



Series DB and DB-F 2 Ft. NPSH Centrifugal Pumps

- Capacities to 200 gpm
- Discharge Pressures to 250 psig

A brief discussion of NPSH

as it affects pump selection

The term NPSH (**Net Positive Suction Head**) has often been confusing for many people. In the following paragraphs we would like to clarify this term and its relevance to pump application.

NPSH is often defined as the net positive pressure which causes liquid to flow through the suction piping to a pump and enter the eye of the pump impeller. Net positive suction head is simply a statement of the minimum suction conditions required to prevent flashing of a fluid in a pump.

There are two values of NPSH. First is the required NPSH of the pump (NPSHR). Required NPSH as a function of the pump design is measured and supplied by the pump manufacturer. The second value of NPSH is that net positive suction head which is available to the pump suction (NPSHA). Both NPSHA and NPSHR are normally expressed in feet.

Net positive suction head available must be equal to or greater than the net positive suction head required by the pump for proper operation. Insufficient available NPSH will permit steam bubbles to form in the pump suction causing pump cavitation. Cavitation sets up violent conditions as steam pockets occur and implode in the pump impeller. This condition if permitted to persist will erode the impeller and reduce capacity.

Available NPSH can be easily determined using the following guideline:

Positive

- System Pressure
- Static Head
- Vapor Pressure of Liquid

Negative

- Friction Loss thru Piping
- Suction Lift

In a closed system, available suction head is equal to the system pressure. In open systems where the receivers are vented

as in most condensate or boiler feed applications the system pressure is zero. Static head or water column into the pump also develops available positive suction head. This value can be simply determined by measurement of the distance from the water line above the pump to the impeller.

The last area to evaluate positive suction head is the vapor pressure of the fluid. Typically the vapor pressure of condensate decreases as its temperature increases. This value is the difference between barometric pressure in feet and vapor pressure at a given temperature. The following chart exhibits these values for condensate (water) at sea level.

On the negative side, friction loss through the suction piping into the pump collated against the required flow of the pump must be evaluated. In addition the static lift must be considered if the condensate source into the pump is lower than the pump suction.

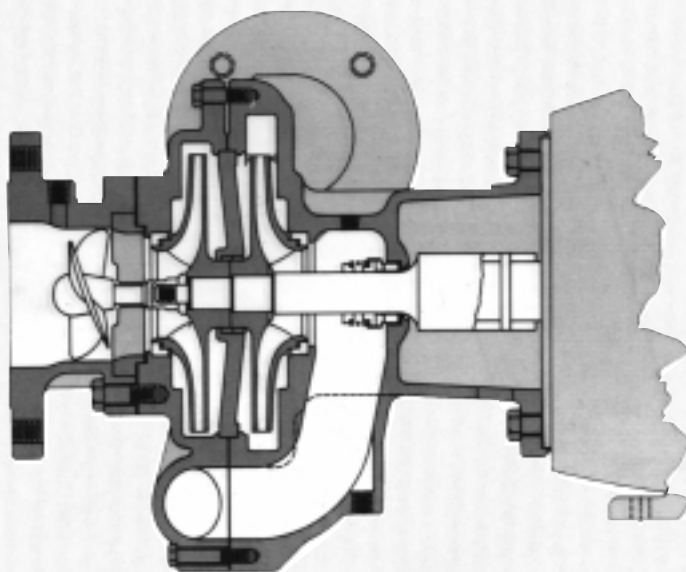
The sum of both the positive and negative sources of suction head determines the Net Positive Suction Head Available to the Pump (NPSHA).

DB and DB-F pumps are designed with an axial flow impeller that builds up a positive pressure of about 5 psig (34.4 kPa) (eleven feet of head) directly into the centrifugal impeller thus guaranteeing low NPSH pump requirements. These pumps are well suited for high temperature and less than 2 ft. (0.6M) NPSHA application. Although we do furnish pumps to operate at less than two feet NPSHA, we have on the following pages tabulated the pumps at 2 feet NPSHR. Please refer to the individual pump curves for applications which require pump NPSH other than two feet (0.6M).

**NPSH TABLE FOR WATER AT SEA LEVEL*
AND ATMOSPHERICALLY VENTED SUPPLY TANK**

Temp. °F	Temp. °C	STATIC SUCTION HEAD IN FEET (M)										
		0	1(0.3)	2(0.6)	3(0.9)	4(1.2)	5(1.5)	6(1.8)	7(2.1)	8(2.4)	9(2.7)	10(3.0)
212°	100°	0(0)	1(0.3)	2(0.6)	3(0.9)	4(1.2)	5(1.5)	6(1.8)	7(2.1)	8(2.4)	9(2.7)	10(3.0)
210°	98.9°	1.4(0.4)	2.4(0.7)	3.4(1.0)	4.4(1.3)	5.4(1.6)	6.4(2.0)	7.4(2.3)	8.4(2.6)	9.4(2.9)	10.4(3.2)	11.4(3.5)
208°	97.8°	2.6(0.8)	3.6(1.1)	4.6(1.4)	5.6(1.7)	6.6(2.0)	7.6(2.3)	8.6(2.6)	9.6(2.9)	10.6(3.2)	11.6(3.5)	12.6(3.8)
206°	96.7°	4.0(1.2)	5.0(1.5)	6.0(1.8)	7.0(2.1)	8.0(2.4)	9.0(2.7)	10.0(3.0)	11.0(3.4)	12.0(3.7)	13.0(4.0)	14.0(4.3)
204°	95.6°	5.1(1.6)	6.1(1.9)	7.1(2.2)	8.1(2.5)	9.1(2.8)	10.1(3.1)	11.1(3.4)	12.1(3.7)	13.1(4.0)	14.1(4.3)	15.1(4.6)
200°	93.3°	7.5(2.3)	8.5(2.6)	9.5(2.9)	10.5(3.2)	11.5(3.5)	12.5(3.8)	13.5(4.1)	14.5(4.4)	15.5(4.7)	16.5(5.0)	17.5(5.3)
190°	87.8°	12.5(3.8)	13.5(4.1)	14.5(4.4)	15.5(4.7)	16.5(5.0)	17.5(5.3)	18.5(5.6)	19.5(5.9)	20.5(6.2)	21.5(6.6)	22.5(6.9)

