IMPORTANCE OF LUMBER SPECIES AND GRADE IN WOOD SHEAR WALLS

PROBLEM: Use of Hem Fir Pressure-Treated Sill Plates

Structural designs normally assume the sill plate in a shear wall is Douglas Fir-Larch. However, local contractors frequently build shear walls with hem fir pressure-treated sill plates. This substitution of hem fir results in a 7% strength reduction for wood structural panel shear walls. This strength loss occurs due to the weaker holding power of nails in less dense wood species.

PROBLEM: Existing Sill Plate or Framing is Redwood

Many older existing buildings used redwood for sill plates or general framing. Wood structural paneled shear walls constructed with open grain redwood are 13% weaker than equivalent walls framed with Douglas Fir-Larch. Shear walls built with close grain redwood are 7% weaker.

PROBLEM: Unspecified Lumber Grades for Shear Wall Ends Studs

New wood frame construction generally uses various grades of Douglas Fir-Larch for studs in the same wall. Common stud grades include “Stud,” “Standard,” “Construction,” and “No. 2". Unless specified, shear wall end studs could be any one of these grades. The grade of Douglas Fir-Larch helps determine the allowable tension and compression loads for end studs in shear walls. The lumber species of the sill or sole plate will also determine the allowable load in compression.

Product approvals for hold-downs specify the allowable load values for the lesser of the bolt strength in wood or the strength of the steel connector. These approvals do not determine the proper size and grade of lumber for the tension and compression loads. The engineer of record, must verify the allowable tension and compression loads in end studs.

REQUIRED ACTIONS:

Structural Plan Check: Plan Check Engineers shall verify that the engineer of record has analyzed the end studs of wood structural panel shear walls with hold-downs. Approved plans shall specify the size and grade of hold-down end studs and the species (i.e. Douglas Fir-Larch) of all pressure-treated sill plates.

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Building and Building-Mechanical Inspection: During shear wall inspection, building and building-mechanical inspectors shall verify the lumber size, grade of hold-down end studs, and the species of pressure treated sill plates. Pressure-treated Douglas Fir-Larch sill plates are dark green while hem fir sill plates are olive green. Unless otherwise shown on the approved plans, shear wall construction using lumber other than Douglas Fir-Larch shall be referred to the engineer of record and structural plan check for resolution.

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