



16HS21 RAW RIVER WATER INTAKE PUMP

PUMPSENSE
FLUID
ENGINEERING
PVT. LTD.

FREQUENTLY ASKED QUESTIONS

8HS18TB WITH CORROSION RESISTANT MATERIAL



1. Effect of Expansion Joint



Fig. 1: Expansion Joint with corrugated bellows

Purpose of an expansion joint

1. Prevents transmission of piping strain onto the pump. Piping strain is due to piping misalignment or due to thermal growth while handling hot liquid.
2. Expansion joint introduces a reaction force and a torque on the pump and its foundation.
3. The reaction force for a vertically mounted expansion joint is:

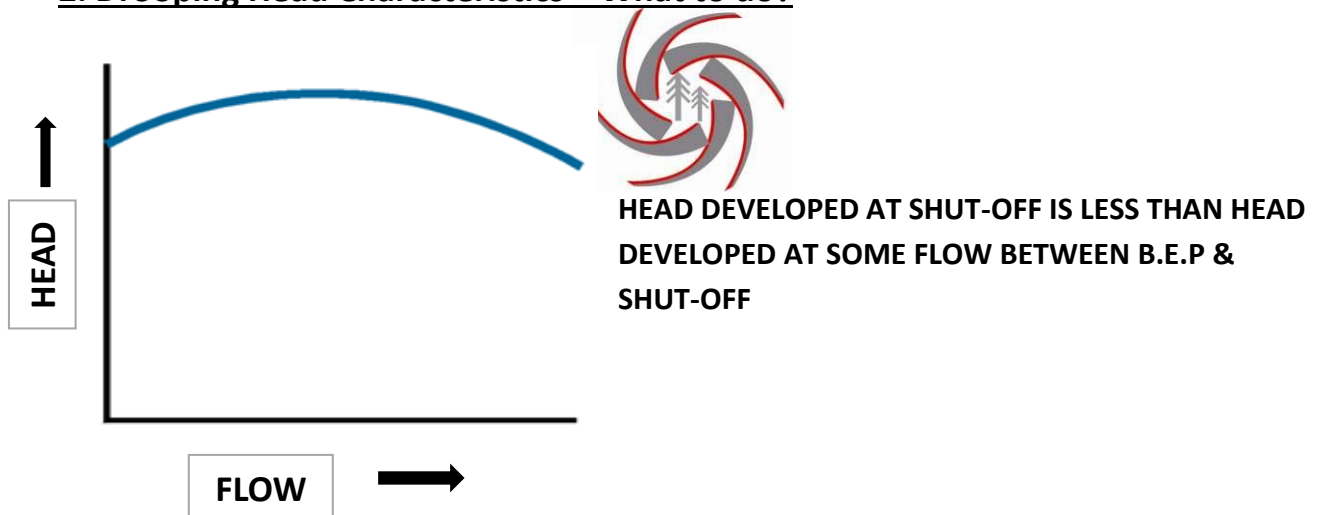
$$R = \text{Pressure} \times \text{Area}$$

Area is based approximately corresponding to the mean diameter of the corrugated bellows.

Tide water Problem		
pump capacity	1600	m ³ /hr
pump head	140	m
pump discharge flange	12	inch
discharge pipe expansion joint ID	12	inch
discharge pipe expansion joint corrugation OD	17	inch
expansion joint corrugation Mean dia (Dm)	14.5	inch
expansion joint corrugation effective area ($A_e = \pi * D_m^2 / 4$)	165.0463	inch ²
internal fluid pressure (p)	199	psi
force acting on expansion joint (F)	32844.2	pounds
	14897.8	Kg-f

Fig. 2: Sample calculation to find the reaction force for an expansion joint

2. Drooping Head Characteristics – What to do?



1. If it is a single pump operation with relatively large friction head component- Generally no problems, if the capacity is not regulated by throttling.
2. If multiple pumps are operating in parallel with drooping or unstable H-Q curve, problem of unequal load sharing occurs.
3. Pumps operating in a system with very high propulsion of static head may undergo problems with a drooping head curve.

3. Delivery & Suction branch size

For Suction Branch

- At least 5 pipe diameters should be provided after last bend to pump inlet.
- Optimum length of a full size straight pipe, devoid of any flow obstruction, immediately upstream of the pump suction connection, should be 10D.
- Total length of suction line must be kept within 100D with minimum no. of connections.
- The straight suction pipe should rise steadily towards the inlet.
- Double Suction pumps should have pipe elbows perpendicular to the pump shaft.

