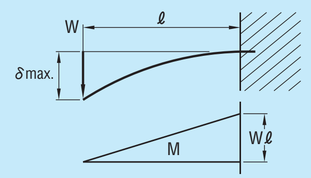
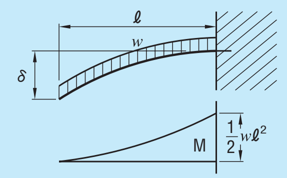
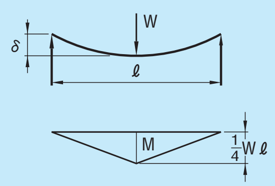
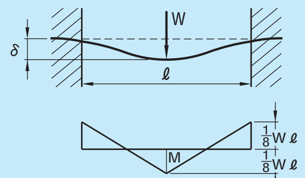
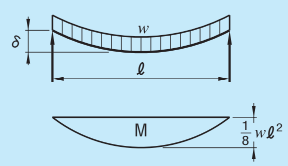
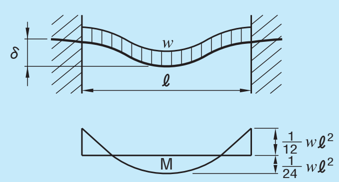
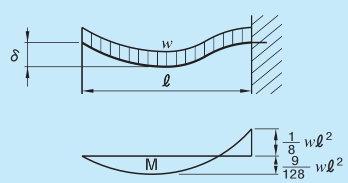
〔TECHNICAL DATA〕
CALCULATION OF BEAM DEFLECTION 1

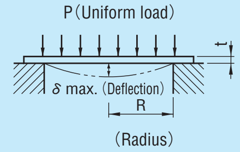
	Load bending moment diagram	Bending moment (M)	Deflection (δ)
1		$M_{max.} = W\ell$	$\delta_{max.} = \frac{W\ell^3}{3EI}$
2		$M_{max.} = \frac{w\ell^2}{2}$	$\delta_{max.} = \frac{w\ell^4}{8EI}$
3		$M_{max.} = \frac{1}{4}W\ell$	$\delta_{max.} = \frac{W\ell^3}{48EI}$
4		$M_{max.} = \frac{1}{8}W\ell$	$\delta_{max.} = \frac{W\ell^3}{192EI}$
5		$M_{max.} = \frac{1}{8}w\ell^2$	$\delta_{max.} = \frac{5w\ell^4}{384EI}$
6		$M_{max.} = \frac{1}{12}w\ell^2$	$\delta_{max.} = \frac{w\ell^4}{384EI}$
7		$M_{max.} = \frac{1}{8}w\ell^2$	$\delta_{max.} = \frac{w\ell^4}{184.6EI}$

Young's modulus (Vertical elastic modulus) $E = \frac{\sigma}{\varepsilon}$ ε = Deflection σ = Rectangular stress I = Cross-sectional secondary moment

〔TECHNICAL DATA〕
CALCULATION OF DEFLECTION 2

Load bending moment diagram / Maximum stress, Maximum deflection

1.Disk receiving uniform load and having supported the perimeter



The circumferential stress σt and radial σr can be expressed as follows at the center.

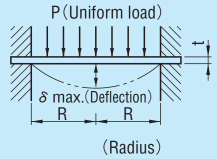
$$(\sigma t)max. = (\sigma r)max. = \pm\frac{3P(3m+1)R^2}{8mt^2}$$

Also, the central deflection δ max. can be expressed as follows:

$$\delta\,max. = \frac{3(m-1)(5m+1)}{16Em^2t^3}PR^4$$

Wherein, P…Load, R…Radius of plate, t…Plate thickness,
E…Young's modulus, $\frac{1}{m}$…Poisson's ratio

2.Disk receiving uniform load and having been fixed to the perimeter



The peripheral stress can be expressed as follows:

$$\sigma t = \pm\frac{3PR^2}{4mt^2} \quad (\sigma r)max. = \pm\frac{3PR^2}{4t^2}$$

