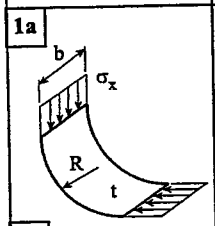
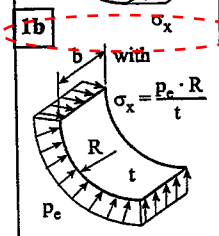
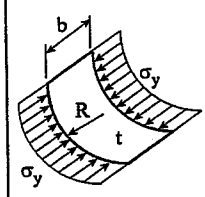
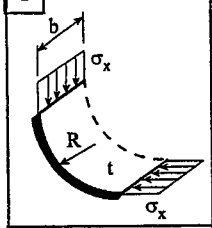
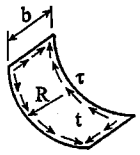
KC#483

Table 3.4 Curved plate field $R/t \leq 2500$ [1]

Load case	Aspect ratio b / R	Buckling factor K	Reductions factor κ
1a 	$\frac{b}{R} \leq 1{,}63\sqrt{\frac{R}{t}}$	$K = \frac{b}{\sqrt{R \cdot t}} + 3\,\frac{(R \cdot t)^{0{,}175}}{b^{0{,}35}}$	$\kappa_x = 1$ [2] for $\lambda \leq 0{,}4$ $\kappa_x = 1{,}274 - 0{,}686\,\lambda$ for $0{,}4 < \lambda \leq 1{,}2$ $\kappa_x = \frac{0{,}65}{\lambda^2}$ for $\lambda > 1{,}2$
1b  with $\sigma_x = \frac{p_e \cdot R}{t}$ p_e = external pressure in [N/mm²]	$\frac{b}{R} > 1{,}63\sqrt{\frac{R}{t}}$	$K = 0{,}3\,\frac{b^2}{R^2} + 2{,}25\left(\frac{R^2}{b \cdot t}\right)^2$	
2 	$\frac{b}{R} \leq 0{,}5\sqrt{\frac{R}{t}}$	$K = 1 + \frac{2}{3}\,\frac{b^2}{R \cdot t}$	$\kappa_y = 1$ [2] for $\lambda \leq 0{,}25$ $\kappa_y = 1{,}233 - 0{,}933\,\lambda$ for $0{,}25 < \lambda \leq 1$ $\kappa_y = 0{,}3/\lambda^3$ for $1 < \lambda \leq 1{,}5$ $\kappa_y = 0{,}2/\lambda^2$ for $\lambda > 1{,}5$
	$\frac{b}{R} > 0{,}5\sqrt{\frac{R}{t}}$	$K = 0{,}267\,\frac{b^2}{R \cdot t}\left[3 - \frac{b}{R}\sqrt{\frac{t}{R}}\right] \geq 0{,}4\,\frac{b^2}{R \cdot t}$	
3 	$\frac{b}{R} \leq \sqrt{\frac{R}{t}}$	$K = \frac{0{,}6 \cdot b}{\sqrt{R \cdot t}} + \frac{\sqrt{R \cdot t}}{b} - 0{,}3\,\frac{R \cdot t}{b^2}$	as in load case 1a
	$\frac{b}{R} > \sqrt{\frac{R}{t}}$	$K = 0{,}3\,\frac{b^2}{R^2} + 0{,}291\left(\frac{R^2}{b \cdot t}\right)^2$	
4 	$\frac{b}{R} \leq 8{,}7\sqrt{\frac{R}{t}}$	$K = K_\tau \cdot \sqrt{3}$ $K_\tau = \left[28{,}3 + \frac{0{,}67 \cdot b^3}{R^{1{,}5} \cdot t^{1{,}5}}\right]^{0{,}5}$	$\kappa_\tau = 1$ for $\lambda \leq 0{,}4$ $\kappa_\tau = 1{,}274 - 0{,}686\,\lambda$ for $0{,}4 < \lambda \leq 1{,}2$ $\kappa_\tau = \frac{0{,}65}{\lambda^2}$ for $\lambda > 1{,}2$
	$\frac{b}{R} > 8{,}7\sqrt{\frac{R}{t}}$	$K_\tau = 0{,}28\,\frac{b^2}{R\sqrt{R \cdot t}}$	

Explanations for boundry conditions:
- ----- plate edge free
- ——— plate edge simply supported
- ━━━ plate edge clamped

[1] For curved plate fields with a very large radius the κ-value need not to be taken less than one derived for the expanded plane field.

[2] For curved single fields. e.g. the bilge strake, which are located within plane partial or total fields, the reduction factor κ may taken as follow:

Load case 1b: $\kappa_x = 0{,}8/\lambda^2 \leq 1{,}0$: load case 2: $\kappa_y = 0{,}65/\lambda^2 \leq 1{,}0$