Design of Tee Sections based on ASD method

Section Properties:

b =	200	mm	Flange width (mm)
d =	146	mm	Stem of tee (mm)
t =	6.4	mm	Flange thickness (mm)
w =	6.4	mm	Stem of tee thickness (mm)
b =	7.87	in	Flange width (in)
d =	5.76	in	Stem of tee (in)
t =	0.25	in	Flange thickness (in)
w =	0.25	in	Stem of tee thickness (in)
A =	3.37	in^2	Area of tee section (in^2)
y =	4.45	in	distance between N.A. and bottom of stem
I =	10.31	in^4	Moment of inertia around X axis
S_1 =	2.32	in^3	
S_2 =	7.86	in^3	
S_x =	2.32	in^3	Section modulus around X axis (in^3)
I_y =	10.26	in^4	
S_y =	2.61	in^3	
rx =	1.75	in	
ry =	1.74	in	
L (mm) =	820	mm	

Allowable Flexural Stress:

Fy =	50.75	ksi	(50 ksi for 350W) 1 Mpa = 0.145 ksi
d =	5.76	in	Max b/2 & d (in)
t =	0.25	in	Thickness (in)
Web Slenderness (b/2t) =			
d / t =	22.88		
	1		compact section upper limit (1 = N/A) (Sec. B5.2.)
127/(Fy^0.5) =	17.83		noncompact section upper limit (Sec. B5.2.)

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176/(Fy^0.5) =	24.71		Eq. A-B5.5. (App. B5.2.a)
Section =	3		1 = compact , 2 = noncompact , 3 = slender (Sec. B5.2)
Qs =	0.743		Reduction Factor (App. B5.2.a)
M1x (KN-m) =	0.14		1 KN-m = 8.85 kip-in
M2x (KN-m) =	-0.14		* Negative for single curvature (|M2| > |M1|)
M1x (Kip-in) =	1.2		
M1x (Kip-in) =	-1.2		
C_mx = 0.6 - 0.4 (M1x / M2x) =	1		Sect. H1
M1y (KN-m) =	1.82		1 KN-m = 8.85 kip-in
M2y (KN-m) =	-1.82		* Negative for single curvature (|M2| > |M1|)
M1y (Kip-in) =	16.1		
M1y (Kip-in) =	-16.1		
C_my = 0.6 - 0.4 (M1y / M2y) =	1		Sec. H1
Lc =	84.0	in	Sec. F.1.1.
Lb =	820	mm	
Lb (in) =	32.3	in	
Lc > Lb ?	No		
Cb =	1		Sec. F.1.3.
It = (1/12)*b*t^3+(b*t)*(t/2+(d-y-t)/3)^:	0.48	in^4	Sec. F.1.3.
At = b*t+(d-y-t)/3*w =	2.07	in^2	Sec. F.1.3.
rt = (It / At)^0.5	0.48	in	Sec. F.1.3.
L / rt =	67.2		
(102*1000*Cb/Fy)^0.5 =	44.8		Sec. F.1.3.
(510*1000*Cb/Fy)^0.5 =	100.2		Sec. F.1.3.
Fbx_1 (from Eqs (F1.6) & (F1.7) - F:	26.22		Non Compact & Lb>Lc - Sec. F1.3.
Fbx_2 = 0.6*Fy*Qs (From B5.2.a) :	22.62		App. B5.2.a
Fbx = Min (Fbx_1, Fbx_2) =	22.62		Allowable Bending Stress X (Fbx) - F3.1. & B5.2.d

Design of Tee Sections based on ASD method

Fby = 0.6*Fy*Qs =	22.62	ksi	Allowable Bending Stress Y (Fby) - Non Compact - F2.2
F_ex =	438.0		Sec. H1
F_ey =	435.8		Sec. H1
f_bx = Mx / S_x =	0.53	ksi	
f_by = My / S_y =	6.18	ksi	

Allowable Compressive Stress:

K =	1		
L (mm) =	820	mm	Length (mm)
L (in) =	32.3	in	Length (in)
Sx = KL/rx =	18.5		Slenderness (x)
Sy = KL/ry =	18.5		Slenderness (y)
(KL/r)max. = Max (Sx, Sy) =	18.5		
Q =	0.743		Reduction Factor (from top)
E =	29000	ksi	Modulus of Elasticity
C_c =	123		App. B5.2.c.
KL/r < C_c	Yes		
Fa =	21.64	ksi	Allowable Compressive Stress (App. B5.2.c)
P =	0.596	KN	1 KN = 0.2248 kips
P =	0.1	kips	
fa = P / A =	0.04	ksi	

Allowable Shear Stress:

d / w =	22.875		
380 / (Fy^0.5) =	53.34		Sec. F.4
d/w < 380/(Fy^0.5)	Yes		Sec. F.4

Design of Tee Sections based on ASD method

a =	32.3	in	distance between stiffeners (Sec. F.4.)
a/h =	5.60		Sec. F.4
Kv = 5.34 + 4 / (a/h)^2 =	5.47		Sec. F.4
Cv =	9.26		Sec. F.4
Fv =	20.3	ksi	
V =	1.054312	kips	1 KN = 0.2248 kips
fv =	0.73	ksi	1 Mpa = 0.145 ksi

Stress Ratios:

fa / Fa =	0.002	O.K.
f_bx / Fbx =	0.02	O.K.
f_by / Fby =	0.27	O.K.
fv / Fv =	0.04	O.K.
Eq. H1-1	0.30	O.K.
Eq. H1-2	0.30	O.K.