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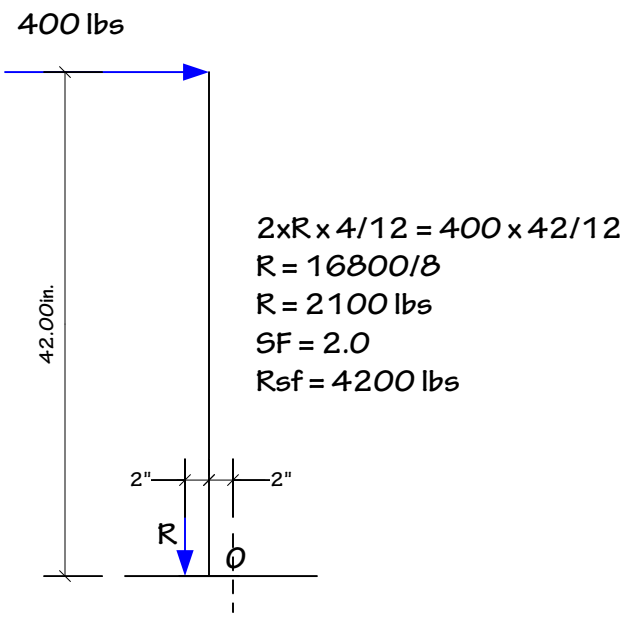
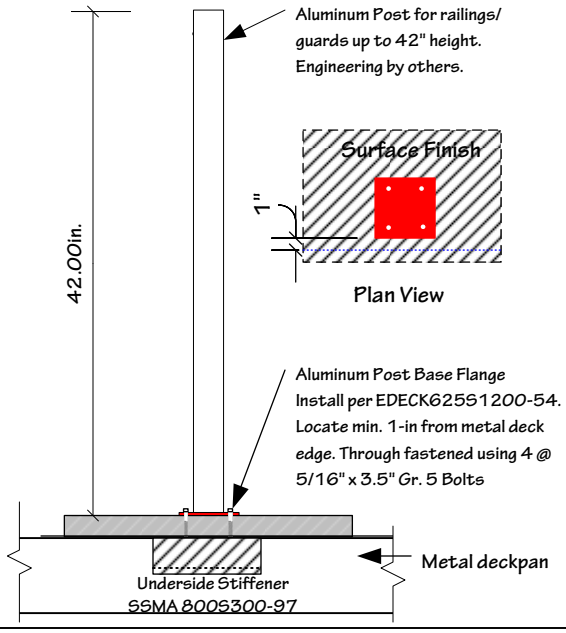
STIFFENER CAPACITY / LATERAL LOAD to Evolutiondeck EDECK625S1200-54

Load Reaction per Bolt



2xR x 4/12 = 400 x 42/12
R = 16800/8
R = 2100 lbs
SF = 2.0
Rsf = 4200 lbs

Section View



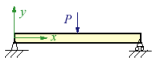
Stiffener Analysis

Stiffener spec = Steel C-channel SSMA 800S300-97 x 9in.
Ixx = 15.1 in4; xcg = 0.7in
Factored load on stiffener = 4200 lbs

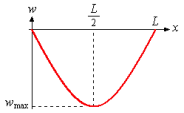
Calculator Input

Length of beam, L:	9	in
Load on beam, P:	4200	lbf
Young's Modulus, E:	29500	ksi
Distance from neutral axis to extreme fibers, c:	0.7	in
Moment of Inertia, I:	15.1	in^4

Beam Diagram and Calculator Input



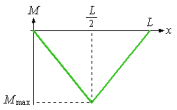
Displacement



$$w(x) = \begin{cases} -\frac{P x (3L^2 - 4x^2)}{48 EI} & 0 \le x \le \frac{L}{2} \\ \frac{P (L-x)(L^2 - 8xL + 4x^2)}{48 EI} & \frac{L}{2} \le x \le L \end{cases}$$

$w_{max} = w\left(\frac{L}{2}\right) = -\frac{P L^3}{48 EI}$ = -1.43 × 10^-4 in

Moment and Maximum Bending Stress

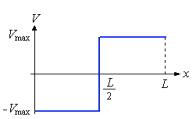


$$M(x) = \begin{cases} -\frac{P x}{2} & 0 \le x \le \frac{L}{2} \\ -\frac{P (L-x)}{2} & \frac{L}{2} \le x \le L \end{cases}$$

$M_{max} = M\left(\frac{L}{2}\right) = -\frac{P L}{4}$ = -788 lbf-ft

$\sigma_{max} = |M_{max}| \frac{c}{I} = \left|\frac{P L}{4 Z}\right|$ = 438 psi

Shear



$$V(x) = \begin{cases} -\frac{P}{2} & 0 \le x < \frac{L}{2} \\ \frac{P}{2} & \frac{L}{2} \le x \le L \end{cases}$$

$V_{max} = V(x) = \mp\frac{P}{2}$ = 2100 lbf

Induced stress from guard post
438 psi < 50000 psi = OK

Bolt Pull-out Analysis (Industrial Fasteners Institute)

IFI 7th Edition Inch Standards Book

Size	Bolt tensile Stress Area sq. in.	Bolt Thread Stripping Areas sq. in. per in. of Engagement	Internal Thread Stripping Areas sq. in. per in. of Engagement
5/16-18 UNC	0.0524	0.470	0.682

Engineering Analysis:

GR. 2: 5/16-18 Bolt (Galvanized)
(Ts = 120000 psi Ys = 92000, Ss = 0.6 Ys)

(1) Bolt tensile strength = As x Ts = .0524 x 120000 = 6288 lbs > 4200 lbs = OK

(2) Bolt thread shear strength per inch = 0.470 x .6 x 120000 = 33840 lbs

(3) Length of engagement needed to avoid bolt thread stripping
= bolt tensile strength / bolt thread shear strength per inch
= 6288 / 33840 = .186 in

(4) Internal thread shear strength per inch = ASn X Internal thread shear strength
= 0.682 x 120000 x 0.5 = 40920 lbs

(5) Length of engagement needed to avoid internal thread stripping
= bolt tensile strength / internal thread shear strength per inch
= 6288 / 40920 = 0.154 in

(6) Engagement height of 5/16-18 Nut = 19/64 in = 0.297 in > 0.186in = OK

Note: Design limit may be based on maximum lateral load from wind.
Engineering / capacity of guard post to be determined by other.

STIFFENER CAPACITY / LATERAL WIND LOAD				
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