



Carga Leve

Referência	Diam. Externo	Diam. Interno	Compr. Total (mm)	Constante Elástica		32% do compr. total 1Milhão de ciclos		36% do compr. total 500mil ciclos		40% do compr. total 300mil ciclos	
				(N / mm)	(Kgf /mm)	Deflexão	Carga	Deflexão	Carga	Deflexão	Carga
TL 8 x 10	8	4	10	24.53	{ 2.50 }	3.2	78.5 { 8.0 }	3.6	88.3 { 9.0 }	4.0	98.1 { 10.0 }
15			15	16.35	{ 1.67 }	4.8		5.4		6.0	
20			20	12.26	{ 1.25 }	6.4		7.2		8.0	
25			25	9.81	{ 1.00 }	8.0		9.0		10.0	
30			30	8.18	{ 0.83 }	9.6		10.8		12.0	
35			35	7.01	{ 0.71 }	11.2		12.6		14.0	
40			40	6.13	{ 0.63 }	12.8		14.4		16.0	
45			45	5.45	{ 0.56 }	14.4		16.2		18.0	
50			50	4.91	{ 0.50 }	16.0		18.0		20.0	
55			55	4.46	{ 0.45 }	17.6		19.8		22.0	
60			60	4.09	{ 0.42 }	19.2		21.6		24.0	
65			65	3.77	{ 0.38 }	20.8		23.4		26.0	
70			70	3.50	{ 0.36 }	22.4		25.2		28.0	
75			75	3.27	{ 0.33 }	24.0		27.0		30.0	
80			80	3.07	{ 0.31 }	25.6		28.8		32.0	
TL 10 x 20			10	5	20	17.71		{ 1.81 }		6.4	
25	25	14.17			{ 1.44 }	8.0	9.0	10.0			
30	30	11.81			{ 1.20 }	9.6	10.8	12.0			
35	35	10.12			{ 1.03 }	11.2	12.6	14.0			
40	40	8.85			{ 0.90 }	12.8	14.4	16.0			
45	45	7.87			{ 0.80 }	14.4	16.2	18.0			
50	50	7.08			{ 0.72 }	16.0	18.0	20.0			
55	55	6.44			{ 0.66 }	17.6	19.8	22.0			
60	60	5.90			{ 0.60 }	19.2	21.6	24.0			
65	65	5.45			{ 0.56 }	20.8	23.4	26.0			
70	70	5.06			{ 0.52 }	22.4	25.2	28.0			
75	75	4.72			{ 0.48 }	24.0	27.0	30.0			
80	80	4.43			{ 0.45 }	25.6	28.8	32.0			
90	90	3.94			{ 0.40 }	28.8	32.4	36.0			





