Slab Thickness

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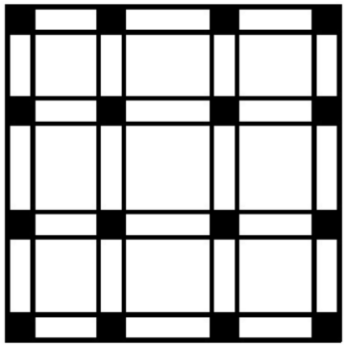


Depth limitations based on deflection requirements:

1-Providing h≥ ACI 318-14 requirements.
2-Check calculated deflection with ACI 318-14 requirements.

First: Slabs with beams between all supports:

1. Calculate beam/slab relative stiffness:

$$\alpha_f = \frac{E_{cb} I_b}{E_{cs} I_s}$$

$$E_c = 4700\sqrt{f'c}$$

E_{cb}=Young's modulus for beam

I_b= moment of inertia for beam

E_{cs}= Young's modulus for slab

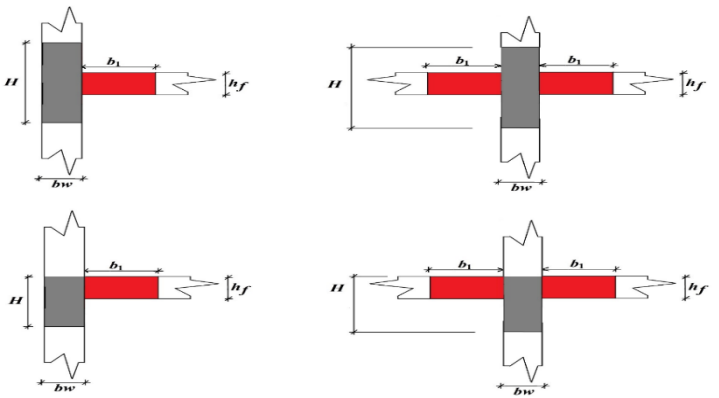
I_s= moment of inertia for slab

Note: approximately:

For internal beams: $I_b = 2 * I_{rec.}$

For external beams: $I_b = 1.5 * I_{rec.}$

Where I_{rec} is the moment of inertia for the rectangular beam section $I_{rec.} = \frac{b_w \ H^3}{12}$



2. Calculate α_{fm}

$$\alpha_{fm} = \frac{\sum \alpha_m}{4}$$

- If $\alpha_{fm} \leq 0.2$, use the table below, i.e. neglect the beam existence (without beams) due to low stiffness.
- If $0.2 < \alpha_{fm} \leq 2$:

$$h_{min} = \frac{l_n\,(0.8 + \frac{fy}{1400})}{36 + 5\beta(\alpha_m - 0.2)} \geq 125mm$$

- If $\alpha_{fm} > 2$:

$$h_{min} = \frac{l_n\,(0.8 + \frac{fy}{1400})}{36 + 9\beta} \geq 90mm$$

where $\beta = \frac{l_n \textbf{ in long span}}{l_n \textbf{ in short span}}$

Note: In case of **external spans**, final h_{min} calculated in (step 2), should be increased by 10% when the relative stiffness for the **external beams** $\alpha_f < 0.8$

Second: Slabs without beams between all supports:

fy (MPa)	No drop panel ($h_{min} \geq 125$mm)			With drop panels ($h_{min} \geq 100$mm)		
	External Panels		Internal panels	External Panels		Internal panels
	No ext. beams	With ext. beams		No ext. beams	With ext. beams	
280	$l_n/33$	$l_n/36$	$l_n/36$	$l_n/36$	$l_n/40$	$l_n/40$
420	$l_n/30$	$l_n/33$	$l_n/33$	$l_n/33$	$l_n/36$	$l_n/36$
520	$l_n/28$	$l_n/31$	$l_n/31$	$l_n/31$	$l_n/34$	$l_n/34$

Where: ln is face to face for the longer span

Notes:

1-Regarding fy values, linear interpolation is permitted.

2-Slabs with beams between columns along exterior edges. Exterior panels shall not be considered to be with edge beams if $\alpha_f < 0.8$.