

Building Pipes and Water System Assessment for Habitat Suites Hotel, Austin, TX

Section 1: Facility Profile

Facility Type: Hotel- 3 Buildings 32 Rooms Each

Building Architectural and Engineering Design Differences: No difference between the 3 buildings

Approximate Size of Buildings: 180' X 40'

Building Construction Dates: 1983 (All)

Building Age: 34 years

Floor Levels per Building: 2

Laundry: No

Dishwashers: No

Rooms per Building: 32 (16 per floor level)

Building Occupation in Relation to Building #2:

Building 1: Lower than Building 2

Building 3: Higher than Building 2

Section 2: Building Pipe Layout

Water Supply Summary and Pipe Layout:

Eco-friendly facility does not operate a salt water softener. City water is supplied to the complex by two main pipes of unknown diameter to water shutoff valves, located in front of the Guest House (Lobby). From that point pipes enter each Building by the boiler rooms where they split in two distribution sections. (O.D.= Outside Diameter)

1. Cold Water Building Main - Pipe Size 1½ - Pipe O.D. 1.9"
2. Hot Water Loop - Pipe Size 1¼ - Pipe O.D. - 1.7"

Distribution System Pipe Diameter Reductions:

- Cold pipe ends to kitchens and bathrooms: from **2" to 0.84" O.D.**
- Hot pipe ends to kitchens and bathrooms: from **1.7" to 0.84" O.D.**
- Water return. Before boilers from **1.7" to 1" and back to 1.7" O.D.** to boilers.

Standard Nipples and Pipe Sizing			
Pipe Size	Outside Diameter (O.D.)	Circumference	Threads Per Inch
1/2"	0.840"	2.639"	14
3/4"	1.050"	3.299"	14
1"	1.315"	4.131"	11 1/2
1 1/4"	1.660"	5.215"	11 1/2
1 1/2"	1.900"	5.969"	11 1/2
2"	2.375"	7.461"	11 1/2
2 1/2"	2.875"	9.032"	8

Section 3: Water Heating System

Type of Heaters: Natural Gas and Tank Type

Heater Manufacturing Dates and Brands:

- | | |
|---|-------------------------------|
| a. Building 1, Boiler A: 07/12/2004 AC Smith | B: 03/30/2005 AC Smith |
| b. Building 2, Boiler A: 08/01/2011 AC Smith | B: 08/01/2011 AC Smith |
| c. Building 3, Boiler A: 03/04/1994 State | B: 10/11/1997 AC Smith |

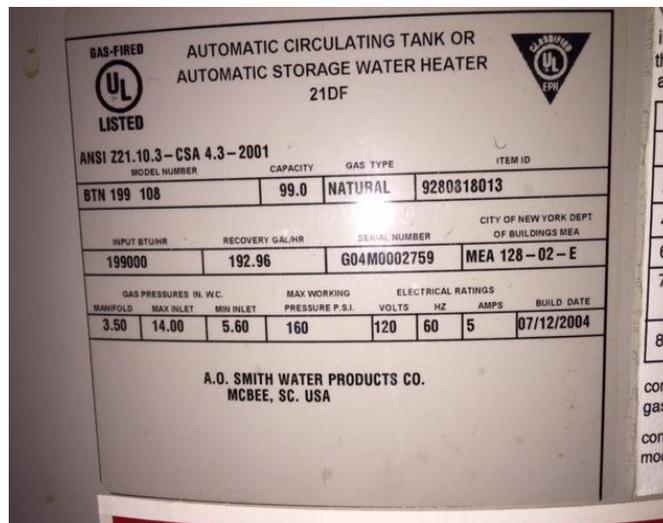
Heater Maintenance Overhaul Dates (Dates: Provided by Management):

Building 1 Heaters A and B: November 2016

No contracted maintenance overhaul on record for Building 2

Note on Building 3 Heater A - "Serviced 10/11/1997"

Heater General Specifications (All Equal):



Heating System Temperatures

Recommended reading:

<http://www.plumbingengineer.com/content/hot-water-system-temperatures-and-code>

Thermostat Setting – Heater Output Pipe – Building End Room Temperatures

- Building #1
 - Heater A- Thermostat Set to: **140°F** - Output Pipe: **128.5 °F** - Room 1116: **110.2°F**
 - Heater B- Thermostat Set to: **138 °F** - Output Pipe: **127.2 °F** - (Serviced Nov/2016)
- Building #2
 - Heater A- Thermostat Set to: **160° F** - Output Pipe: **152.1 °F** - Room 2209: **107.6°F**
 - Heater B- Thermostat Set to: **160 °F** - Output Pipe: **116.5 °F** - (**Urgent Service Req.**)
- Building #3
 - Heater A- Thermostat Set to: **N/A** - Output Pipe: **125.7 °F** - Room 3209: **113.2°F**
 - Heater B- Thermostat Set to: **130 °F** - Output Pipe: **126.5 °F**

