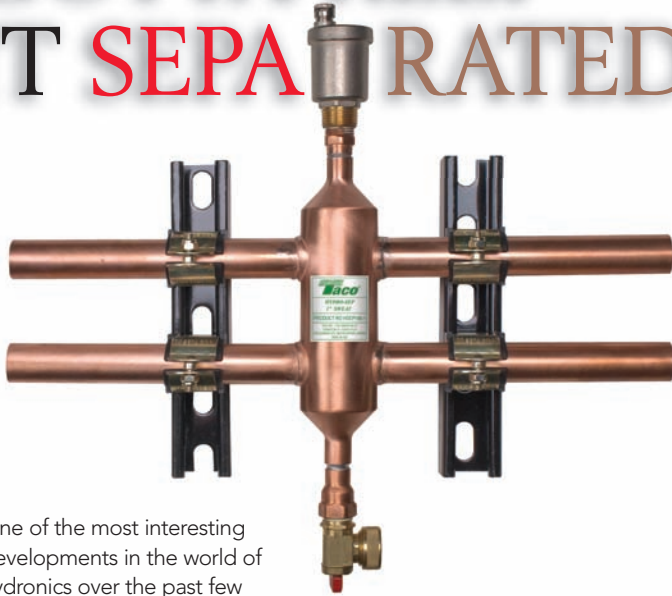




GOTTA KEEP IT SEPARATED



One of the most interesting developments in the world of hydronics over the past few years has been hydraulic or "hydro" separators. Also known as low-loss hydronic headers, these components create a low-pressure zone, enabling the connected primary and secondary loops to be hydraulically independent.

"The key detail is a pair of closely-spaced tees," says hydronics contractor Jeffrey Young. "The body of water between them serves as a hydraulic separator between the boiler or heat source and the load circuits." The purpose of the tees is to connect the secondary circuit to the primary loop in a way that neutralizes any tendency to influence flow in the secondary circuit.

This isn't an incidental detail. The installation of a parallel primary loop or low-loss header is now widely regarded as fundamental to the optimal performance of most low-temperature, multi-zone hydronic systems.

Thinking Out-of-the-Box

Rather than relying on meticulously-assembled parallel primary loops, hydro separators are a ready-made option that can be attached to hydronic heating or chilled water systems to permit different heat adjustments for separate, multiple zones when there is only one boiler or chiller.

According to Rick Brindamour, product manager for flow controls at Taco, the technology can easily be designed into any type of hydronic circuit. Its key function, for systems that otherwise wouldn't have a means of hydraulic separation between loops with separately-sized circulators, is to prevent the possibility of a tug-of-war between circulators.

PRO TIP

Primary/Secondary piping is best suited for more complex, multi-load, multi-temperature systems, though their applicability can extend into the arena of simpler hydronic systems as well.

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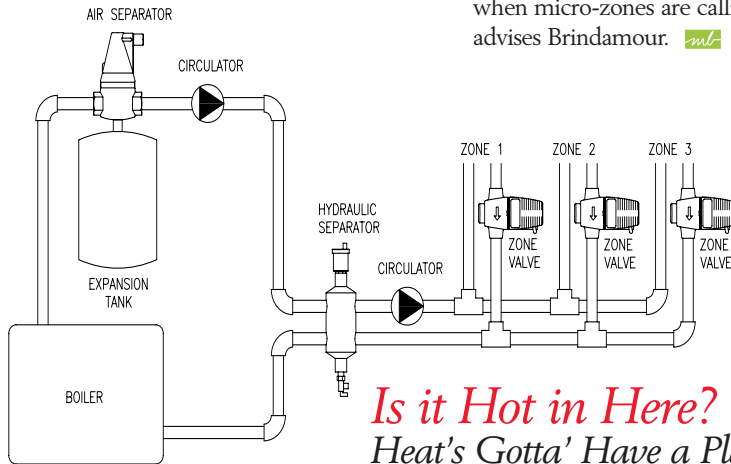
• Finessing the design

“The hydro separator is, by design, the low pressure loss zone where fluids enter and depart freely, enabling both primary and secondary circuits to be hydraulically independent of one another,” says Brindamour.

The function of a hydro separator, or low loss header, is critical for the new generation of high head, high flow-resistant, low-mass condensing boiler installations because it provides a safe-haven for interconnecting multiple circuits with varying flow-rates and head-loss. The low-loss header's closely spaced tees and the hydro-separator's large

chamber connect the secondary circuit(s) to the primary loop internally so that flow in the primary loop has little or no tendency to influence flow in the secondary circuit and visa-versa.

