

# Brigade<sup>®</sup>

Condensing Gas Water Heater



AquaPLEX<sup>®</sup>  
Engineered Duplex Alloy

199 MBH | 6-year Warranty

# Compact Footprint with Greater Life Expectancy

A breakthrough in smart design, PVI's Brigade is a powerful commercial water heater that delivers reliable hot water for demanding applications in a small footprint. Brigade's high efficiency, durability and compact footprint will help owners and facility managers ensure their buildings have a long-lasting system that saves on space and operating costs.

## Features and Benefits

### Ultra-compact Footprint

- 16" wide x 26.25" deep x 75" tall with all connections at the top for ease of installation
- 0" clearance from sides and rear, and 8" from top, 3" from front of unit (in closet installations)

### Low Maintenance, Operating Cost

- Up to 99% thermal efficiency
- High turndown ratio (7:1) with spark ignition

### Long Service Life

- AquaPLEX® duplex stainless-steel construction with performance-enhanced, high efficiency, patent-pending firetubes
- Eliminates the 3-4-year replacement cycle common to glass-lined water heaters
- Industry leading 6-year full vessel warranty

### Dynamic Water Heating

- 199 MBH
- 25 gallons temperature buffer
- 233 gallons per hour from 40°F to 140°F
- 185°F maximum water temperature setpoint

### Comprehensive Regulatory and Agency Compliances

- ENERGY STAR® certified
- SCAQMD Rule 1146.2 for ultra-low-NOx emissions
- Intertek / ETL Listed Mark:
  - ✓ ANSI Z21.10.3 - CSA 4.3
  - ✓ NSF/ANSI 372 for low lead
  - ✓ NSF 5



# A Look Inside Revolutionary Design

## Top-Mounted Utility Connections

- Building Return: Boosts thermal efficiency up to 99%
- Built-in Pump: Destratify the tank and avoids unwanted hot spots, scouring action prevents scale build-up
- Flue Gas Venting: Allows for maximum flexibility with the use of 3" PVC/CPVC/PP on vent runs up to 90'
- Combustion Air Intake: Allows for easy use of 3" PVC or galvanized vent pipe up to 100'

## Blower Gas Valve Assembly

- Optimizes combustion performance by consistently delivering gas and air mixture

## Modulating Premix Burner

- 7:1 turndown ratio provides even flame distribution for optimal performance for any demand
- Direct Spark Ignition provides reliable seamless ignition

## AquaPLEX Heat Exchanger

- Greater resistance to Chloride Stress Corrosion Cracking when compared to 316L
- Higher strength steel results in lighter weight and better heat transfer due to thinner cross-sections

## Patent-pending Firetube Design

- Custom firetube design allows larger surface area to heat for maximum efficiency
- Fewer weld joints and single-pass design reduces the chance of potential leaks as compared to multi-flue designs

## Operating and Safety Control

- Programmable touchscreen controller with user-friendly interface and built-in diagnostics
- Precise temperature control from 80° to 185°F, detailed water heater status with fault history
- Low Water Cutoff (LWCO) control prevents overheating, burner operation when the flow of water is inadequate
- Integration to Building Management System via BACnet or Modbus communication protocol

## Wiring Junction Box

- Single phase, 120VAC, 60 Hz, 5A
- Built-in surge protection

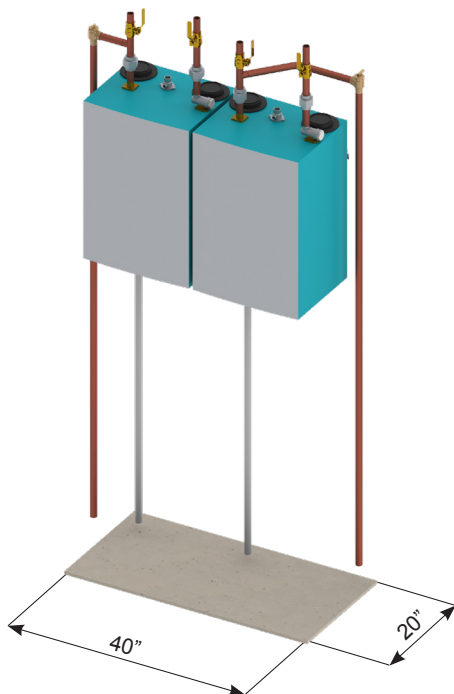
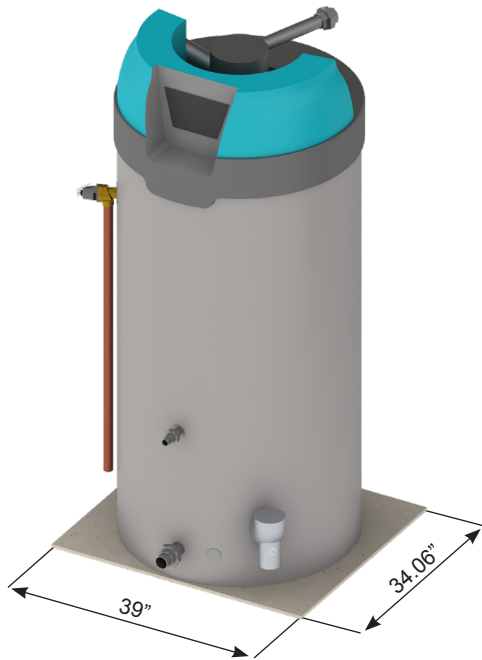
## Fiberglass Insulation with 100% recyclable Polyethylene Jacket

