

# Continental Consulting

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## Commercial Inspection Report

Heating System Evaluation

Prepared for:

Commercial Customer  
100/10 Dalmatian Drive  
Somewhere, ME. 04000

April 24, 2004



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## GENERAL INFORMATION

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This report summarizes the observations of the heating system at 100-10111 Dalmatian Drive conducted on April 12, 2004. At the time of the inspection the temperature was approximately 46 degrees; it was partially overcast. The structure was occupied when the inspection was conducted. The owner, Commercial Customer, was present.

An additional inspection was conducted on April 20<sup>th</sup>; Mr. Plumber of Mr. Plumber Plumbing & Heating in Monmouth, Me accompanied the inspector for the purpose of providing cost estimates.

**PROPERTY LOCATION:**

100/101 Dalmatian Drive  
Augusta, Maine

**REPORT DATE:**

April 13, 2004

**INSPECTION DATE:**

April 12, 2004

**REPORT NUMBER:**

200400-00014

**CLIENT:**

Commercial Customer  
P.O. Box  
Somewhere, ME 00000  
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**PREPARED BY:**

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## 1. PURPOSE OF THE INSPECTION

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Continental Consulting was commissioned to investigate the central heating system of a six unit apartment building located on 100/101 Dalmatian Drive for the purpose of providing recommendations regarding the following issues:

1. Excessive annual oil consumption
2. Overheating in the basement
3. Uncontrolled heating in apartment units

## 2. GENERAL OBSERVATIONS

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1. 100/101 Dalmatian Drive is a six unit residential apartment complex consisting of a basement and three levels of occupancy. The building is estimated at 100+/- years old.
2. There are six rental units in the building with a total of 9 occupants.
3. The heating plant is an older model A5 sectional low pressure steam (15 psi) Oil Boiler, Model A507 2B-J2 Series, rated at 508MBTUH. Maximum firing rate is 4.75 gph with #2 fuel oil.
4. The steam distribution system is connected as a one-pipe, gravity system, with the main serving the dual purpose of supplying steam to the terminal units (radiators) and conveying condensate back to the wet leg. The system pressure control was set approximately at 2psig.
5. The Burner is a relatively new Beckett Burner.
6. The boiler was inspected and tested for combustion efficiency on 03/23/04 by OEM Oil Company. Combustion Efficiency was documented at 83.5%.
7. Steam piping is black iron pipe in good condition.
8. The boiler additionally provides domestic hot water from three parallel immersion coils with a mixing valve to distribution. The cold water line is 3/4" copper and the hot water line is 3/4" increasing to 1".
9. 101 Dalmatian Drive has a wall mounted thermostat on the second floor in the hallway, and an additional thermostat within the adjoining apartment. The outside thermostat was set at 90 degrees F; the inside thermostat was set at 60 degrees F. It was not possible to determine which thermostat was the operative thermostat.
10. 100 Dalmatian Drive has a thermostat on the first floor in the hallway. It was set at 71 degrees F.

## 3. SPECIFIC OBSERVATIONS

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### INSPECTION OF BASEMENT

1. The Basement area was overheating.

2. Steam piping in the basement is un-insulated. At one time it was insulated with asbestos insulation, which was subsequently removed but not replaced. (see notes on re-insulating piping Appendix A & B highlighted)
3. Radiant losses from the boiler casing did not seem to be excessive.
4. In spite of the mild outside temperature, the burner cycled often.
5. The operating pressure on the boiler was set approximately at 2 psig.

#### **INSPECTION OF 101 DALMATIAN DRIVE FIRST FLOOR**

1. The apartment temperature appeared to be normal.
2. Radiators were being controlled by the occupants by adjusting the air vents. Additionally, some of the main valves to the radiators were not in the full open position.  
Note: Valves are not designed to regulate heating output and should remain in the full open position (see Recommendations).

#### **INSPECTION OF 101 DALMATIAN DRIVE SECOND FLOOR**

1. The apartment appeared to be overheating
2. Radiators were being controlled by the occupants by adjusting the air vents. Additionally, some of the main valves to the radiators were not in the full open position.  
Note: Valves are not designed to regulate heating output and should remain in the full open position (see Recommendations).
3. A wall mounted thermostat is installed inside the apartment and reported by the owner to be functional. The thermostat was set at 60 degrees F.

