Bleaching Stage: Chemical, Solution and Dilution Water

Chemical use, solution flow and dilution water of a bleaching stage from OD pulp flow, chemical charge on pulp, solution strength and the stage consistency.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Pulp production (oven-dry)	500.00	t/d
Chemical charge on OD pulp On the same chemical basis as the solution strength (for example both as ClO_2, not one as active chlorine: 1 kg ClO_2 = 2.63 kg active chlorine).	1.0000	%
Chemical solution strength	10.000	g/L
Consistency of pulp entering the mixer	12.000	%
Stage consistency	10.000	%

Calculated results

Parameter	Value	Unit
Chemical	208.33	kg/h
Chemical solution	347.22	L/min
Dilution water after the solution	13.889	t/h

Formula and method

$$\dot{m}_c = c\,\dot{m}_{OD}, \quad \dot{V}_s = \frac{\dot{m}_c}{s}, \quad \dot{m}_{dw} = \dot{m}_{OD}\left(\frac{1}{C_{st}} - \frac{1}{C_{in}}\right) - \rho_w \dot{V}_s$$

Variables

$\dot{m}_{OD}$	Pulp production (oven-dry)	kg/s
c	Chemical charge on OD pulp	-
s	Chemical solution strength	kg/m³
C_{in}	Consistency of pulp entering the mixer	-
C_{st}	Stage consistency	-
$\dot{m}_c$	Chemical	kg/s
$\dot{V}_s$	Chemical solution	m³/s
$\dot{m}_{dw}$	Dilution water after the solution	kg/s

Method and standards

Fibre and water balances.

Assumptions and limits

- Solution density 1 kg/L.
- The charge and the solution strength must be on the same chemical basis (both as ClO_2, or both as active chlorine; they differ by 2.63 times).
- When the solution alone over-dilutes, or the stage is thicker than the incoming pulp, no dilution water is shown and a note explains why.

References

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

- ch. 11 (bleaching: charges on OD pulp at a stage consistency)

Report details

Report reference	FCC-B4QQ-1QCW (the same inputs always give the same reference)
Generated	17 November 2026, 19:36 UTC
Calculator	Bleaching Stage: Chemical, Solution and Dilution Water
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/chemical/pulp-paper/bleaching-chemical-charge

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.