



# THE ULTIMATE GUIDE TO TANKLESS WATER HEATERS

FIVE WAYS TO OPTIMIZE YOUR INSTALLATIONS



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## Intro: Why propane tankless water heating?

What's your customer's biggest concern about water heating? Rising utility costs? Running out of hot water? Environmental sensitivity? Builders and remodelers can address any of these concerns by choosing high-efficiency propane tankless water heating. Propane tankless units provide comfort, versatility, convenience, and efficiency by supplying high volumes of hot water with compact and highly innovative technology — a level of performance that electric and heating oil systems can't match.

### Optimize your installations

Installing a propane tankless water heater is fairly straightforward. Tankless units are less labor-intensive to install than tank-style units, and they use the same plumbing as natural gas water heaters.

But experienced pros know there's an art to perfecting a water heater installation. With proper technique and advanced planning, pros can minimize an installation's upfront cost, maximize performance and return on investment, and ensure the tankless unit lasts for its predicted lifespan.

"The Construction Professional's Ultimate Guide to Tankless Water Heaters" collects five of our most popular and helpful resources on tankless water heaters in one comprehensive ebook that you can pull up on your tablet or print out for your subs. From venting tactics to whole-house heating strategies, these articles will ensure you have the training and expertise you need to give your customers a flawless tankless water heater installation.

### Key benefits of propane tankless water heaters

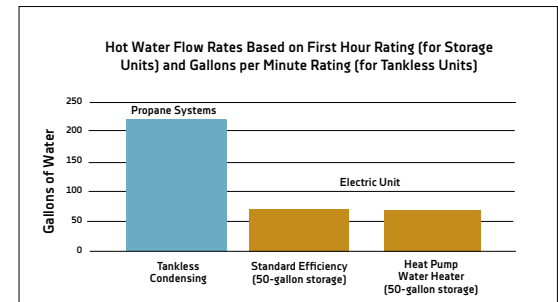
**Reduced energy costs.** Propane tankless water heaters can reduce energy costs by up to 50 percent and eliminate standby energy loss from the tank as well as the unnecessary expense of heating water when it is not being used.

**Lower annual cost of ownership.** Propane tankless water heaters offer the lowest annual cost of ownership in four out of five U.S. climate zones and far better performance than other models tested<sup>1</sup>.

**No cold showers.** Propane tankless water heaters provide an endless supply of hot water, averaging about 222 gallons per hour, compared with an average first-hour delivery rating of just 62 gallons per hour for electric storage tank models.

**Compact size.** A propane tankless water heater can save up to 16 square feet of floor space over a standard storage tank model.

**Long service life.** Propane-fueled tankless water heaters have a life expectancy of about 20 years, much longer than any conventional storage water heater.



Source: Comparing Residential Water Heaters for Energy Use, Economics, and Emissions by Newport Partners, LLC.

Get the facts on water heater efficiency, performance, and carbon emissions at [buildwithpropane.com/waterheating](http://buildwithpropane.com/waterheating).

<sup>1</sup><http://www.buildwithpropane.com/uploadedFiles/buildwithpropane/website/Resources/propane-water-heating-analysis-2010.pdf>



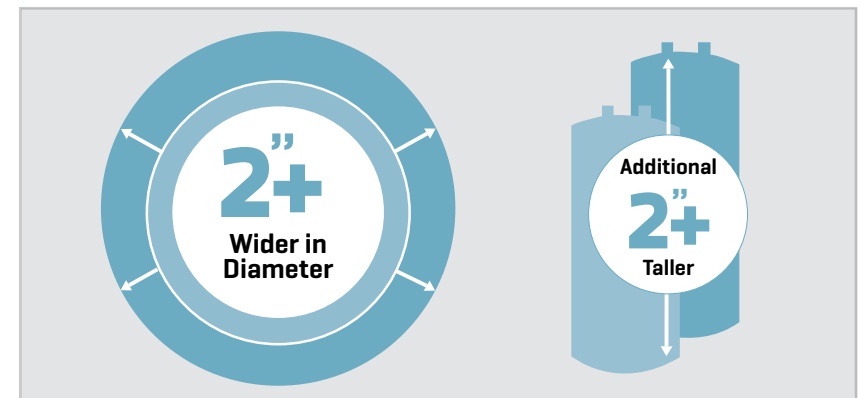
## Are you ready for new water heater efficiency regulations?

