



Bell & Gossett

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INSTRUCTION MANUAL

S10300H



ROLAIRTROL®
Air Separator
ASME



COMPRESSION TANK
ASME



IAS
In-Line
Air Separator



ATFL
Airtrol Tank Fitting



ABF
Airtrol
Boiler Fitting



ATF
Airtrol
Tank Fitting

Airtrol® System

DESCRIPTION

The Airtrol System consists of an air separating device (Rolairtrol, IAF, IAS, or ABF), an air control tank fitting (ATFL or ATF) and a compression tank. These devices insure the proper removal and control of air in a hydronic system.



SAFETY INSTRUCTION

This safety alert Symbol will be used in this manual to draw attention to safety related instructions. When used the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.**

OPERATIONAL LIMITS

Model	Maximum Pressure psig	Maximum Temperature °F
IAS	175	300
ATFL	175	250
Rolairtrol	125	350
IAF	125	375
ABF	175	250
ATF	175	250
Compression Tank (15-100 Gal)	150	650
Compression Tank (120-400 Gal)	125	650

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

INSTALLATION INSTRUCTIONS

1. Refer to Figures 1 thru 12 for the proper installation of the various Airtrol System Components.

CAUTION: The generous use of pipe joint compound when installing Airtrol system components will foul the operating mechanism of many of the Airtrol system components and prevent them from functioning properly. Pipe joint compound must be conservatively applied to male threads only. Failure to follow these instructions can result in moderate personal injury and/or property damage.

CAUTION: The use of PTFE impregnated pipe compound or PTFE tape on pipe threads provides lubricity which can lead to overtightening and breakage. Do not overtighten. Failure to follow these instructions can result in moderate personal injury from hot water and/or property damage.

2. When installing compression tanks make sure that provisions are made to support the wet weight. For example, a 30 gallon compression tank weighs 67 pounds empty and 317 pounds full of water.

WARNING: Wet weight of compression tanks can exceed strength of supports. Make sure the provisions are made to support the wet weight and not just the dry weight. Failure to follow these instructions could result in serious personal injury or death and property damage.

3. The air-line to the compression tank must always pitch up and be of the proper size to allow air to flow to the compression tank.
4. The cold water supply must be connected to the air-line to the compression tank.
5. The pressure relief valve must not be connected to the air-line to the compression tank.
6. The system must be air tight.

OPERATING INSTRUCTIONS

1. Close all air vents except the vent at the bottom of the Airtrol tank fitting. If the ATFL model is used then open the ATFL Drain-O-Tank vent screw which is in the center of the handle.
2. Begin filling the system with fluid.
3. When water runs freely from the Airtrol tank fitting vent or ATFL Drain-O-Tank vent close the vent tightly.

CAUTION: Improper use of Airtrol tank fitting vent can cause excessive system pressure resulting in periodic discharge of the system relief valve. Scaling and corrosion of system components will result from addition of makeup water. Do not open this vent unless the system has to be drained. Failure to follow this procedure will result in a water logged compression tank. This will cause the compression tank to lose its ability to absorb the thermal expansion of the system water. Failure to follow these instructions can result in moderate personal injury and/or property damage.

4. Vent radiation units and other high points of the system.

WARNING: Venting can also release hot water. During venting care must be exercised to collect any water that vents off with the air and that vented fluids are directed away from you during venting. Failure to follow these instructions could result in serious personal injury or death and property damage.

5. If the system pressure is not high enough to reach the high points in the system, adjust the B&G pressure reducing valve so that adequate pressure is obtained.
6. After the system has completely filled, start the pump and allow it to circulate cold water for 20 to 30 minutes. This will dislodge entrained air bubbles in the system and return them to the air separator for removal.

7. Stop the pump and start the boiler burner. Allow the boiler temperature to reach 220°F then shut off the boiler burner. Wait at least one minute, then start the pump and allow it to run for 10 minutes.

CAUTION: Panel type radiation can be damaged by extremely hot water. Allow the boiler to cool to 140°F before starting the pump. Failure to follow these instructions could result in moderate personal injury and property damage.