#### **INSPECTION OF 101 DALMATIAN DRIVE THIRD FLOOR**

1. The apartment appeared to be overheating.
2. Radiators were being controlled by the occupants by adjusting the air vents. Additionally, some of the main valves to the radiators were not in the full open position.  
Note: Valves are not designed to regulate heating output and should remain in the full open position (see Recommendations).
3. The radiator in the main living area had a radiator cover over it.
4. The occupant complained that cold and hot water were often “soapy-like.”

#### **INSPECTION OF 100 DALMATIAN DRIVE FIRST FLOOR**

1. The apartment temperature appeared to be normal.
2. Radiators were being controlled by the occupants by adjusting the air vents. Additionally, some of the main valves to the radiators were not in the fully open position.  
Note: Valves are not designed to regulate heating output and should remain in the full open position (see Recommendations).

#### **INSPECTION OF 100 DALMATIAN DRIVE SECOND & THIRD FLOORS**

1. The second and third floor apartments on 100 Dalmatian Drive were not visited.

#### 4. FACTS (Source: Owner)

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##### ANNUAL OIL CONSUMPTION

1. 01/02 – 12/02: \$7412.00. Assumption fuel purchased at \$1.02/gal: 7266 gal # 2 fuel oil.
2. 06/16 - -3/04: \$5493.46: See Excel Spread Sheet **FUEL OIL CONSUMPTION 03/04**

##### ANNUAL WATER CONSUMPTION

See Excel Spread Sheet **ANNUAL WATER CONSUMPTION**

1. Q1/03: 8600 cf            10.6 cf/person/day
2. Q2/03: 6300 cf            7.77 cf/person/day
3. Q3/03: 7300 cf            9.01 cf/person/day
4. Q4/03: 7400 cf            9.13 cf/person/day

#### 5. RECOMMENDATIONS

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##### OVERVIEW:

In general, one pipe steam heating systems – though still used today – are no longer considered modern because of their inability to provide consistently balanced heat exchange due to routine maintenance and system understanding and operation. In times past, when fuel oil costs were considerably less expensive, it was common practice to open windows when overheating occurred. Additionally, steam heating boilers of this age are more susceptible to expansion and cooling cycles, which potentially could result in leaks during seasonal changes when boiler are shut down.

The boiler at 100 Dalmatian Drive is probably 40 +/- years old, and while it is impossible to determine its remaining useful life, it is nevertheless probable that a boiler of this type and condition will continue to serve a useful function for many years to come. That said, there are two considerations predicated the conclusion of this report:

1. **Retain the Boiler and make System modifications**
  - a. Retain existing boiler.
  - b. Upgrade existing terminal units and distribution system
  - c. Modify Domestic Hot Water (DHW) system (See subsequent notes)
2. **Replace the Boiler**
  - a. Purchase a new steam boiler sized for the heating load (see spread sheets on heating load based on current oil consumption)
  - b. Upgrade existing terminal units and distribution system
  - c. Install individual apartment hot water heaters (electric or oil/gas). Operating costs to be borne by renters.

I recommend Option 1— keeping the boiler to defer capital outlay until it is apparent that a replacement boiler is required, or the investment can be justified at an earlier date (see Costs Section). Furthermore, I recommend that system modifications be made to the boiler, distribution system and terminal units (radiators), since these will be necessitated with a new boiler installation as detailed in Option 2. Specifics are noted herein:

## **BOILER**

1. Size Burner Nozzle to lowest possible nozzle size based on manufacturer's recommendations.
  - a. The present boiler and nozzle are oversized for winter operation, and invariably oversized for summer operation in which domestic hot water is the only requirement.
  - b. The currently installed burner nozzle is a 4 gph 80 B. The rated maximum nozzle size for the boiler is 4.75 gph. A heat loss was not conducted on the building, but analyzing fuel consumption figures for 03-04 (see Excel Spread Sheet **FUEL OIL CONSUMPTION 03-04**) the average hourly consumption figure for January was 189,286 BTU/Hr, significantly less than the current boiler rating of 508,000 BTU/Hr. Based on 1684 degree days (Source: NOAA.gov) for Augusta during January 2004, including the Domestic Hot Water Load (DHW) and assuming a design day at -20F, an approximation of the Design Heating Load is 283,929 BTU's/hr. This is significantly less than the current system firing rate.  
Note: The above figure is an estimate only. An actual heat loss should be done before a boiler is selected.
  - c. Domestic Hot Water Usage (see Excel Spread Sheet **FUEL OIL CONSUMPTION 03-04**) equates to 3.9 gallons of fuel oil per day, or 453,213 BTU's/day.
2. Reduce the operating steam pressure to the lowest possible operating level (e.g. 1.5 psi w/ .5 psi differential) to satisfy the building heating load during the winter.
3. Install an aqua-stat for summer operation, running the boiler as a hot water system to provide heat to the auxiliary DHW tank.
4. Based on the age of the boiler it is recommended that the boiler be operated throughout the year to prevent leaks from seasonal expansion and contraction. Modern day boilers, however, can be shut down during summer months.

## **THERMOSTATS**

1. Remove the Wall-mounted Thermostats, and control operation of the boiler through the boiler pressure operating control during the winter months. During the summer months, operate the boiler off an aqua-stat (see DHW Recommendations)

## **DISTRIBUTION SYSTEM**

1. Insulate the piping in the basement to reduce uncontrolled heat loss and improve system efficiency (see Appendix A & B).
2. Balance the system after all system modifications have been made.

## **TERMINAL UNITS**

1. Install Thermostatic Controlled Radiator Valves (see attachment)
2. Replace defective Supply Valves, and ensure that all valves remain open.

## **DOMESTIC HOT WATER OPTION #1 (RECOMMENDED OPTION WITH CURRENT BOILER)**

1. Continue to use current boiler and internal coils for Domestic Hot Water. Fuel oil consumption during the period of 06/16/03 to 09/08/03 (Summer Operation Period) reflects 325 gals or \$296.02. This is based on the boiler operating under steam. If, as the recommendations suggest, the boiler is operated as a hot water boiler, there is a possibility that the coils will not operate as efficiently; consequently delivered water temperature will be lower. Cleaning the coils, if they haven't been cleaned in some time may positively aid the situation.

In other words, this option is based on economics; the down side is that the boiler may have to be operated in the steam mode.

## **DOMESTIC HOT WATER OPTION # 2 (ECONOMICS QUESTIONABLE)**

1. Install an auxiliary hot water heating tank with internal coil off the present boiler.
  - a. The average water consumption per day, including cold and hot water usage, is 9.12 cf/person/day. Assuming 75% is hot water usage, then each person uses about 51 gallons of hot water daily. This equates, with the present occupancy of nine tenants, to 459 gallons each day or 307 MBTU (exclusive of plant efficiency losses). Usage patterns most likely peak in the mornings and evenings.
2. The domestic hot water coil may be undersized, and the distribution line size of 3/4" appears to be similarly undersized, though Domestic hot Water availability and quality did not seem to be a common complaint voiced by the tenants. A properly sized hot water tank will insure adequate availability of hot water in the future; however there are reservations about the line sizes to the apartments based on the 3/4" piping.

Note: This may not be a cost effective option if a new boiler and on-demand water heaters are installed in the next few years.

## **DOMESTIC HOT WATER OPTION # 3 (RECOMMENDED WITH NEW BOILER SYSTEM)**

1. Install separate on demand electric hot water, oil/gas units for the individual apartments.
  - a. The least expensive option would be to install quick recovery heaters in each apartment and meter the electricity to the tenant (see Appendix)

## **EDUCATION**

1. Instruct Tenants how to use Thermostatic Radiator Valves.
2. Instruct tenants not to operate radiator supply valves for heating control.
3. Instruct tenants not to operate radiator air vents for heating control.

## MAINTENANCE

1. Regular maintenance on one-pipe steam systems is critical to proper operation and system efficiency. The system should be inspected regularly, preferably during the Fall and Summer seasons, at which time controls for summer/winter operation can be activated.