- Reduce standby losses far below ASHRAE 90.1 limits averaging about \$50 annually
- Lightweight plastic design allows for hassle-free transportation and easy maneuverability during installation



# A Redundant System for Every Solution

The Brigade's ultra-compact footprint enables it to be installed in applications that are tight on space. One Brigade is more compact than two wall-hung units. And with its zero-side clearance capability, two Brigades provide a redundant system in the same space of a single tank water heater.



# Brigade's Advantages Over Wall-Hung Water Heaters

## Maintenance and Longevity

Water tube instantaneous heaters contain narrow water pathways and are prone to hard-water scale buildup in the heat exchanger, which over time reduces the performance of the heater. These heater designs have higher maintenance cost due to the regular descaling necessary in a high-volume commercial application.

Brigade by comparison is a fire tube heater that is less prone to scale performance issues and is easier and less costly to maintain.

## Hot Water Delivery at Temperature

Although advertised as providing “endless” hot water, a water tube instantaneous heater is in fact limited in its ability to provide hot water. If hot water demand occasionally outpaces the Btu input to the heater, the outlet water temperature will drop. Because a single 199,000 BTU wall-hung heater is sometimes not capable of providing adequate flow at temperature, two or more of these heaters are often installed in food service establishments where proper outlet temperature is mandated.

The Brigade heater contains a 25-gallon water buffer that acts like a reserve bank of hot water at the needed temperature for occasions where hot water flow requirements exceed the recovery of the burner. As a result, fewer Brigade units would be required to meet the total hot water demand.

## Wall-hung is Often Installed with a Tank

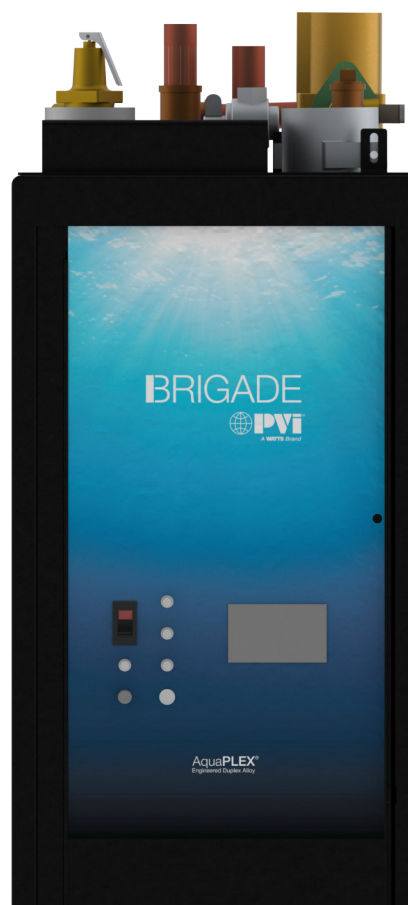
Due to temperature control fluctuations, water tube instantaneous heaters are often installed with a storage tank in high-demand commercial applications. With such a system, the “instantaneous” nature of the product vanishes and the heater behaves as a boiler and tank system. The operation changes from responding to variations in flow and adjusting burner firing rate accordingly, to one of simply reheating the tank at high fire as quickly as possible between demands. This configuration lowers the efficiency of a water tube product due to the limited ability to modulate and the ever increasing entering water temperature as the tank returns to set point.

Brigade heaters would not require a separate tank, and high efficiency is maintained due to the continuing presence of a cold-water zone at the bottom of the heater where flue product are “super-cooled” to extract the energy from the condensing process.

## Effect of a Re-circulation Line

Similar to the drop in performance when connected to a storage tank, a wall-hung, water tube instantaneous heater also suffers an efficiency drop when a building re-circulation line is connected to the cold water inlet. Hotter water entering what is intended to be a cold water inlet directly impacts the heat transfer ability of any heat exchanger and increases operating cost as efficiency drops.

