

## 11.2 TRANSPORTATION CONDITION

### Skirt Data :

Skirt Outside Diameter at Base	SOD	1320.0000	mm.
Skirt Thickness	STHK	10.0000	mm.
Skirt Internal Corrosion Allowance	SCA	0.0000	mm.
Skirt External Corrosion Allowance		0.0000	mm.
Skirt Material		SA-516 70	

### Basering Input: Type of Geometry: Continuous Top Ring W/Gussets

Thickness of Basering	TBA	20.0000	mm.
Design Temperature of the Basering		37.78	C
Basering Matl		SA-36	
Basering Operating All. Stress	BASOPE	114.46	N./mm <sup>2</sup>
Basering Yield Stress		248.22	N./mm <sup>2</sup>
Inside Diameter of Basering	DI	1140.0000	mm.
Outside Diameter of Basering	DOU	1540.0000	mm.
Nominal Diameter of Bolts	BND	36.0000	mm.
Bolt Corrosion Allowance	BCA	0.0000	mm.
Bolt Material		SA-325	
Bolt Operating Allowable Stress	SA	139.28	N./mm <sup>2</sup>
Number of Bolts	NGIV	8	
Diameter of Bolt Circle	DC	1440.0000	mm.
Ultimate Comp. Strength of Concrete	FPC	20.7	N./mm <sup>2</sup>
Allowable Comp. Strength of Concrete	FC	8.3	N./mm <sup>2</sup>
Modular ratio Steel/Concrete		9.833	
Thickness of Gusset Plates	TGA	12.0000	mm.
Width of Gussets at Top Plate	TWDT	100.0000	mm.
Width of Gussets at Base Plate	BWDT	100.0000	mm.
Gusset Plate Elastic Modulus	E	199159.0	N./sq.mm.
Gusset Plate Yield Stress	SY	248.2	N./mm <sup>2</sup>
Height of Gussets	HG	165.0000	mm.
Distance between Gussets	RG	70.0000	mm.
Dist. from Bolt Center to Gusset (Rg/2)	CG	35.0000	mm.
Number of Gussets per bolt	NG	2	
Thickness of Top Plate or Ring	TTA	30.0000	mm.
Radial Width of the Top Plate	TOPWTH	100.0000	mm.
Anchor Bolt Hole Dia. in Top Plate	BHOLE	40.0000	mm.
External Corrosion Allowance	CA	0.0000	mm.
Dead Weight of Vessel	DW	49616.1	N.
Operating Weight of Vessel	ROW	49616.1	N.
Earthquake Moment on Basering	EQMOM	133797880.0	N.mm.
Wind Moment on Basering	WIMOM	66408932.0	N.mm.
Percent Bolt Preload	ppl	100.0	
Use AISC A5.2 Increase in Fc and Bolt Stress		No	
Use Allowable Weld Stress per AISC J2.5		No	
Factor for Increase of Allowables	Fact	1.0000	

## Results for Basing Analysis : Analyze Option

Calculation of Load per Bolt [W/Bolt], Earthquake + Operating Condition:

$W = ROW \quad M = EQMOM + UEQMOM$

$$= ((4 * M/DC) - W) / RN \text{ per Jawad \& Farr, Eq. 12.3}$$

$$= ((4 * .13380E+09 / 1440.000) - 12404) / 8$$

$$= 44888.2656 \text{ N.}$$

Required Area for Each Bolt, Based on Max Load	322.3177	mm <sup>2</sup>
Area Available in a Single Bolt (Corr)	738.0151	mm <sup>2</sup>
Area Available in all the Bolts (Corr)	5904.1206	mm <sup>2</sup>
Bolt Stress Based on Approximate Analysis	60.8	N./mm <sup>2</sup>
Allowable Bolt Stress 139.3 [Fact]	139.279	N./mm <sup>2</sup>

Concrete Contact Area of Base Ring	CCA	841946.81	mm <sup>2</sup>
Concrete Contact Section Modulus of Base Ring		250889200.00	mm. <sup>3</sup>

Calculation of Concrete Load, Earthquake in Operating Condition [Sc]:

$$= ((ppl/100 * (Abt * Sa) + W) / Cca) + M/CZ \text{ per Jawad \& Farr Eq. 12.1}$$

$$= (1.000 (5904.1206 * 139 + 86828) / 841946) + .13380E+09 / .25089E+09$$

$$= 1.61 \text{ N./mm}^2$$

Results of Neutral Axis Shift Calculation:

Bearing Pressure on Concrete	0.84	N./mm <sup>2</sup>
Allowable Stress on Concrete	8.27	N./mm <sup>2</sup>
Stress in Bolt	28.15	N./mm <sup>2</sup>

Calculation of Basing Thickness, (N.A. Shift):

$$Tbna = R_w * (3 * Scna / S)^{1/2} + CA \text{ per Jawad \& Farr Eq. 12.12}$$

$$Tbna = 110.0000 * (3 * 0.837 / 171.686)^{1/2} + 0.0000$$

$$Tbna = 13.3059 \text{ mm.}$$

Required Thickness of Top Plate in Tension:

(Calculated as a fixed beam per Megyesy)

$$F_t = (S_a * A_{bss}), \quad \text{Bolt Allowable Stress * Area}$$

$$R_m = (F_t * 2 * C_g) / 8, \quad \text{Bending Moment}$$

$$S_b \quad \text{Allowable Bending Stress}$$

$$W_t = (Topw_{th} - B_{nd}), \quad \text{Width of Section}$$

$$T = (6 * R_m / (S_b * W_t))^{1/2} + CA$$

$$T = (6 * 899700 / (171 * 64.0000))^{1/2} + 0.0000$$

$$T = 22.1615 \text{ mm.}$$

Required Thickness of Continuous Top Ring per Moss:

$$a = (D_c - SkirtOD) / 2 \quad \text{Skirt Distance to Bolt Circle}$$

$$P = S_a * A_{bss} \quad \text{Bolt Allowable Stress * Area}$$

$$l = Avgwdt \quad \text{Average Gusset Width}$$

$$g_1 = \text{Gamma } 1 \quad \text{Constant Term } f(b/l)$$

$$g_2 = \text{Gamma } 2 \quad \text{Constant Term } f(b/l)$$

$$g = \text{Flat distance} / 2 \quad \text{Nut } 1/2 \text{ Dimension (from Tema)}$$

$$F_b = \quad \text{Allowable Bending Stress}$$

$$M_o = P / (4\pi) [1.3 (\ln((2l \sin(\pi a/l) / (\pi g))) + 1) - [(0.7 - g_2) P / (4\pi)]] \quad \text{Moment Term}$$

$$T_c = (6 * Abs(M_o) / F_b)^{1/2} + CA \quad \text{Required Thickness}$$

$$T_c = (6 * 268495 / 171)^{1/2} + 0.000$$

$$T_c = 19.2172 \text{ mm.}$$