Efficiency standards that went into effect in April 2015 change the calculation on the best water heater for your homes.

In years past, recommending the right water heater for homes without natural gas was complicated. The decision involved [a variety of considerations](#), including performance, operating cost, and upfront installation cost. Even if your homeowner desired the utility savings of heating water with propane, this often required significantly more cash coming out of the homeowner's pocket upfront.

But that's changing now. [New water heating standards](#) from the Department of Energy that went into effect in April 2015 are rewriting the price-point differential between electric and propane water heaters, especially for tank storage units above 55 gallons.

The new standards require that all water heaters, regardless of size, type, or heating source, be more efficient. For tank storage units smaller than 55 gallons, the increases are negligible. The minimum energy factor (EF) on a gas, 50-gallon tank heater will increase from .58 to just .60; the EF on the same size electric unit will increase from .90 to .95. Keep in mind that EF cannot be used to compare the energy costs of systems using different energy types, such as propane and electricity. An electric storage tank water heater with an EF of 0.95 could have a higher energy cost than a propane storage tank water heater with an EF of 0.67.



In order to comply with the new efficiency regulations, tank storage water heaters will need to become taller, wider, or both to accommodate additional insulation. For replacement projects with space constraints, it may be easier to retrofit old storage tank water heaters with new, compact tankless water heaters.

Manufacturers say those increases can be achieved simply by using more insulation, which might make the storage tank units a few inches wider, at a cost of about \$50. That increased girth will likely affect space-constrained projects such as multifamily housing, where a relatively small gas tankless unit may be an easier fit than the new, wider tanks.

But the real jump comes for higher-volume water heaters.

For tanks of 55 gallons or more, the new rules get a lot more stringent. For instance, EF requirements for a 65-gallon electric tank heater will more than double, from .88 to 1.98. But the only way to get that efficiency out of an electric unit is to use heat pump technology. That adds significant costs — 65-gallon units start around \$2,000 — along with [installation concerns](#). Heat pump water heaters (HPWHs) require a higher vertical clearance and at least 1,000 cubic feet of space around them. Plus, without external venting, a HPWH will cool the air within that surrounding space, potentially increasing the demand on the space-heating system.

## HEAT PUMP WATER HEATER CONCERNS

Under the new regulations, electric storage tank water heaters sized at 55 gallons or more will need to use heat pump technology, which may not be appropriate for all projects. Heat pump water heaters:

- Have a large physical footprint
- Require higher vertical clearance
- Require at least 1,000 cubic feet of space
- Cool the air in the surrounding space if used without external venting, increasing heating demand
- Are inefficient in colder climates or when installed in cooler areas such as a garage

Gas tank storage units will need to use condensing technology to meet the new standards. Condensing technology adds its own costs, as well as a need for a condensing drain and an electrical outlet.

With these regulatory changes, the upfront cost gap between propane tankless units and electric storage tank heaters might not be so large — or it may even turn in favor of propane.

“It really takes the upfront cost difference out of the decision-making process,” says Roy Setliff, sales and marketing director at [Plantation Propane & Petroleum](#) in Thomasville, Georgia. Plantation has installed more than 600 propane tankless water heaters in the last 10 years, with the performance of

the units often as much of a selling point as the ongoing utility cost savings over time. “Now, you can talk about performance and the unlimited hot water they can get from these units when the whole family is in town during the holidays,” he says.

Joe Holliday, director of business and product development at tankless water heater manufacturer [Rinnai](#), says the new requirements, which went into effect April 16, 2015, for manufacturers, provide a new selling opportunity for construction pros that install or specify propane water heaters.

## The old “yank and replace” practice won’t work when it comes time to replace large storage tank water heaters.



“If you’re talking about an electric storage tank heater that used to cost \$300 to \$400 now being priced upwards of \$1,000, that really closes the gap,” Holliday says. “You’ve got a good potential to convert them to propane, with the lifestyle benefits of tankless.”

Rinnai estimates that, industrywide, 265,000 tank storage heaters of 50 gallons or larger were sold in 2013, or approximately 5 percent of the water heater market. “There are a lot of those heaters out there,” Holliday says.

The old “yank and replace” practice won’t work when it comes time to replace those large storage tank units. That should provide plenty of opportunity for you to upgrade those customers to high-efficiency propane water heating.



