**Commercial, Instantaneous, Indirect-fired Water Heaters**

**Description**

1. Packaged, commercial, instantaneous, steam generated water heater without storage capacity; and
heat exchanger for heating water.

**General**

1. The instantaneous water heaters shall be mounted on an angle iron frame for horizontal installation.
2. The package shall be pre-plumbed with all required components and pressure tested. Packages which
require field assembly other than basic water, and steam service shall be unacceptable.
3. The instantaneous water heater shall operate on water differential using the feed-forward principal. A feedback temperature control device with capillary system shall not be used.

4. The tube bundle shall be fixed in one end and free-floating in the other end for easy removal. The tubes
shall be straight with a removable end cap to facilitate cleaning. "U" and helical tubes shall be unacceptable
5. The instantaneous water heater shall not use copper lined storage tanks
6. The temperature controller shall be controlled digitally via integrated circuit board technology designed
to deliver blended water economically at a safe, accurate temperature for sanitary use in re-circulated
hot water systems.
**7. A vendor representative must assist in the start-up of the heater and perform training to University of Missouri Residential Life personnel.**

**Construction**

1. The shell of the heat exchanger shall be of carbon steel and designed for a maximum allowable pressure of 150 psig.
2. The inner tubes shall be 5/8" 16 gauge admiralty brass tube expanded into brass tube sheet.
3. One 12V Digital Recirculating Valve (DRV80) *See BIG BRAIN below*
4. One UL Listed Power supply's rated at 1 00-240V ( 12V AC output)
5. All required valve fittings and isolation valves, pressure gauges, inlet combination ball valve strainers,
inlet/return check valves, inlet, system blend and return line thermometers
6. The package shall be factory pre-piped with all the necessary pipe, valve fittings, gauges
7. The frame must be able to be mounted to the floor.
8. Stand: Factory fabricated for floor mounting.
9. The instantaneous water heater shall be factory pre-piped with only steam, water and condensate hookups
necessary. Full size traps shall be provided with each heater.
10. If the package consists of multiple instantaneous water heaters, the instantaneous water heaters must
be factory pre-piped such that each unit could be run separately or together.

**Performance**

1. The instantaneous water heater shall be of the horizontal shell and tube design providing easy access
to individual tubes without moving the heater from its installed position. No overhead clearance shall be
required for servicing.
2. The maximum water pressure drop shall not exceed 10 psig in the instantaneous heater.

3. Accurate control of blended water drawn from the system at a point of use typically within +/- 2 degrees
F at draw off points a minimum of 5m downstream of mixing valve during consistent system demand periods.
4. Minimum valve inlet to outlet temperature requirement (system recirculation temperature loss) of 2 degrees F.
5. Automatic shutoff of hot water flow in the event of a power failure.
6. Maintain a consistent system "idling" temperature and control "temperature creep" without the use of a
manual throttling device or balance valve.
7. System shall not require a temperature activated pump shut-off device (aquastat)
8. Programmable set point range of 100-160 degrees F )37 -71 degrees C) plus full hoUfull cold
9. Ability to thermally disinfect at recommended temperatures
10. Programmable 1st level hillo temp alarm display
11 . Programmable 2nd level hillo temp alarm display/full cold
12. Operational steam pressure shall be 2 to 15 psig.
13. Operational water pressure of 150psig.
14. The controlling valve of the instantaneous water heater shall fail in the closed position to prevent overheating and *I* or scalding.

**Big Brain**
To include (1) BIG BRAIN digital water mixing valve (the same as we have in other residence halls on
University of Missouri Campus). The BIGBRAIN valve will be piped to the hot water heater package. This is the digital recirculation valve for "point of source" temperature controller in a continuously pumped re-circulating hot water system. System hot water temperature can be set at the BIG BRAIN valve. This system will integrate with software already in place for other Residential Life Residence Hall
Buildings.

**Brain Scan 1**
To include (1) BRAIN Scan 1 Hot water system monitoring. This is a digital hot water management system console optionally supplied with DRV80 Digital Re-circulating Valves and DRV80 based Mixing
Center. This includes remote hot water supply, cold/recirculation water supply and blended water outlet
temperature readings. Also gives the ability to remotely change blended water outlet temperature set point.
This will integrate with software already in place for other Residential Life Residence Hall Buildings.

The heater skid needs to include two (2) shell and tube exchangers, piped in parallel (redundant heat exchanger and DRV mixing valve) steam to water shell and tube water heater package and designed for recirculation service. It must be pressure tested prior to delivery. The instantaneous shell and tube water heater shall be of single wall construction with straight brass tubes expanded into red brass tube sheets with a bolted end cover. Heat exchanger shall be fixed on one end of the shell and free floating on the opposite end in accordance with ASME Code Section VIII.

The package shall include two (2) temperature controllers (DRV), Digital Recirculating Valve, digital, integrated circuit board to deliver blended water at a safe and accurate temperature for sanitary use in re-circulated hot water systems. The DRV shall have a 2 line, 16 character display for delivered temperature in degree F or Degree C. Display shall show error codes and alarm conditions and be compliant with ASSE Standard 1017 and CSA B125, UL listed and so certified and identified.

The skid will include two (2) DRV Brain digital mixing valves and motorized ball valves for emergency shut off in case the Brain valve were to fail. All brass components must be “Lead free” and meet the “Safe Water Drinking Act” standards.

Steam pressure on system to be no more that 15 PSIG and designed to generate 73 GPM with a 40 degree entering cold water temperature, a 140* mixed water set point utilizing 15 PSIG steam at maximum of 3883 lbs/hr. steam load.

Water heater shall have all of the following operational capabilities:

+/- 2F* water temperature control from 0 to full system demand

2* minimum inlet to outlet water temperature differential

Automatic shutoff of hot water flow upon cold water inlet supply failure

Automatic shut off of hot water flow in the event of power failure.

Programmable set point range of 81-158* F(27-70* C)

Programmable thermal disinfection mode

Programmable 1st level hi/lo temp alarm display

Programmable error temperature error level for double safety shutdown.

LCD display which indicates set point, delivered temperature, error codes and alarm conditions.

Isolation valves and clean in place connectors to chemically clean the exchanger without dis-assembly of the exchanger.

¼” domestic side pressure relief pop-off valve with 165 psig crack pressure. Self seating.

Water heater package shall have the following connectivity capabilities

SPOC relay outputs which are energized during operation

RS485 Serial Port for connection to Brainscan or Modbus

Warranty: Pre-package skid shall have a 2 year warranty from date of installation but no longer than 27 months from date of shipment. DRV shall have a 5 year all components parts warranty.