

(213)

Evaluation of Structural Aspects of Timber Roof Designs in Sri Lanka

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Abstract

Structural timber can be identified as a construction material which has high strength to weight ratio, therefore can be used for structural members with larger spans. Timber is used for construction of roofs, doors, windows and ceilings and for house construction. In order to construct a typical single story house of 100 m², a volume of approximately 1.5 m³ timber is used for roofing. About 320,000 houses are built in a year locally which require more than 470,000 m³ volume of timber. This is approximately 110,000 trees are harvested per year. Timber is the most common structural material used for roof construction in Sri Lanka, especially in residential house construction, and Coconut and Kempas are the most common timber types used. In order to investigate the timber usage in residential houses' roof construction in Sri Lanka, ten residential houses roofed with timber were selected in Colombo area and the timber element sizes of those houses were investigated. The structural members of the roofs such as rafters, purlins, ridges and wall plates of each of these houses were designed against bending, deflection, bulking, shear and bearing. These were designed in accordance with according to the timber design guideline BS 5268-2:2002 (British Standard, 2002) to meet the relevant loading conditions. The results were compared with the actual member sizes used in each house. The typical sections used for rafters, ridge plates, wall plates and purlins are 4"×2", 7"×2", 4"×3", 4"×2" respectively. It was found that the timber in 60% of Coconut rafters, in 80% of Kempas ridges and wall plates and in 55% of Kempas purlins was overused. Such timber wastage can be minimized by designing the roof members according to the design guidelines. This can save a large amount of timber thereby saving trees and environment.

Keywords: Overuse, Roofing, BS Codes, Civil engineering standards, Imported and local timber