Deaerator and Feed Water Tank Sizing

Storage volume and total volume of a deaerator storage tank or feed water tank for a feed flow and storage time, with the length for a chosen diameter.

Method: IAPWS R7-97(2012) IF97 (saturated water density)

Input parameters

Unit system: SI

Parameter	Value	Unit
Feed water flow (boiler MCR plus blowdown)	51,000	kg/h
Storage time between normal and low-low level Enter your specification's storage time. Default from FireCAD design practice; enter your specification's value.	10.000	min
Deaerator pressure (absolute) The water is taken as saturated at this pressure.	1.2000	bar
Usable share of the tank volume Volume between normal water level and low-low level divided by the total volume. Enter your design's value.	70.000	%
Tank inside diameter for the length (0 = skip)	2.4000	m

Calculated results

Parameter	Value	Unit
Total tank volume	12.717	m³
Storage (working) volume	8.9018	m³
Length of a horizontal cylinder of that diameter	2.8110	m
Water density at saturation	954.87	kg/m³

Formula and method

$$V_s = \frac{\dot{m}_{fw} t_s}{\rho} \qquad V_t = \frac{V_s}{f} \qquad L = \frac{V_t}{\pi D^2/4}$$

Variables

$\dot{m}_{fw}$	feed water flow	kg/s
t_s	storage time between normal and low-low level	s
p_{da}	deaerator pressure, absolute	Pa
f	usable share of the tank volume	–
D	tank inside diameter	m
V_t	total tank volume	m³
V_s	storage volume	m³
L	length of a horizontal cylinder of that diameter	m
ρ	density of saturated water at p_{da}	kg/m³

Method and standards

Volume balance; density of saturated water at the deaerator pressure from FireCAD's IAPWS-IF97.

Assumptions and limits

- The length is that of a plain cylinder; dished ends add volume (use the tank volume calculator for the ends).
- The usable share depends on the level settings and the tank shape; for a horizontal tank it is not the same as the height ratio.

References

• IAPWS R7-97(2012) IF97 (saturated water density)

Report details

Report reference	FCC-2NDN-E216 (the same inputs always give the same reference)
Generated	17 November 2026, 19:36 UTC
Calculator	Deaerator and Feed Water Tank Sizing
Method last reviewed	10 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/boilers-power-plant/steam/feedwater-tank-sizing

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.