In temperate climates, installing a tankless water heater on an exterior wall can minimize installation costs.

## Five keys to a perfect tankless upgrade

Upgrading to a propane tankless water heater can help your homeowners save big on their energy bills. Installing the unit correctly ensures they'll get their money's worth.

Tankless water heater installation involves more than simply swapping out a tank unit. Creative layout solutions and proper installation are critical to minimize initial costs, improve payback time, and realize the system's predicted life. Plumbers and remodelers need to take several factors into consideration for a perfect tankless installation.

### 1 Location

Tankless water heaters should be located in a place that minimizes installation cost and maximizes performance. Tankless units must vent to the outside, but because they are small and need no indoor air for combustion, they can be located in more places than a traditional water heater. Plumbers should evaluate the venting, gas, and water lines to help the homeowner minimize installation costs. One option unique to tankless systems is the ability to install a unit outside.

One option unique to tankless systems is the ability to install a unit outside.

"In warmer climates, consider an exterior unit for greater installation savings," says Trey Hoffman, global product manager at [Rinnai](#). "For interior and exterior units, carefully think through the layout and find the location that minimizes the length of water and gas lines to save money." Be aware that tankless fans can make noise, so locate the unit where the sound won't be a factor. To further reduce noise, install a unit with a low decibel rating or use an isolation kit to absorb the sound.

### 2 Waterlines



On tank heaters, the water connections come in at the top, but they need to go in at the bottom of tankless units, possibly requiring a reroute of lines. If the tank was in the center of a room, you'll likely also need to move the waterlines to an exterior wall, where the new tankless unit can more easily vent outside.

The type of pipe used for the water will also affect cost. Copper pipes are already present in many retrofit scenarios, but PEX or PVC plumbing is less expensive, can be installed more quickly, and is easier to work with.



### 3 Condensate

If the tankless replacement is a condensing unit, you must run a condensate line. Since highly acidic condensate can stain concrete or corrode metal pipe, use a condensate neutralizer — which contains a base media, such as limestone or marble chips — in a section of pipe. Or drain the condensate into a plastic or vinyl washing machine drain, as soap will neutralize the condensate. Although condensing tankless units require this additional step and are a bit more expensive than non-condensing models, their cooler exhaust gas temperatures allow for the use of less-expensive plastic venting pipe, whereas the high-temperature flue gases of non-condensing tankless water heaters require more expensive stainless steel vents.

"When plumbers neglect to hook up a condensate line, the condensate can run down into the heat exchanger and burner assembly areas, which may reduce the life of the heater from 20-plus years down to four to five."



Although condensate is primarily an issue with condensing units, it is also important to properly drain condensate in non-condensing units, especially when there are long vertical vent runs. "When plumbers neglect to hook up a condensate line, the condensate can run down into the heat exchanger and burner assembly areas, which may reduce the life of the heater from 20-plus years down to four to five," says Ed Clark, master plumber and owner/operator of Tankless Concepts in Falls Church, Virginia.

### 4 Gas Pressure

When at full power, tankless units require between 120,000 and 199,000 British thermal units (Btu) — three to five times the heating capacity of a tank-type water heater. In many tank water heater replacement scenarios, you must increase the gas line size from the typical half inch to three-quarter inch. But the higher pressure of propane means that you can sometimes reuse the existing half-inch line for the tankless unit. Depending on the length of gas line needed, propane systems may not require a larger-diameter gas line, offering installation savings of up to \$1,000.

### 5 Technology

Some new tankless water heaters are even more adept at using a half-inch gas line for either natural gas or propane by using a negative pressure gas valve and the exhaust system fan to pull gas in and stabilize it at 190,000 Btu. "Some units also heat from the top down to eliminate superheating the water, so you have less mineral separation and don't incur scale buildup," says Marc Heffner, marketing manager at Navien America in Irvine, California. "In addition, some units have eliminated cold-water shock caused by the water cooling in the pipe through a buffer tank and recirculating pump."

Finding the least-restrictive way to install a tankless system and reducing the length of water or gas lines helps lower installation costs. Take the time to learn the correct way to install tankless systems to offer customers a better return on investment and long-term satisfaction.

"Some tankless water heaters have eliminated cold-water shock caused by the water cooling in the pipe through a buffer tank and recirculating pump."

