U-Tube Manometer Pressure Difference

Pressure difference from a U-tube manometer reading with a manometer liquid and a process fluid above it, and for an inclined-tube manometer.

Method: Hydrostatics of a U-tube manometer

Input parameters

Unit system: SI

Parameter	Value	Unit
Reading (difference in levels or length along an inclined tube)	250.00	mm
Density of the manometer liquid Mercury 13 546 kg/m³ at 20 °C; water 998.	13,546	kg/m³
Density of the fluid above it	998.00	kg/m³
Tube angle from horizontal (90° for a vertical U-tube)	90.000	°

Calculated results

Parameter	Value	Unit
Pressure difference g h sin θ (ρ_m − ρ_f)	30.763	kPa
Vertical height difference	250.00	mm
Equivalent column of water at 1000 kg/m³	3,137.0	mm

Formula and method

$$\Delta p = g\,h\sin\theta\,(\rho_m - \rho_f)$$

Variables

h	Reading (difference in levels or length along an inclined tube)	m
ρ_m	Density of the manometer liquid	kg/m³
ρ_f	Density of the fluid above it	kg/m³
θ	Tube angle from horizontal (90° for a vertical U-tube)	rad
Δp	Pressure difference g h sin θ (ρ_m − ρ_f)	Pa
h_v	Vertical height difference	m
h_{wc}	Equivalent column of water at 1000 kg/m³	m

Method and standards

Hydrostatics.

Assumptions and limits

- Static liquids. For a well-type inclined manometer the reservoir level also falls: multiply by (1 + a/(A sin θ)) with a/A the tube-to-well area ratio; this correction is not applied.

References

- Hydrostatics of a U-tube manometer

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/manometer-reading

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.