CHEMPUMP
A DIVISION OF TEIKOKU USA INC.

ENGINEERING DATA SHEET

Total Dynamic Head		
Date	**Supersedes**	**No.**
04/01/99	**06/01/66**	**6E**

Careful calculation of the total dynamic head (TDH) is one of the most important factors in selecting the proper size of a Chempump. The total dynamic head of any centrifugal pumping system consists of all static discharge and suction heads, all dynamic heads, all friction heads, velocity heads, and entrance and exit losses -- properly added together.

The basic rule is to add all elements which act to oppose pumping action (static discharge head, suction lift, suction supply under vacuum, friction, etc.) and then add up all elements which act to aid pumping action (static suction head, suction supply under pressure, etc.). All factors must be expressed in the same units, usually feet.

Total dynamic head is then the difference between opposing and aiding elements. Correction factors for specific gravities of fluids other than water must also be taken into consideration.

Below are lists of the aiding and opposing elements most often encountered in centrifugal pumping systems.

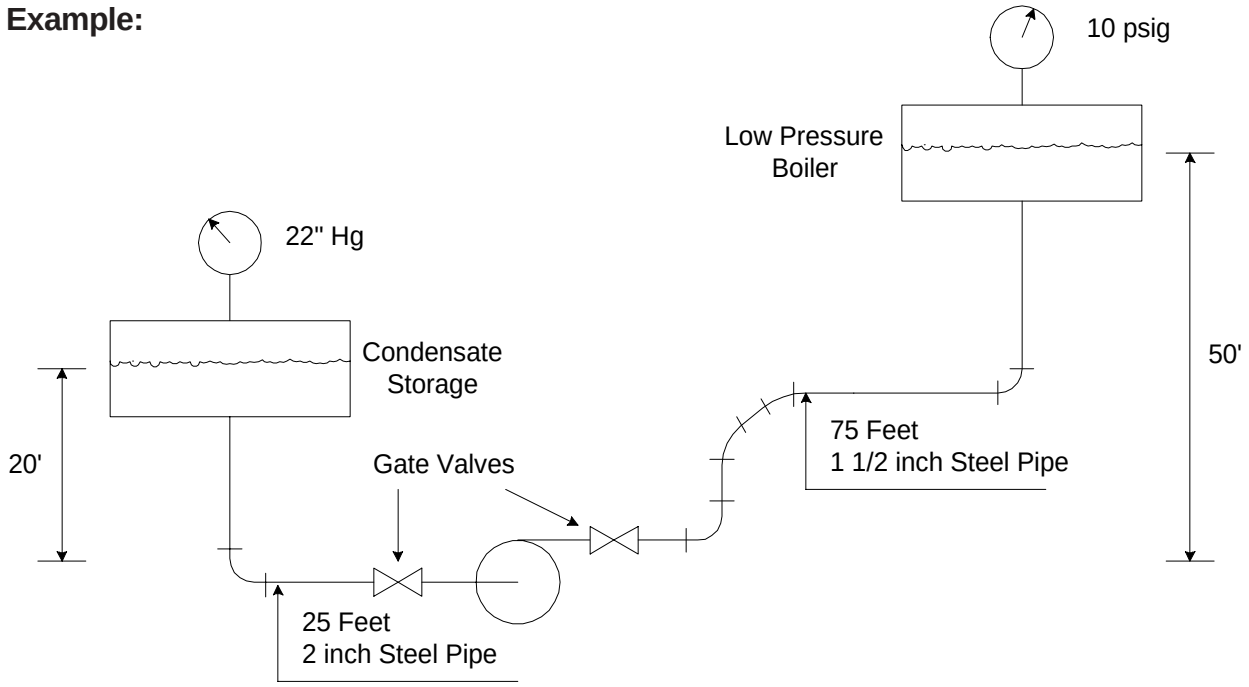
Elements Aiding Pumping Action

→ Static suction head (when free level of supply source is above pump suction centerline).
→ Pressure in closed supply vessel.
→ Vacuum in closed discharge receiver.
→ Static discharge drop (when free level of discharge receiver is below pump discharge centerline).

Elements Opposing Pump Action

→ Static suction lift (when free level of supply source is below pump suction centerline).
→ Vacuum in closed supply vessel.
→ Pressure in closed discharge receiver.
→ Static discharge head (when free level of discharge receiver is above pump discharge centerline).
→ Frictional heads due to resistance offered by piping, fittings, valves, etc., in both suction and discharge sides).
→ Velocity head (equivalent to head necessary to accelerate pumped fluid. Equal numerically to the height through which pumped fluid would have to fall to acquire velocity at which it is pumped. Given by formula, velocity head = $\frac{V^2}{2g}$, where V is velocity of pumped fluid (feet per second) and g = 32.2 (feet/second/second).
→ Entrance and exit losses due to inefficient transition from pressure heads to velocity heads, such as when fluids leave a supply vessel and enter a pipe, or vice versa.
→ Friction losses, velocity head losses, and entrance and exit losses can be found in an hydraulic data book.

Example:



Required: CHEMPUMP to handle 60 gpm water at 150° F.

Elements Aiding	Opposing	Aiding
Static Suction Head		20 ft.
Elements Opposing		
Static Discharge Head	50 ft.	
Supply Vessel Vacuum	22" Hg. = 24.9 ft.	
(Inches Hg x 1.13 = ft., water)		
Discharge Vessel Pressure	10 psig = 23.1 ft.	
(Psig x 2.31 = ft., water)		
Friction losses		
(From Cameron hydraulic data)		
2-inch line	1.9 ft.	
piping and fitting		
1 1/2-inch line	18.5 ft.	
piping and fittings		
Friction Head Losses	1.4 ft.	
Entrance Loss	.3 ft.	

Total Head Opposing	120 ft.	
Total Head Aiding		20 ft.
Total Dynamic Head (Opposing vs. Aiding)	120 ft. - 20 ft. = 100 ft.	