Thickener (Decker) Balance: Filtrate and Fibre Loss

Thickened stock and filtrate flows of a decker or disc thickener from inlet and outlet consistency and filtrate consistency, with fibre lost to the filtrate.

Method: Smook; Handbook for Pulp & Paper Technologists; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Stock in	500.00	t/h
Inlet consistency	0.80000	%
Outlet consistency	12.000	%
Filtrate consistency	0.030000	%

Calculated results

Parameter	Value	Unit
Thickened stock	32.164	t/h
Filtrate	467.84	t/h
Fibre in the filtrate	3.3684	t/d
Fibre retention	96.491	%

Formula and method

$$\dot{m}_{out} = \dot{m}_{in}\frac{C_{in} - C_f}{C_{out} - C_f}, \quad \dot{m}_f = \dot{m}_{in} - \dot{m}_{out}, \quad \dot{m}_{f,OD} = \dot{m}_f C_f, \quad R = \frac{\dot{m}_{out}C_{out}}{\dot{m}_{in}C_{in}}$$

Variables

$\dot{m}_{in}$	Stock in	kg/s
C_{in}	Inlet consistency	-
C_{out}	Outlet consistency	-
C_f	Filtrate consistency	-
$\dot{m}_{out}$	Thickened stock	kg/s
$\dot{m}_f$	Filtrate	kg/s
$\dot{m}_{f,OD}$	Fibre in the filtrate	kg/s
R	Fibre retention	-

Method and standards

Total and fibre balances.

Assumptions and limits

- Steady state.

References

- Smook
- Handbook for Pulp & Paper Technologists
- 3rd ed. (Angus Wilde, 2002)
- ch. 9.6 (thickening)

Report details

Report reference	FCC-86E6-Q3RK (the same inputs always give the same reference)
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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/pulp-paper/thickener-decker-balance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.