8. Stop the pump. Vent radiation and the high points of the system. Normal system operation may now be started.

NOTE: If the above procedure has been followed carefully and the Airtrol System properly installed, there should not be a reason for further venting. However, if there are leaks in the system through which air may be lost, the compression tank can lose its air and become water logged. To drain the tank, allow the system temperature to cool to below 100°F, close the cold water supply valve and open the boiler drain and Airtrol tank fitting vent screw. Continue to drain the tank until the water level is just below the tank vent tube level. Close the vent and the boiler drain. Open the cold water supply valve and return the system to normal operation.

WARNING: Water at temperatures above 100°F can flash to steam and be very hazardous. Allow system temperature to cool below 100°F before draining water from system. Failure to follow these instructions could result in serious personal injury or death and property damage.

SERVICE INSTRUCTIONS

WARNING: Leakage, corrosion or indications of damage are signs of an impending serious failure of the Airtrol component. Periodically inspect all components for damage and if noted the Airtrol component must be serviced or replaced. Failure to follow these instructions could result in serious personal injury or death and property damage.

1. If the relief valve discharges whenever boiler water is being heated, it is probably due to a water logged compression tank (loss of system air cushion). To correct this problem, check the compression tank and the other Airtrol components for leaks. Those that are leaking must be replaced. First cool the system to ambient temperature, then either drain the system or isolate the leaking component with leak tight valves. Refer to item 8 under operating instructions on how to drain a water logged compression tank. If the system was drained to install a new Airtrol or other system component, follow instructions 1 thru 8 under operating instructions to return the system to normal operation.

WARNING: A water logged compression tank can cause system pressure to rise high enough for the relief valve to discharge. As system cools down additional water will need to be added to maintain adequate system pressure. The cycle will repeat continuously until corrected, causing scale and corrosion on heat system components. Make sure the compression tank is drained to a proper level and system checked for leaks. Failure to follow these instructions could result in serious personal injury or death and property damage.

2. The strainer in the R-Series Rolairtrol may need to be cleaned periodically. This is particularly true during the initial startup period. The need to clean the strainer will be evidenced by a high pressure drop across the Rolairtrol or by pump cavitation problems. To clean the strainer follow the following instructions:

- a. Allow the system water temperature to cool below 100°F.

WARNING: Water at temperatures above 100°F can be very hazardous. Allow system water temperature to cool down below 100°F before blowing down Rolairtrol. Failure to follow these instructions could result in serious personal injury or death and property damage.

- b. Open the blowdown drain valve for a few seconds. This should dislodge accumulated dirt from the strainer. If it does not then the strainer must be removed from the Rolairtrol for cleaning. This can be accomplished by closing the isolation valves to isolate the Rolairtrol from the system. Make sure the water temperature in the Rolairtrol is below 100°F. Open the blowdown valve on the bottom of the Rolairtrol to drain the unit. Make sure that all flow from the blowdown valve has stopped. If water continues to flow, the isolation valves must be repaired or replaced before proceeding.

WARNING: System fluid under pressure and/or at high temperature can be very hazardous. Before proceeding to service strainer, reduce system pressure to zero or isolate the Rolairtrol from the system. Allow the system to cool below 100°F. Failure to follow these instructions could result in serious personal injury or death and property damage.

- c. Remove the flange bolts that hold the strainer housing cover in place on the bottom of the Rolairtrol. Remove the cover and strainer. Clean the strainer and reinstall in the Rolairtrol. Replace the cover gasket with a new one and reinstall the cover making sure that the flange bolts are tightened in a criss-cross pattern to the proper bolt torque. Close the blowdown valve and open the isolation valves to return the Rolairtrol to normal operation. Check the gasket for signs of leakage. If found, additional slight tightening of bolts may be required.

INSTALLATION ON TOP OUTLET BOILERS

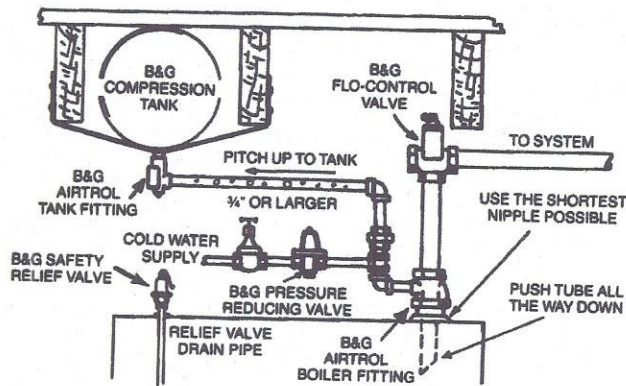


FIG. 1. Horizontal piping between boiler and compression tank must be full size of tapping in the Airtrol Tank Fitting. If horizontal pipe length is more than 7 feet, increase to next larger size pipe — two sizes larger if horizontal pipe is more than 20 feet. Do not use a valve of any kind between the compression tank and boiler! It is unnecessary and prevents free passage of air into the tank. If a valve must be used, install a gate valve in the vertical pipe line.

