

# TECHNICAL NOTE NUMBER 124

FOREST PRODUCTS LABORATORY - U. S. FOREST SERVICE - MADISON, WISCONSIN

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## MATERIALS USED IN DRY KILN CONSTRUCTION

Any of the ordinary building materials - wood, brick, tile, or concrete - may be used in the construction of a dry kiln. The choice between them will depend upon the relative importance of the first cost, maintenance, and fire hazard. The following comments on each type are based on the experience of the U. S. Forest Products Laboratory:

Where insurance rates permit, a well-built wood kiln is very satisfactory, wood being a very good insulator, easily repaired, and cheaper than the other materials. The chief objection to the use of wood, aside from fire risk, is its tendency to swell and shrink with alternate moist and dry conditions, causing more or less working of the frame and loosening of nails. All lumber should be thoroughly seasoned. Fir, Douglas fir, yellow pine, redwood, cypress, and similar woods with low shrinkage rates should be used for sheathing and sills. For frame timbers any good straight-grained material is suitable. The sheathing should be shiplap laid horizontally and nailed twice at each stud, in the middle and at the bottom of the board. Outside walls should be sheathed on both sides or sheathed inside and plastered outside. They should also be insulated with a good moisture-proof, heat-resistant insulator. The ordinary quilt insulations sewed between so called waterproof paper have not proved satisfactory in dry kiln construction. Walls should be painted on the inside with asphaltic paint. Where lumber is plentiful, crib or laminated construction may be used, the walls being built up of 2 by 6 inch planks laid flat, and the roof of similar material laid tight together. If the planks are well seasoned and well manufactured, this form of

construction permits very little heat loss; but if the lumber is low grade and knotty, a tight, weather-resistant construction is extremely difficult to obtain. The shrinkage of the walls is excessive, and causes considerable trouble at door jambs and where pipes pass through the walls.

Brick or hollow tile is procurable almost everywhere, and where permanency is desired is usually more satisfactory than wood. The brick or tile should be hard burned. The walls should be laid up in tempered or cement mortar. Unequal expansion in the exterior walls, caused by the difference in temperature of the outer and inner faces, is almost certain to create numerous small cracks, which should be painted up with an elastic cement rather than mortar. A kind of tile should be chosen that has openings running horizontally rather than vertically in the wall. The tile should be scored for plastering. Both sides of tile walls should be plastered with cement mortar. When brick, tile, or concrete kilns are over 50 feet long, it is advisable to build both the exterior and interior walls 12 inches thick, particularly if fireproof roofs are used.

Walls of monolithic concrete or of concrete blocks are highly absorbent of moisture unless thoroughly water-proofed. It is very difficult to hold a high humidity within a kiln whose walls absorb moisture readily. The heat loss through such walls is also very great.