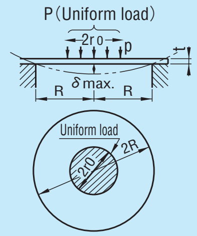
and the central one is as follows: $(\sigma t)max. = \sigma r = \pm\frac{3(m+1)PR}{8mt^2}$

The central deflection δ max. can be expressed as follows:

$$\delta\,max. = \frac{3(m^2-1)PR^4}{16Em^2t^3}$$

Wherein, P…Load, R…Radius of plate, t…Plate thickness,
E…Young's modulus, $\frac{1}{m}$…Poisson's ratio

3.Disk receiving uniform load on the concentric circle having supported to the perimeter



The central stress can be expressed as follows:

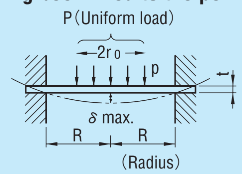
$$(\sigma t)max. = (\sigma r)max. = \pm\frac{3(m+1)P}{2\pi mt^2}\left(\frac{m}{m+1} + \log\frac{R}{r_0} - \frac{m-1}{m+1}\frac{r_0^2}{4R^2}\right)$$

When the central deflection r_0 is smaller than R,

δ max. is expressed as follows: $\delta\,max. = \frac{3(m-1)(3m+1)PR^2}{4\pi Em^2t^3}$

Wherein, P…Total load on the concentric circle. $P = \pi r_0^2 p$
R…Radius of plate, t…Plate thickness, E…Young's modulus, $\frac{1}{m}$…Poisson's ratio

4.Disk receiving uniform load on the concentric circle having been fixed to the perimeter



The peripheral stress can be expressed as follows:

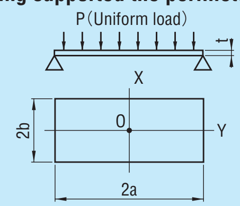
$$\sigma_1 = \pm\frac{3P}{2\pi mt^2}\left(1-\frac{r_0^2}{2R^2}\right) \quad \sigma r = \pm\frac{3P}{2\pi t^2}\left(1-\frac{r_0^2}{2R^2}\right)$$

and the central one is as follows: $\sigma_1 = \sigma r = \pm\frac{3(m+1)P}{2\pi mt^2}\left(\log\frac{R}{r_0} + \frac{r_0^2}{4R^2}\right)$

The central deflection δ max. can be expressed as follows: $\delta\,max. \fallingdotseq \frac{3(m-1)(7m+3)PR^2}{16\pi Em^2t^3}$

Wherein, P…Total load on the concentric circle. $P = \pi r_0^2 p$
R…Radius of plate, t…Plate thickness, E…Young's modulus $\frac{1}{m}$…Poisson's ratio

5.Rectangular plate receiving uniform load and having supported the perimeter



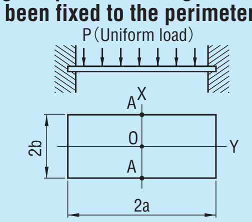
The X-axis direction stress at center O can be expressed as follows: $(\sigma x)\,max. = \alpha_1\frac{Pb^2}{t^2}$

The deflection at the center O can be expressed as follows: $\delta\,max. = \beta_1\frac{Pb^4}{Et^3}$

a/b	1.0	1.5	2.0	3.0	4.0	∞
α_1	1.150	1.950	2.440	2.850	2.960	3.000
β_1	0.709	1.350	1.770	2.140	2.240	2.280

E…Young's modulus

6.Rectangular plate receiving uniform load and having been fixed to the perimeter



The stress to X-axis direction at the center A of the longer side can be expressed as follows:

$$(\sigma x)max. = \alpha_2\frac{Pb^2}{t^2}$$

$$\delta\,max. = \beta_2\frac{Pb^4}{Et^2}$$

a/b	1.0	1.5	2.0	∞
α_2	1.231	1.817	1.990	2.000
β_2	0.221	0.384	0.443	0.454

E…Young's modulus