CODE

A.11—Expected strength for force-controlled actions

A.11.1 Force-controlled actions shall be evaluated in accordance with the general building code, with expected strength taken as $\phi_s B R_n$.

A.11.2 ϕ_s shall be in accordance with Table A.11.2, with ϕ determined in accordance with Chapter 21, except that 21.2.4.1 shall not apply.

Table A.11.2—Seismic resistance factor

Force-controlled action	ϕ_s
Critical	ϕ
Ordinary	$\phi/0.9 \le 1.0$
Noncritical	$\phi/0.85 \le 1.0$

A.11.3 Bias factor, B, shall be taken as 1.0. Alternatively, it shall be permitted to calculate B using Eq. (A.11.3):

$$B = 0.9R_{ne}/R_n \ge 1.0 \qquad \text{(A.11.3)}$$

A.11.3.1 Nominal strength, R_n, shall be in accordance with Chapter 18, 22, or 23.

A.11.3.2 The expected strength, R_{ne}, is permitted to be defined in accordance with the nominal strength provisions of Chapters 18, 22, or 23, with f_{ce}' substituted for f_c' and f_{ye} substituted for f_y or f_{yt}, except as provided in A.11.3.2.1 and A.11.3.2.2.

A.11.3.2.1 For structural walls where $h_w/\ell_w \ge 2$ meeting (a) through (d), the requirements of A.11.3.2.1.1 and A.11.3.2.1.2 shall apply.

(a) Wall is modeled with fiber elements in accordance with A.10.2(b)
(b) Strains calculated as the mean of the maximum demand from a suite of response history analyses
(c) Calculated concrete compressive strain < 0.005
(d) Calculated longitudinal tensile strain < 0.01

A.11.3.2.1.1 $V_{ne} = 1.5A_{cv}(0.17\lambda\sqrt{f_{ce}'} + \rho_t f_{ye})$

A.11.3.2.1.2 For all vertical wall segments sharing a common lateral force, V_{ne} shall not be taken greater than

COMMENTARY

RA.11—Expected strength for force-controlled actions

RA.11.1 Currently, strength reduction factors, ϕ, are not specifically calibrated to the seismic reliability targets specified in ASCE/SEI 7. Rather, these strength reduction factors are calibrated to the target reliabilities for other loads (ASCE/SEI 7-16 Table 1.3-1). The bias factor, B, is provided to adjust the resistance factors specified by the materials standards to the seismic target reliabilities, considering the inherent bias in the nominal strength equations contained in the materials standards. This bias is a function of both the ratio of expected material strength to minimum specified strength and also inherent conservatism in the predictive equations specified by the materials standards.

RA.11.2 For ordinary and noncritical actions, the resistance factors are relaxed in order to accept a higher probability of failure.

More detailed discussion regarding the differences of evaluation approaches of force-controlled actions in ASCE/SEI 7, TBI (2017), and LATBSDC (2017) are provided in TBI (2017) and LATBSDC (2017). Additional background on this approach is provided in Wallace et al. (2013) and Kim and Wallace (2017).

RA.11.3.2.1 The shear strength determined from these provisions is applicable only to walls with relatively low flexural ductility demands (Wallace 2013; LATBSDC 2017).