

Constants for Pump Performance at Various Speeds

200.E.06

The following are constants to be used with capacity, head and horsepower when operating speeds are those other than nominal motor speeds.

To use these constants, divide capacity and head requirements by those constants shown at the intended operating speed of the pump. Using these new capacity and head figures, select a pump from the 1800 RPM curves in Section 5. Notice that the actual operating speeds are around 1760 RPM, the reference point for the multipliers. After selecting the operating point, calculate the HP using the efficiency shown on the curve. Multiply this HP by the HP constant at the operating speed to arrive at operating HP.

After obtaining HP, check to see that this rating falls within the bowl pressure limitations and maximum shaft horsepower. Also check friction losses to insure that pump meets the rating discharge.

Example:

800 GPM, 50' TDH at Discharge at 2200 RPM

Pumping Level = 200'

Pump Setting = 250'

$800 / 1.25^* = 640$ GPM

$(200 + 50) / 1.563^* = 160'$ TDH

Select 10JHC / 4 Stage

HP = 32.3

HP at 2200 RPM = $32.3 \times 1.954^*$
= 63.1 HP

Check Friction Loss = $(250 / 100) (2.2)^\dagger$
= 5.5'

Select Pump at Maximum Diameter
10JHC / 4 Stage

*From Tables at 2200 RPM

†From Friction Tables

Multipliers for Pump Performance at Various Speeds Using 1760 RPM as Reference Speed

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RPM	GPM	HEAD	HP
1400	.7955	.6316	.5023
1450	.8239	.6786	.5590
1500	.8523	.7262	.6188
1550	.8807	.7754	.6828
1600	.9091	.8286	.7510
1650	.9375	.8798	.8048
1700	.9659	.9339	.9020
1760	REFER TO PERFORMANCE CURVE		
1800	1.023	1.04	1.06
1850	1.051	1.102	1.157
1900	1.080	1.166	1.259
1950	1.108	1.21	1.331
2000	1.136	1.276	1.44
2050	1.165	1.345	1.56
2100	1.193	1.44	1.728
2150	1.222	1.488	1.815
2200	1.250	1.563	1.954
2250	1.278	1.633	2.087
2300	1.306	1.706	2.228
2350	1.335	1.782	2.379
2400	1.363	1.858	2.532
2450	1.391	1.935	2.692
2500	1.420	2.016	2.863
2550	1.448	2.097	3.036
2600	1.477	2.182	3.223

RPM	GPM	HEAD	HP
2650	1.505	2.265	3.409
2700	1.534	2.353	3.610
2750	1.562	2.440	3.811
2800	1.590	2.528	4.020
2850	1.619	2.621	4.244
2900	1.647	2.713	4.468
2950	1.676	2.810	4.710
3000	1.704	2.904	4.948
3050	1.732	3.000	5.196
3100	1.761	3.101	5.461
3150	1.789	3.201	5.727
3200	1.818	3.305	6.090
3250	1.846	3.408	6.289
3300	1.875	3.516	6.593
3350	1.903	3.621	6.891
3400	1.931	3.729	7.200
3450	1.960	3.842	7.530
3500	1.988	3.887	7.727
3520	2.000	4.000	8.000

For Operating Speeds Other Than Those Listed:

$$GPM_1 = GPM_{1760} \left(\frac{RPM}{1760} \right) \quad HP_1 = HP_{1760} \left(\frac{RPM}{1760} \right)^3$$

$$HEAD_1 = HEAD_{1760} \left(\frac{RPM}{1760} \right)^2$$

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