

**EFFECT OF GREEN LUMBER FRAMING ON
WOOD STRUCTURAL PANEL SHEAR WALL PERFORMANCE**

Green lumber, that which has a moisture content (MC) greater than 19%, is sometimes used in shear wall construction. When wood dries, or loses moisture, it shrinks. This shrinking can cause loosening of connections and is the general basis for the wet service adjustment factors for connections in the National Design Specification for Wood Construction (NDS, 2001). Some engineers suggest applying the wet service adjustment decrease to the strength of a shear wall constructed with green framing which will be used dry (MC \leq 19%) in service, based on the NDS connection design provisions. Whether or not this single-fastener adjustment is appropriate for shear walls has been considered questionable, since the shear wall is a system and fasteners are generally in line.

A test program has been completed to investigate the effect of constructing shear walls when the framing lumber is green, then allowing the shear wall assembly to dry before testing. Eight walls total were tested. Six shear walls were constructed with green framing, and three variations on hold-down nut tightness (to simulate potential sill plate shrinkage) were investigated. These three variations examined the effects of a loose hold-down nut, a loose hold-down nut and a shrinkage-compensating device, and a tight hold-down. Two shear walls were constructed after the lumber had dried to equilibrium moisture content (EMC) for use as controls, and hold-down nuts were tight on these dry walls. All walls were tested after the framing had reached EMC. Two replications of each wall were tested.

The load displacement curves show that ultimate (peak) loads were not significantly different between any walls tested, but that shear wall stiffness is affected. The shrinkage-compensating device did not have a significant effect on the test results of this program.

This testing supports the following recommendations.

- The ultimate strength, upon which wood structural panel shear wall design values are normally based, is not significantly affected by fabrication with green lumber. Therefore, "strength" reducing penalties do not appear to be warranted for this application.
- The stiffness of shear walls constructed with green lumber is reduced. The reduced stiffness can be accurately predicted using the APA 4-term shear wall deflection equation, which is also in model building codes (e.g., 2000 International Building Code, 1997 Uniform Building Code), with appropriate green-dry nail slip values.

References

APA. 2002. Effect of Green Lumber Framing on Wood Structural Panel Shear Wall Performance. APA Report T2002-53. APA – The Engineered Wood Association. Tacoma, WA.

NDS, 2001. National Design Specification for Wood Construction. American Forest and Paper Association, Washington, D.C.

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