Strainer Pressure Drop when Clean and Clogged

Pressure drop across a pipeline strainer from its loss coefficient and flow, its rise as the screen clogs, and the clogging at which a differential alarm is reached.

Method: Loss coefficient with open-area scaling; Crane Technical Paper 410; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Flow	100.00	m³/h
Pipe (inlet) diameter	150.00	mm
Clean strainer loss coefficient	2.5000	
Fluid density	1,000.0	kg/m³
Fraction of screen open area blocked	50.000	%
Differential pressure alarm	50.000	kPa

Calculated results

Parameter	Value	Unit
Pipe velocity	1.5719	m/s
Clean pressure drop	3.0886	kPa
Pressure drop at that clogging	12.354	kPa
Clogging at the alarm	75.146	%

Notes for this case

• Δp = Kρv²/2 clean; the screen loss scales with 1/(open area)², so with a fraction c blocked Δp ≈ Δp₀/(1 − c)² (housing losses assumed small). Set the alarm well below the screen's collapse rating.

Formula and method

$$\Delta p_0 = K\frac{\rho v^2}{2}, \quad \Delta p_c = \frac{\Delta p_0}{(1-c)^2}, \quad c_{al} = 1 - \sqrt{\frac{\Delta p_0}{\Delta p_{al}}}$$

Variables

Q	Flow	m³/s
D	Pipe (inlet) diameter	m
K	Clean strainer loss coefficient	-
ρ	Fluid density	kg/m³
c	Fraction of screen open area blocked	-
Δp_{al}	Differential pressure alarm	Pa
v	Pipe velocity	m/s
Δp_0	Clean pressure drop	Pa
Δp_c	Pressure drop at that clogging	Pa
c_{al}	Clogging at the alarm	-

Method and standards

Strainer loss.

Assumptions and limits

- Screen loss dominates; incompressible flow.

References

Loss coefficient with open-area scaling, Crane Technical Paper 410, Flow of Fluids through Valves, Fittings and Pipe (Crane)

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/fluid-mechanics/strainer-pressure-drop-clogging

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.