

Glossary of Water Heater Terms

➤ Atmospheric water heater

- A gas water heater uses an atmospheric vent with no fans or other assistance. Most residential water heaters are of this type.

➤ Booster water heater

- Booster water heaters are designed to use hot water as its input and to boost the temperature to the final use temperature. These are common in commercial kitchens to provide 180 F water for dishwashers. They are of interest in the residential market as a means to raise the temperature of hot water tanks that have been heated by renewable energy sources.

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➤ Condensing water heaters

- Gas water heaters that have a sufficiently high efficiency that the cool exhaust gases allow the water vapors to condense as water prior to exiting the water heater. These heaters require a condensate drain and PVC venting.

➤ Dip tube

- The dip tube is the plastic tube that runs from the cold water inlet down to the lower portion of the water heater tank. Its purpose is to introduce the cold water near the bottom of the tank.

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➤ Direct vent water heater

- A direct vent water heater is a unit that gets its combustion air from the outside. It is sometimes called a “two pipe” system since there is both an air intake vent and an exhaust vent. While most direct vent water heaters use a fan (called a power direct vent) to assist with the gas movement, there are a few unpowered direct vent water heater models available

➤ ECO (Emergency Cut Off)

- The ECO is a separate temperature probe and circuit in the standard gas valve that serves as an Upper Limit Switch. The ECO will shut off the gas to the water heater when the temperature in the tank reaches a dangerous level.



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➤ Energy Factor

- The Energy Factor is the federally mandated measure of efficiency for all NAECA water heaters. Energy Factor is measured with a complex 24 hour-long test that purports to simulate actual residential hot water use and standby conditions.

➤ EPACT

- EPACT (Energy Policy Act) is the federal legislation that controls among other things, the efficiency test methods for large water heaters.... $\geq 75,000$ BTU/hr input for gas storage units, $\geq 200,000$ BTU/hr for gas tankless, ≥ 12 KW for electric water heaters. The measures of efficiency for EPACT are thermal efficiency (TE) and standby loss.



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➤ Expansion tank

- An expansion tank is a device that uses a rubber bladder and air pressure to regulate the pressure in water lines. All manufacturers recommend installing an expansion tank on the inlet line to the water heater to accommodate the water expansion caused by heating water.

➤ FVIR

- Flammable Vapor Ignition Resistant water heaters have passed the ANSI requirements for resisting the ignition of external flammable vapors by the water heater burner. These heaters usually have a sealed combustion chamber with the only inlet air coming through a flame arrestor. All currently manufactured NAECA storage water heaters must pass this requirement.



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➤ Heat trap

- Heat traps are devices placed in the inlet and outlet of water heaters that prevent the convective flow of hot water up and out of the water heater during stand-by. Obviously, these devices must allow adequate flow of water when there is a hot water demand. The internal mechanism in heat traps varies but often they either involve a rubber flapper or a ball. Most high performance NAECA water heaters currently have heat traps on both their inlets and outlets.

➤ HPWH

- HPWH (Heat Pump Water Heaters) use conventional heat pump technology to heat water. These units, which can either be integrated with the water heater tank or add-on devices, make use of the standard refrigeration cycle; only in reverse. Typically, HPWH are extremely efficient but have a very slow recovery.

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➤ Hybrid water heater

- “Hybrid water heater” is a term sometimes used by water heater marketers that does not have a single, explicit meaning. Sometimes it refers a combined tank and tankless water heater and other times it refers to water heaters that can operate on dual fuels, etc.

➤ Legionella

- Legionella is bacteria commonly found in water that thrives in warm water (95 to 115°F). Legionella can cause Legionnaires’ disease when droplets with high legionella concentration are inhaled. Individuals with compromised immune systems are particularly vulnerable to Legionella. Legionella is the primary reason why it is unwise to set water heater temperatures below 120°F.

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➤ NAECA

- NAECA (National Appliance Energy Conservation Act) is the federal legislation that controls, among other things, the efficiency test methods for small water heaters....<75,000 BTU/hr input for gas storage water heaters, <200,000 BTU/hr for gas tankless water heaters and < 12KW for electric water heaters. The required measure of efficiency for all NAECA water heaters is the Energy Factor (EF).

➤ NOx

- There a number of oxides of nitrogen which can be formed during combustion of fossil fuels. The notation or the term, NOx, is used to refer to these gases that have a significant impact on air quality. The NOx output of most water heaters in controlled by EPA regulations.

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➤ P & T valve

- The Pressure and Temperature relief valve is designed to prevent water heater tank explosions should there be a failure in the other safety systems which allow either the temperature or the pressure to rise to the danger point. Typically P&T valves open at either 150 psi pressure or 210°F. T&P valves should be located within 6" of the top of the water heater tank and often must be plumbed to an external location. It is not a good practice to manually open the T&P valve to test its operation. Manual operation does not really test its relief valve capabilities and invites dirt and debris to prevent complete closure of the valve set.

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➤ POU water heater

- POU (Point of Use) water heaters are occasionally used to provide hot water at locations that are remote from the water heater. POU's are usually small electric tankless or storage heaters that are often located under the sink or in a nearby closet.