**Section 4: Water Heating System Design- Capacity Verification
Available vs. Recommended**

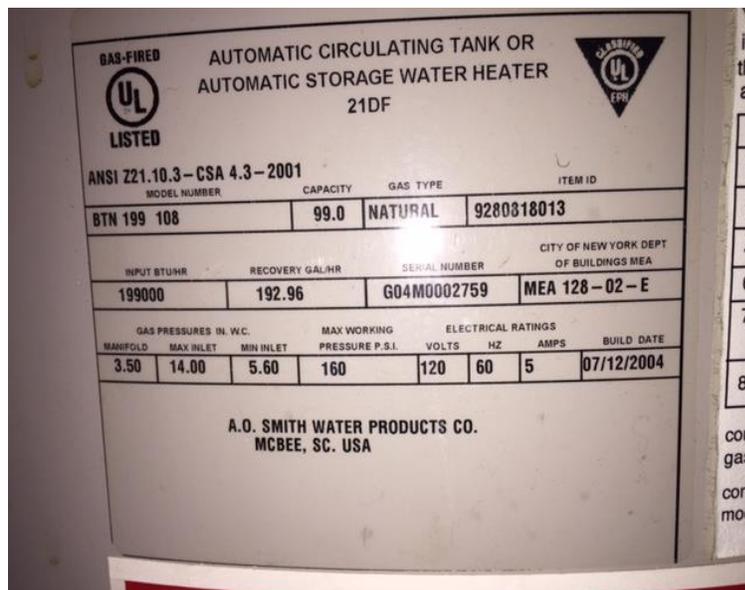
On Site 2 Units per Building with Specs. As Described Below



Conclusion:

Per Heater Manufacturer AO Smith specs, the 3 apartment buildings at Habitat Hotel have an adequate design capacity to sustain 64 guests showering (8 minutes max. @ a 2.5 gpm. shower head flow) in each period of two hours and more. Actual mechanical condition, is marginally adequate or not adequate to supply this demand and not apt to compensate for a higher demand load beyond the indicated parameters unless set at 160°F. See sizing documents provided.

Typical specifications for all heaters



Section 5: Reported Mechanical Problems

Water Supply Problem Summary:

Not enough hot water to supply Building #2 end rooms on peak times at full occupancy.
Reported presence of limescale on hot and cold pipes.

Other Notes:

- A pipe section of the hot water return line to Building #2 heaters was replaced after showing a heavy obstruction due to calcium deposits. Pipe size reductions downstream promote minerals to accumulate in these sections. See actual Habitat Suites hot water loop pipe below.



Section 6: Problem Causes

1. Water Supply from Austin City (Very Hard 180-210 mg/L). No water softener on property.
2. Building #2 Heater B is set to 160°F and outputs around 116.5° F. This is an indication of severe scaling on heating elements and water tank. Limescale obstructs proper heat transfer and reduces water tank capacity, making heating inefficient.
3. Scaling obstructing water flow at pipe O.D. reductions spots. Bathrooms, kitchens and heater return line. Scaling may also be present at pipe 90° bends. Many pipe sections have been replaced for this reason.

Section 7: Maintenance and Preventive Actions

Overview:

The damaging effects limescale can have on the lifespan of a water heater and its energy efficiency are significant. Where mains hard water exceeds 200 ppm, feed water to heaters and the hot water circuit must be chemically treated periodically to reduce the rate of limescale accumulation.

