



Shaft Elongation Chart

millimetres (mm) elongation per 30 metres of Shaft

HYDRAULIC THRUST kg	SHAFT DIAMETER mm -millimetres (inches)										
	20mm 3/4"	25mm 1"	32mm 1-1/4"	38mm 1-1/2"	45mm 1-3/4"	50mm 2"	57mm 2-1/4"	64mm 2-1/2"	70mm 2-3/4"	76mm 3"	82mm 3-1/4"
100	0.52	0.29	0.19	0.13	0.09	0.07	0.06				
200	1.02	0.58	0.38	0.26	0.19	0.15	0.12	0.09			
300	1.55	0.87	0.57	0.39	0.28	0.22	0.17	0.14	0.12		
400	2.07	1.16	0.75	0.52	0.38	0.29	0.23	0.19	0.15	0.13	
500	2.58	1.45	0.94	0.55	0.47	0.36	0.29	0.23	0.19	0.16	0.14
600	3.1	1.74	1.13	0.77	0.57	0.44	0.34	0.29	0.23	0.19	0.17
700	3.61	2.04	1.32	0.90	0.66	0.51	0.40	0.33	0.27	0.23	0.19
800	4.13	2.33	1.51	1.03	0.76	0.58	0.46	0.37	0.31	0.26	0.22
900	4.65	2.62	1.70	1.16	0.85	0.65	0.52	0.42	0.35	0.29	0.25
1,000	5.16	2.91	1.89	1.29	0.95	0.73	0.57	0.47	0.38	0.32	0.28
1,200	6.42	3.49	2.26	1.55	1.14	0.87	0.69	0.56	0.46	0.39	0.33
1,400		4.07	2.64	1.81	1.32	1.02	0.80	0.65	0.54	0.45	0.39
1,600		4.65	3.02	2.07	1.52	1.16	0.92	0.74	0.61	0.52	0.44
1,800		5.23	3.40	2.32	1.71	1.31	1.03	0.84	0.69	0.58	0.50
2,000		5.82	3.77	2.58	1.90	1.45	1.15	0.93	0.77	0.65	0.55
2,250		6.54	4.24	2.90	2.13	1.63	1.29	1.05	0.86	0.73	0.62
2,500			4.72	3.22	2.37	1.81	1.43	1.16	0.96	0.81	0.69
2,750			5.19	3.55	2.61	2.00	1.58	1.28	1.06	0.89	0.76
3,000			5.66	3.87	2.84	2.18	1.72	1.39	1.15	0.97	0.83
3,250			6.13	4.20	3.08	2.36	1.86	1.51	1.25	1.05	0.89
3,500			6.60	4.51	3.32	2.54	2.01	1.63	1.34	1.13	0.96
3,750				4.84	3.56	2.72	2.15	1.74	1.44	1.21	1.03
4,000				5.16	3.79	2.90	2.29	1.86	1.54	1.29	1.10
4,500				5.81	4.27	3.27	2.58	2.09	1.73	1.45	1.24
5,000				6.45	4.74	3.63	2.67	2.32	1.92	1.61	1.38
5,500					5.21	4.00	3.16	2.56	2.11	1.78	1.51
6,000					5.69	4.36	3.44	2.79	2.30	1.94	1.65
6,500					6.16	4.72	3.73	3.02	2.50	2.10	1.79
7,000					6.64	5.08	4.02	3.25	2.69	2.26	1.93
8,000						5.81	4.59	3.71	3.07	2.59	2.20
9,000						6.53	5.16	4.18	3.46	2.90	2.48
10,000							5.74	4.65	3.84	3.23	2.75
11,000							6.31	5.11	4.22	3.55	3.02
12,000								5.58	4.61	3.87	3.30
13,000								6.04	5.00	4.20	3.57
14,000								6.51	5.38	4.52	3.85
15,000									5.76	4.84	4.12
16,000									6.14	5.16	4.40
18,000										5.81	4.95
20,000										6.45	5.50

Figures shown are based on Grade CS 1040 Carbon steel.
For grades of 300 series stainless steel multiple value by 1.3

Downthrust due to the hydraulic thrust of the pump causes the shaft and column to stretch after the pump is in operation. Unless the impellers can be and are raised off the bottom of the bowls enough to allow for this stretch plus some running clearances, the impellers will rub, causing the pump to wear and increase kW power required. With the total hydraulic downthrust known and the Shaft Elongation determine from this Chart, the total stretch of the column shaft for the setting in question can be determined. To find the net elongation subtract from shaft elongation the column elongation

$$e = \frac{L \times 1000 \times HT \times 9.8}{E \times GSA}$$

e = elongation (mm)
L = Shaft length (m)
E = Modulus of elast. (200 x 10³ Mpa)
HT = Hydraulic thrust (kg)
CSA = Cross Section Area (mm²)