➤ Powered anode

- A powered or impressed current anode uses a D.C. power supply to provide cathodic protection to the water heater tank. These devices usually use a platinum coated probe that provides electrons to the water in the tank to prevent oxidation of the steel tank.

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➤ **Powered burner**

- A powered burner uses a fan to assist the intake of combustion air and fuel into a water heater burner. Powered burners are not common on residential water heaters and are usually deployed when there is a necessity to either force the combustion products through a long heat exchanger (high efficiency, condensing water heaters) or when it is critical to control the NOx output by regulating the air to fuel mixture in the burner.

➤ **Powered direct vent water heater**

- A powered direct vent water heater is a unit that uses a fan to assist the flow of inlet and outlet gases through the system (see Direct vent water heater).

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➤ **Powered vent water heater**

- A powered vent water heater uses a fan to push the combustion products through the vent system. Usually, the fan is mounted on the top of the water heater. Power vented water heaters can use much longer vents than atmospheric water heaters and they are usually substantially more efficient than atmospheric water heaters because the chimney effect during standby is minimized.

➤ **Sacrificial anode**

- A sacrificial anode is a Mg, Al or similar alloy rod that is placed in a water heater tank to prevent corrosion of the steel tank. Due to an electrochemical process known as galvanic corrosion, the anode is designed to be consumed rather than the tank. Proper maintenance of a water heater will ensure that adequate anode material is present to provide the required cathodic protection of the steel tank.

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➤ **Scaling/liming**

- Scaling or liming is the development of calcium carbonate deposits when water of certain chemistries is heated in a water heater. These deposits typically build up in the bottom of the tank and eventually cause some degradation in the efficiency of gas water heaters and can, in extreme cases, break heating elements in electric water heaters. Regular draining of water heaters may tend to limit the scale build-up but reliable methods for preventing scale build-up are expensive and rarely used.

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➤ Sealed combustion

- “Sealed Combustion” is a term often used by individuals outside the water heater industry. This term has not explicit meaning...it may refer to direct vent water heaters which draw their combustion air from outside (two pipe systems) or it may refer to FVIR water heaters which have sealed combustion chambers to prevent ignition of external flammable vapors. It is best to avoid using this ambiguous term.

➤ Side arm water heater

- Side arm water heaters are heaters that have the burner external to the tank itself. The advantage of a side-arm is that there is no central flue in the gas water heater that hurts standby losses. Unfortunately, side arm heaters are expensive to manufacture and are very unusual in today's water heater market.

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➤ Stacking

- Stacking is the increase in water temperature at the top of a gas water heater caused by numerous short draws in a relatively short sequence. A sequence of short draws which just barely cause the burner to fire, can cause the water temperature in the tank to exceed the thermostat setting by as much as 20 - 30°F. ANSI standards for gas water heaters limit the amount of stacking allowed and a stacking test is done on each gas water model as a part of the certification process.

➤ Standby losses

- Standby losses are the energy losses that result from storing hot water in a tank over a period of time. These losses are often measured by measuring the temperature loss in a tank over a 24-hour period and are reported as an energy loss in BTU/hr units.

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➤ Thermal Efficiency

- The thermal efficiency of a water heater is the measure of the amount of thermal energy put into the water versus the amount of thermal energy produced by the fuel consumed. Thermal efficiency does not consider standby losses.

Resources

Electric and Gas Storage Water Heater Manufacturers

A.O. Smith:	www.hotwater.com
Bradford White:	www.bradfordwhite.com
Rheem:	www.rheem.com
H.H2O® Water Heaters	www.howardharrisbuilders.com

Electric Tankless Water Heater Manufacturers

Seisco-Microtherm:	www.seisco.com
Stiebel-Eltron:	www.stiebel-eltron-usa.com
Bosch:	www.boschhotwater.com
EE Max:	www.eemaxinc.com

Gas Tankless Water Heater Manufacturers

Takagi:	www.takagi.com
Rinnai:	www.foreverhotwater.com
Noritz:	www.noritz.com
Paloma:	www.palomatankless.com

Resources

Demand Controlled Circulation Systems

- ACT Inc. Metlund Systems www.gothotwater.com
- Taco www.taco-hvac.com
- Wirsbo www.wirsbo.com
- Utili-save www.utili-save.com
- Enovative Group www.enovativegroup.com

Water Heater Maintenance

- www.waterheaterrescue.com

Drain Heat Recovery

- www.gfxtechnology.com
- www.power-pipe.com

More Resources

California Energy Commission

www.energy.ca.gov

2005 Integrated Energy Policy Report,
Chapter 8 Integrating Water and Energy Strategies

<http://www.energy.ca.gov/2005publications/CEC-100-2005-007/CEC-100-2005-007-CMF.PDF>

California's Water-Energy Relationship-Final Staff Report

<http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF>

Hot Water Distribution System Research-Phase 1

http://www.energy.ca.gov/pier/final_project_reports/CEC-500-2005-161.html

California Urban Water Conservation Council

Residential Hot Water Distribution

http://www.cuwcc.org/res_hot_water.lasso