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What do hydronic system hydraulic equalizers do?

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DURING THE PAST 10 years or so the trend in hydronics has been to replace high water content boilers with low water content boilers. New installations are also primarily low water content boilers as well.

The reasons for this are readily apparent: smaller size, lower cost, and they are easier to handle in tight spaces. The only drawback that occurs in these systems is that, along with the size of the unit, the water content of the system is also reduced.

A high water content residential boiler can contain 20 to 30 gallons of water. The present low water content boilers can have as little as one half to three gallons. This reduction in system water often causes hydraulic flow problems and interferes with system performance.

This problem is intensified when a mixing valve is installed in the system. The valve continuously hunts to find its setpoint and begins to act erratically due to quick changes in boiler temperature. In addition, burners will short cycle, doubling and tripling the amount of operating cycles during a typical heating season period from 10,000 to 30,000 on/off cycles, causing long term mechanical and control problems.

So what is the role of a "hydraulic equalizer?"

A hydraulic equalizer is a neutral flow zone between the heat source and the heat distribution system. This neutral flow zone is nothing more than a water volume buffer with low internal flow velocities, installed as a simple holding tank. The zone has heat source supply and return connections and consumer circuit supply and return connections, all entering and exiting independently at the buffer.

The equalizer maintains constant flow rates and pressure differentials within individual consumer circuits.

Installing a buffer tank is fairly common in North America. It's used primarily to add water volume to a system when a low water content boiler is present.

How does the hydraulic equalizer work?

While its real function is not to add water volume to the system (that's a beneficial side-effect), its main purpose is to hydraulically disengage everything from everything. The equalizer maintains constant flow rates and pressure differentials within individual consumer circuits, eliminating pressure differential valves, and eliminating backfeeding and interaction among consumer circuits (a chronic problem especially with mixing valves present in low temperature heating systems).

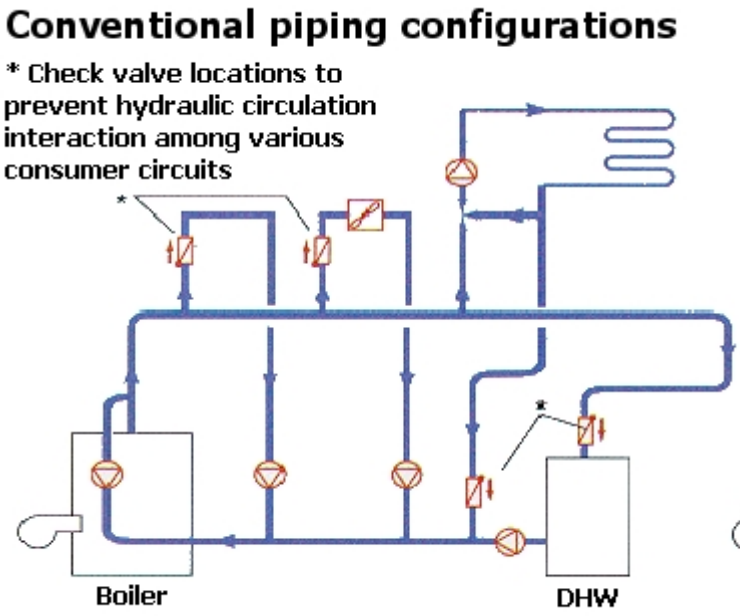
What other forms of hydraulic equalizers are there besides a holding tank?

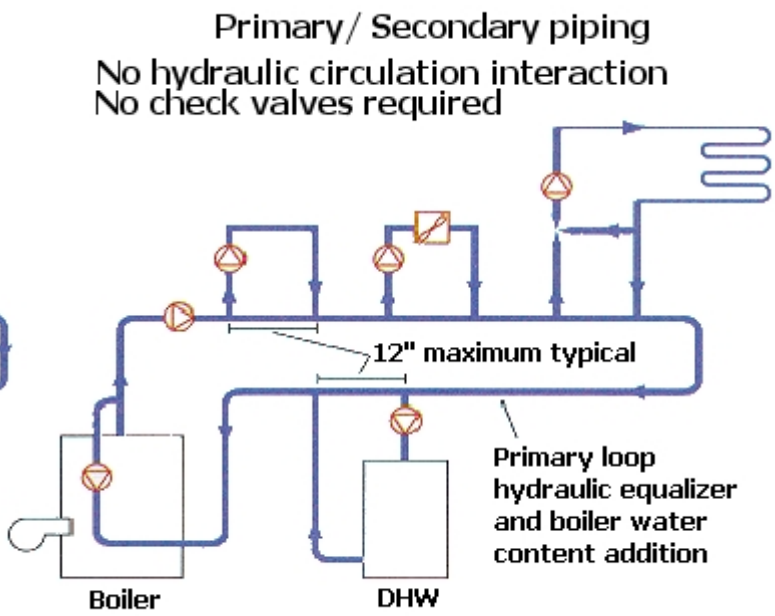
One form is a holding tank with internal flow baffles and a multitude of supply and return connections for boiler and consumer circuit connections to simplify larger commercial system installations.

Another form is a European boiler with two or three sets of supply and return tapings to accommodate separate low-temperature, high-temperature and domestic hot water circuits.

And one of the best is the common primary/secondary pumping system, which is proving more and more to be the mother of all problem solvers, acting as the perfect hydraulic equalizer. It adds volume with the primary distribution loop acting as an extension of the boiler water content, eliminating all the associated problems of low water content boilers.

The necessity of using boiler pumps on low water content boilers to prevent heat exchanger meltdown can cause serious problems when combined with mixing valve systems. The “great equalizer’’ solves these problems.





The primary/secondary pumping approach is low cost; piping is schematically simple, demanding low labor. There are no circuit backflow problems, check valves or pressure differential valves.

When combined with constant circulation in both the primary and secondary loop, you’ve got everything you could possibly want from a state-of-the-art hydronic system. The great equalizer is capable of combining any design concepts and, most importantly, making them all work in perfect harmony.

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