The purpose of the guideline is to lay down the procedure for estimation of pressure drop across filters/strainers in a piping system.

For pressure drop estimation graphs are referred.

This graph gives pressure drop based on specific gravity of water 1.0 and viscosity of water 1.0 cP.

Screen openings chart indicates the % open area of perforated plate and meshed line screens.

For fluids of high viscosity and finer weave meshes viscosity and density correction factor chart will be referred.
Estimate pressure drop across 100 mesh lined Sure Flow Y-strainer provided in a 6" line with following data.

- Flow rate = 700 GPM
- Viscosity = 100 cP
- Specific Gravity = 0.80
- 100 mesh screen

The Pressure Drop Chart for Y-strainer indicates a drop of 1.3 psi.
Sample calculation

The Screen openings chart indicates the % open area of 100 mesh is 30%.
Sample calculation

From chart #1 correction factor to be 1.2.

<table>
<thead>
<tr>
<th>Size Range</th>
<th>Screen Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perforated Plate</td>
</tr>
<tr>
<td></td>
<td>% screen Material Open Area</td>
</tr>
<tr>
<td>1/4” – 1-1/2”</td>
<td>60% 50% 40% 30% 20%</td>
</tr>
<tr>
<td>1/4” – 1-1/2”</td>
<td>0.45 0.55 0.7 1 1.15</td>
</tr>
<tr>
<td>2” – 48”</td>
<td>0.65 0.8 1 1.4 2.15</td>
</tr>
</tbody>
</table>

Total Pressure drop (P1) = 1.3 X 1.2 = 1.56 psi

Multiply P1 by the specific gravity of the fluid actually flowing through the strainer to get P2 ➔ Since specific gravity = 0.80
Pressure drop (P2) = P1 X Sp. Gravity = 1.56 X 0.80 = 1.25 psi
Sample calculation

Using chart 2 multiply P2 by the appropriate component factor (CF) to get P3.

Viscosity & Density correction factor chart

(Chart 2)

<table>
<thead>
<tr>
<th>Size range</th>
<th>Component Factor (CF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4” – 1-1/2”</td>
<td>0.25</td>
</tr>
<tr>
<td>2” – 48”</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Using chart 2, (P3) = P2 X (CF) = 1.25 X 0.35 = 0.44 psi
Let, P4 = P2 – P3 = 1.25 – 0.44 = 0.81 psi
Sample calculation

Multiply P3 by the appropriate body loss factor (BF) in chart 3 to get P5

Using chart 3 → P5 = P3 X (Body Loss Factor)

= 0.44 x 1.6 = 0.70 psi
Sample calculation

Multiply P4 by the appropriate Screen Loss factor (PF OR MF) in chart 3 to get P6

Using chart 3, P6 = P4 X (PF or MF) = 0.81 X 6.5 = 5.27 psi

⇒ Total pressure drop (P7) = P5 + P6
⇒ Total pressure drop (P7) = 0.70 + 5.27 = 5.97 psi
Watch out for pressure differential (pressure drop)

For maximum efficiency, a differential pressure gauge installed across the inlet and outlet will indicate pressure loss due to clogging and may be used as a guide to determine when cleaning is required. Normally, when differential pressure reaches 5–10 psi, screen must be cleaned.

If the Y-strainer is equipped with a blow off connection.

The screen can thus be cleaned by simply opening then closing the blow off plug.

We can also install a blow out (drain) valve at the blow out connection of the Y-strainer. So it is easy for us to clean the strainer without shutting off the flow or disassembling the strainer.
When to clean the basket?

Strainer baskets should be cleaned on a regular basis, not when they become clogged, to insure that they are not damaged by too high a differential pressure. Another reason for frequent cleaning is a phenomenon known as "runaway buildup". As dirt in a strainer basket accumulates and as the mesh or perforations plug up, pressure drop increases. The curve of this pressure difference is not a straight line. It starts out as a low slope, but as the basket clogs more and more it turns upward faster and faster. As the dirt builds up the free open area in the basket gets smaller and smaller.

All conditions in the basket are now working faster and faster to decrease the flow passage and to increase drag on the liquid flowing through the basket. Dirt is being brought faster to the passages that are open and they are being shut faster. Liquid velocity and pressure inside the basket build up faster and the whole thing keeps accelerating. It is similar to a fire in that it progresses with increasing speed.

It means that a good flow of liquid can slow to a trickle or stop quickly. It also means that full line pressure is now brought to bear across the basket, and as pointed out before, if this is high, breakage can occur. Good maintenance procedure dictates that basket be cleaned or changed before they can become clogged. Most strainer users do this at standard intervals, whether the basket are ready for cleaning or not.

Of course, the most obvious indication that a basket need changing is a drop in flow through the line. In closed systems this is not always so easy to notice. In these cases installation of a pressure gauge on the downstream side of the strainer will point out drop in flow or pressure. Better yet, two gauges, one on either side of the strainer, will indicate pressure drop through the unit and show whether the basket needs cleaning.
Select the anticipated clogging (%) at the left of the chart. The example shows a basket 50% clogged. Then, follow that value to the right until the curve is intersected. From that point follow downward to the scale along the bottom to read the pressure drop multiplying factor, in this case 2. The resulting pressure drop across the basket at 50% clogged is twice as great as that for a clean basket.

**THEORETICAL PRESSURE DROP CURVE FOR SCREEN CLOGGING**

Based on flow formula: \( Q = KA\sqrt{\Delta P} \)
For example:
Please find the pressure drop for a clean basket screen which is 50% clogged for the previous 6” Sure Flow Y-strainer?

Total pressure drop (P7) = 0.70 + 5.27 = 5.97 psi
From the “% screen clogging” versus “pressure drop factor” chart ➔ The pressure drop factor of 50% clogged screen is 2

So we have to clean the screen of the Y-strainer when the Y-strainer’s pressure drop reaches 2 x 5.97 psi = 11.94 psi!