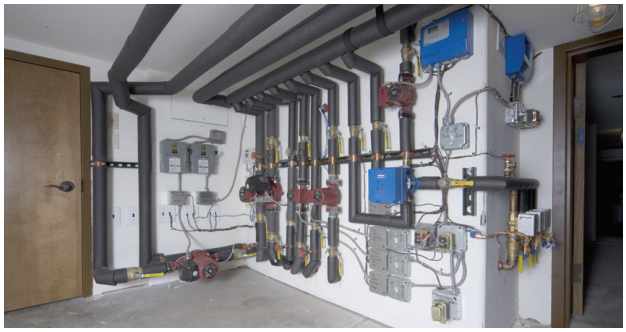
Product Spotlight

Concept Mechanical Turns to Multi-speed Pumps for large Colorado Home

By Tim Rosen, PE

Last year, Concept Mechanical, a plumbing and mechanical contracting firm based in Avon, Co., had the opportunity to install plumbing and mechanical systems for a 9,000-square-foot, $9 million home in a small, top-of-mountain subdivision with dramatic views of Vail Village, Co., and all of the resort's main, northern slopes.

As with most of Concept Mechanical's systems, we use a primary-secondary piping arrangement with individual pumps dedicated to project energy loads. For the larger loads, we've selected Grundfos VersaFlo pumps for their three-speed adaptability, and remarkably quiet operation. Our customers demand highly sophisticated systems and technology, but they rarely want to see system components. And they certainly never want to hear mechanical equipment.



Though the owner didn't make too many changes – aesthetically or mechanically – he was certain that he wanted some additional snowmelt capability, which quickly took our attention to the mechanical system. Amazingly, we were able to accommodate the change by shifting the VersaFlo circulators to a higher speed, increasing the flow effortlessly. And, as unfinished areas of the house were completed, the multi-speed pumps fit the bill by providing higher flow, and head, with the flip of a switch.

The home has two mechanical rooms, both in the less-than-five-foot-high range. One of the biggest problems with working in the Vail area are the square footage constraints. With sale prices of $1,100 to $1,500+ per square foot at the upper end (where we typically find ourselves working), the homeowners and architects are always trying to maximize square footage, and tend to be very reluctant to turn over floor area for a mechanical room.

Anything five feet high, or under that, isn't considered to be part of the "gross residential floor area" (GRFA), so a lot of our mechanical rooms need to be designed around the space we're given, like it or not.

The first mechanical room has the single snowmelt and two house heat boilers and the in-floor heat controls for the home's upper five zones. High-temp lines run from there to the second mechanical room where two 120-gallon, indirect-fired, domestic water heaters reside. Here, there are also three fan coil units and an additional 15 zones of in-floor heat and a small Laars Endurance boiler used for added deck and bridge walkway snowmelting.

There's also an impressive 50-foot high spiral stairway surrounded by a thick, circular stone wall reminiscent of Medieval castles, with the exception that these ancient-looking, lichen-covered walls are entirely heated by hidden radiant tubes embedded in the wall's mass.

The spiral stairway joins all five levels of the home and serves as a trunk line for many of the radiant slabs that provide heat throughout the entire residence.

In the main mechanical room (*see photo, left*), the large circulator near the floor is the deck snowmelt pump. Another large pump, up higher, is for domestic hot water, pumping water to the lower mechanical room where two, 120-gallon, indirect-fired, water heaters attend to the home's domestic water needs. The two circulators in the middle handle kitchen make-up air (left) and, on the right, the unit pumps heated water down to the lower level in-floor heat to a motorized four-way mixing valve for 15 zones.

As you examine the photo, note the uppermost pump. It handles the in-floor heat for four upper radiant zones. We also installed two Tekmar controllers and a snowmelt sensor. Finally, on the far right, there is a bank of Honeywell zone valves.

We've standardized on Grundfos circulators because we feel they do the best job. One of the most important facets to optimal circulation for hydronic systems is our ability to match a pump's performance, or flow characteristics, to the specific job that it needs to perform within the system.

A single-speed pump has one performance curve – a measurement of head (ft) and flow (gpm) – and operates at that level only for a particular condition.

But their new three-speed circulators offer a much broader range of performance. We can easily choose a speed, changing head and flow to match the specific needs of the system. This gives us greater control and versatility.

I always do the math and calculate heat loss, flow rate and pressure drop for each pump. I use this information and the stated pump curve to select the proper pump for each load. In the past, we might have three or four different pump models on one job, all selected to match the exact needs that we've determined. With multi-speed pumps, I can use one pump and select the speed to match the flow and head that we want. And, the use of multi-speed pumps allows for future expansions, changes, and retrofits in stride.

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