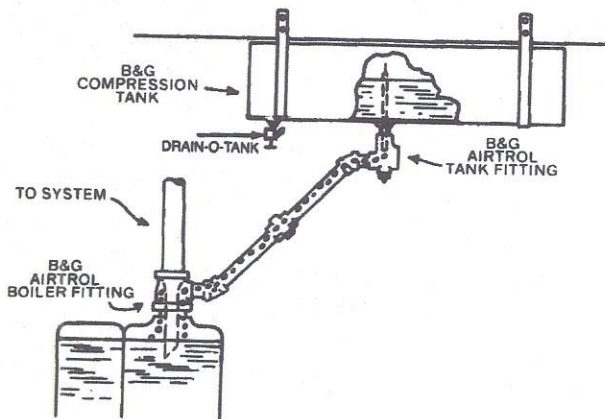


FIG. 2. This is an ideal method of running the pipe between the boiler and compression tank, as it permits an unrestricted flow of air bubbles to the tank. When this type of connection is not practical, horizontal piping with sufficient pitch-up to the tank (see Fig. 1) is adequate. A minimum of 1" pitch-up in five feet should be used.

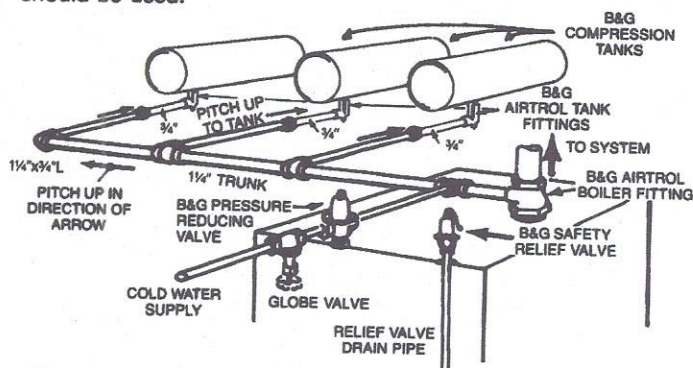


FIG. 3. Where there is not sufficient space between the boiler and the ceiling for a single compression tank of adequate capacity, several smaller tanks may be used. When two tanks are used, increase the horizontal header to one size larger than the tapping in the Airtrol Tank Fitting. For three or more tanks in parallel, increase the header two sizes. In installations where ceiling height will not permit unions in vertical piping they may be used horizontally. Airline piping must pitch-up to tanks.

INSTALLATION OF ATFL-1" TANK FITTING

The ATFL Airtrol Tank Fitting is made especially for compression tanks with capacities of 100 gallons and larger. This fitting may be used with all suitably sized ABF Airtrol Boiler Fittings, Rolairtrol and In-Line Airtrol Separators. Figs. 4 and 5 show typical recommended methods of installation.

The horizontal pipe between the ATFL Fitting and the boiler must always pitch-up at least 1" in 5 feet. For example, if the horizontal pipe is 2.5 feet long, use a nipple in the vertical pipe (see Fig. 4) approximately 1/2" shorter than would be required to make the line horizontal. Then pull the horizontal line down to catch the union.

For horizontal run-outs more than 7 feet long, use 1 1/4" pipe size. For lengths of 20 feet or more, use 1 1/2" pipe.

The ATFL Drain-O-Tank valve which is furnished with each ATFL fitting, is installed into a separate tapping in the tank. When the tube which is attached to the ATF Drain-O-Tank valve is uncoiled, the tube is long enough to be used in a 48" diameter tank. To use with any other size diameter tank, tube must be cut to right length with a hack saw as shown in the table below.

Diameter of Tank	Length of Tube
48"	32"
42"	28"
36"	24"
30"	20"
24"	16"
20"	13"

FIG. 4. ATFL Tank Fitting connect to top outlet ABF Boiler Fitting.