Carga Leve

Referência	Diam. Externo	Diam. Interno	Compr. Total (mm)	Constante Elástica		32% do compr. total 1Milhão de ciclos		36% do compr. total 500mil ciclos		40% do compr. total 300mil ciclos				
				(N / mm)	(Kgf /mm)	Deflexão	Carga	Deflexão	Carga	Deflexão	Carga			
TL 12 x 20	12	6	20	25.88	{ 2.64 }	6.4	166.7	7.2	186.3	8.0	206			
25			25	20.70	{ 2.11 }	8.0		9.0		10.0				
30			30	17.25	{ 1.76 }	9.6		10.8		12.0				
35			35	14.79	{ 1.51 }	11.2		12.6		14.0				
40			40	12.94	{ 1.32 }	12.8		14.4		16.0				
45			45	11.50	{ 1.17 }	14.4		16.2		18.0				
50			50	10.35	{ 1.06 }	16.0		18.0		20.0				
55			55	9.41	{ 0.96 }	17.6		{ 17.0 }		{ 19.0 }		{ 21.0 }		
60			60	8.63	{ 0.88 }	19.2		21.6		24.0				
65			65	7.96	{ 0.81 }	20.8		23.4		26.0				
70			70	7.39	{ 0.75 }	22.4		25.2		28.0				
75			75	6.90	{ 0.70 }	24.0		27.0		30.0				
80			80	6.47	{ 0.66 }	25.6		28.8		32.0				
90	90	5.75	{ 0.59 }	28.8	32.4	36.0								
TL 14 x 25	14	7	25	27.22	{ 2.78 }	8.0	216	9.0	245	10.0	275			
30			30	22.69	{ 2.31 }	9.6		10.8		12.0				
35			35	19.44	{ 1.98 }	11.2		12.6		14.0				
40			40	17.01	{ 1.73 }	12.8		14.4		16.0				
45			45	15.12	{ 1.54 }	14.4		16.2		18.0				
50			50	13.61	{ 1.39 }	16.0		18.0		20.0				
55			55	12.37	{ 1.26 }	17.6		216		19.8		245	22.0	275
60			60	11.34	{ 1.16 }	19.2		{ 22.0 }		{ 25.0 }		{ 28.0 }		
65			65	10.47	{ 1.07 }	20.8		23.4		26.0				
70			70	9.72	{ 0.99 }	22.4		25.2		28.0				
75			75	9.07	{ 0.93 }	24.0		27.0		30.0				
80			80	8.51	{ 0.87 }	25.6		28.8		32.0				
90			90	7.56	{ 0.77 }	28.8		32.4		36.0				
100	100	6.81	{ 0.69 }	32.0	36.0	40.0								
TL 16 x 25	16	8	25	34.89	{ 3.56 }	8.0	275	9.0	314	10.0	343			
30			30	29.07	{ 2.96 }	9.6		10.8		12.0				
35			35	24.92	{ 2.54 }	11.2		12.6		14.0				
40			40	21.81	{ 2.22 }	12.8		14.4		16.0				
45			45	19.38	{ 1.98 }	14.4		16.2		18.0				
50			50	17.44	{ 1.78 }	16.0		18.0		20.0				
55			55	15.86	{ 1.62 }	17.6		19.8		22.0				
60			60	14.54	{ 1.48 }	19.2		{ 275 }		{ 314 }		{ 343 }		
65			65	13.42	{ 1.37 }	20.8		{ 28.0 }		{ 32.0 }		{ 35.0 }		
70			70	12.46	{ 1.27 }	22.4		23.4		26.0				
75			75	11.63	{ 1.19 }	24.0		25.2		28.0				
80			80	10.90	{ 1.11 }	25.6		27.0		30.0				
90			90	9.69	{ 0.99 }	28.8		28.8		32.0				
100	100	8.72	{ 0.89 }	32.0	32.4	36.0								
125	125	6.98	{ 0.71 }	40.0	36.0	40.0								
					45.0	50.0								



