Swimming Pool Evaporation Rate and Latent Load

Evaporation from an indoor pool from surface area, water and air temperatures, humidity, air speed and activity factor, with the latent load and daily water loss.

Method: ASHRAE Handbook—HVAC Applications (2019); ch. 6 (natatoriums: w_p = A(p_w − p_a)(0.089 + 0.0782V)/Y × F_a); IAPWS-IF97 for p_w and Y

Input parameters

Unit system: SI

Parameter	Value	Unit
Pool surface area	300.00	m²
Water temperature	28.000	°C
Room air temperature	30.000	°C
Room relative humidity	60.000	%
Air velocity over the water	0.10000	m/s
Activity factor	0.80000	

Calculated results

Parameter	Value	Unit
Evaporation rate	42.428	kg/h
Latent heat load	28.693	kW
Water lost per day	1,018.3	L

Notes for this case

• ASHRAE pool equation (w_p in kg/s with p in kPa, Y in kJ/kg). Activity factors: residential 0.5, hotel 0.8, public pools 1.0, whirlpools 1.0, wave pools 1.5. Keep room air 1–2 K above water to limit evaporation.

Formula and method

$$w_p = \frac{A(p_w - p_a)(0.089 + 0.0782V)}{Y} F_a$$

Variables

A	Pool surface area	m²
t_w	Water temperature	K
t_a	Room air temperature	K
φ	Room relative humidity	-
V	Air velocity over the water	m/s
F_a	Activity factor	-
w_p	Evaporation rate	kg/s
Q_l	Latent heat load	W
V_d	Water lost per day	m³

Method and standards

ASHRAE pool evaporation.

Assumptions and limits

- Indoor pool; steady state.

References

• ASHRAE Handbook—HVAC Applications (2019)
• ch. 6 (natatoriums: w_p = A(p_w − p_a)(0.089 + 0.0782V)/Y × F_a); IAPWS-IF97 for p_w and Y

Report details

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Calculator	Swimming Pool Evaporation Rate and Latent Load
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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/hvac/loads/pool-evaporation-load

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.