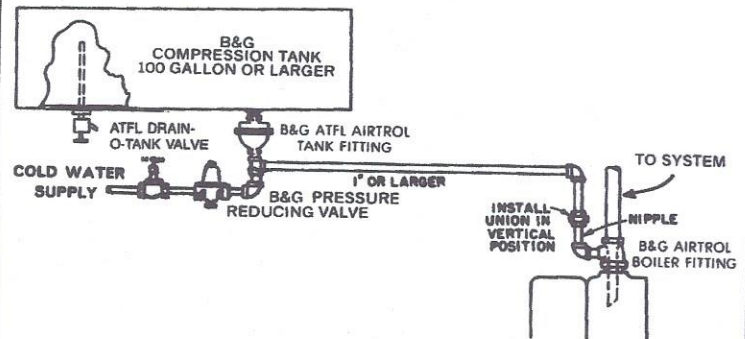
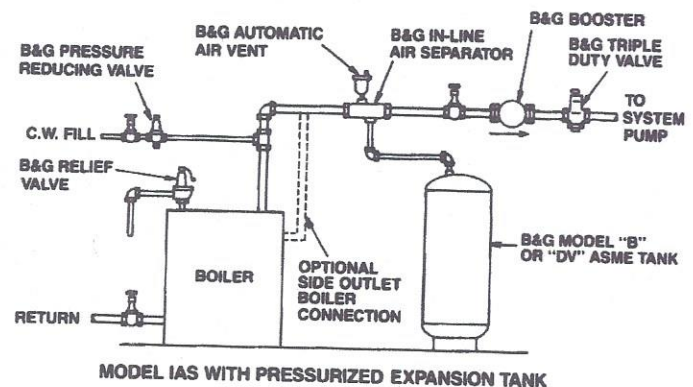


FIG. 5.

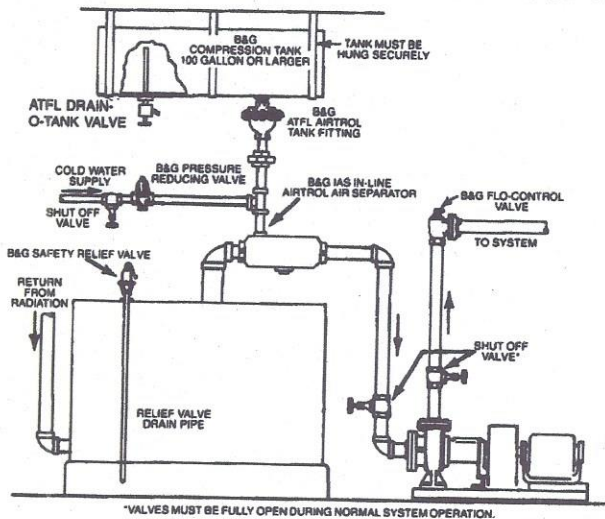


MODEL IAS WITH PRESSURIZED EXPANSION TANK

Note: Model IAS must be installed in horizontal pipe only.

