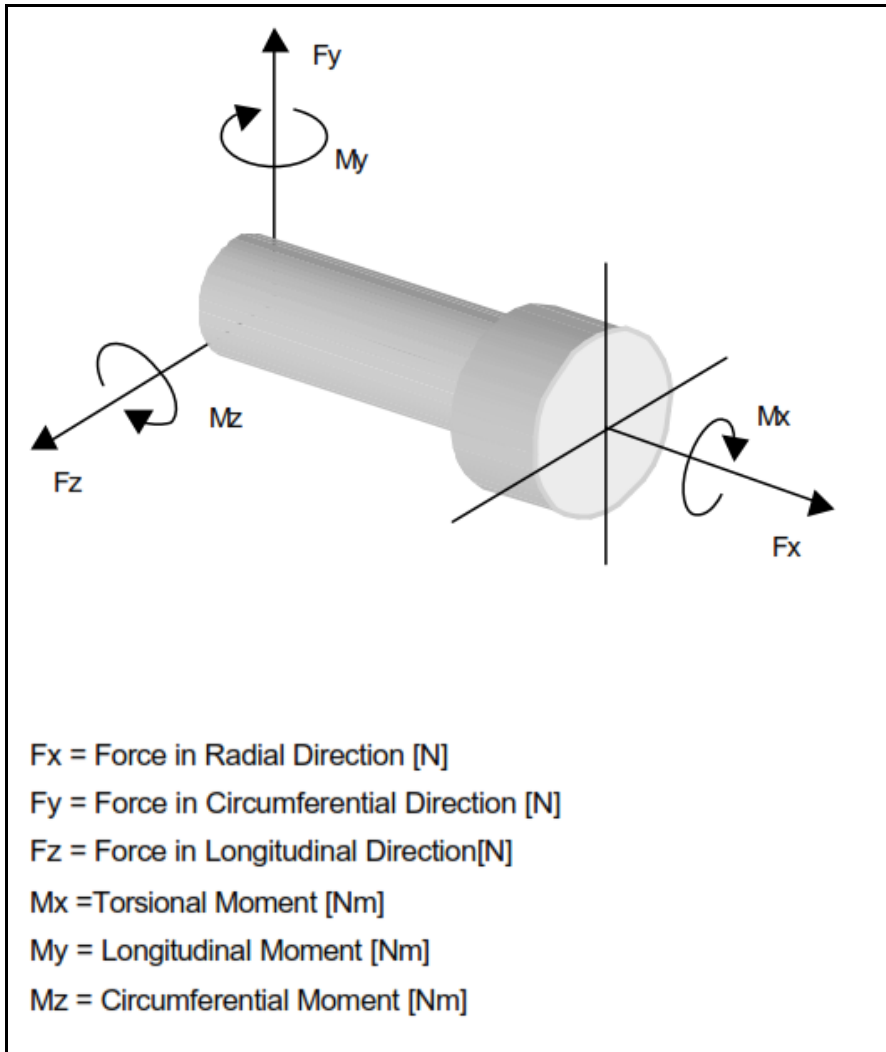


Appendix I - Nozzle loads for pressure vessels



Pressure class 150 #				$\beta = 0,6$		
Nozzle size D (")	Forces (N)			Moments (Nm)		
	F_x	F_y	F_z	M_x	M_y	M_z
1	1200	900	1200	90	78	60
1,5	1800	1350	1800	203	176	135
2	2400	1800	2400	360	312	240
3	3600	2700	3600	810	702	540
4	4800	3600	4800	1440	1248	960
6	7200	5400	7200	3240	2808	2160
8	9600	7200	9600	5760	4992	3840
10	12000	9000	12000	9000	7800	6000
12	14400	10800	14400	12960	11232	8640
14	16800	12600	16800	17640	15288	11760
16	19200	14400	19200	23040	19968	15360
18	21600	16200	21600	29160	25272	19440
20	24000	18000	24000	36000	31200	24000
24	28800	21600	28800	51840	44928	34560

Pressure class 300 #				$\beta = 0,7$		
Nozzle size D (")	Forces (N)			Moments (Nm)		
	F_x	F_y	F_z	M_x	M_y	M_z
1	1400	1050	1400	105	91	70
1,5	2100	1575	2100	236	205	158
2	2800	2100	2800	420	364	280
3	4200	3150	4200	945	819	630
4	5600	4200	5600	1680	1456	1120
6	8400	6300	8400	3780	3276	2520
8	11200	8400	11200	6720	5824	4480
10	14000	10500	14000	10500	9100	7000
12	16800	12600	16800	15120	13104	10080
14	19600	14700	19600	20580	17836	13720
16	22400	16800	22400	26880	23296	17920
18	25200	18900	25200	34020	29484	22680
20	28000	21000	28000	42000	36400	28000
24	33600	25200	33600	60480	52416	40320

