PETROBRAS	**TECHNICAL SPECIFICATION**	Nº	I-ET-0000.00-0000-500-PEI-005
	CLIENT: INDUSTRIAL, TRANSPETRO, GAS&ENERGY, E&P AND OTHER CLIENTS OF PRGE		SHEET 1 OF 4
	JOB: ALL PROJECTS		
	AREA: ALL UNITS		
PRGE	TITLE: **MAXIMUM ALLOWABLE LOADS ON PRESSURE VESSEL NOZZLES**		**NP-1** PRGE/ENG

MICROSOFT WORD / V. 97 / I-ET-0000.00-0000-500-PEI-005=0

INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	*ORIGINAL ISSUE*

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	*MAR/30/17*								
DESIGN	*EETC/EBET*								
EXECUTION	*MARANGONE*								
CHECK	*PATRICIO*								
APPROVAL	*ARTUR*								

THE DATA, OR PART THEREOF, ARE PETROBRAS PROPERTY AND THUS MUST NOT BE USED IN ANY WAY WITHOUT PERMISSION.

THIS FORM IS PART OF PETROBRAS N-381 REV.J ANNEX A – FIGURE A-1.

1- SCOPE

- This Technical Specification provides tables of the maximum allowable external piping loads on nozzle of pressure vessels (including heat exchangers), when these piping loads are not furnished by a proper piping flexibility analysis.
- Whenever expressly authorized by PETROBRAS, in case of the proper piping flexibility is not available yet, these load tables are applicable for the following items:
  - To perform stress analyses of nozzle junctions on shells or heads, by means of Finite Element Analysis (FEA) or by means of the WRC buletins WRC-107/297 when applicable;
  - To perform mechanical calculation of flange dimensions: according to design codes procedures and to prevent leakage.



Rating 150#						
Nominal Diameter	**Frad (N)**	**Flong (N)**	**Ftang (N)**	**Mtors (N.m)**	**Mtang (N.m)**	**Mlong (N.m)**
2"	2280	1710	1710	342	228	228
3"	3420	2565	2565	770	513	513
4"	4560	3420	3420	1368	912	912
6"	6840	5130	5130	3078	2052	2052
8"	9120	6840	6840	5472	3648	3648
10"	11400	8550	8550	8550	5700	5700
12"	13680	10260	10260	12312	8208	8208
14"	15960	11970	11970	16758	11172	11172
16"	18240	13680	13680	21888	14592	14592
18"	20520	15390	15390	27702	18468	18468
20"	22800	17100	17100	34200	22800	22800
24"	27360	20520	20520	49248	32832	32832

Rating 300#						
Nominal Diameter	**Frad (N)**	**Flong (N)**	**Ftang (N)**	**Mtors (N.m)**	**Mtang (N.m)**	**Mlong (N.m)**
2"	2660	1995	1995	399	266	266
3"	3990	2993	2993	898	599	599
4"	5320	3990	3990	1596	1064	1064
6"	7980	5985	5985	3591	2394	2394
8"	10640	7980	7980	6384	4256	4256
10"	13300	9975	9975	9975	6650	6650
12"	15960	11970	11970	14364	9576	9576
14"	18620	13965	13965	19551	13034	13034
16"	21280	15960	15960	25536	17024	17024
18"	23940	17955	17955	32319	21546	21546
20"	26600	19950	19950	39900	26600	26600
24"	31920	23940	23940	57456	38304	38304



Rating 600#						
Nominal Diameter	**Frad (N)**	**Flong (N)**	**Ftang (N)**	**Mtors (N.m)**	**Mtang (N.m)**	**Mlong (N.m)**
2"	3040	2280	2280	456	304	304
3"	4560	3420	3420	1026	684	684
4"	6080	4560	4560	1824	1216	1216
6"	9120	6840	6840	4104	2736	2736
8"	12160	9120	9120	7296	4864	4864
10"	15200	11400	11400	11400	7600	7600
12"	18240	13680	13680	16416	10944	10944
14"	21280	15960	15960	22344	14896	14896
16"	24320	18240	18240	29184	19456	19456
18"	27360	20520	20520	36936	24624	24624
20"	30400	22800	22800	45600	30400	30400
24"	36480	27360	27360	65664	43776	43776

Rating 900#						
Nominal Diameter	**Frad (N)**	**Flong (N)**	**Ftang (N)**	**Mtors (N.m)**	**Mtang (N.m)**	**Mlong (N.m)**
2"	4940	3705	3705	741	494	494
3"	7410	5558	5558	1667	1112	1112
4"	9880	7410	7410	2964	1976	1976
6"	14820	11115	11115	6669	4446	4446
8"	19760	14820	14820	11856	7904	7904
10"	24700	18525	18525	18525	12350	12350
12"	29640	22230	22230	26676	17784	17784
14"	34580	25935	25935	36309	24206	24206
16"	39520	29640	29640	47424	31616	31616
18"	44460	33345	33345	60021	40014	40014
20"	49400	37050	37050	74100	49400	49400
24"	59280	44460	44460	106704	71136	71136

Rating 1500#						
Nominal Diameter	**Frad (N)**	**Flong (N)**	**Ftang (N)**	**Mtors (N.m)**	**Mtang (N.m)**	**Mlong (N.m)**
2"	5700	4275	4275	855	570	570
3"	8550	6413	6413	1924	1283	1283
4"	11400	8550	8550	3420	2280	2280
6"	17100	12825	12825	7695	5130	5130
8"	22800	17100	17100	13680	9120	9120
10"	28500	21375	21375	21375	14250	14250
12"	34200	25650	25650	30780	20520	20520
14"	39900	29925	29925	41895	27930	27930
16"	45600	34200	34200	54720	36480	36480
18"	51300	38475	38475	69255	46170	46170
20"	57000	42750	42750	85500	57000	57000
24"	68400	51300	51300	123120	82080	82080



Rating 2500#						
Nominal Diameter	**Frad (N)**	**Flong (N)**	**Ftang (N)**	**Mtors (N.m)**	**Mtang (N.m)**	**Mlong (N.m)**
2"	6840	5130	5130	1026	684	684
3"	10260	7695	7695	2309	1539	1539
4"	13680	10260	10260	4104	2736	2736
6"	20520	15390	15390	9234	6156	6156
8"	27360	20520	20520	16416	10944	10944
10"	34200	25650	25650	25650	17100	17100
12"	41040	30780	30780	36936	24624	24624
14"	47880	35910	35910	50274	33516	33516
16"	54720	41040	41040	65664	43776	43776
18"	61560	46170	46170	83106	55404	55404
20"	68400	51300	51300	102600	68400	68400
24"	82080	61560	61560	147744	98496	98496