Brigade has a dedicated recirculation fitting that re-introduces hot return water to the hot zone of the water heater, thereby leaving the cold zone at the bottom of the tank unaffected. The result is continuing high efficiency on calls for heat.



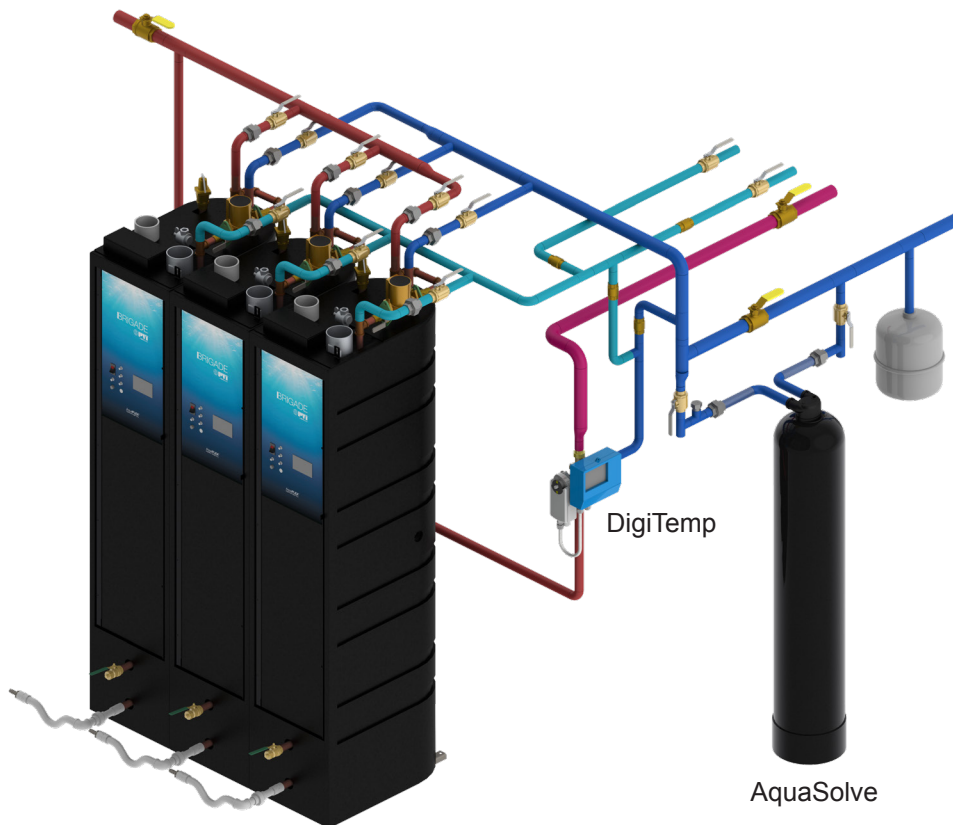
# Complete Flexible Solutions

Brigade water heaters can be provided as full systems solutions for domestic hot water that address water heating, water quality and water temperature mixing. These components are available for field installation or as factory-assembled skid systems for those projects where qualified tradesman may not be available for onsite assembly or when facility owners are desiring a factory-guaranteed assembly. Opting for PVI assembly of these components on a skidded system ensures expert assembly and expert sizing of all piping, valves and accessories.

The available accessories include:

- Brigade Condensing Water Heater(s)
- DigiTemp Mixing Valve
- AquaSolve Anti-scale Water Conditioning System
- Watts Expansion Tanks