Carga Leve

Referência	Diam. Externo	Diam. Interno	Compr. Total (mm)	Constante Elástica		19.2% do compr. total 1Milhão de ciclos		21.6% do compr. total 500mil ciclos		24% do compr. total 300mil ciclos	
				(N / mm)	(Kgf /mm)	Deflexão	Carga	Deflexão	Carga	Deflexão	Carga
TL 18 × 25	18	9	25	42.44	{ 4.33 }	8.0	333 { 34.0 }	9.0	382 { 39.0 }	10.0	422 { 43.0 }
30			30	35.37	{ 3.61 }	9.6		10.8			
35			35	30.32	{ 3.09 }	11.2		12.6			
40			40	26.53	{ 2.71 }	12.8		14.4			
45			45	23.58	{ 2.40 }	14.4		16.2			
50			50	21.22	{ 2.16 }	16.0		18.0			
55			55	19.29	{ 1.97 }	17.6		19.8			
60			60	17.69	{ 1.80 }	19.2		21.6			
65			65	16.32	{ 1.66 }	20.8		23.4			
70			70	15.16	{ 1.55 }	22.4		25.2			
75			75	14.15	{ 1.44 }	24.0		27.0			
80			80	13.26	{ 1.35 }	25.6		28.8			
90			90	11.79	{ 1.20 }	28.8		32.4			
100			100	10.61	{ 1.08 }	32.0		36.0			
125			125	8.49	{ 0.87 }	40.0		45.0			
TL 20 × 25	20	10	25	53.44	{ 5.45 }	8.0	422 { 43.0 }	9.0	481 { 49.0 }	10.0	530 { 54.0 }
30			30	44.54	{ 4.54 }	9.6		10.8			
35			35	38.17	{ 3.89 }	11.2		12.6			
40			40	33.40	{ 3.41 }	12.8		14.4			
45			45	29.69	{ 3.03 }	14.4		16.2			
50			50	26.72	{ 2.72 }	16.0		18.0			
55			55	24.29	{ 2.48 }	17.6		19.8			
60			60	22.27	{ 2.27 }	19.2		21.6			
65			65	20.56	{ 2.10 }	20.8		23.4			
70			70	19.09	{ 1.95 }	22.4		25.2			
75			75	17.81	{ 1.82 }	24.0		27.0			
80			80	16.70	{ 1.70 }	25.6		28.8			
90			90	14.85	{ 1.51 }	28.8		32.4			
100			100	13.36	{ 1.36 }	32.0		36.0			
125			125	10.69	{ 1.09 }	40.0		45.0			
150	150	8.91	{ 0.91 }	48.0	54.0						
TL 22 × 25	22	11	25	65.33	{ 6.66 }	8.0	530 { 54.0 }	9.0	588 { 60.0 }	10.0	657 { 67.0 }
30			30	54.44	{ 5.55 }	9.6		10.8			
35			35	46.67	{ 4.76 }	11.2		12.6			
40			40	40.83	{ 4.16 }	12.8		14.4			
45			45	36.30	{ 3.70 }	14.4		16.2			
50			50	32.67	{ 3.33 }	16.0		18.0			
55			55	29.70	{ 3.03 }	17.6		19.8			
60			60	27.22	{ 2.78 }	19.2		21.6			
65			65	25.13	{ 2.56 }	20.8		23.4			
70			70	23.33	{ 2.38 }	22.4		25.2			
75			75	21.78	{ 2.22 }	24.0		27.0			
80			80	20.42	{ 2.08 }	25.6		28.8			
90			90	18.15	{ 1.85 }	28.8		32.4			
100			100	16.33	{ 1.67 }	32.0		36.0			
125			125	13.07	{ 1.33 }	40.0		45.0			
150	150	10.89	{ 1.11 }	48.0	54.0						





Carga Leve

Referência	Diam. Externo	Diam. Interno	Compr. Total (mm)	Constante Elástica		32% do compr. total 1Milhão de ciclos		36% do compr. total 500mil ciclos		40% do compr. total 300mil ciclos		
				(N / mm)	{ Kg / mm }	Deflexão	Carga	Deflexão	Carga	Deflexão	Carga	
TL 25 x 25	25	12.5	25	82.78	{ 8.44 }	8.0	657	9.0	745	10.0	824	
30			30	68.98	{ 7.03 }	9.6		10.8		12.0		
35			35	59.13	{ 6.03 }	11.2		12.6		14.0		
40			40	51.74	{ 5.28 }	12.8		14.4		16.0		
45			45	45.99	{ 4.69 }	14.4		16.2		18.0		
50			50	41.39	{ 4.22 }	16.0		18.0		20.0		
55			55	37.63	{ 3.84 }	17.6		19.8		22.0		
60			60	34.49	{ 3.52 }	19.2		21.6		24.0		
65			65	31.84	{ 3.25 }	20.8		23.4		26.0		
70			70	29.56	{ 3.01 }	22.4		{ 25.2 }		{ 28.0 }		{ 84.0 }
75			75	27.59	{ 2.81 }	24.0		27.0		30.0		
80			80	25.87	{ 2.64 }	25.6		28.8		32.0		
90			90	22.99	{ 2.34 }	28.8		32.4		36.0		
100			100	20.69	{ 2.11 }	32.0		36.0		40.0		
125			125	16.56	{ 1.69 }	40.0		45.0		50.0		
150			150	13.80	{ 1.41 }	48.0		54.0		60.0		
175			175	11.83	{ 1.21 }	56.0		63.0		70.0		
200	200	10.35	{ 1.06 }	64.0	72.0	80.0						
TL 27 x 25	27	13.5	25	98.11	{ 10.00 }	8.0	785	9.0	883	10.0	981	
30			30	81.76	{ 8.34 }	9.6		10.8		12.0		
35			35	70.08	{ 7.15 }	11.2		12.6		14.0		
40			40	61.32	{ 6.25 }	12.8		14.4		16.0		
45			45	54.51	{ 5.56 }	14.4		16.2		18.0		
50			50	49.06	{ 5.00 }	16.0		18.0		20.0		
55			55	44.60	{ 4.55 }	17.6		19.8		22.0		
60			60	40.88	{ 4.17 }	19.2		21.6		24.0		
65			65	37.74	{ 3.85 }	20.8		23.4		26.0		
70			70	35.04	{ 3.57 }	22.4		{ 25.2 }		{ 28.0 }		{ 100.0 }
75			75	32.70	{ 3.33 }	24.0		27.0		30.0		
80			80	30.66	{ 3.13 }	25.6		28.8		32.0		
90			90	27.25	{ 2.78 }	28.8		32.4		36.0		
100			100	24.53	{ 2.50 }	32.0		36.0		40.0		
125			125	19.62	{ 2.00 }	40.0		45.0		50.0		
150			150	16.35	{ 1.67 }	48.0		54.0		60.0		
175			175	14.02	{ 1.43 }	56.0		63.0		70.0		
200	200	12.26	{ 1.25 }	64.0	72.0	80.0						



