BASIC SPAN TO DEPTH RATIO AS PER EUROCODE TO CONTROL DEFLECTION.

8.0 DEFLECTION

(Ref. Section 7.4: MS EN 1992-1-1: 2010)

The equations to calculate the basic span-effective depth ratios, to control deflection to a maximum of span/250 are given as:

$$\frac{l}{d} = K\left[11 + 1.5\sqrt{f_{ck}}\frac{\rho_o}{\rho} + 3.2\sqrt{f_{ck}}\left(\frac{\rho_o}{\rho} - 1\right)^{3/2}\right] \qquad \text{if } \rho \le \rho_o$$

$$\frac{l}{d} = K\left[11 + 1.5\sqrt{f_{ck}}\frac{\rho_o}{\rho - \rho'} + \frac{1}{12}\sqrt{f_{ck}}\sqrt{\frac{\rho'}{\rho}}\right] \qquad \text{if } \rho > \rho_o.$$

where l/d is the limiting span/depth

K is the factor to take into account the different in structural system from Table 7.4N

ρ_o is the reference reinforcement ratio $= \sqrt{f_{ck}}\,10^{-3}$

ρ is the required tension reinforcement ratio $= \frac{A_{s,req}}{bd}$

ρ' is the required compression reinforcement ratio $= \frac{A_{s,req}'}{bd}$

Table 7.4N: Basic span/effective depth ratio (typical values for rectangular section for steel grade $f_{yk} = 500$ N/mm^2 and concrete class C30/35)

Structural System	K	Basic span-effective depth ratio	
		Concrete highly stressed, $\rho = 1.5\%$	Concrete lightly stressed, $\rho = 0.5\%$
1. Simply supported beam, one/two way simply supported slab	1.0	14	20
2. End span of continuous beam or one-way continuous slab or two way spanning slab continuous over one long side	1.3	18	26
3. Interior span of beam or one way or two way spanning slab	1.5	20	30
4. Slab supported on columns without beam (flat slab) based on longer span	1.2	17	24
5. Cantilever	0.4	6	8

The basic ratios are modified in particular cases as follows:

(i) For flange section where the ratio of the flange width to the web width exceeds 3, the values should be multiplied by 0.8.

(ii) For beam and slabs, other than flat slab, with spans exceeding 7 m, which support partitions liable to be damaged by excessive deflection, the values should be multiplied by 7/span.

(iii) Where more tension reinforcement is provided ($A_{s,\ prov}$) than that calculated ($A_{s,\ req}$), multiply the values by = $\frac{A_{s,prov}}{A_{s,req}}$ (upper limit = 1.5).

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