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tankless water heater sizing guide

Published: September 3, 2026 | Index ID: #-

Tankless Water Heater Sizing Guide: How to Pick the Right Unit for Your Home

When it comes to hot water, most homeowners still rely on the old-school storage tank. But a tankless water heater—also called a point of use or on demand system—offers instant heat, energy savings, and a smaller footprint. Choosing the correct size is critical. A unit that's too small will leave you with cold showers, while an oversized model wastes money and space. This comprehensive sizing guide walks you through every step, from measuring flow rates to calculating BTUs, so you can confidently select the best tankless water heater for your household.

What Is a Tankless Water Heater?

A tankless water heater heats water directly as it flows through the unit, eliminating the need for a storage tank. It's a compact appliance that can be installed under a sink, in a closet, or even on a wall. Because it doesn't store hot water, it can deliver a continuous supply—provided the unit's capacity matches the household's demand.

Key Advantages

- Energy Efficiency: No standby losses; energy is used only when hot water is requested.
- Space Savings: Typically 30–40% smaller than storage tanks.
- Longer Lifespan: Most units last 15–20 years with proper maintenance.
- Consistent Temperature: Maintains a set temperature regardless of water flow.

Common Types

- Electric Tankless: Ideal for homes with high electrical capacity and moderate hot water needs.
- Gas Tankless: Provides higher flow rates, making it suitable for larger households or multiple simultaneous fixtures.
- Hybrid (Heat Pump): Uses electricity to move heat from the air, offering the best energy factor for milder climates.

Why Sizing Matters

Proper sizing ensures that your tankless water heater can meet peak demand without dropping the temperature. An undersized unit will struggle to keep up when you run a shower, a dishwasher, and a washing machine at the same time. Conversely, an oversized unit may require more space and higher upfront costs without any real benefit. Accurate sizing also helps you avoid costly retrofits or the need to install a secondary system.

Core Factors in Sizing a Tankless Water Heater

Three main variables influence the required capacity:

1. Flow Rate (Gallons Per Minute, GPM): How much water you need at once.
2. Temperature Rise (9EB“ The difference between the incoming cold water temperature and the desired hot water temperature.
3. Peak Demand: The maximum number of fixtures that will operate simultaneously.

Additional considerations include climate (cold vs. hot water supply), local water pressure, and whether you're installing an electric or gas unit.

Step-by-Step Sizing Process

1. Identify Your Hot Water Fixtures

List every fixture that draws hot water: showers, bathtubs, kitchen faucets, dishwashers, washing machines, and any specialty appliances like coffee makers. Note their approximate flow rates (often found in the manufacturer's spec sheet).

2. Calculate the Required Flow Rate

For each fixture, find its flow rate in gallons per minute (GPM). Common values:

- Showerhead: 2.5–5.0 GPM (depending on pressure).
- Kitchen faucet: 1.5–2.5 GPM.
- Dishwasher: 1.5–2.0 GPM.
- Washing machine: 1.0–1.5 GPM.

Add the GPM of all fixtures that might run simultaneously. If you're unsure, assume the worst case—e.g., shower + dishwasher + washing machine.

3. Determine the Temperature Rise (9EB•

Measure or estimate the incoming cold water temperature. In colder climates, it may be 45°F or lower; in warmer areas, it can be 60°F or higher. Decide the desired hot water temperature—commonly 120°F. Compute 9E@ by subtracting the cold water temperature from the desired temperature.

Example: Cold water 50°F !' Desired 120°F !' 9EB Ò s `.

4. Use the BTU Formula

BTU (British Thermal Unit) is the energy needed to heat water. The standard formula is:

BTU = Flow Rate (GPM) × Temperature Rise (9EB' r S à

Why 500? Because 1 GPM of water requires 500 BTU to raise its temperature by 1°F. After calculating BTU, convert to kilowatts (kW) by dividing by 3,412.

kW = BTU ÷ 3,412.

5. Add a Safety Margin

Manufacturers typically recommend adding 20–25% to the calculated BTU to accommodate fluctuations in water temperature, pressure drops, and future needs. For example, if the calculation yields 12,000 BTU, target a unit rated for 14,400 BTU.

6. Match the Unit's Capacity

Review the product specifications of available tankless models. Look for:

- BTU rating (gas) or kW rating (electric).
- Maximum flow rate at the required 9E@.
- Energy Factor (EF) or Uniform Energy Factor (UEF) for efficiency.
- Installation type (floor, wall, or under-sink).

Example Calculation

Let’s walk through a realistic scenario.

1. Fixtures: One shower (3.5 /GPM), one kitchen faucet (2.0 /GPM), one dishwasher (1.5 /GPM). Assume all could run simultaneously.
2. Total Flow Rate: 3.5 /+ /2.0 /+ /1.5 /= /7.0 /GPM.
3. Temperature Rise: Cold water 55°F !’ Desired 120°F !’ 9EB Ò c[`.

kW = 227,500 ÷ 3,412 /"H /66.7 /kW.

Target kW "H /83.4 /kW.

Note that this example yields a high demand, so a multi zone or dual unit setup might be necessary for a large home.

Electric vs. Gas: How Capacity Differs

Electric units typically provide 20–30 /kW of heating power, whereas gas units can deliver up to 90,000 /BTU ("H /26 /kW) or more. If you have a high peak demand, a gas unit is often the only feasible option. However, electric units have lower upfront costs and are easier to install, especially in homes with sufficient electrical service.

Electric Tankless Water Heaters

- Best for: Small families, single-family homes, or areas with high electrical capacity.
- Typical flow rates: 1.5–4.0 /GPM at 120°F 9E@.
- Energy Factor: 0.95–0.98 (very efficient).

Gas Tankless Water Heaters

- Best for: Larger households, multiple simultaneous fixtures, or cold climates.
- Typical flow rates: 5–8 /GPM at 120°F 9E@.
- Energy Factor: 0.75–0.85.

Common Mistakes to Avoid

1. Ignoring Peak Demand: Many homeowners only consider the total flow rate, not the simultaneous use of fixtures.
2. Underestimating Temperature Rise: In colder regions, 9EB 6 â &R s c“ `, significantly raising BTU requirements.
3. Overlooking Water Pressure: Low pressure can reduce the effective flow rate; some units include a pressure booster.
4. Skipping a Professional Assessment: A licensed plumber or HVAC technician can validate your calculations and recommend the best unit.

Tips for Homeowners Choosing a Tankless Water Heater

1. Check your electrical service capacity before purchasing a high kW electric model.
2. Consider a dual zone system if you need hot water in both the kitchen and bathroom simultaneously.
3. Look for units with high Uniform Energy Factor (UEF)—the higher, the better.
4. Install a pressure regulator if your home has low water pressure.
5. Schedule annual maintenance to keep the unit running efficiently.

Frequently Asked Questions (FAQ)

Q: Can I replace my existing tank with a tankless heater?

A: Yes, but you must verify that the new unit's capacity matches your household's demand. A professional assessment is recommended.

Q: How much does a tankless water heater cost?

Prices vary widely: electric models start around $500–$800, while gas units can range from $1,000 to $2,500. Installation costs add another $200–$1,000.

Q: Will a tankless unit keep my water at a consistent temperature?

Yes. Unlike storage tanks, tankless systems maintain a steady temperature as long as the unit's

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