

For the purpose of specifying a pump, the design engineer needs to calculate the pressure loss of piping system in suction and discharge side of the pump. This calculation requires estimating the pressure loss of each item on the pipe including pipe appurtenances and equipment. The pressure losses of popular pipe fittings are available in tables in respective references like Crane or Perry's. The below tables give a rough estimation of equipment pressure loss in the absence of manufacturers' information.

**Shell & tube Heat Exchanger**

Single phase	
Gas/ vapour	5 psi
Liquid	10 psi (5 psi for water)
Phase Change	
Liquid → vapour	5 psi
Vapour → liquid	10 psi(depends on operating pressure)

**Plate Type Heat Exchanger**

Single phase	
Liquid	Up to 10 psi per Pass

**Control Valve**

Globe type	10 psi or 35% of pipe pressure loss
Rotary type	5 psi or 35% of pipe pressure loss

**Flow meter**

DP type (orifice plate type)	10 psi
Ultrasound / magnetic type	2 psi
Coriolis type	20 psi

**Miscellaneous**

Pump Suction strainer	2 psi
Spray Nozzle	10 psi
Spray nozzle for smaller atomization	40 psi
Automatic Min flow adjuster	10 psi
Spring loaded check valve	5 psi
Pressure Safety Valve(PSV)	10-20 psi
Furnace	20 psi

All the above liquid pressure losses are for watery liquids. For higher viscosities, the DP could be increase by a factor of  $\mu^{0.16}$  for fully turbulent flow to  $\mu^1$  for complete laminar flow.

### Flooded Vessels

In the cases vessel which cannot be assumed as “node” (constant pressure), its pressure loss should be estimated. These vessels are usually flooded vessels. For pressure loss estimation the design engineer generally relies on the vendor information. However, in the absence of that, the total pressure loss includes some or all the below components:

- Vessel Inlet: Sudden expansion (can be calculated through pipe fitting formula)
- Distributor =  $100 * \Delta P$  expansion(from above)
- Media ( $\approx 1$  mm Dia.) 1 KPa per meter of bed depth
- Collector =  $100 * \Delta P$  contraction(from below)
- Vessel Outlet: Sudden contraction(can be calculated through pipe fitting formula)

Although the author have made every effort to ensure that the information in this article was correct at publication time, the author do not assume and hereby disclaim any liability to any party for any loss, damage, or disruption caused by errors or omissions, whether such errors or omissions result from negligence, accident, or any other cause.