In summary, this report attempts to provide recommendations based on solving the current problems of uncontrolled heating and excessive fuel consumption without investing significant capital. The distribution system and terminal units (radiators) are, by and large, the single most cost effective areas to address. The existing boiler, while not as efficient as modern day boilers, is still relatively efficient when operating during the heating system. Typical modern cast iron boilers operate at 85-87% AFU.

## COSTS ESTIMATES

1. Costs for Insulating the Steam Pipes in the Basement should be relatively inexpensive. In addition to improving system efficiency, the quality of steam delivered to the apartments will be significantly improved. This will have a significant impact on permitting the reduction of the system operating pressure.
2. Thermostatic Radiator Control Valves generally range from \$50-\$100 depending on the manufacturer plus installation. Each radiator should be equipped with a valve.
3. The cost for an auxiliary DHW tank off the boiler should be between \$2000 - \$2500 including installation.
4. The cost of a new boiler (350 MBTUH) should be about \$4000-\$5000 plus installation and removal of existing boiler.

This report does not attempt to qualify heating loads, no represent savings in fuel consumption. It is intended as an overview to provide general recommendations to obvious deficiencies.. Additional details on cost savings and system layout can be provided as required.

Contractor cost Estimates from Mr. Plumber Plumbing and Heating will be forwarded shortly.

Thank you for using Continental Consulting, and please do not hesitate to contact me about any aspect of this report.

Sincerely,

John W. Dumont, Jr. PE  
Continental Consulting  
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## 6. REPORTS

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### 6.1 Annual Water Usage

Annual Water Usage								
Item	Quarter	Cubic Feet (CF)/Qtr	Gallons/QTR	Occupancy	Units	Days	CF/Person/Day	Gal/Person/day
1	Q1	8600	64242	9	6	90	10.62	79.31
2	Q2	6300	47061	9	6	90	7.78	58.10
3	Q3	7300	54531	9	6	90	9.01	67.32
4	Q4	7400	55278	9	6	90	9.14	68.24
Total		29600	221112					

## 6.2 Annual fuel Usage

Commercial Property		Fuel Oil Consumption 03/04							
Item	Date	Fuel Oil Usage (gal)	Payment	Price/gal					
1	06/16/03	203.3	\$182.97	\$0.90					
					<b>DHW Average Summer Operation</b>				
					Fuel Oil	Days	Gal/day	Gal/hr	Btu/Day
2	09/08/03	325.3	\$296.02	\$0.91	325.3	84	3.9	0.2	453213
3	10/08/03	232.1	\$223.70	\$0.96					
4	11/03/03	350.4	\$330.71	\$0.94					
5	11/18/03	329.1	\$332.52	\$1.01					
6	12/02/03	268.4	\$264.32	\$0.98					
7	12/15/03	328.7	\$338.99	\$1.03					
8	12/24/03	321.8	\$333.55	\$1.04					
9	01/02/04	183.7	\$194.54	\$1.06					
10	01/05/04	107.6	\$114.35	\$1.06					
11	01/12/04	197.5	\$224.04	\$1.13	<b>January Averages/Heating &amp; DHW</b>				
12	01/16/04	261.4	\$276.82	\$1.06					
13	01/26/04	271.7	\$287.73	\$1.06	Fuel Oil	Days	Gal/day	Gal/hr	Heating/Btu/hr*
14	01/30/04	248.7	\$263.37	\$1.06	1086.9	28	38.8	1.6	189286
15	02/09/04	314	\$321.16	\$1.02	<b>February Averages/ Heating &amp; DHW</b>				
16	02/18/04	308.3	\$326.49	\$1.06	Fuel Oil	Days	Gal/day	Gal/hr	Heating/Btu/hr
17	03/01/04	350.2	\$370.86	\$1.06	972.5	29	33.5	1.4	163523
18	03/12/04	352.6	\$367.60	\$1.04					
19	03/24/04	419	\$443.72	\$1.06					
<b>Totals</b>		<b>5373.8</b>	<b>\$5,493.46</b>	<b>\$1.02</b>					
*Heating Btu/Hr at 83% combustion efficiency									





the pump should be 160–180 F. This subcooling assures that there is no heat loss due to flash steam escaping from the receiver vent. It also allows a simple single stage centrifugal condensate pump to return the condensate.

