

ENGINEERING DATA SHEET

<i>Calculating Heat Input into Fluid Pumped</i>		
Date	Supersedes	No.
04/01/99	05/02/83	9E

Chempump's Application Engineering Department can supply a computer generated temperature - pressure profile for any application. A sample of the data presented is shown below.

To calculate the temperature and pressure at various points within the motor the following information is required:

- Specific gravity @ operating temperature
- Vapor pressure vs. temperature curve
- Specific heat @ operating temperature
- Maximum, minimum and design flow points

Please contact this department when you require this type of information.

Specific gravity @ operating temperature

calculation of pump and circulation flow temperature rise

Pump model: NC-A05-10-N4-1S

Fluid: 100% phosgene

	Reverse Circulation External Circ. Design Flow	Reverse Circulation Internal Circ. Design Flow	min flow Reverse-Internal Minimum Flow
desired flow, gpm	59.45	59.45	25.00
head, ft	205.00	205.00	236.00
temperature in, F	90.30	90.30	90.30
specific heat, btu/lb F	0.21	0.21	0.21
specific gravity	1.34	1.34	1.34
hydraulic power, hp	4.14	4.14	2.00
Total pump flow, gpm	59.45	59.45	25.00
pump efficiency - Note 1.	31.00	31.00	17.00
motor output HP	13.34	13.34	11.78
Delivered Pump Head, Ft.	205.00	205.00	236.00

motor efficiency, Note 3.	69.00	69.00	66.00
motor input KW	14.42	14.42	13.31
Overall efficiency	21.39	21.39	11.22
impeller diameter, in.	7.63	7.63	7.63
Motor circulation flow, gpm	9.18	7.34	7.50
Process Wire-Water Eff.	21.39	21.39	11.22
Total Circ rate, GPM, Note 2.	9.20	7.34	7.50
Psuct at NPSH=48.7ft.,psia	62.61	62.61	62.61

Temperature rise:

Standard circ (pump)

temp. pump exit

circ flow (motor)

total temperature rise

max temp. circ. flow

Est. P vap, psia

Reverse circ (pump)	2.25	2.35	5.09
temp. pump exit	92.55	92.65	95.39
circ flow (motor)	11.78	14.72	14.59
Total temperature rise	14.03	17.07	19.68
max. temp. circ. flow	104.33	107.37	109.98
Est. P vap, psia	43.62	45.88	47.90
Percent max circ flow	0.90	0.90	0.90
Min. Motor pressure, psia	94.85	94.85	99.72
Circ press/ differential	0.27	0.27	0.27
Margin (Motor pressure-vapor pressure)	51.23	48.97	51.83

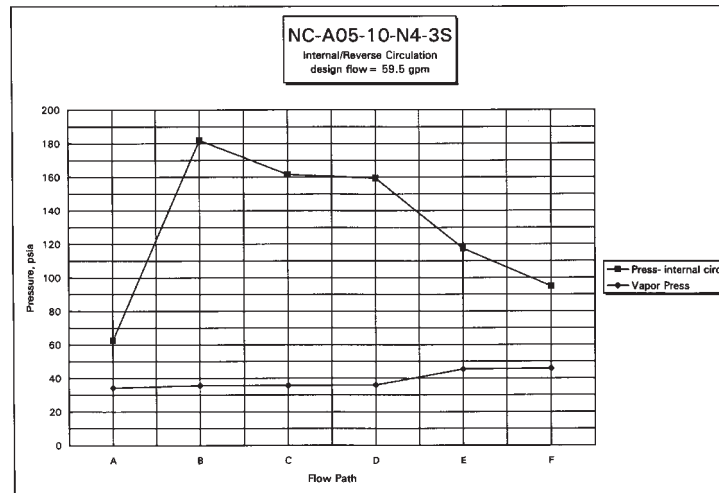
Note 1. Efficiency at "Total pump flow"

Note 2. Total Circ Flow includes front bearing flow (does not affect temp rise).

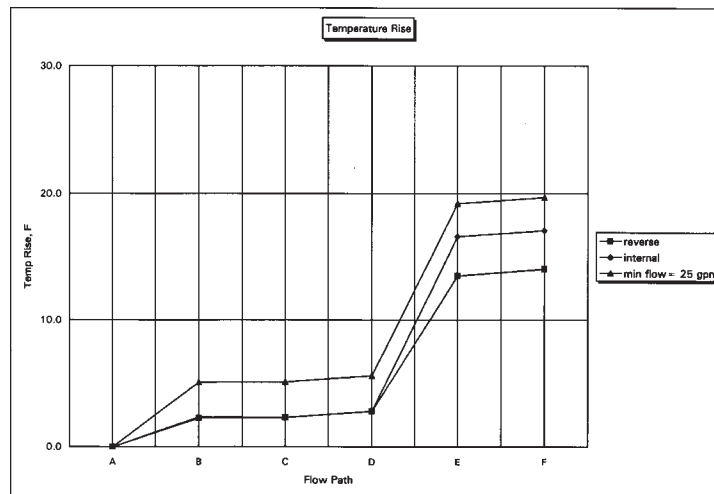
Note 3. Motor efficiency includes windage loss (correct for specific gravity).

Note 4. System heat added with reverse circulation is "total heat" less "motor heat".

Vapor pressure vs. temperature curve



Specific heat @ operating temperature



Maximum, minimum and design flow points

- A = Pump Suction
- B = Pump Discharge
- C = Inlet to Motor
- D = Inlet of Rotor
- E = Outlet of Rotor
- F = Return to Suction