Pressure class 600 #				$\beta = 0,8$		
Nozzle size D (")	Forces (N)			Moments (Nm)		
	F_x	F_y	F_z	M_x	M_y	M_z
1	1600	1200	1600	120	104	80
1,5	2400	1800	2400	270	234	180
2	3200	2400	3200	480	416	320
3	4800	3600	4800	1080	936	720
4	6400	4800	6400	1920	1664	1280
6	9600	7200	9600	4320	3744	2880
8	12800	9600	12800	7680	6656	5120
10	16000	12000	16000	12000	10400	8000
12	19200	14400	19200	17280	14976	11520
14	22400	16800	22400	23520	20384	15680
16	25600	19200	25600	30720	26624	20480
18	28800	21600	28800	38880	33696	25920
20	32000	24000	32000	48000	41600	32000
24	38400	28800	38400	69120	59904	46080

Pressure class 900 #				$\beta = 1,8$		
Nozzle size D (")	Forces (N)			Moments (Nm)		
	F_x	F_y	F_z	M_x	M_y	M_z
1	3600	2700	3600	270	234	180
1,5	5400	4050	5400	608	527	405
2	7200	5400	7200	1080	936	720
3	10800	8100	10800	2430	2106	1620
4	14400	10800	14400	4320	3744	2880
6	21600	16200	21600	9720	8424	6480
8	28800	21600	28800	17280	14976	11520
10	36000	27000	36000	27000	23400	18000
12	43200	32400	43200	38880	33696	25920
14	50400	37800	50400	52920	45864	35280
16	57600	43200	57600	69120	59904	46080
18	64800	48600	64800	87480	75816	58320
20	72000	54000	72000	108000	93600	72000
24	86400	64800	86400	155520	134784	103680

Notes:

- 1) Nozzle loads combined with loads due to internal pressure to be taken into account for nozzle/flange assessment.
- 2) All forces and moments act at the nozzle to shell and nozzle to head junction.
- 3) Tables are to be applied for nozzles with standard ANSI flanges.
- 4) No loadings shall be applied to manways, handholes and instrument nozzles
- 5) Nozzle loads calculated as per below formula:
 $F_x = \beta \cdot 2000 \cdot D$ (N)
 $F_y = \beta \cdot 1500 \cdot D$ (N)
 $F_z = \beta \cdot 2000 \cdot D$ (N)
 $M_x = \beta \cdot 150 \cdot D^2$ (Nm)
 $M_y = \beta \cdot 130 \cdot D^2$ (Nm)
 $M_z = \beta \cdot 100 \cdot D^2$ (Nm)

Pressure class 1500 #				$\beta = 3,0$		
Nozzle size D (")	Forces (N)			Moments (Nm)		
	F_x	F_y	F_z	M_x	M_y	M_z
1	6000	4500	6000	450	390	300
1,5	9000	6750	9000	1013	878	675
2	12000	9000	12000	1800	1560	1200
3	18000	13500	18000	4050	3510	2700
4	24000	18000	24000	7200	6240	4800
6	36000	27000	36000	16200	14040	10800
8	48000	36000	48000	28800	24960	19200
10	60000	45000	60000	45000	39000	30000
12	72000	54000	72000	64800	56160	43200
14	84000	63000	84000	88200	76440	58800
16	96000	72000	96000	115200	99840	76800
18	108000	81000	108000	145800	126360	97200
20	120000	90000	120000	180000	156000	120000
24	144000	108000	144000	259200	224640	172800

Pressure class 2500 #				$\beta = 3,3$		
Nozzle size D (")	Forces (N)			Moments (Nm)		
	F_x	F_y	F_z	M_x	M_y	M_z
1	6600	4950	6600	495	429	330
1,5	9900	7425	9900	1114	965	743
2	13200	9900	13200	1980	1716	1320
3	19800	14850	19800	4455	3861	2970
4	26400	19800	26400	7920	6864	5280
6	39600	29700	39600	17820	15444	11880
8	52800	39600	52800	31680	27456	21120
10	66000	49500	66000	49500	42900	33000
12	79200	59400	79200	71280	61776	47520
14	92400	69300	92400	97020	84084	64680
16	105600	79200	105600	126720	109824	84480
18	118800	89100	118800	160380	138996	106920
20	132000	99000	132000	198000	171600	132000
24	158400	118800	158400	285120	247104	190080