

Capacity Of Nail & Screw Connections

Capacity of nail and screw connections is performed using; (1) Standard NDS code provisions (11.4) for combined withdrawal and lateral load, and (2) General Dowel Equations per Technical Report 12 to determine reference lateral capacity, including gap between members.

Angle (α) between wind uplift force and main member (main truss top chord) is equal to 90 degrees minus the slope of the main truss (24.6 degrees), or 65.4 degrees.

Calculation of adjusted withdrawal capacity (W') is based on the assumption that nail or screw is perpendicular to the main truss top chord, which is very nearly the case for installation angle around 30 degrees.

Calculation of adjusted lateral capacity (Z') must be based on requirements (NDS 11.3.9) for load inclined with respect to the fastener axis.

As shown in Figure 11E of the NDS code, thickness of each member (T_s , T_m) is to be taken as projected length of fastener in each member (L_s , L_m)

For this calculation, projected length of fastener in valley truss (L_s for "side" member) is taken as length of fastener in the valley truss.

For installation parameters specified on design plans (S4.1), effective thickness (T_s) of side member (valley truss) is then 1.44 inches. Effective thickness of main member (T_m) is 1.54 inches.

Fastener Properties

Nail diameter (0.135") is taken as the same diameter listed in calculations by engineer for builder. Yield strength is taken as 100,000 psi, per standard NDS guidelines.

Screw diameter (0.152" root diameter) is taken as standard per NDS for the 10 gage screw specified on design plans. Per standard NDS recommendations, yield strength is then 90,000 psi and pullout strength is 163 pounds per inch of thread penetration.

However, diameter of wood screw listed on product sheet attached to calculations by engineer for builder show a much smaller diameter (0.138") which would result in much lesser uplift capacity.

Further information about properties of as-installed nails and screws should be obtained.

