

to manufacturing specifications. Resin-bonded plywood also has been subjected to shear test: the wet shear figures are frequently as high as the dry values. In testing five-ply, glue lines are subjected to stress in series.

84. *Box-testing*.—Tumbler and drop tests of accumulator-boxes and various types of munitions containers have been carried out as a means of improving designs, drafting suitable specifications, and securing better performance under service conditions. Trials of banana-cases manufactured from mamalava—a Samoan wood—have indicated that, with slight modifications to their original design, entire satisfaction can be expected, thus allowing the use of local Samoan timber-supplies instead of calling upon New Zealand resources, already in short supply.

85. *Wood Technology*.—Following the visit of a Forest Service officer to the Pacific theatre of war, a major investigation of Pacific islands woods is in progress. The reference-slide collection and assembled data relating to New Zealand woods have proved useful in the search for substitutes for imported special-purpose woods. Routine identifications for both civil interests and defence services have covered a wide range of overseas woods in addition to indigenous and locally grown exotic woods, in all some forty species having been investigated.

Sample-plot investigations of exotic stands in Golden Downs State Forest have supplied the bulk of the material examined for specific gravity. The Golden Downs insignis pine aged from twelve to sixteen years had an average specific gravity (based on oven-dry weight and green volume) at the butt of 0.389, decreasing to 0.341 at the lowest green-branch level: these values are generally higher than those for similar-aged Kaingaroa timber. Slow-grown insignis pine approximately fifty years old from Central Otago had a maximum specific-gravity value at the butt as high as 0.502. Average figures for three trees were: butt, 0.432; mid-height, 0.403; and merchantable top, 0.399. Numerous small lots of other exotic-forest softwoods have been examined and tests made of both exotic and indigenous woods in conjunction with the routine identifications and standard mechanical tests already referred to.

86. *The Drying of Timber*.—More expansion in dry-kiln facilities occurred during the period than in any previous year in the history of the timber-trade, and most kilns were of modern design and permanent construction, allowing of automatic control of temperature and humidity and of positive control and reversal of air circulation. The only regrettable tendency is continued adherence to 8 ft. wide piles and narrow side flues—sometimes only 18 in. wide—instead of a maximum width of pile of 7 ft. and a minimum side flue of 2 ft. in width. Intending kiln-owners unfortunately do not appreciate that, though their kilns hold one-seventh more timber, it takes at least that much longer to dry the larger load to the same average moisture content, whilst, in addition, some of the finished timber is wetter and other of it drier and poorly conditioned as compared with timber dried in the narrower piles. In other words, the 8 ft. piles are so wide that centre boards cannot be dried sufficiently without over-drying the outer boards, and, while the highest class of kiln drying calls for only 6 ft. piles, sufficiently good drying for most purposes can be achieved with 7 ft. stacks. Likewise, the wider side flues give a much more uniform distribution of air from top to bottom of piles and therefore not only hasten but ensure more uniform drying throughout the pile. Assistance was rendered new owners in starting up and operating their installations.

Timber-production is barely keeping pace with even urgent requirements for seasoned timber for housing, furniture, and other uses, and it is only the expanded kiln-drying facilities which enable these demands to be satisfied. The danger of acceding to these by supplying and using timber which has been insufficiently dried and/or unloaded and block stacked before cooling is generally appreciated by kiln-owners, but not by many users; but it is even more important to avoid the drying of mixed loads of different thicknesses, qualities, and species and to insist upon the proper control of the kiln-drying process by alteration of schedule conditions based upon the moisture content of an adequate range of samples and finally upon their stress determinations. Every user of kiln-dried timber, particularly manufacturers of high-quality products, should assure himself that the kilns from which he secures his supplies are operated in accordance with such precautions. A standard specification incorporating these principles has been formulated and will shortly be submitted for consideration by the Standards Institute. The real necessity for this specification arises out of the fact that badly kiln-dried timber can give infinitely worse results than poorly air-dried timber.

With numerous standard specifications for wood products now providing for definite limitation of moisture-content, it is hoped that more general recourse to moisture-content tests before use will follow in the woodworking industries. The public should realize that shrinkage of wood, whether in building or in furniture, &c., is *prima facie* evidence that the timber has not been adequately dried and stored and that universal insistence upon correction of the trouble by replacement of the offending timber or product is the most practicable means of securing any improvement in the technique of timber-drying and wood use.

87. *Wood-preservation*.—In view of continuing attempts by owners or agents for proprietary wood-preservation to secure endorsement or use by Government Departments, &c., of their products and services, and of the danger of exclusive use thereof, it is necessary to restate the Forest Service view that no support should be given to the