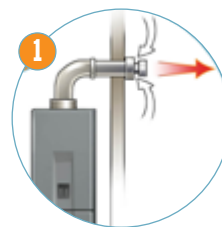


## 8 tips for venting tankless water heaters

This handy graphic showcases opportunities to save money, reduce installation time, and correct misconceptions about tankless water heaters.

Homeowners love tankless water heaters because the on-demand units never run out of hot water and they reduce water heating bills by eliminating standby losses. Construction professionals love them, too, because their compact size and direct-vent design make them versatile enough to install even in tight spaces or difficult retrofits.

In some cases, however, builders and remodelers may not be aware just how flexible tankless water heaters can be when it comes to venting. Don't let any of these misconceptions about venting keep you from recommending a tankless unit. Share this infographic with colleagues, clients, and your on-site team to make the most of this high-efficiency technology. And for details on any of this information, read more at [8 facts to know about venting tankless water heaters](#).



**Gas tankless water heaters don't have to use indoor air for combustion.** Tankless water heaters can be vented in two ways: power-vent or direct-vent. Power-vent units use indoor air for combustion and simply vent the exhaust to the outside. Direct-vent units pull in air from outside the house, so they have two vents for intake and exhaust. While power-vent units require only an exhaust vent, they create additional placement concerns: They must be placed in a large-enough room or a room with vents or louvers so that they have adequate make-up air for the gas combustion. Because direct-vent units use outdoor air, they can be placed in smaller spaces, such as an attic or closet.



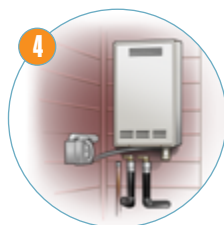
**You don't always need two ventilation pipes, even for direct-vent units.** Direct-vent water heaters can use two separate pipes for intake and exhaust, but some manufacturers offer concentric venting, a single pipe that contains an inner exhaust vent and an outer intake vent. Concentric vents provide a couple of advantages, Trey Hoffman, global product manager for Rinnai, says. First, with only one pipe, installers only need to make one penetration in the wall or ceiling. Second, unlike exhaust vent pipes, which are hot to the touch and thus require clearance to avoid contact with the wall, concentric vents are cool to the touch, so they don't require additional clearance through the wall.



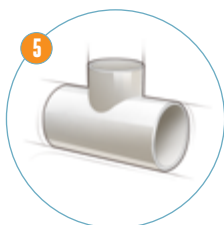
# VENTING TANKLESS WATER HEATERS



**You don't have to go through the roof.** Traditional [tank] gas water heaters vent through the roof using galvanized steel B-vents because they work through natural draft, allowing the hot exhaust air to rise up and out of the house. By contrast, tankless water heaters' vents can terminate on a side wall because their combustion fan blows exhaust from the units horizontally. That fact is particularly helpful to remodelers or professionals replacing electric tanks [which don't require venting] with propane tankless units, Hoffman says.



**With an outdoor unit, you don't need to vent at all.** In warmer climates, it's easy to install a tankless water heater outdoors, with no additional venting required. Tankless units are designed to withstand below-freezing temperatures through self-warming capabilities that prevent freezing and cracking. [Because the heating elements run on an electrical supply, however, tanks can freeze in very cold climates where electrical outages occur, making indoor installations a better option for those locations.] Replacing a tank water heater with an outdoor tankless unit can even free up indoor floor space, Tommy Olsen, [Rheem's](#) market manager for tankless and specialty products, says. "You pick up 9 square feet on the floor, but you also pick up that floor-to-ceiling cube," he says.

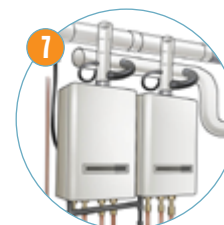


**With a condensing tankless water heater, you don't need metal venting.** While non-condensing tankless water have a hot exhaust gas that requires metal venting, condensing units are more efficient, so the temperature of the exhaust gas is lower. That means they can be vented with a less expensive plastic, generally PVC or polypropylene. In fact, the price difference in the venting can even offset the cost of the higher-efficiency unit, Olsen says. "The overall installed cost of a high-efficiency unit is typically equal to or lower than that of a mid-efficiency product."