B & G AIRTROL SYSTEM

FIG. 6 TYPICAL INSTALLATION — INLINE AIRTROL AIR SEPARATOR



MODEL IAS WITH CONVENTIONAL TANK

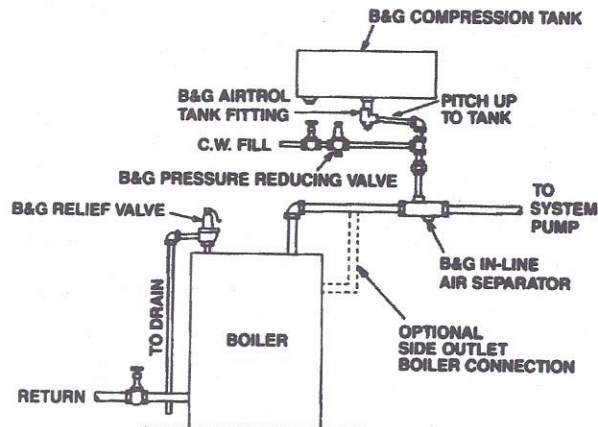
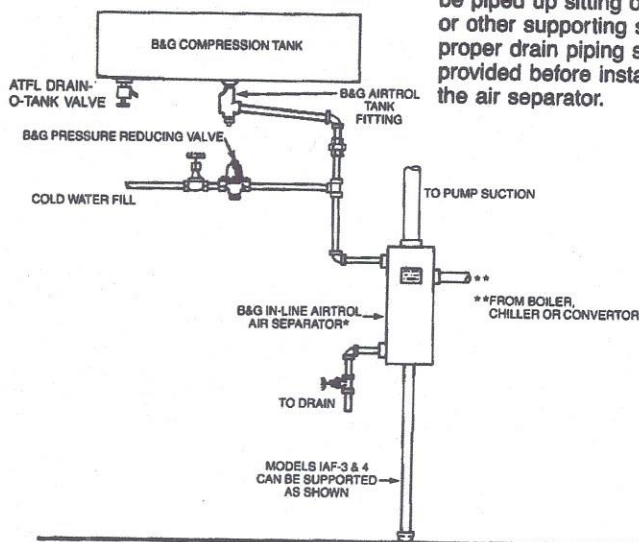
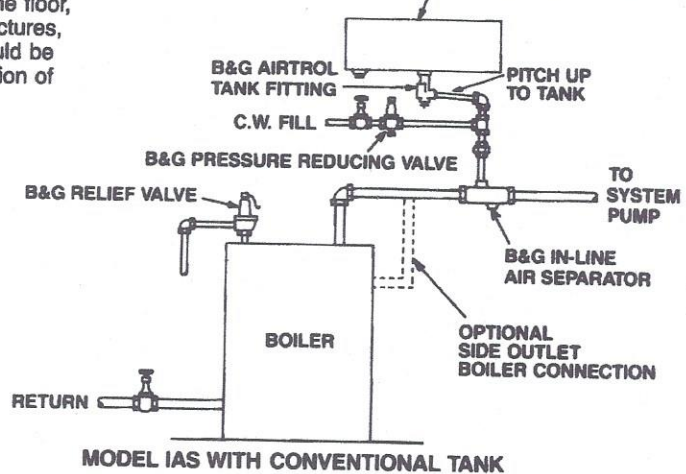


FIG. 7. TYPICAL INSTALLATION DETAIL FOR IAF-2'-3'-4" MODELS



*Note: If the In-Line Airtrol is to be piped up sitting on the floor, or other supporting structures, proper drain piping should be provided before installation of the air separator.

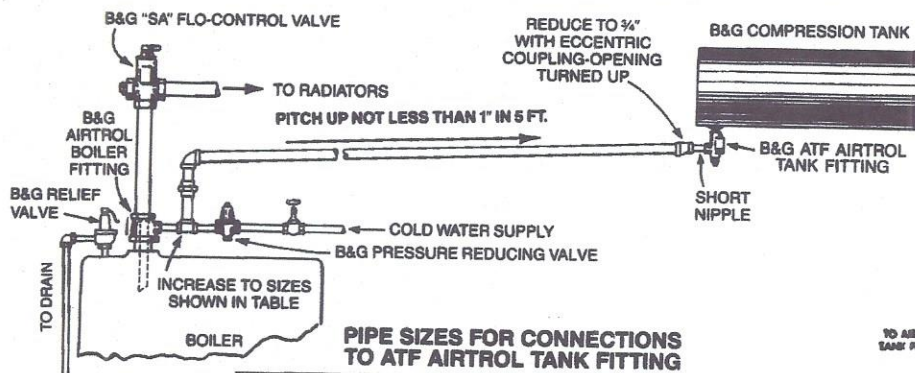
FIG. 8. TYPICAL INSTALLATION DETAIL FOR IAF-2'-3'-4" MODELS



MODEL IAS WITH CONVENTIONAL TANK

Note: Model IAS Air Separator must be installed in horizontal pipe only.

FIG. 9. OTHER INSTALLATION DETAILS



Total length of horizontal connection from boiler to most distant compression tank

Less than 7 ft.	Over 7 ft. and not more than 20 ft.	Over 20 ft. and not more than 40 ft.
3/4"	1"	1 1/4"

FIG. 10. Airtrol Boiler Fitting installation in a cast iron boiler, showing correct depth of tube.

