

304.2.2.2 Settling due to compaction. Settling due to compaction (Δc) shall be determined in accordance with the requirements of this section.

304.2.2.2.1 Prescribed. Prescribed compaction shall be $\frac{1}{4}$ inch (6.4 mm) per log course or 2 percent of involved settling height.

304.2.2.2.2 Noncompaction conditions. $\Delta c = 0$ when $B = B_r$.

where:

B_r = Required bearing width.

B = Actual bearing width of the log profile.

304.2.2.2.2.1 Bearing width. The bearing width B , is the width of the horizontal contact area, between two wall logs, that is continuous for the full length of the logs. The required bearing width B_r shall be calculated by the equation:

$$B_r = [(W_F + W_R + W_W) / 12] / F_c$$

where:

W_F = Total loading (plf) applied to the wall by floors above the starter log (sill log or bottom plate log).

W_R = Total loading (plf) applied to the wall by roofs above the starter log (sill log or bottom plate log).

W_W = Total weight the wall (plf) above the starter log (sill log or bottom plate log).

F_c = The allowable design value for compression perpendicular to grain (psi).

304.2.2.2.2.2 Coped bearing surfaces. For angled or round bearing surfaces, divide the actual bearing width B , by the C_{AN} factor in Table 304.2(3) to determine the required bearing width, B_r .

304.2.2.2.3 Compaction conditions. When logs are profiled with a cope on their underside, the weight of the log and imposed loads is transferred along the two lines of contact unless the cope is contoured to match the shape of the top of the log beneath (e.g., cope radius = log radius).

304.2.2.3 Settling due to dimensional change. Settling of log walls due to shrinkage (dimensional change in cross-section, Δs) shall be determined in accordance with the provisions of this section.

304.2.2.3.1 Prescribed, Method A. Prescribed shrinkage (Δs) shall be $\frac{3}{8}$ inch (3 percent) per foot (9.5 mm per 305 mm) of involved log wall height.

304.2.2.3.2 Prescribed, Method B. Prescribed shrinkage (Δs) shall be 1 percent change in dimension per 4 percent change in moisture content ($MC_S - MC_D$) per foot of involved log wall height.

304.2.2.3.3 Prescribed, Method C. Select prescribed shrinkage (Δs) from Table 304.2(4) by climate zone, initial moisture content (M_I), and

shrinkage coefficient. Refer to the Climate Zone Map included in Figure 304.2.2.3 for a representation of geographic variation in outside equilibrium moisture content.

304.2.2.3.4 Calculated. Settling due to shrinkage shall be calculated using the equation:

$$\Delta s = [H_D \times (MC_D - MC_S)] / [(MC_{FSP} \times 100 / S - MC_{FSP}) + MC_D]$$

where:

H_D = The height of the wall section (involved height); for horizontal joint design, $H_D = H_L$ (see Section 302.2.3.5).

MC_D = The design moisture content (see Section 302.2.2.1).

MC_S = The service moisture content (see Section 302.2.2.2).

MC_{FSP} = Moisture content at fiber saturation point; see Table 304.2(1). Neither MC_D nor MC_S shall exceed MC_{FSP} , the moisture content value where shrinkage starts for most species.

S = The shrinkage coefficient (%) in radial (S_R) direction, see Table 304.2(2).

304.2.3 Engineering analysis. Total settling is permitted to be determined by engineering analysis.

304.2.4 Test method. Total settling is permitted to be determined by using empirical test data.

304.2.5 Field survey. Total settling is permitted to be determined by using data reported from actual case studies from an inventory of same construction with identical measurements taken yearly for a minimum of five years.

304.3 Accommodating settling. Log structures shall accommodate calculated settling. Calculated settling accommodation shall be stated in the construction documents for each location of involved settling height.

Exception: Log wall systems where Δt is less than or equal to 0.5 percent of the involved settling height (H_D) to a maximum of $\frac{1}{2}$ inch (12.7 mm).

304.3.1 Settling gap. The settling gap must accommodate the involved settling height of materials as they settle. Trim or other measures used to conceal settling gaps in walls shall be treated as sliding joints.

304.3.2 Sliding joint. Vertical joints shall not restrict settling at log wall interface. Examples include but are not limited to the buck system installed at the sides of log wall openings, frame-wall intersections, cabinet installation, trim application, fireplaces and chimneys.

304.3.3 Settling devices. An adjustable and accessible device shall be used to accommodate the involved settling height at point loads. Examples include and are not limited to support posts and horizontal structural framing member to non-settling structures.