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Referência	Diam. Externo	Diam. Interno	Compr. Total (mm)	Constante Elástica		32% do compr. total 1Milhão de ciclos		36% do compr. total 500mil ciclos		40% do compr. total 300mil ciclos						
				(N / mm)	(Kg / mm)	Deflexão	Carga	Deflexão	Carga	Deflexão	Carga					
TL 30 × 25	30	15	25	118.78	{12.11}	8.0	951 { 97.0 }	9.0	1,069 { 109.0 }	10.0	1,187 { 121.0 }					
30			98.98	{10.09}	9.6	10.8										
35			84.84	{8.65}	11.2	12.6										
40			74.24	{7.57}	12.8	14.4										
45			65.99	{6.73}	14.4	16.2										
50			59.39	{6.06}	16.0	18.0										
55			53.99	{5.51}	17.6	19.8										
60			49.49	{5.05}	19.2	21.6										
65			45.68	{4.66}	20.8	23.4										
70			42.42	{4.33}	22.4	25.2										
75			39.59	{4.04}	24.0	27.0										
80			37.12	{3.78}	25.6	28.8										
90			32.99	{3.36}	28.8	32.4										
100			29.69	{3.03}	32.0	36.0										
125			23.76	{2.42}	40.0	45.0										
150			19.80	{2.02}	48.0	54.0										
175			16.97	{1.73}	56.0	63.0										
200	14.85	{1.51}	64.0	72.0												
TL 35 × 40	35	17.5	40	101.46	{10.35}	12.8	1,295 { 132.1 }	14.4	1,461 { 149.0 }	16.0	1,618 { 165.0 }					
45			90.19	{9.20}	14.4	16.2										
50			81.17	{8.28}	16.0	18.0										
55			73.79	{7.52}	17.6	19.8										
60			67.64	{6.90}	19.2	21.6										
65			62.44	{6.37}	20.8	23.4										
70			57.98	{5.91}	22.4	25.2										
75			54.11	{5.52}	24.0	27.0										
80			50.73	{5.17}	25.6	28.8										
90			45.09	{4.60}	28.8	32.4										
100			40.58	{4.14}	32.0	36.0										
125			32.47	{3.31}	40.0	45.0										
150			27.06	{2.76}	48.0	54.0										
175			23.19	{2.36}	56.0	63.0										
200			20.29	{2.07}	64.0	72.0										
TL 40 × 40			40	20	40	132.15		{13.48}		12.8		1,697 { 173.0 }	14.4	1,903 { 194.1 }	16.0	2,120 { 216.2 }
45					117.47	{11.98}		14.4		16.2						
50	105.72	{10.78}			16.0	18.0										
55	96.11	{9.80}			17.6	19.8										
60	88.10	{8.98}			19.2	21.6										
65	81.32	{8.29}			20.8	23.4										
70	75.52	{7.70}			22.4	25.2										
75	70.48	{7.19}			24.0	27.0										
80	66.08	{6.74}			25.6	28.8										
90	58.73	{5.99}			28.8	32.4										
100	52.86	{5.39}			32.0	36.0										
125	42.29	{4.31}			40.0	45.0										
150	35.24	{3.59}			48.0	54.0										
175	30.21	{3.08}			56.0	63.0										
200	26.43	{2.70}			64.0	72.0										
225	23.49	{2.40}			72.0	81.0										
250	21.14	{2.16}			80.0	90.0										
275	19.22	{1.96}	88.0	99.0												
300	17.62	{1.80}	96.0	108.0												