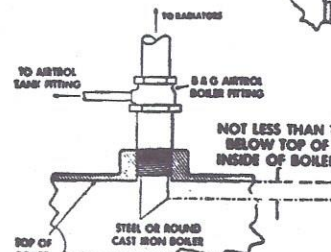
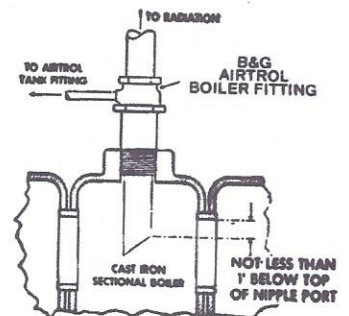
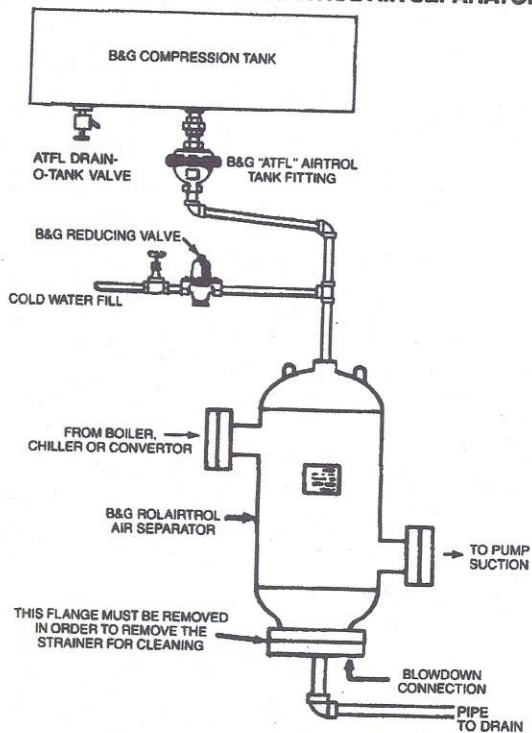


FIG. 11. Airtrol Boiler Fitting installation in steel or round cast iron boiler, showing correct depth of tube.

FIG. 12.

**TYPICAL INSTALLATION DETAIL FOR FLANGED
MODEL R AND RL ROLAIRTROL AIR SEPARATORS**



Note: Model "RL" Rolairtrol Air Separators (less strainer) can be installed in the same manner as Model "R" Rolairtrol Air Separators or sitting on integral support skirt. When installed on the support skirt, proper drain piping should be provided prior to installing the unit in the system piping.

Note: Model "R" Rolairtrol Air Separators have strainers which must be removed and cleaned after 24 hours operation, 30 days operation and as required to maintain proper system air separation. Before installing the model "R" Rolairtrol refer to the following table which notes minimum distances to be maintained between the blowdown connection and the floor or other equipment for strainer removal.

MODEL NO.	DISTANCE REQUIRED TO REMOVE STRAINER INCHES	MODEL NO.	DISTANCE REQUIRED TO REMOVE STRAINER INCHES
R-2	8½	R-12	34
R-2½		R-14	37
R-3	12	R-16	42
R-4	14	R-18	52
R-5	17	R-20	56
R-6	20	R-22	60
R-8	23	R-24	64
R-10	29	R-30	80

Note: Rolairtrol sizes through an "R8" or "RL8" can be supported in the piping system as long as pipe hangers are attached to the tangential nozzles as close to the Rolairtrol shell as possible. Sizes larger than an "R8" or "RL8" will need to have additional supports such as a cradle under the Rolairtrol acting on a diameter as close to the Rolairtrol outside diameter as possible or factory installed clips welded to the shell for overhead hanging.

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Let's Solve Water

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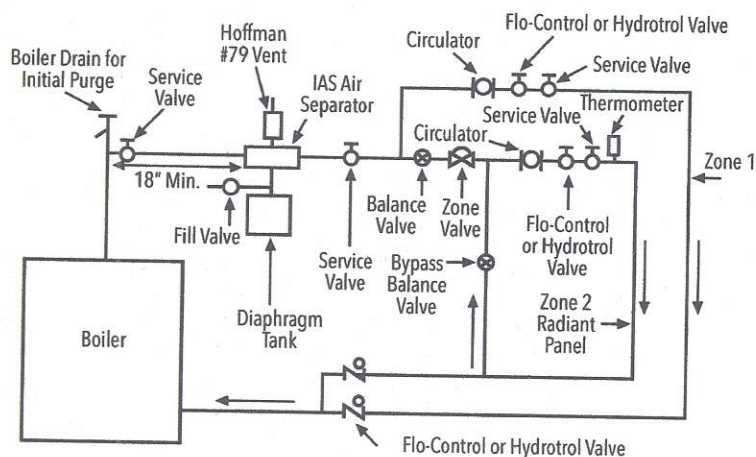
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3-way valve take orders from a room thermostat and a boiler aquastat working together as a team. Or, better yet, you could have the 3-way valve respond to an outdoor-air sensor. That way, as the day gets cooler, the water-supply temperature can get hotter, and vice versa. (This is not a good way to do it, however, if you have a tankless coil or a side-arm heater.)

