
Question: How can the deflection and rigidity of wood shear walls be calculated?

Subject: Shear Wall Deflection

Code Reference: 97UBC, 2315.1

Answer:

The formula for calculating deflection of structural-use panel shear walls is given in 1997 Uniform Building Code Volume 3 Section 23.223 (referenced by 1997 UBC Section 2315.1), Allowable Stress Design Manual For Engineered Wood Construction (APA EWS Supplement) and Design of Wood Structures by Donald E. Breyer. This formula has four terms, which consider the contribution of boundary elements, panel specifications (including double-sided shear walls), nail deformation and hold-downs (shrinkage, crush and slippage).

Seismic Design Manual Volume 2 has examples showing how to calculate the deflection of structural-use panel shear walls using the above referenced formula. The example includes shear wall with opening supported by a beam.

Once the deflection is calculated using the above referenced formula, the rigidity is obtained by reciprocating the deflection value.

An approximate method for calculating the relative rigidity is to multiply the allowable shear by length of shear wall and divide it by its height. In calculating relative rigidity by approximate method, effect of openings in the panel, rocking of the panel and flexibility of the support(s) should be taken into consideration. Approximate method may be used for unblocked shear walls as well as shear walls utilizing cement plaster or gypsum board.

Deflection can not be calculated by reciprocating relative rigidity obtained from approximate method. Therefore, approximate method may be used only for preliminary design or where drift calculations are not required by the code.