EJMA Calculations for t=.03 , w=1.095, q= 1.0 inches

Db	38	in	Inside diameter
Dm= Db+w+nt	39.125	in	Mean diameter
tp=t(Db/Dm)^-2	0.029566	in	
tp^2	0.000874		
Cp	0.68		from curves, Figure 4.16 EJMA
n	1		material plies of thickness "t"
t	0.03	in	
w	1.095	in	
w^3	1.312932		
q	1	in	
P	14.5	psi	

S_3=Pw/2ntp

Meridional Membrane due to pressure
Eq. 4-30

S_3	268.56	psi

P/2	7.25	
(w/tp)^2	1371.692	

S_4=P/2n(w/tp)^2C_p

Meridional Bending due to pressure
Eq.4-31

S_4	6762.44	psi

E_b	29000000	psi	Elastic modulus
e=X/N	0.0525	in	Per convolution
X	0.315	in	
N	6		Number of convolutions
C_f	1.65		from curve, Figure 4.17 EJMA

S_5=Eb(tp)^2(e))/2(w)^3*C_f

Meridional membrane due to deflection
Eq. 4-32

S_5	307.17	psi

S_6=5(Eb)(tp)e/3(w^2)C_d

Meridional Bending due to deflection
Eq.4-33

S_6	38386.29	psi

C_d 1.63 from curve, Figure 4-18

Spring Rate

f_{iu}=1.7 ((DmEb(tp^3)n)/(w^3)C_f))

Bellows Theoretical Axial Spring Rate
Eq.4-37

tp^3	2.58E-05
DmEb	1.13E+09
DmEb*(tp^	29323.11
w^3Cf	2.166338

f_{iu}	23010.85	lbs/in

Note: Per convolution

K_{total}	3835.14	lbs/in

For N=6 (total convolutions)
in series

23010.85	11505.42	5752.712	3835.141
23010.85			
23010.85	11505.42		
23010.85			
23010.85	11505.42		
23010.85			

Required Parameters for all Curve Constants

1.82rm/(Dmtp)^-2		0.423
rm	0.25	in
2rm/w		0.457

Fatigue Life Calculations

Sf = 0.7 (S3 +S4) + (S5 +S6)

See Figure 4-20

S_f=	43615.15	psi