On commercial jobs, this is called a "reset" system because the water temperature is always being re-set to meet the needs of the building at any given time.

Add a room thermostat in series with the reset control and you'll be able to compensate for the body heat that rises off a houseful of company.

Here's another way to do it.



This does the same thing as the three way valve but it does it with a standard 2-way zone valve. The control sequence can be the same as what we talked about for the 3-way valve.

Zoning with Condensate

We could subtitle this, "Many Have Tried, But Few Have Succeeded." A lot of guys try to use the water below the boiler water line of a steam boiler to create a hot water zone. It's an inexpensive way to get the job done - and it can be done. But to do it correctly, you have to remember your high-school physics.

Pumping the water out of the boiler and through a loop of baseboard isn't so tough. As long as the loop runs around the basement floor, that is. But when you try to put that zone up on the first or second floor, well, that's when you can get into trouble.

But not if you know what you're doing. In fact, you can put a hot water zone on the third floor of a building - if you stop and think about what's going on.

First, you have to remember that water boils at 212°F at atmospheric pressure. Naturally, in a steam boiler, the water is usually hotter than that because it's under a few pounds of pressure. For instance, at two psig, water won't boil until it reaches 219°F.

Next point: In a closed hot water system we use the pressure reducing valve to keep the high point of the system under pressure. We set it up

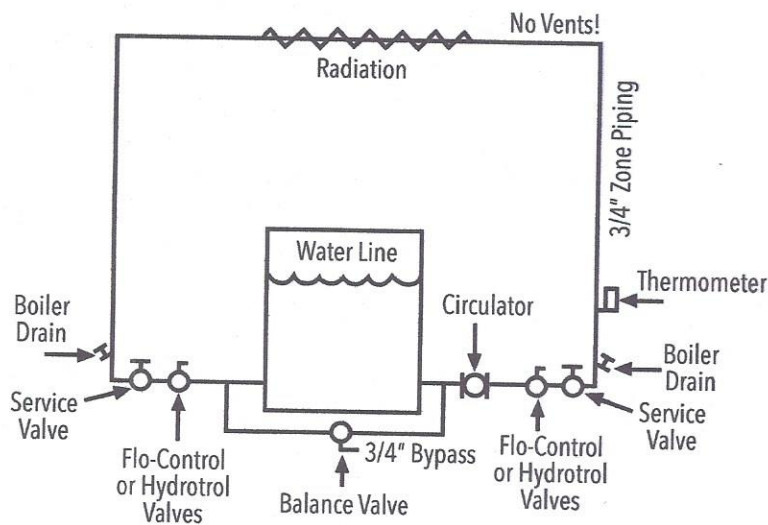
so there's always at least 4 psig of water pressure inside the top floor radiator. That's to make sure the water inside that radiator won't boil under normal system conditions. You see, it's the pressure reducing valve that allows us to run hot water boilers at temperatures over 212°F. A boiler under 12 psig pressure, for instance, can operate at 244°F without having the water boil.

But when we pump condensate up to the first, second, or third floor of a building, the only thing providing pressure at the high point is the circulator. And when the circulator shuts off, the water in that top floor radiator will "flash" into steam if it's too hot.

"Flashing" is not only noisy, it's incredibly destructive. And the sudden expansion of the water into steam as the "flash" occurs will push all the water in the zone back down into the steam boiler and flood it.

There's a trick you can use to avoid this. It's a way to make sure the water in that top-floor radiator never gets so hot that it can flash to steam. We use a bypass line made from a length of 3/4" copper tubing and a full port balancing valve - just like we did on the hot-water job.

Here, take a look.



We run a continuous 3/4" loop from the boiler up through the baseboard on, say, the third floor. From there, it returns to a point on the opposite side of the boiler.

Naturally, both of those connections must be made below the boiler water line, as low as possible, but not in the mud leg. This system is much easier to pipe on a cast-iron boiler than it is on a steel boiler because there are more tappings on a cast-iron boiler.

