Nitrogen for Boiler Lay-Up (Dry Storage)

Nitrogen in normal cubic metres to fill a drained boiler at a capping pressure and temperature, times the number of fills or purges, and the cylinders needed.

Method: Ideal gas V_n = V (p/p_n)(T_n/T) n

Input parameters

Unit system: SI

Parameter	Value	Unit
Steam–water volume to fill	80.000	m³
Nitrogen capping pressure (absolute)	1.5000	bar
Temperature	30.000	°C
Fills (including purges)	3.0000	
Nitrogen per cylinder (normal m³) Normal m³ per cylinder.	7.0000	m³

Calculated results

Parameter	Value	Unit
Nitrogen (normal m³ at 0 °C, 1 atm)	320.13	m³
Cylinders	46.000	

Notes for this case

- Purge until the vent oxygen is low before capping; keep a small positive pressure and log it daily.
- Each fill or purge is counted as a full boiler volume at the capping pressure. For pressure purges vented to atmosphere each cycle adds only about V(p − p_atm)/p_n, so the total is conservative.

Formula and method

$$V_n = V\frac{p}{p_n}\frac{T_n}{T}n$$

Variables

V	Steam–water volume to fill	m³
p	Nitrogen capping pressure (absolute)	Pa
T	Temperature	K
n	Fills (including purges)	-
V_c	Nitrogen per cylinder (normal m³)	m³
V_n	Nitrogen (normal m³ at 0 °C, 1 atm)	m³
N_c	Cylinders	-

Method and standards

Ideal gas.

Assumptions and limits

- Ideal gas.
- Each fill or purge counts as a full boiler volume of nitrogen at the absolute capping pressure (displacement purging). Pressure purges vented to atmosphere use only about V(p − p_atm)/p_n per cycle, so the result is conservative for them (about 3 times high at 1.5 bar absolute).
- Volumes are normal cubic metres at 0 °C and 1 atm, shown in m³ in every unit system; US standard cubic feet at 60 °F are a different basis.

References

- Ideal gas V_n = V (p/p_n)(T_n/T) n

Report details

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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/boilers-power-plant/water-treatment/nitrogen-lay-up

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.