### **Float and Thermostatic Traps**

*Float and thermostatic (F&T) traps* have separate elements for venting air and draining condensate. The thermostatic element is located above the trap condensate level to allow free air venting during start up. The thermostatic element is similar to those in thermostatic traps. Air entering the trap body is discharged through the thermostat seat. The opening and closing of the thermostat seat depends on the temperature surrounding the thermostatic element.

Initially, condensate fills the trap body to a level slightly above the trap seat. It is sufficient to seal the valve seat opening, kept closed by the valve pin. As condensate continues to enter the trap body, the float will rise, causing the valve seat to be opened. Condensate then will be discharged through the trap outlet. The rise and fall of the float, due to changes in the water level within the trap body, results in a modulated discharge which is characteristic of F&T traps.

### **Inverted bucket traps**

Bucket traps are so named because the operating mechanism inside the trap resembles an upside down open bucket. The bucket is fastened to the end of a lever, and the valve pin is fastened to the same lever near the fulcrum. A small bleed hole in the top of the bucket allows air to vent from the bucket.

The bucket trap opens when the bucket is filled with *condensate* and lifts to close the trap when it is filled with steam. The *bucket trap* operation is open-close; it does not modulate.

### **Efficient operation**

For low pressure steam systems to heat efficiently:

- Boilers should be set for operation at the minimal pressure that will provide the required heating. *Condensate* temperature and resulting flash loss relates to operating pressure.
- Most heat exchangers heating fluids to under 200 F should be sized for 2 psi steam operating pressure.
- Probe boiler controls should be cleaned or replaced annually.
- Float type boiler controls should be blown down frequently in accordance with the manufacturer's recommendation to prevent the build up of dirt inside the float housing.
- Boiler blowdown should be performed according to the recommendations of the water treatment company.
- Use *thermostatic traps* where possible to take advantage of subcooling.
- Insulate steam lines to reduce heat loss in the distribution system. Don't insulate the return line if it results in flash loss or pump cavitation. Install condensate return units where condensate is being dumped. Monitor and record condensate temperatures weekly.
- Keep traps in good condition to prevent steam from passing into the return system. Test traps at least once a year on low pressure systems.
- Make sure the system vents properly—air trapped in the system acts as an insulator and results in poor heating.
- Avoid lifts in the gravity return lines that can cause poor venting and *water hammer*.

This article was originally published in the October 1998 issue of Maintenance Technology magazine.

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## **Appendix A**

## Tips on Balancing One-Pipe Systems

Since George D. Hoffman invented the first float-and-thermostatic steam air vent in 1912, we've learned a thing or two. We'd like to share with you a few one-pipe-steam balancing tips we've picked up along the way.

**Vent the mains quickly.** If you want the steam to arrive at all the radiators at about the same time, you must vent the mains quickly. Steam is a gas and it will always look for a way out of the system. When it leaves the boiler, it heads toward the air vents. The bigger the air vent, the more inclined steam will be to head that way. If your system heats unevenly, install a Hoffman #75 main vent near the end of the main and marvel at the difference it makes.

The #75 vent should be at least 15 inches back from the end of the main and six to ten inches up on a nipple to keep it away from any end-of-main water hammer. The bigger the hole, the faster the venting, so it pays to install a tee with a 3/4 inch tapping for the vent near the end of the main. Don't try to get by with a tiny hole drilled into the main.



**Install a Hoffman "Y"strainer vertically before the main vent.** We don't have to tell you how dirty an old steam system can be. Since the steam is moving at high velocity (typically, about 25 mph in a one-pipe system), it picks up particles of rust and sediment. Eventually, this stuff winds up inside the main vent. Before long, the main vents clog and can't shut. They spit water and let steam pass to the atmosphere. This creates water-level problems at the boiler.

**Vent the radiators based on their size.** If your goal is to get all the radiators hot simultaneously on the coldest day of the year, you'll have to handle the air in a special way. First, as we said before, vent the mains quickly. That's important. Then vent the radiators in relation to their size, not necessarily their location in the building.

The main vents will make sure steam reaches each radiator at about the same time. Since big radiators contain more air than small radiators, big radiators should have larger air vents than small radiators.