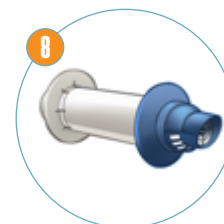


## **You don't have to have a box stuck to your wall.**

For new-construction applications, some manufacturers offer recess boxes to keep the tankless water heater inside the wall. At 14 inches wide, non-condensing units can fit between conventional studs; 18-inch-wide condensing units may require more creative framing. "Now your water heater is flush with the outside of the house," Hoffman says. "It makes for a very neat and tidy solution."



**You don't always need separate vents for multiple water heaters.** While commercial and large residential applications may use multiple tankless units, they don't necessarily require two vent penetrations per unit. Rinnai is developing a common-venting system that uses a manifold to share the same exhaust and intake vents for up to eight tankless units, a useful option for projects where pros want to avoid extra penetrations in the building envelope for practical or aesthetic reasons.



## **Your venting system doesn't have to be ugly.**

Several manufacturers have designed aesthetically pleasing vent options. "You've got people that really like the tankless option, but at the end of the day, they don't want that pipe sticking out of the wall," Olsen says. With attractive pipe covers and termination points available, beauty's no longer a reason to shun tankless water heaters.



## Five profitable tips for tankless water heater gas lines

Save costs, boost revenue, and improve customer satisfaction with these straightforward methods for sizing and installing gas lines for tankless water heaters.

While gas tankless units only need to run when hot water is needed, their gas usage must ramp up quickly when they're meeting high demands for hot water. That means it's vital for builders, remodelers, and installers to be aware of the proper procedures for installing the gas lines that supply the tankless unit. Joe Holliday, director of business and product development for tankless water heater manufacturer [Rinnai](#), offers five tips to ensure your water heater runs at its best.

**A half-inch or three-quarter-inch gas line?** Holliday says most of the questions he hears about proper gas installation are on how to size the gas line. And while manufacturers may offer varying guidance, following the [National Fuel Gas Code](#) is the most straightforward way for builders and remodelers to ensure they're following proper procedure.

Sizing is important, Holliday says, to ensure your tankless water heater always runs at optimal efficiency. "If the installer isn't doing all the applications correctly or paying attention to the whole system load, sometimes it can be undersized," he says. A builder could install a tankless unit in the summer and it would work fine. "But when winter comes, and the furnace is running, and they've got the stove on and everything else, maybe there's not enough gas supply for the whole system. You end up starving the appliances for gas and they don't run efficiently or don't work quickly."

To plan for correct sizing, think about these five factors, Holliday says:

1. **Type of gas [propane or natural gas].**
2. **Inlet pressure.**
3. **Allowable pressure drop.**
4. **Type of gas appliances in the home.**
5. **The maximum gas load of the whole home.**

For a handy reference guide for you and your technicians, get a copy of the [Propane Technical Pocket Guide](#) and bring it to the jobsite.

Get the latest edition of the National Fuel Gas Code (NFPA 54) at [nfga.org](#).





## **You may just want to install a three-quarter-inch gas line.**

Calculations aside, Rinnai often recommends builders just install the larger three-quarter-inch lines. “That way you’re sure to have the gas load you need and it’s not an iffy subject or question,” Holliday says. “It’s a good practice to do especially for builders, because the difference in cost in running a half-inch versus a three-quarter-inch is quite minimal upfront.” Retrofitting later to a larger gas line, on the other hand, could cost several hundred dollars.

Under some building codes, such as California’s Title 24, builders are required to prepare their homes for the higher gas load of a high-efficiency appliance, Holliday says, so they’ll likely need to install the larger gas lines even if they don’t immediately install the high-efficiency water heater.

Many builders don’t realize that propane can be available on any type of home site, making gas tankless water heaters a possibility even when natural gas isn’t available.

## **Consider propane if the natural gas main is difficult or expensive to reach.**

Many builders don’t realize that propane can be available on any type of home site, making gas tankless water heaters a possibility even when natural gas isn’t available, Holliday says. “They can get their local propane company to not just bury underground tanks, but, in big developments, they’ll actually put in the underground piping so that it actually works like a natural gas system. I think that’s a key thing for builders: propane can be readily available to get people on these high-efficiency products.”

Virtually all tankless units are field-convertible from natural gas to propane or vice versa, so builders can develop a new community with propane and then switch over to natural gas if it becomes available later.

