Bell & Gossett CounterPoint™

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The Ins and Outs of Boiler Bypass Lines

Boiler manufacturers are emphasizing bypass lines nowadays and with good reason. Today's boilers are relatively small. Their heat exchangers are much more efficient than the boilers of yesteryear, and because they are, modern boilers have specific flow rate and temperature needs. Many of them call for a flow-bypass line. It really pays to read the instructions carefully, because if you install this bypass in the wrong place, you'll be inviting trouble.

With that in mind, here's a crash course in the right way to pump a boiler bypass line.

First decide what you want the bypass to do. It can either raise the temperature of water returning to the boiler, or lower the temperature of water heading out to the system. Different systems have different needs.

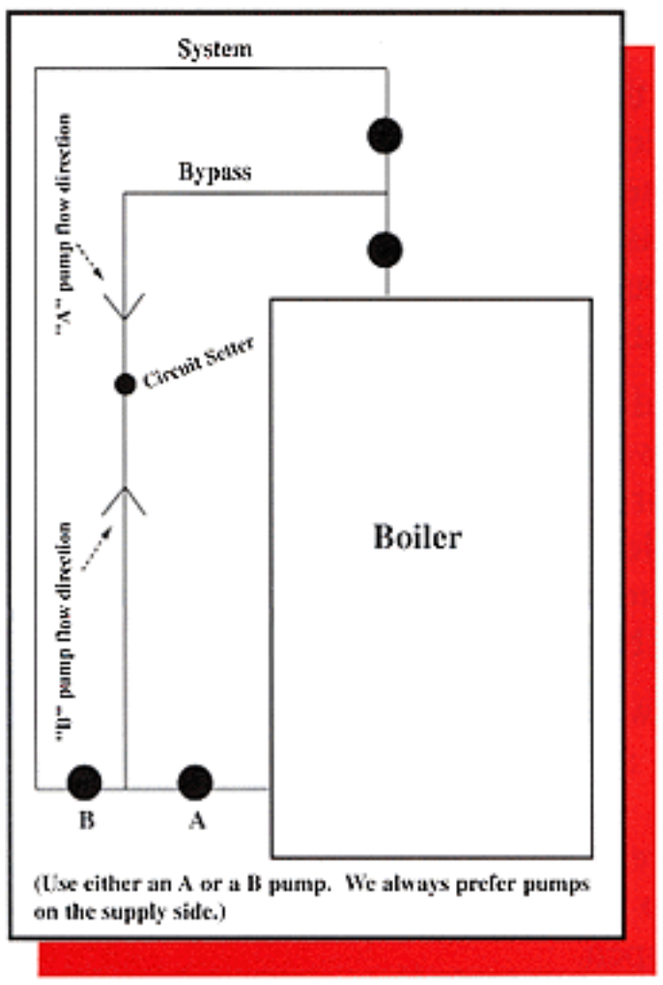
Next, make a sketch of the piping around the boiler. Use the tip of your pencil to trace the water's path as it flows through the boiler and the bypass. Remember, when water enters a tee, it has two ways out. Depending on where you place your Bell & Gossett circulator, the water can flow *either way* through your bypass. And when it comes to system performance, this choice makes a world of difference.

Look at our sketch, for instance. We're showing four possible locations for your B&G circulator. We've marked two of those locations "A," and the other two "B." Naturally, you'll be using *either* the A location or the B location, not both. We're just illustrating that you can have your circulator on the supply side of the system (always our first choice), or on the return. It's your choice

Let's look at the A location. Set up this way, the circulator will take hot water out of the boiler and use it to raise the temperature of the water returning from the system. The water, as you can see, flows from the top of the bypass to the bottom.

Now, whether it's on the supply (our first choice!) or the return side of the boiler, notice how our circulator is on the *boiler* side of the bypass. Make a note of this, and stick it in your wallet: *"A circulator on the boiler side of the bypass will raise the return water temperature."*

Now, why would you want to raise the temperature of the water returning to the boiler? Well, suppose you had a high-volume system and a low-volume boiler. Say, an old gravity system. If the returning water



was cool (less than 140 degrees for a cast-iron boiler), the flue gases would condense inside the boiler and cause corrosion. There's also the possibility of thermal shock, although this is usually less of a concern than condensation.

Also, without the bypass, the fuel bills will usually be much higher than they should be, because the low-volume boiler will find it difficult to reach high-limit and shut off. Piped this way, the bypass lets you avoid these common problems.

Okay, let's look at the B location for your B&G circulator. In this position, the circulator mixes the cooler return water with the hot boiler water. In other words, it lowers the temperature of the hot water heading out to the system. Notice how the circulator is on the system side of the bypass. Before you put that note away in your wallet, add this to it: *"A circulator on the system side of the bypass lowers the supply water temperature."*

Why would you want to lower the temperature of the water leaving the boiler? Seems like a waste, doesn't it? But it's an inexpensive way to run a radiant heating system, at say 120° while you maintain 180° in the boiler to satisfy a tankless domestic hot water coil. However, we don't recommend using this type of bypass as a "control," because it doesn't respond to temperature. If you had more than one zone, things wouldn't work out well for you.

Nevertheless, you'll find this sketch in most boiler manufacturers' operating manuals, so it's important to be clear on the difference between the two bypass piping arrangements. Imagine what would happen if you were trying to protect a boiler from a potential flue-gas condensation problem, and you misplaced your circulator or your bypass line. You'd have big problems for sure!

Now consider a copper fin-tube boiler. These can accept cooler return-water temperatures (typically 105°), but they're very dependent on the right flow rates across their heat exchangers. If the water moves too slowly across a copper fin-tube boiler, the boiler will shut off on safety.

With copper fin-tube boilers, the circulator always goes on the boiler side of the bypass, whether you're pumping on the supply or the return. And check the manufacturer's instructions, because most of them insist that the bypass line should never be smaller than one inch in diameter.

If you're looking to save a few fittings when your setting up your bypass line around that modern boiler, keep in mind you can use the bottom part of your B&G Flo-Control® valve to send the water back to the boiler. Just enter on the side of the Flo-Control valve, and bypass through the bottom. It works beautifully!

And always use a true balancing valve in the bypass line so you can set the right temperature and/or flow rate. For long life, a B&G Circuit Setter® is your best choice. Ball valve manufacturers caution against using their products as balancing valves. They want their ball valves to be either fully opened or fully closed, not throttled.

If you have any questions, you'll get straight answers from your local B&G representative. These professionals are always ready to help with solid advice and the most reliable products made today.