Hoffman's 1-A vent, with its adjustable venting rate, is an excellent choice for systems with radiators of different sizes.

**Insulate the steam lines.** When steam condenses and turns back into water, it stops moving. That's why the old-timers spent so much time insulating their steam mains. They wanted the steam to condense in the radiators, not in the basement piping.

If someone removed the asbestos insulation, you must replace it with a more suitable material

if you want a balanced system. Uninsulated steam pipes have about five times the heat loss of insulated steam pipes.

Wrap the pipes well so the steam has a chance to get where you want it to go.

**Clean the system.** If the boiler water is dirty, the steam will carry water with it when it heads off into the piping. This leads to water level problems at the boiler, sure, but it also creates balancing problems throughout the system.

The steam gives up its latent-heat energy to the mist of water that's traveling with it. That stops the steam dead in its tracks. The far radiators remain cold while the radiators near the boiler room get warm. The burner often short-cycles when the steam quality is poor. This, too, leads to balancing problems.

Check the boiler manufacturer's cleaning instructions. It can take a day or two to get a boiler's water back in "clean-steam" shape, but this is often the only solution to those balancing problems.

**Lower the steam pressure.** Steam heating systems ride a wave of pressure from the "cut-in" to the "cut-out" setting of the pressuretrol or the vaporstat. The system must cycle up and down on that wave because that's how the air vents work.

Steam pushes the air from the vents; the vents then shut on temperature. When the steam condenses, the vents are supposed to open to allow venting to continue. But if the system pressure is too high, the air vents might stay closed. Since air can't escape from a closed air vent, the radiators stay cool, and the system goes out of balance.

The air vents and the pressuretrol or vaporstat work together to move the air from the system. If you set the "cut-in" setting at one-half psi on a pressuretrol or at about four ounces on a vaporstat, you'll never lock the air vents closed.

The "cut-out" pressure should be as low as possible. There is no reason to raise the steam pressure any higher than it has to be. High-pressure steam actually moves more slowly than low-pressure steam.

So when you're trying to balance that one-pipe system, lower the pressure.

Proper near-boiler piping also plays a huge role in the one-pipe-steam balancing act. Always follow the boiler manufacturer's specifications carefully.

*Your Hoffman representative is well versed in steam-heating-system problems and their solutions. If you need help, call and ask for their advice. They're always there for you!*

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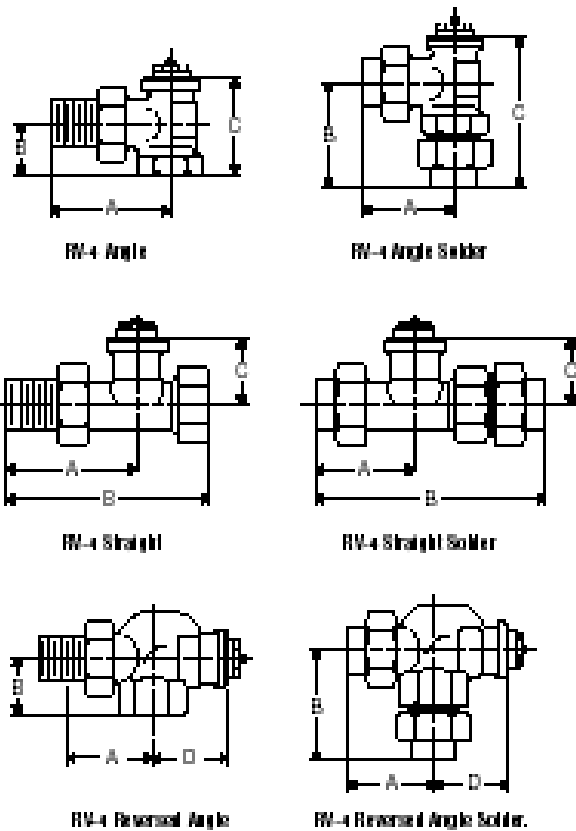
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## Appendix B



# Armstrong Thermostatic Radiator Valves



## For Hot Water and Low Pressure Steam

Armstrong's thermostatic radiator valves are offered in straight, angle and reversed angle patterns. Thermostatic operators provide accurate and automatic control of space temperature. They are ideal for hot water and low pressure steam heated convectors, radiators, thermostatically controlled hydronic or low pressure heat exchangers. Five (5) styles of thermostatic operators are available with liquid, liquid remote or low density wax sensors.