Today, many experts agree that when used with high-mass cast iron or steel boilers, zero-balance hydro separators save time and help to eliminate unexpected problems. One common concern is with low-mass boilers. “Where micro-zoning BTU loads fall well below minimum firing rates for modulating burners, a hydro-separator offers additional thermal mass to minimize short cycling when micro-zones are calling for comfort,” advises Brindamour. 



Is it Hot in Here? Heat's Gotta' Have a Place to Go

The key challenge with low-mass boilers, of course, is that they have no place to put large heat inputs. If improperly sized this can lead to the over-firing of a complete building load and then, as a result, hammering and sizzling – with or without a good bypass.

If you have a 300,000 BTUH copper-tube boiler and a 70,000 BTUH indirect water heater, you'd better have a safe place to direct 230,000 BTUs. You don't want 70,000 BTUs going into an indirect water heater with all the other zones shut off in the summer unless you have some means to anticipate tube overheating.

With the use of a hydro separator, it is assumed that there will be multiple zones, so only part of the input will be necessary. It's also assumed that the installer understands the need to pipe the system to handle part loads when only one or few zones are open.


Many old school pros now see hydro separators as a useful and helpful device. “But,” cautions hydronics columnist Mark Eatherton, “one of the most important issues is to design systems so that burner input doesn't exceed terminal unit output. That's been a key challenge. Just using one of these devices provides easy – hopefully pump-away – manifolding, air elimination and expansion tank fitting, while making unexpected flows a thing of the past.”

Finessing the design

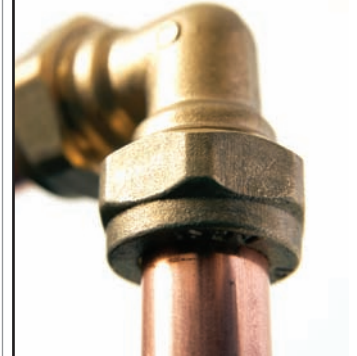
“Series primary loops are best suited to situations where two or more secondary loads will operate with different supply temperatures,” says

John Siegenthaler, principal at Appropriate Designs. He adds that the basic principle is to connect the higher-temp secondary circuits near the beginning of the primary loop and the lower-temp secondary circuits toward the end. This arrangement tends to increase the temperature drop along the primary loop, reducing flow rate. An added benefit is that it may also permit a reduction of the size of the primary loop's piping and circulators.

According to hydronics contractor Jeffrey Young, sensible modifications to this basic design will accommodate any number of secondary circuits, permitting them to operate at similar supply temperatures.

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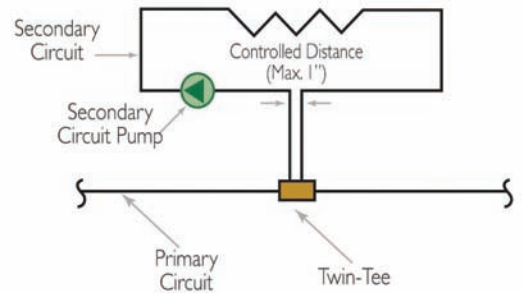
HYDRONICS CON'T

Closely Spaced Tees

With primary/secondary (P/S) piping, the ability to isolate system circuits makes it relatively easy to design sophisticated multi-load systems with little concern about how flow rates and pressure drops will change as various circulators turn on and off. According to hydronics contractor Jeffrey Young, this is a big advantage because otherwise, circuits compete in a tug-of-war with each other for water pressure within the system.

"It seems that everyone wants to get into the primary/secondary piping game, but few really understand how to make it happen, especially with the larger, more complex systems," says Young.

"Hydro separators are a valuable tool for us," adds Dave Yates, a hydronics contractor and columnist. "I want to know that all of my



pipng jobs have a known and consistent performance, no matter which technician does the job. My labour hours are a finite resource, so any tool like the hydro separator that increases our productivity – while at the same time improving quality – is important to me."

The Beauty of Buffers

Modulating boilers can adjust downward to supply small matching loads. However, one- or two-stage burner input can easily exceed summer month, indirect water heater-only loads and staggered zone-opening loads. For installations like these, installers Young and Yates both recommend the use of a buffer tank, ideally with a coil set inside to make domestic water, adding valuable mass to the water loop during operation of single or two-stage boilers with few open zones.

"Sufficient water mass permits some additional time for the controls to sense and shut down the burner, then absorb the exchanger's heat," explains Taco's Rick Brindamour. "Manifolds can be built to use the tank in the same manner as a hydro separator, but the separator typically gets it done so much more effectively."

A hydro separator may not be the answer for every job, but its applicability is gaining favour. It's easy to take a wrong turn while assembling a P/S layout, and one small mistake can cause a substantial problem – or at the very least, can create a situation where system efficiency is reduced.

John Vastyen is a public relations practitioner who handles communications for Taco.

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