Make sure there are no air vents, valves with packing glands or anything else that could allow air to enter the system when the circulator shuts off. And size the baseboard to the heat loss of the space with an average water temperature of 170°F. (The hottest water we'll ever have up there at the top will be 180°F.)

We fill the entire loop with a garden hose. Just hook it up to one of the two boiler drains on the system side of the two shut-off valves and purge all the loop's air through to the other boiler drain. When we get a solid stream of air-free water, we shut both boiler drains at the same time.

the top of the loop. We don't have to. Water will stay in a 3/4" pipe that's about thirty feet high. As long as you don't let any air get in the top, that is. The water stays in that pipe for the same reason that soda will stay in a straw when you hold your finger over the top and lift it out of the glass.

The atmospheric pressure pushing down on the surface of the water in the boiler holds the water up in the pipe. It's like a barometer. As long as air can't get into the top of the pipe (no vents, please!) the water can't fall out.

So now all the circulator has to do is circulate, just like it does in a closed, pressurized system. We're not asking it to do any lifting so we don't have to use a high head circulator. And as long as the water temperature leaving the boiler stays below 180°F there's no way it can flash at the top.

We make sure it stays relatively cool at the top by installing the 3/4" bypass around the boiler. That line, with its 3/4" full-port balancing valve, becomes the path of least resistance for the water. It's easier for the water to go through the bypass than it is to go through the boiler. So when the circulator comes on, all the water will bypass the boiler and flow only through the loop.

Now all we have to do is make the water hot. We do that by slightly throttling the balancing valve until the thermometer on the discharge side of circulator hits 180°F. Of course, you have to do this when the steam pressure is up.

From that day on, the temperature on the discharge side of the circulator will never go above 180°F because the bypass will automatically blend water that's been through the system with water that's been through the boiler.

The B&G Flo-Control valves you see in the drawing are needed on both sides of the loop to prevent gravity circulation. And yes, you do need two of them because gravity circulation doesn't need an entire loop to happen. It just needs a single pipe! The hot will rise up the center of the pipe as the colder water falls down the sides.

The circulator should always discharge out of the boiler and toward the system. That's because circulators need a certain positive pressure at their suction side to prevent what's known as cavitation.

Simply put, cavitation is what happens when a circulator tries to throw out more water than it can take in. In this case, it can't take water in when the suction pressure is too low because the water is flashing into steam!

You should use an all-bronze Series 100 B&G circulator for this zoning application. Condensate is very corrosive. It's much too tough for a water-lubricated circulator. If you want this zoning job to last, use the right circulator.

Oh, another thing: Make sure the circulator is below the boiler water line. If the circulator is above that line, it will empty itself of water on start-up, drop its suction pressure below atmospheric, and flash whatever water's inside of itself. We once saw a circulator installed like this move six inches off center when it came on!

you control the circulator with a thermostat. If the boiler is maintaining temperature for a tankless coil or a side-arm heater there should always be enough heat in the boiler for the zone.

If the boiler fires on demand, however, you'll have to also add an aquastat to fire up to high-limit (180°F) when the thermostat calls in the circulator.

So install it right and you'll find it's a good, inexpensive way to add a zone to that old steam system.

The Bell & Gossett Advantage

How you decide to zone that next job is your choice. You may prefer circulators over zone valves. Or you may feel just the opposite. We realize that personal preference and experience play a large part in your decision.

But whichever way you decide to go, we don't think you have to be an engineer to get most residential and light-commercial zoning jobs done well. You just have to have a good basic grasp of what's going on in the system. And you have to be able to feel confident about what you're doing.

We've drawn from our years of field experience to bring you this booklet. We hope it helps to make you even more successful than you are now.

As you use these "**Rules of Thumb**" to save time when you're doing that next quote or to figure out what's wrong when you troubleshoot that next problem job, we hope you'll remember us by using our products. We think there's a tremendous advantage to working with people who can help you.

That's the B&G advantage. We can help you get the job done right.

Besides, your customers know us. Many of them have grown up with B&G equipment in their homes. They feel comfortable with B&G and they know, when they see that bright red color and the B&G logo, that you've given them the quality they expected.

We hope you'll use this booklet, and the other "Made Easy" booklets to your best advantage. We want you to know we appreciate the business you've given us, and we look forward to working with you on your next job!

*110 years
old home*