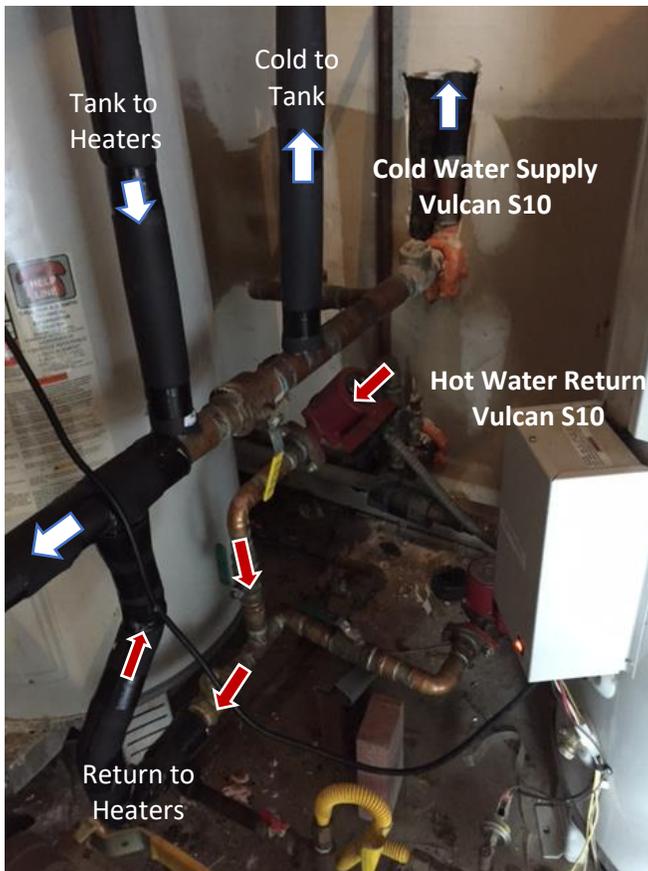
Suggested Reading: [http://inspectapedia.com/plumbing/Water Heater Scale Removal.php](http://inspectapedia.com/plumbing/Water_Heater_Scale_Removal.php)

Recommended actions to take:

1. Options to prevent pipes from continuing building up scale.
 - a. Vulcan Physical Water Treatment. Instant limescale prevention.
 - b. Salt Water Softener. Expensive to purchase and to maintain. Does not dissolve scale.
2. Options to remove existing scale from pipes.
 - a. Acid descaling of old copper pipes may be harmful to welds on pipe joints. Concerns about pipes leaking after being flushed with acid are very high.
 - b. Pipe replacement. Non-practical. Costly and requires extended building shut down.

- c. Vulcan Physical Water treatment will dissolve the soft outer layers of scale within the first six months opening pipe space and preventing further incrustations. The inner layers of limestone are more solid. They will become soft after months of treatment and will be dissolved in the long run. Heating elements will always cause minerals to bake on to their surface. Vulcan will prevent solubilized minerals to keep building up over the baked-on surfaces by de-activating the adhesive properties of minerals.
- 3. Remove existing scale from heater tanks and heating elements.
 - a. Schedule tank and heating elements cleaning for Building 2 Heater B during hot summer months. Depending on its condition, heating elements may need replacement. If possible, inspect Heater A for output level and internal condition.
 - b. Schedule tank and heating elements cleaning for building 3 heaters during hot summer months.
 - c. Schedule an inspection for building 1 heaters to evaluate its output level and internal condition.

Section 8: Recommended Vulcan Physical Water Treatment Sizes

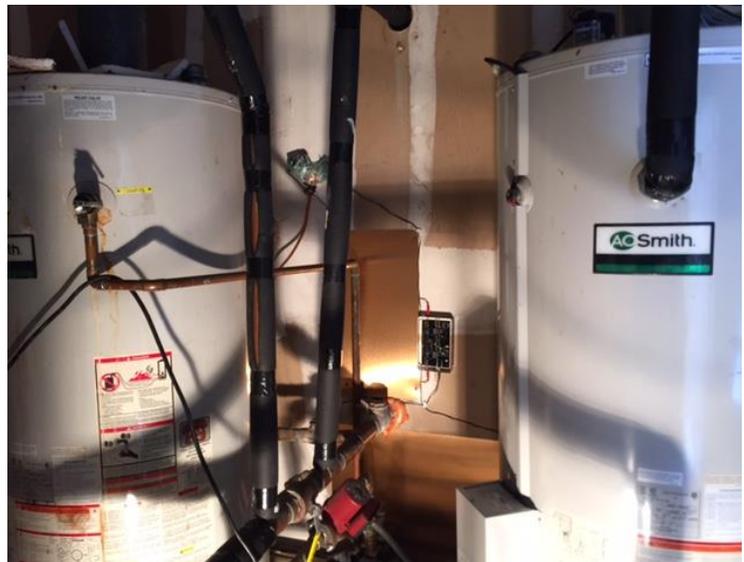


Cold Water Dia. 1.9" – Vulcan S 10
Hot Water Dia. 1.7"– Vulcan S 10

Installation at Pfizer Puerto Rico Operations
 Chilled Water Loop Vulcan S100



Actual Installation Pictures at Habitat Suites Vulcan S10 (2 Units) Cold Main and Hot Water Recirculation Loop



2 aluminum inspection panels were manufactured to cover the gaps in the wall.