*Boiling point decreases 1°F (.55°C) for every 500 feet (150M) of elevation above sea level. [at 500' (150M) above seal level, boiling point is 211°F (99.44°C)].



PH-0109

For high pressure applications we offer the DB pump, which we believe is the most economical centrifugal pump in its performance range.

The design of the DB pump is unique: a close-coupled pump with two centrifugal impellers. Back-to-back placement of the impellers balances axial thrust, and opposed discharges balance radial thrust. The mechanical seal operates "between" stages, which prevent excessive wear. Servicing is no more complicated than the B35, except there is one more impeller. The same high quality standards and materials are used as in the other pumps: bronze-fitted construction, stainless steel shaft, hand-finished and balanced bronze centrifugal impellers. Mechanical Seal is carbon against tungsten carbide.

SELECTION DATA FOR DB

Pumps are designed for up to 35 PSI (241 kPa) suction pressure and up to 250°F (121°C). CONSULT FACTORY for other suction pressure applications.

PUMP DELIVERY IN GPM AT MOTOR HP, 3500 RPM, EITHER 2 FT. OR 3 FT. NPSH AND APPLICABLE DISCHARGE PRESSURE

HP	FT. TDH(M) PSIG (kPa)	231(70.4) 100(690)	277.2(84.5) 120(827)	323.4(98.6) 140(965)	369.3(112.6) 160(1103)	404.3(123.2) 175(1207)	462(140.8) 200(1379)	519.7(158.4) 225(1551)	577.5(176.0) 250(1724)
5	gpm (l/s) Model		12(0.8) 620						
7½	gpm(l/s) Model		45(2.8) 620	30(1.9) 620	22(1.4) 620	12(0.8) 620			
10	gpm(l/s) Model		65(4.1) 620	55(3.5) 620	45(2.8) 620				
15	gpm(l/s) Model	130(8.2) 618	110(6.9) 618	70(4.4) 620	70(4.4) 620	70(4.4) 620	37(2.3) 620		
20	gpm(l/s) Model	150(9.5) 618	150(9.5) 618	130(8.2) 618	110(6.9) 618	90(5.7) 618			
25	gpm(l/s) Model				150(9.5) 618	130(8.2) 618			
30	gpm(l/s) Model		200(12.6) 628	200(12.6) 628	155(9.8) 628	155(9.8) 628	155(9.8) 628		
40	gpm(l/s) Model				200(12.6) 628	200(12.6) 628	200(12.6) 628	155(9.8) 628	155(9.8) 628
50	gpm(l/s) Model							200(12.6) 628	175(11) 628

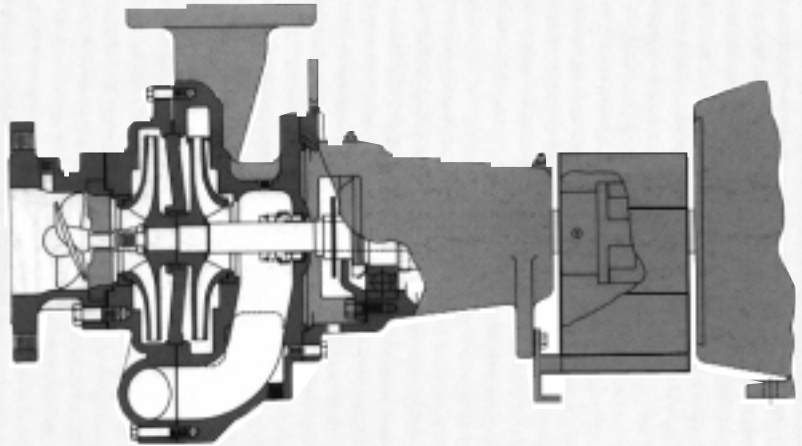
Shaded areas indicate capacities at 3 ft. (0.9M) NPSHR. Unshaded areas indicate capacities at 2 ft. (0.6M) NPSHR. For other NPSH requirements refer to pump curves. Impellers trimmed to nearest 1/16" (1.6mm) to meet capacity specified.

NOTE: TEFC and explosion proof motors available. The motor horsepower requirement is often greater using explosion proof as they have unity service factor.

DB-F

For the ultimate in pump design we offer the type DB-F base mounted pumps with electric motors or steam turbine drives.

The flexible coupled design permits ease of service. The pump may be serviced without disconnecting the motor leads, or the motor may be changed without disturbing the pump. Standard footed motors are used on the DB-F pump. Flanges compatible to ASA are provided for the suction and the discharge. The pump design is similar to the DB pump on page 3.



PH-0146

SELECTION DATA FOR DB-F Pumps are designed for up to 35 PSI (241 kPa) suction pressure and up to 250°F (121°C). CONSULT FACTORY for other suction pressure applications.

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