

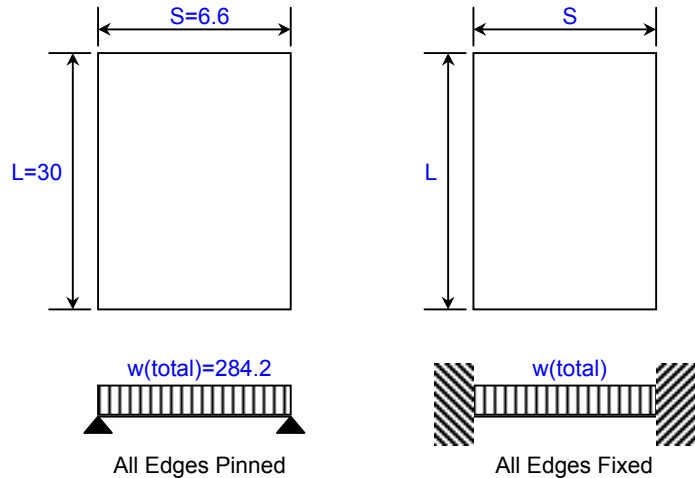
STEEL CHECKERED FLOOR PLATE DESIGN

**For Rectangular Flat Plates Subjected to Uniformly Distributed Live Loading
with Either All Edges Pinned or All Edges Fixed (per AISC 9th Edition ASD Manual)**

Job Name:		Subject:	
Job Number:		Originator:	Checker:

Input Data:

Long Span of Plate, L =	30.0000	ft.
Short Span of Plate, S =	6.6000	ft.
Plate Thickness, t =	13/16	in.
Uniform Live Load, wLL =	250.00	psf
All Edges Condition =	Pinned	
Yield Stress, Fy =	36.00	ksi
Allow. Deflection Ratio =	S/100	



Nomenclature for Rectangular Flat Plates

Results:

Flexural Stress:

Unif. Dead Load, wDL =	34.20	psf
Unif. Load, w(total) =	284.20	psf
fb(max) =	13.83	ksi
Fb(allow) =	27.00	ksi

wDL = floor plate self-weight in psf (per Reference #1)
 $w(\text{total}) = wDL + wLL$
 $fb(\text{max}) = 0.75 * (w(\text{total}) / 144) * (S^2 / t^2) * (1 + 1.61 * (S/L)^3) / 1000$
 $Fb(\text{allow}) = 0.75 * Fy$

fb(max) <= Fb(allow), O.K.

Deflection:

Aspect Ratio, α =	0.2200	
Mod. of Elasticity, E =	29000000	psi
$\Delta(\text{max})$ =	0.6936	in.
$\Delta(\text{ratio})$ =	S/114	
Allow. $\Delta(\text{ratio})$ =	S/100	

$\alpha = S/L$
 $E = 29,000,000$ psi (assumed value for steel)
 $\Delta(\text{max}) = 0.1422 * (w(\text{total}) / 144) * (S^4 / E * t^3) * (1 + 2.21 * (S/L)^3)$
 $\Delta(\text{ratio}) = (S^2 / \Delta(\text{max}))$
 Allow. $\Delta(\text{ratio}) = S/100$ (user defined and selected)

S/114 <= S/100, O.K.

References:

1. AISC Manual of Steel Construction (ASD) 9th Edition (Fourth Impression, 9/00), page 2-145.
2. "Design of Welded Structures", by Omer W. Blodgett (James F. Lincoln Arc Welding Foundation) Table 1, page 6.5-4 - taken from "Formulas for Stress and Strain" by Raymond J. Roark. These same formulas are found in "Design of Weldments" by Omer W. Blodgett (James F. Lincoln Arc Welding Foundation) in Table 1 on page 4.6-4.

Comments: