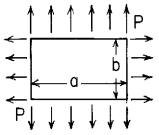
TABLE 11.4 Formulas for flat plates with straight boundaries and constant thickness (*Continued*)

1g. Uniform over entire plate plus uniform tension P lb/linear in applied to all edges

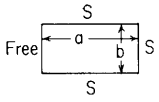


$y_{max} = \alpha \frac{qb^4}{Et^3}$ $(\sigma_a)_{max} = \beta_x \frac{qb^2}{t^2}$ $(\sigma_b)_{max} = \beta_y \frac{qb^2}{t^2}$. Here α, β_x, and β_y depend on ratios $\frac{a}{b}$ and $\frac{P}{P_E}$, where $P_E = \frac{\pi^2 Et^3}{3(1-\nu^2)b^2}$, and have the following values:

Coef.	a/b \ P/P_E	0	0.15	0.5	1	2	3	4	5
α	1	0.044	0.035	0.022	0.015	0.008	0.006	0.004	0.003
	$1\frac{1}{2}$	0.084	0.060	0.035	0.022	0.012	0.008	0.006	0.005
	2	0.110	0.075	0.042	0.025	0.014	0.010	0.007	0.006
	3	0.133	0.085	0.045	0.026	0.016	0.011	0.008	0.007
	4	0.140	0.088	0.046	0.026	0.016	0.011	0.008	0.007
β_x	1	0.287	0.216	0.132	0.084	0.048	0.033	0.026	0.021
	$1\frac{1}{2}$	0.300	0.204	0.117	0.075	0.045	0.031	0.024	0.020
	2	0.278	0.189	0.111	0.072	0.044	0.031	0.024	0.020
	3	0.246	0.183	0.108	0.070	0.043	0.031	0.025	0.020
	4	0.222	0.183	0.108	0.074	0.047	0.032	0.027	0.024
β_y	1	0.287	0.222	0.138	0.090	0.051	0.036	0.030	0.024
	$1\frac{1}{2}$	0.487	0.342	0.186	0.108	0.066	0.042	0.036	0.030
	2	0.610	0.302	0.216	0.132	0.072	0.051	0.042	0.036
	3	0.713	0.444	0.234	0.141	0.078	0.054	0.042	0.036
	4	0.741	0.456	0.240	0.144	0.078	0.054	0.042	0.036

In the above formulas σ_a and σ_b are stresses due to bending only; add direct stress P/t to σ_a and σ_b. (Ref. 42)

2. Rectangular plate; three edges simply supported, one edge (b) free



2a. Uniform over entire plate

$\sigma_{max} = \frac{\beta qb^2}{t^2}$ and $y_{max} = \frac{-\alpha qb^4}{Et^3}$

a/b	0.50	0.667	1.0	1.5	2.0	4.0
β	0.36	0.45	0.67	0.77	0.79	0.80
α	0.080	0.106	0.140	0.160	0.165	0.167

(Ref. 8 for $\nu = 0.3$)

2d. Uniformly increasing along the a side

$\sigma_{max} = \frac{\beta qb^2}{t^2}$ and $y_{max} = \frac{-\alpha qb^4}{Et^3}$

a/b	0.50	0.667	1.0	1.5	2.0	2.5	3.0	3.5	4.0
β	0.11	0.16	0.20	0.28	0.32	0.35	0.36	0.37	0.37
α	0.026	0.033	0.040	0.050	0.058	0.064	0.067	0.069	0.070

(Ref. 8 for $\nu = 0.3$)