For Delivery Branch

- Pumps of low specific speed should have at least 10 pipe diameters before first end.
- Non Return Valve (if fitted) should be downstream of valve, to protect it against water hammer effect.

General

- In general, any extra accessories/connection like strainers, check valves etc. should only be included when absolutely necessary.
- Piping should run directly vertically or horizontally into the pump without high pockets (high pockets) that can cause air accumulation.

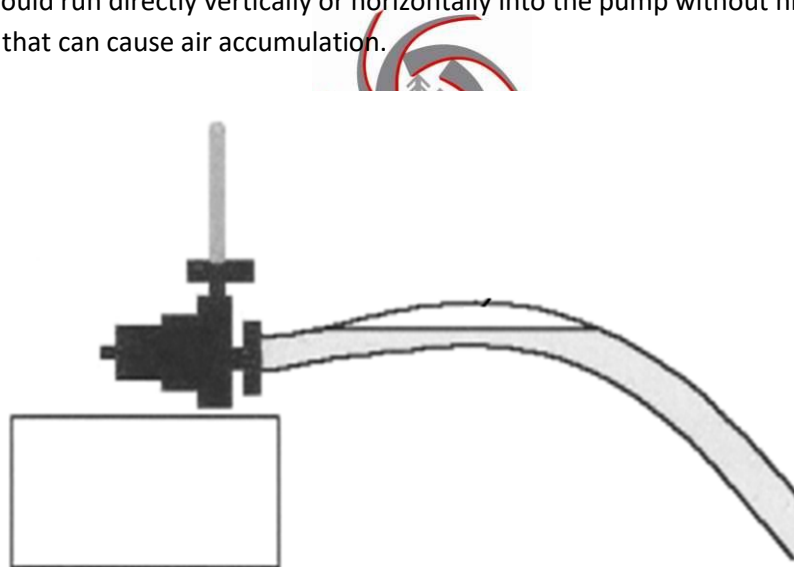


Fig. 2: Air accumulation at high pockets

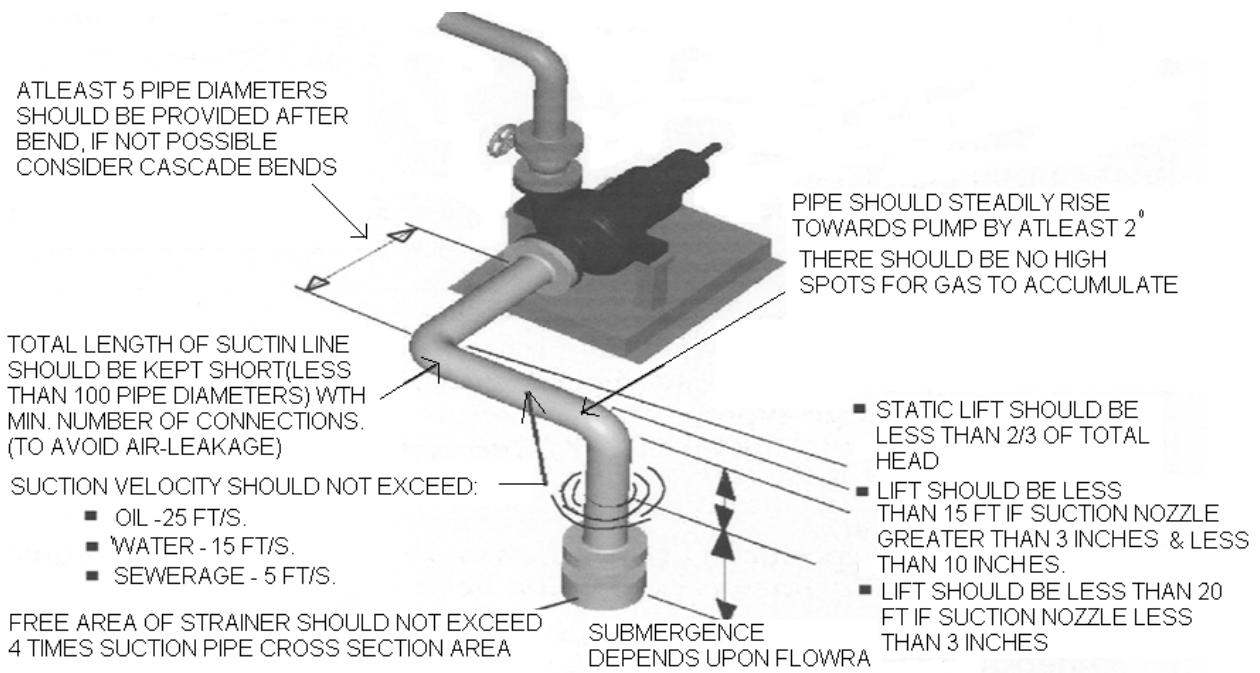


Fig. 3: General Guidelines for Suction Branch Design

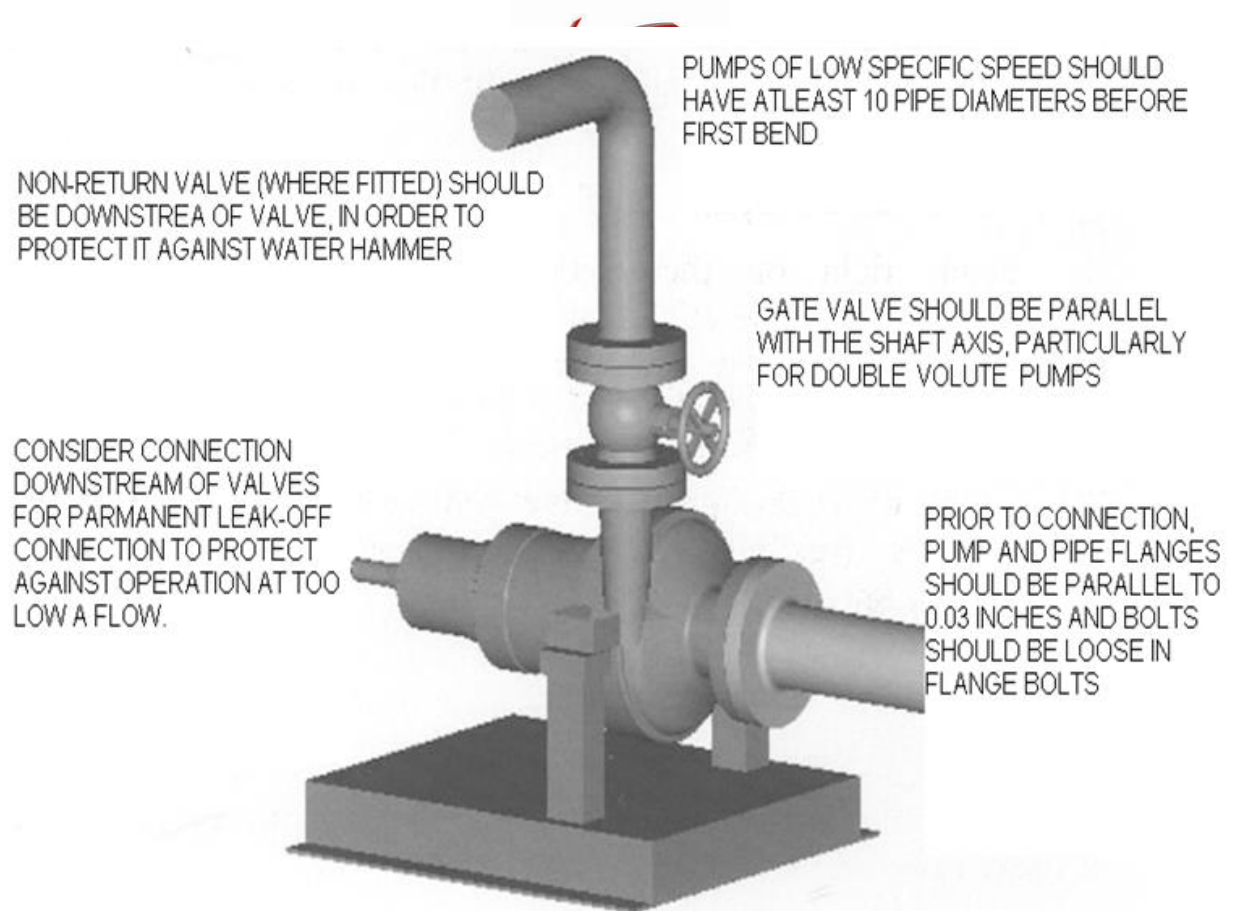


Fig. 4: General Guidelines for Delivery Branch Design