Reflux Drum Size from Hold-Up Time

Volume, diameter and length of a horizontal reflux drum from the reflux and distillate liquid flows, hold-up time, fill fraction and length-to-diameter ratio.

Method: Vessel volume from hold-up time (definition); typical hold-up times and L/D are design choices

Input parameters

Unit system: SI

Parameter	Value	Unit
Reflux + distillate liquid flow	30.000	m³/h
Hold-up time (normal to empty)	5.0000	min
Liquid fill at normal level (volume fraction)	50.000	%
Length to diameter ratio	3.0000	

Calculated results

Parameter	Value	Unit
Liquid hold-up	2.5000	m³
Drum volume	5.0000	m³
Diameter	1.2850	m
Length	3.8551	m

Formula and method

$$V_L = \dot{V}_L t_h, \quad V = \frac{V_L}{\phi}, \quad D = \sqrt[3]{\frac{4V}{\pi (L/D)}}$$

Variables

$\dot{V}_L$	Reflux + distillate liquid flow	m³/s
t_h	Hold-up time (normal to empty)	s
ϕ	Liquid fill at normal level (volume fraction)	-
L/D	Length to diameter ratio	-
V_L	Liquid hold-up	m³
V	Drum volume	m³
D	Diameter	m
L	Length	m

Method and standards

Hold-up definition and cylinder geometry.

Assumptions and limits

- Cylinder only; heads ignored.
- φ is the liquid volume fraction. In a horizontal drum the level and volume fractions are equal only at half full; convert a level fraction to volume with the segment geometry before entering it.

References

- Vessel volume from hold-up time (definition); typical hold-up times and L/D are design choices

Report details

Report reference	FCC-APHM-7FQH (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Reflux Drum Size from Hold-Up Time
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/chemical/separation/reflux-drum-sizing

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.