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Frictional Coefficients between Timber and Some Structural Sheet Materials

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Abstract: Friction between timber and timber or other structural materials plays an important role in actual mechanical behavior of timber constructions. To consider the effect of friction in structural design of timber constructions, frictional coefficients between the structural materials used should be evaluated as the first step. In this study, we conducted experimental measurements of frictional coefficients between structural timber and some structural sheet materials. We prepared planed softwood timber specimens and some typical structural sheet materials : softwood plywood, hardwood plywood, OSB and MDF. We also prepared “volcanic silicates fiber reinforced multi-layer board” and SS400 steel. Static and dynamic frictional coefficients between timber and these materials were measured for every combination of grain or direction of greater strength. The obtained static frictional coefficients ranged from 0.2 to 0.4 among all combinations of materials and slip directions, and the relative order was MDF > Softwood plywood > Hardwood plywood > volcanic silicates fiber reinforced multi-layer board > steel > OSB. The ratios of dynamic frictional coefficients to static frictional coefficients ranged from 0.6 to 0.9, and the relative order of the average values was volcanic silicates fiber reinforced multi-layer board > steel > hardwood plywood > OSB > Softwood plywood > MDF. Test results showed negative correlations between specific gravity of timber and static/dynamic frictional coefficients among all combinations of test materials and slip directions. Frictional coefficients perpendicular to the grain of timber were found to be larger than those parallel to the grain. Although the surface grain of plywood showed a similar effect, we found only a little difference between both directions.

The effect of strand orientation of OSB was almost negligible.

Keywords: frictional coefficient, structural sheet material, specific gravity, slip direction, practical evaluation

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