Physical Data—Welded Bodies																												
Pattern	Angle								Straight								Reversed Angle											
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm								
Pipe Conn. PPT x MPT	1/2	15	3/4	20	1	25	1-1/4	32	1 1/2	38	1	25	1-1/4	32	1 1/2	38	1	25	3/4	20	1	25						
W	2-5/16	58	2-5/8	68	2-15/16	58	2-7/8	72	2-5/16	58	2-1/2	64	2-1/2	64	2-1/2	64	2-3/8	60	2-3/8	60	2-5/8	68	3	76				
H	1	25	1-1/8	28	1-5/16	32	1-3/8	38	2-3/4	68	4-3/16	93	4-15/16	78	6	153	1-1/8	27	1-3/4	44	1-5/16	32	-	-				
D	1-15/16	48	2-1/8	52	2-3/8	58	2-3/4	70	1-1/8	28	1-1/8	28	1-1/8	28	1-3/8	35	-	-	-	-	-	-	-	-				
Weight, lb (kg)	3/4 (0.34)				1-1/2 (0.68)				1-3/4 (0.79)				1 (0.45)				1-1/2 (0.68)				1-3/4 (0.79)				1 (0.45)			

Physical Data—Solder/Welded Bodies																
Pattern	Angle				Straight				Reversed Angle							
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm				
Pipe Connection Solder	1/2	15	3/4	20	1/2	15	3/4	20	1/2	15	3/4	20				
W	1-7/8	48	2-1/4	57	1-7/8	47	2-5/8	68	1-3/4	44	2-1/4	57				
H	2-5/8	68	2-1/2	64	4-2/8	113	5-1/4	133	2-3/16	52	2-1/8	51				
D	3	76	2-1/2	64	1-1/4	32	1-5/8	39	-	-	-	-				
H	-	-	-	-	-	-	-	-	1-1/2	38	1-1/2	38				
Weight, lb (kg)	3/4 (0.34)				1 (0.45)				1-1/4 (0.68)				1-1/2 (0.68)			

Pressure/Temperature		
Model	"W" Insert (Standard On All Valves)	"S" Insert (Provides Longer Life on Steam Heated)
Maximum Steam, psi (bar)	15 (1)	
Maximum Temp., F (°C)	234 (112)	
Max. Diff.—Water, psi (bar)	15 (1)	
Max. Static Pressure, psi (bar)	150 (10)	

NOTE: An easily closed insert available.

## Appendix C

# One Pipe Steam Valve



## Operation

A one-pipe steam valve assembly consists of the reliable B26000 direct mounting thermostat. The actuator head contains a temperature sensitive wax which expands and contracts on a rise and fall of temperature in the heated area. When the temperature rises above the temperature selected, pressure from the expanding wax closes the valve, preventing or restricting the flow of steam through the radiation unit. When the room temperature falls below the selected temperature, the valve opens and allows an increase of steam flow through the radiation unit. This modulating process continues automatically to maintain the temperature you selected.

## Important:

- 1 Installing the Macon one-pipe steam valve assembly does not eliminate other controls in the system. The boiler must be cycled in some manner.
- 2 If the boiler is cycled from a space thermostat in one zone, do not apply a radiator valve to that zone's radiation.
- 3 Do not apply a radiator valve in a one-pipe steam system that does not use steam air vents venting to the atmosphere on each radiation unit.
- 4 Vacuum break is required for proper operation.
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Connections: 1/8" male NPT inlet

## Features:

- Compact dimensions
- Nickel-plated, forged brass valve
- Thermostat may be locked at or limited to any desired temperature or temperature range
- Actuators may be changed without shutting down the system
- Valve may be installed by dropping the system down to zero pressure
- Individual room control for greater comfort
- Replaceable insert
- Stainless Steel spindle
- Fuel savings up to 30% or more
- Non-electric - fully automatic
- Prevents over- and under-heating
- Reliability
- Remote thermostats available - call or write for the distributor nearest you!
- Vent included