SEASONING

An introduction to this subject appears on pp. 55-57, Vol. I.

Timber from a recently felled tree contains moisture in the form of free water in the cell cavities and absorbed water in the cell walls. Seasoning or conditioning is the process concerned with the *reduction* (not total elimination) of this moisture content (" m.c.") in the timber. Timber required for internal use should be conditioned to a m.c. approximating to the average humidity of the room in which it is to be fixed (see below).

The m.c. is calculated as a percentage of the dry weight of the wood. It is determined in the following manner :—

1. A small test piece or cross-section is cut off a sample of wood before being seasoned. As the extreme ends of the piece may be drier than the remainder, it is usual to cut the cross-sectional specimen at about 1-ft. from one end in order to obtain representative figures, and its length in the direction of the grain need not exceed $\frac{1}{2}$-in. The section is at once weighed (usually on a physical balance) and this is recorded as the *wet weight*.

2. The specimen is placed in an oven where it is subjected to a temperature of 100° C. (212° F.) until the whole of the moisture has been withdrawn. It is again weighed and recorded as the *dry weight*.

3. The percentage moisture is then calculated from the formula :—

$$(a)\ \text{Moisture content per cent.} = \frac{\text{wet weight} - \text{dry weight}}{\text{dry weight}} \times 100,$$

or

$$(b)\ \text{Moisture content per cent.} = \left(\frac{\text{wet weight}}{\text{dry weight}} - 1\right) 100.$$

Thus, as an example, suppose the specimen to be from a 7-in. by 1-in. floor board, $\frac{1}{2}$-in. long, having an initial or wet weight of 42-gm. and a final or dry weight of 30-gm. (1-oz. approx.). The

$$\text{m.c.} = \frac{42-30}{30} \times 100 = 40 \text{ per cent.} \quad . \quad . \quad . \quad (a)$$

or

$$\text{m.c.} = \left(\frac{42}{30} - 1\right) 100 = 40 \text{ per cent.} \quad . \quad . \quad . \quad (b)$$

The determination of the m.c. in kiln samples is referred to on p. 10. The m.c. of samples of timber freshly cut from the log may vary from 50 per cent. or more for hardwoods to over 100 per cent. for softwoods. Much of this moisture must be removed, and the following moisture contents of timber required for various purposes are recommended :[1] Interior joinery work, 9 to 14 per cent. ; external joinery work (as for doors and windows), 15 per cent. ; good class carpentry work, 20 per cent. (maximum) and rough carpentry work, 25 per cent. Although the mean m.c. of timber in centrally heated buildings is approximately 12 per cent., it is advisable to reduce the m.c. in timber to be used for panelling, etc., adjacent to the heating radiators to at least 8 per cent. It is important to note that *timber which has less than 20 per cent. m.c. is not liable to become affected by dry rot* (see pp. 14-16).

[1] Full information appears in " Timber Seasoning," Forest Products Research Records, No. 4.

DEFECTS OR DEGRADES DUE TO SEASONING.—The evaporation of the absorbed water in the cell walls during the process of seasoning does not commence until the whole of the free water in the cavities has disappeared. The term *fibre saturation point* is applied when the last of the free water has been removed and the cell walls are still saturated ; the m.c. at this stage varies from 25 to 30 per cent. Shrinkage does not occur until after the free water has been totally eliminated and the removal of the absorbed water commenced. Changes in size and often in shape then occur, the maximum shrinkage taking place in the tangential direction (*i.e.*, in the direction of the growth rings). Tangential shrinkage is generally approximately double radial shrinkage (*i.e.*, at right angles to the annual rings). Thus, approximate comparative figures show that the *average tangential shrinkage of timber per foot of original width increases from* $\frac{7}{10}$ *to* $\frac{9}{10}$*-in. when the m.c. decreases from* 14 *to* 9 *per cent., and the corresponding radial shrinkage increases from* $\frac{4}{10}$ *to* $\frac{5}{10}$*-in.* Longitudinal shrinkage (*i.e.*, in the direction of the grain) is almost negligible. This unequal movement in the several directions is due to the difference in structure of the wood ; thus, as the ray cells lie in a radial direction (see A, Fig. 1), and as cells do not vary appreciably in length, it follows that the presence of ray cells is chiefly responsible for the relative reduction in radial shrinkage. The thicker the cell walls the greater the shrinkage. From the foregoing it will be appreciated that : (1) Quarter-sawn timber is less liable to movement than that which has been plain sawn ; (2) denser timbers usually shrink and swell more than lighter wood ; and (3) spring wood is more static than the denser summer wood.

As stated in the preceding column, timber for internal joinery work should have a m.c. as near as possible to the mean humidity of the air in the portion of the building in which it is to be permanently fixed. Otherwise, if comparatively dry wood is exposed to a damp atmosphere it will absorb moisture and swell ; conversely, if the m.c. in the timber is relatively high and the air of the room is warm and dry, a certain amount of moisture will be evaporated and the timber will shrink. This movement or *working* takes place when the humidity of the atmosphere in a building is not constant, and serious defects may be caused by the alternating shrinkage and expansion due to extreme fluctuating atmospheric conditions. Such conditions are commonly met with in buildings in course of construction and especially during the winter months when the humidity of the atmosphere is relatively high. *It is therefore advisable to defer as long as possible the fixing of framed work, such as panelling and the laying of wood block and similar flooring, until the building has been well dried.* Every effort should be made by artificial heating and other means to dry newly constructed buildings as thoroughly as practicable before at least the more expensive woodwork is introduced.