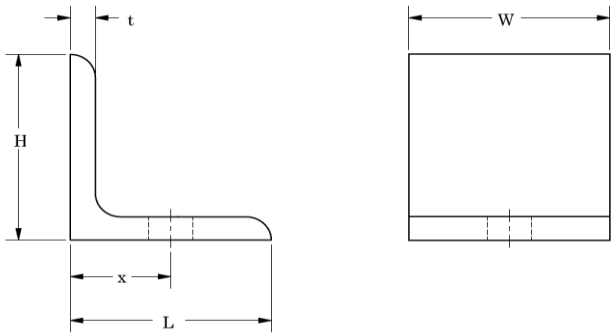
Seismic Leg Clips

Pressure Vessel Design Manual - 4rd Edition - Dennis Moss: Procedure 4-15

Description: Seismic Legs (2)

Leg Data:

	Material
16,600	**S** [psi] - allowable stress
3	**N** - number of legs
4.00	**L** [in] - base length
4.00	**W** [in] - leg width
4.00	**H** [in] - height
2.00	**x** [in] - hole location from back
0.50	**t** [in] - thickness
0.50	**leg** [in] - weld leg



Bolt Data:

	Material:
7,000	**Sb** [psi] - bolt strength
0.75-10 UNC 2A	**Bolt** - bolt size

Seismic Load Data:

54.00	**D** [in] - skirt outside diameter
0.375	**ts** [in] - skirt thickness
11,946.30	**Wb** [lb] - vessel weight
1,156.00	**Ss** [lbf] - seismic shear, skirt bottom
6,959.00	**Mb** [lbf-ft] - bending moment, skirt bottom

Variables:

1	**FT** [psi] =	1.33*S	1.33*16600 =	22,078
2	**FC** [psi] =	1.33*S	1.33*16600 =	22,078
3	**d** [in] =	D+(2*x) bolt cirlce diameter	54+(2*2) =	58.0000
4	**deg** [°] =	IF(N=3,30,IF(N=4,45,0))	IF(3=3,30,IF(3=4,45,0)) =	30.0000

Anchor Bolts:

5	**fs** [lb] =	(48*Mb)/(d*N)-(Wb/N) tension force per bolt	(48*6959)/(58*3)-(11946.3/3) =	-2062.3759
6	**Ab** [in²] =	Lookup("B1.1Table2","RootArea",Bolt) bolt root area		0.3024
7	**Abr** [in²] =	fs/Sb required bolt area	-2062.376/7000 =	-0.2946
8	*ckAb* =	Ab>=Abr	0.302>=-0.295 =	**Ok**

Base Plate:

9	**h** [in] =	(d/2)*COS(RAD(deg))	(58/2)*COS(RADIANS(30)) =	25.1147
10	**I** [lbf-in] =	2*h² moment of inertia at clips	2*25.115² =	1,261.50
11	**Pmax** [lb] =	((Mb*12*h)/I)+(Wb/N)	((6959*12*25.115)/1261.5)+(11946.3/3) =	5,644.63
12	**f'c** [psi] =	((48+Mb)/(π*d²*L))+(Wb/(π*d*L)) bearing presssure (average at bolt circle)		
13			((48+6959)/(π*58²*4))+(11946.3/(π*58*4)) =	16.5564
14	**tb** [in] =	L*SQRT((3*f'c)/S) minimum base thickness	4*SQRT((3*16.556)/16600) =	**0.2188**
15	*ckt* =	t>=tb	0.5>=0.219 =	**Ok**
16	**fc** [psi] =	Pmax/f'c	5644.63/16.556 =	340.9338
17	**wb** [in] =	L*SQRT((3*fc)/S) minimum base width ('L')	4*SQRT((3*340.934)/16600) =	**0.9929**
18	*ckt* =	L>=wb	4>=0.993 =	**Ok**

Skirt:

19	**fLT** [lb/in] =	((48*Mb)/(π*D²))+(Wb/(π*D)) axial load, tension		
20			((48*6959)/(π*54²))+(11946.3/(π*54)) =	106.8818447
21	**fLC** [lb/in] =	-((48*Mb)/(π*D²))+(Wb/(π*D)) axial load, tension		
22			-((48*6959)/(π*54²))+(11946.3/(π*54)) =	33.9561

23	**tsk** [in] =	MAX(fLT/FT,fLC/FC) min. skirt thickness	MAX(106.882/22078,33.956/22078) =	**0.0048**
24	*cktsk* =	ts>=tsk	0.375>=0.005 =	**Ok**
	Weld Check:			
25	**wl** [in] =	(H+H+W+(leg*2)) weld length	(4+4+4+(0.5*2)) =	13.0000
26	**WeldArea** [in^2] =	wl*leg	13*0.5 =	6.5000
27	**SSw** [psi] =	S*0.49 UW-15(c) max weld shear	16600*0.49 =	8,134.00
28	*CheckSSW* =	Ss/WeldArea<=SSw	1156/6.5<=8134 =	**Ok**