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Referência	Diam. Externo	Diam. Interno	Compr. Total (mm)	Constante Elástica		32% do compr. total 1Milhão de ciclos		36% do compr. total 500mil ciclos		40% do compr. total 300mil ciclos	
				(N / mm)	(Kgf /mm)	Deflexão	Carga	Deflexão	Carga	Deflexão	Carga
TL 50 × 50	50	25	50	165.56	16.88	16.0	2,650 { 270.2 }	18.0	2,980 { 303.9 }	20.0	3,310 { 337.5 }
55			150.51	15.35	17.6	19.8		22.0			
60			137.96	14.07	19.2	21.6		24.0			
65			127.35	12.99	20.8	23.4		26.0			
70			118.25	12.06	22.4	25.2		28.0			
75			110.37	11.25	24.0	27.0		30.0			
80			103.47	10.55	25.6	28.8		32.0			
90			91.98	9.38	28.8	32.4		36.0			
100			82.78	8.44	32.0	36.0		40.0			
125			66.22	6.75	40.0	45.0		50.0			
150			55.19	5.63	48.0	54.0		60.0			
175			47.30	4.82	56.0	63.0		70.0			
200			41.39	4.22	64.0	72.0		80.0			
225			36.79	3.75	72.0	81.0		90.0			
250			33.11	3.38	80.0	90.0		100.0			
275			30.10	3.07	88.0	99.0		110.0			
300			27.59	2.81	96.0	108.0		120.0			
350			23.65	2.41	112.0	126.0		140.0			
400			20.69	2.11	128.0	144.0		160.0			
450			18.40	1.88	144.0	162.0		180.0			
500	16.56	1.69	160.0	180.0	200.0						
TL 60 × 60	60	30	60	198.61	20.25	19.2	3,810 { 388.5 }	21.6	4,290 { 437.5 }	24.0	4,770 { 486.4 }
70			170.24	17.36	22.4	25.2		28.0			
80			148.96	15.19	25.6	28.8		32.0			
90			132.41	13.50	28.8	32.4		36.0			
100			119.17	12.15	32.0	36.0		40.0			
125			95.33	9.72	40.0	45.0		50.0			
150			79.44	8.10	48.0	54.0		60.0			
175			68.10	6.94	56.0	63.0		70.0			
200			59.58	6.08	64.0	72.0		80.0			
225			52.96	5.40	72.0	81.0		90.0			
250			47.67	4.86	80.0	90.0		100.0			
275			43.33	4.42	88.0	99.0		110.0			
300			39.72	4.05	96.0	108.0		120.0			
350			34.05	3.47	112.0	126.0		140.0			
400			29.79	3.04	128.0	144.0		160.0			
450			26.48	2.70	144.0	162.0		180.0			
500	23.83	2.43	160.0	180.0	200.0						
TL 70 × 70	70	38.5	70	217.86	22.22	22.4	4,880 { 497.6 }	25.2	5,490 { 559.8 }	28.0	6,100 { 622.0 }
80			190.63	19.44	25.6	28.8		32.0			
90			169.44	17.28	28.8	32.4		36.0			
100			152.50	15.55	32.0	36.0		40.0			
125			122.00	12.44	40.0	45.0		50.0			
150			101.67	10.37	48.0	54.0		60.0			
175			87.14	8.89	56.0	63.0		70.0			
200			76.25	7.78	64.0	72.0		80.0			
225			67.78	6.91	72.0	81.0		90.0			
250			61.00	6.22	80.0	90.0		100.0			
275			55.45	5.65	88.0	99.0		110.0			
300			50.83	5.18	96.0	108.0		120.0			
350	43.57	4.44	112.0	126.0	140.0						