## **Flex pipes can speed and simplify installation.**

You’re no longer stuck with fixed iron pipes for running gas lines. Flexible gas piping, such as corrugated stainless steel tubing (CSST), can make bends and joining a cinch.



Image courtesy Gastite.

**Factor gas lines into your design.** In many cases, there’s no need to run gas line all the way around your home to reach a tankless water heater. By installing the tankless unit on an exterior wall or even outside, builders can allow for shorter gas line runs and easier venting. “Because they’re small, you can put them just about anywhere,” Holliday says. “In fact, for people who put them outside, you can put them by the gas meter and it’s a really short run.”



## Make your water heater act like a furnace

By borrowing heat from a tankless water heater to deliver steady, comfortable space heating throughout the home, hydronic furnaces save space and energy.

In homes at the energy-efficient [Byers Place by Arcadia Properties](#) in Denver, the second-story furnace needs no vent and uses no heating fuel.

Instead, each home is equipped with a hydronic air handler that borrows hot water from a tankless water heater, moves it through a coil to pick up the heat from the water, and blows it through the ductwork and into the house.

The propane- or gas-fueled tankless water heater supplies unlimited hot water — unlike a traditional tank with a capacity of just 50 or 75 gallons — so the system pumps a constant flow through the coil and delivers steady, comfortable heat to the home without the need for a fuel-powered furnace or an extra vent to the outside. At the same time, the tankless water heater performs its primary job without interruption, heating the water that is piped to showers, sinks, dishwashers, and washing machines.



Homes in Byers Place by Arcadia Properties in Denver are heated by a hydronic furnace supplied with heat by a tankless water heater.

Because the water heater is the source of heat for both the air and the water, hydronic systems are as efficient as the tankless water heaters they run on. That means pairing a hydronic air handler with a high-efficiency condensing tankless water heater can achieve efficiency as high as 96 percent.

Byers Place developer Mark Bethel says the two-appliance system is part of his project's sustainable design that features energy-efficient smaller homes.

Still, notes Tracy Young, a product management specialist with [Rinnai](#), which manufactures the community's heating equipment, hydronic furnaces are slowly catching on among single-family home builders. The technology appears more commonly in townhomes, condominiums, and apartment buildings, all of which can utilize the compact size of the tankless water heater/hydronic furnace combination.

But Charlotte, North Carolina, HVAC contractor Scott James predicts more builders will embrace hydronic heating as homebuyers already familiar with the benefits of energy-efficient tankless water heaters learn that those energy- and water-saving devices can also help heat their homes.



After his local newspaper ran an article about a 1,200-square-foot bungalow that James equipped with [Rheem's Integrated Heating & Water Heating System](#), several of his builder clients brought their customers to see it. "It's an easy sell when you sit down and explain to the homeowners how much they have to pay to heat the water while they're sleeping" if they use a traditional water heater with a tank, says James, operations manager at [TCS](#).

## The hydronic heating advantage

Hydronic furnace systems deliver a number of other cost, comfort, and convenience benefits:

- **Cost.** A tankless water heater is more expensive than a traditional model with a tank, but some manufacturers offer the hydronic air handler for less than a comparable gas-powered condensing furnace.
- **Comfort.** Some homeowners report that their water-warmed heat is more even and less dry than heat radiated via a traditional gas furnace.
- **Installation.** The system can be installed in a new building or added to an existing home.
- **Control.** Homeowners can control the air temperature by setting a thermostat, just as they would with a traditional furnace.
- **Build your business.** The dual technology has prompted some plumbers to get into the heating business and some mechanical contractors to add tankless water heater installation to their line of services, says Sal Brunetto, Rheem's corporate manager for national accounts. "This crossover product certainly fills a need" during a sluggish economy when jobs are harder to come by, he says.
- **Water use.** Hydronic systems create no wastewater. They take the water used to heat the air and recirculate it back to the tankless water heater.

## Know before you go hydronic

If it's your first time working with a hydronic system, take note of two common installation concerns:

- **Brand compatibility.** Although some hydronic furnaces are compatible with traditional water heaters or with any brand of tankless water heater, some manufacturers have designed their systems to require both pieces from the same maker.
- **Air-conditioning.** The hydronic system is for heat only, but an air-conditioning system can be incorporated if needed.





## Learn more at [buildwithpropane.com](https://buildwithpropane.com)

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