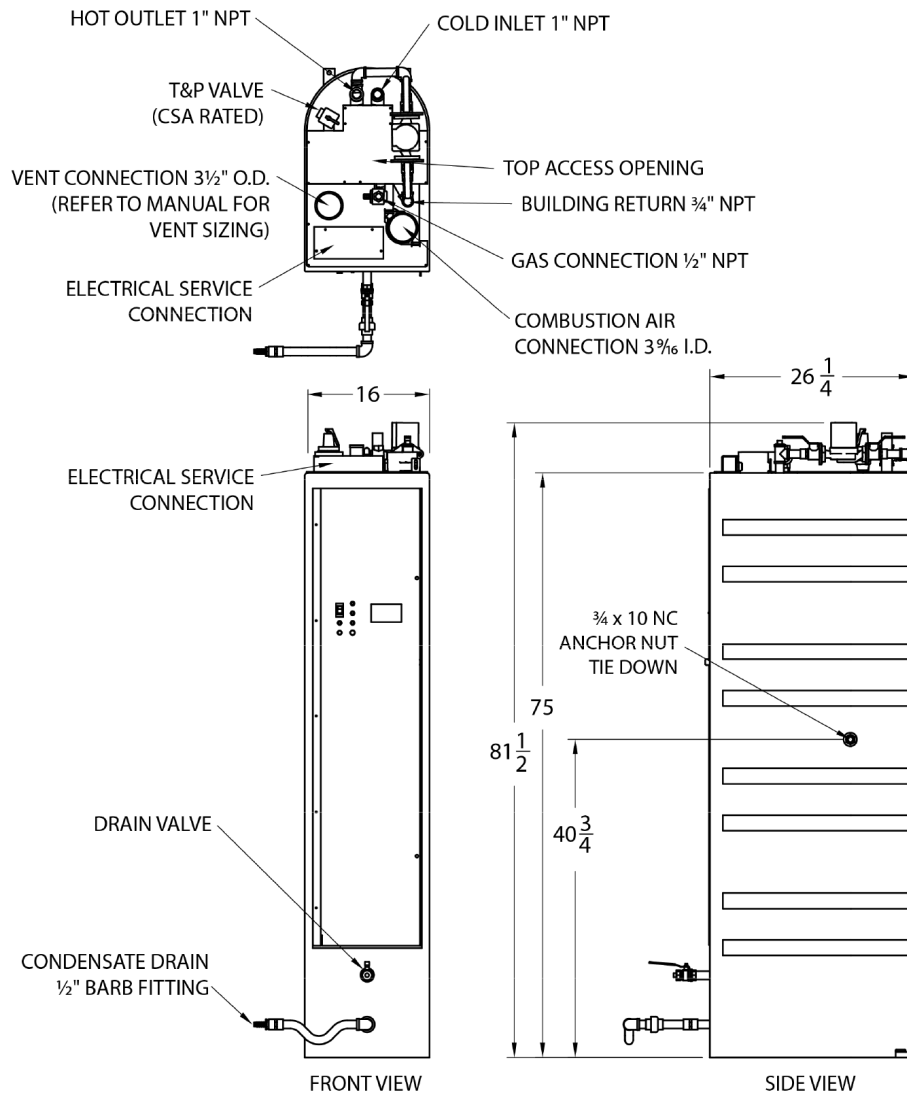
These component systems provide occupant comfort through adequate amounts of heated water, occupant safety with water tempering to avoid scalding risk, and system longevity through pressure control and the reduction of scale buildup.



# Performance and Dimensions

Model ▼	Input (BTU)	Recovery (GPH) (Thermal Efficiency)		Gas Connection (NPT)*	Vent Diameter*	Operating Weight (lbs)
		70°F to 140°F ①	40°F to 140°F ②			
20 L 25-RGC	199,000	329 (96%)	233 (97.5%)	1/2	3" @ 100 eq. ft.	555

- ① Recoveries and thermal efficiency based upon DOE 10 CFR 431 testing per ANSI Z21.10.3 @ 70°F to 140°F.
- ② Recoveries and thermal efficiency based upon 40°F entering water temperature. Dimensions are in inches unless otherwise indicated. For standard and optional equipment, refer to form PV 8693. Empty weight is 348 pounds and shipping weight is 440 pounds.



<b>Standard Electrical Service</b>
120VAC, 1Ø, 60 Hz, 5 amps.
<b>Venting</b>
Use a Category IV PVC, CPVC or ETL, UL, ULC or CSA listed stainless steel or Centrotherm InnoFlue SW Polypropylene vent, minimum vent length 5 eq. feet. Do not size vent based only upon connection diameter at the appliance. Refer to installation manual for sizing requirements.
<b>Inlet Combustion Air Duct</b>
Up to 100 eq. ft. using 3" PVC or galvanized vent pipe. Longer lengths are ETL listed through larger diameter pipe. Refer to installation manual.
<b>Gas Pressure - Natural</b>
Minimum inlet flow pressure 3.5" W.C. Maximum static pressure 14.0" W.C. For LP gas, refer to installation manual.
<b>Minimum Clearance from Combustibles</b>
Zero (0") clearance from sides and rear, and 8" from top. 3" from front of unit for closet installation. Can be installed directly on a combustible floor.
<b>Recommended Service Clearances</b>
18" from all sides, top and front. Check local and national codes for additional clearance requirements.
<b>Emissions</b>
< 20 ppm NOx

\*Do not size the entire length of gas pipe or vent based only upon connection size at the appliance. Refer to the installation manual for proper sizing.

PVI reserves the right to change the design and specification without notice.





**Hot Water Solutions**

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