Association or Southern Forest Products Association.
 - 2) Lumber is generally graded 1, 2, or 3 (1 being the highest number grade), possibly with an additional premium or select grade.
 - 3) Grading is accomplished by evaluating the number and severity of defects.
 - (a) Knots
 - (b) Splits and checks
 - (c) Shakes
 - (d) Pitch pockets
 - (e) Honeycombing
 - (f) Wane
 - (g) Blue stain
 - (h) Decay
 - (i) Holes
 - (j) Warp
 - 4) The designation "economy" generally is equivalent to grade three.
 - 5) Some areas may have further designations involving letters or terms such as (S) or Select, (B) or Better, (C) or Common, Choice, or Supreme; these letters may or may not correspond to a number system.
 - 6) Treated lumber usually does not have a number or letter grade; it is simply referred to as "treated."
3. Discuss common types and grades of sheathing materials available for construction uses. TM 3.1 will be of assistance in discussing the information stamped on sheathing material. Have students complete AS 3.1.

What are the types and grades of sheathing material?

- a) Sheathing materials - generally wood or wood product panels that most commonly are four feet by eight feet in size, with a thickness of $\frac{1}{4}$ to $1\frac{7}{16}$ inches
- b) Types of sheathing materials
 - 1) Plywood - made of thin sheets of wood laminated to a desired thickness.
 - 2) Composite plywood - has a veneer cover laminated to some form of wood core.
 - 3) Nonveneered panels, consisting of oriented strand board (OSB), particle board, and wafer board - made from wood flakes, chips, or fibers that are combined with suitable resins and glues and shaped into panels
- c) Grades of sheathing materials
 - 1) Softwood plywood grades - assigned by associations such as the APA to sheathing materials manufactured to meet their specifications.
 - (a) Generally, a rating of 1 indicates that the plywood is for exterior use, while a rating of 2 is for interior use.
 - (b) Plywood with a rating of "Exposure 1" can withstand moisture but should be used indoors, while "Exposure 2" indicates plywood that should only be used indoors.
 - (c) Letter system - used to rate the quality of the veneer used on the face and back
 - (d) Plywood grade stamp from the APA
 - (1) Span rating - Two numbers separated by a slash; the first number is the maximum span in inches that should be used for roof decking, while the second number is the recommended span for floor decking
 - (2) Panel grade
 - (3) Exposure durability
 - (4) Thickness
 - 2) Hardwood Plywood Institute
 - (a) Rating of 1 or 2 - good face and back with careful grain matching
 - (b) Rating of 3 - structurally sound but has obvious defects and patching
 - 3) Softwood or hardwood plywood - may also be designated G1S, meaning "good one side," or G2S for "good two sides."

G. ***Other Activities***

1. Have the students add to your collection of sample materials.
2. Ask a knowledgeable representative from a local lumber retailer to come and speak to the class about the products and grades of lumber that the business carries.

H. ***Conclusion***

The selection of building materials should be made with a good understanding of what is available along with the advantages of different types of materials. Knowing the types and grades of materials will help control costs while allowing for the construction of a structure that will fulfill its intended purpose.

I. ***Answers to Activity Sheet***

J. ***Answers to Evaluation***

1. b
2. c
3. c
4. b
5. a
6. Answers may include any two of the following: wood products, metals, concrete products, clay bricks and tiles, vinyl, plastics, glass, and fiberglass.
7. Softwood is lumber from evergreen trees, while hardwood is from deciduous trees.
8. Answers may include any three of the following: knots, splits and checks, shakes, pitch pockets, honeycombing, wane, blue stain, decay, holes, and warp.
9. A span rating consists of two numbers separated by a slash; the first number is the maximum span in inches that should be used for roof decking, while the other is the recommended span for floor decking.

EVALUATION

Circle the letter that corresponds to the best answer.

1. Kilns are for:
 - a. Measuring lumber.
 - b. Drying lumber.
 - c. Surfacing lumber.
 - d. Measuring moisture in lumber.
2. What is the regulatory agency that helps set lumber grading guidelines?
 - a. American Lumber Agency.
 - b. Wood Products Agency.
 - c. Department of American Lumber Standards.
 - d. Department of Natural Resources.
3. What is a veneer cover laminated to some form of wood core called?
 - a. Plywood
 - b. OSB
 - c. Composite plywood
 - d. Dimensional lumber
4. Lumber especially designed for outside use is:
 - a. OSB.
 - b. Treated lumber.
 - c. Dimensional lumber.
 - d. Kiln-dried lumber.
5. A material made from wood flakes, chips, or fibers that are combined with suitable resins and glues and shaped into panels is called:
 - a. OSB.
 - b. Composite plywood.
 - c. Dimensional lumber.
 - d. Kiln-dried lumber.

Complete the following short answer questions.

6. What are two common building materials?
 - a.
 - b.

7. What is the difference between hardwood and softwood?

8. What are three types of defects in a piece of lumber?
 - a.
 - b.
 - c.

9. What does the span rating on a sheet of plywood indicate?



Objective: Compare and contrast different types of building materials.

Wood products - dimension lumber

Concrete products

Vinyl

Plastic

Fiberglass

1. What is this material commonly used for in building construction?
2. How is this material made or processed?
3. What safety factors should be remembered when working with this material?
4. How is this material sold, and how is it priced?

5. What are the advantages and disadvantages to using this material?

6. What finishes (paints, stains, etc.) can be used with this material?

7. What tools are needed to work with this material?

8. What fasteners can be used with this material?