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 $B \geq B_r$.

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 one of the provisions of this section.

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

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

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

shrinkage coefficient. Refer to the Climate Zone Map included in Figure 304.2.2.3 for a representation of geographic variation in outside service 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 302.2.3.7).

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 settling in accordance with this section. The settling accommodation shall be calculated and be stated in the construction documents for each occurrence of involved settling height. The required settling allowance at each occurrence of settling is calculated as equal to Δt (total settling) times the involved height at this occurrence.

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

304.3.1 Settling space. There shall be a settling space that accommodates the involved settling height of all materials. Trim or other measures used to conceal settling spaces in walls shall be treated as sliding joints.

304.3.2 Sliding joint. Vertical joints shall accommodate settling including but 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. At point loads, such as at posts of columns, an engineered, adjustable and accessible device shall be used to accommodate the involved settling height.