

HYDRONICS ZONE WET HEAT ELITE



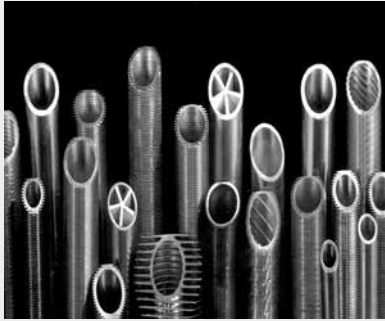
ANTHONY TOSCO
Owner and operator of Avanti Plumbing, Heating, and Cooling Inc. in Collegeville, Pennsylvania
Avanti focuses on high-end residential hydronics work.
Contact him at 610-489-2717 or avantiphmnc@gmail.com

CALFIN
CALIFORNIA FINNED TUBE CO.

Manufacturers of high performance tubing

Replacement tubes in stock or made to your specification for:

- ◆ Carrier
- ◆ Trane
- ◆ York
- ◆ McQuay
- ◆ Dunham-Bush



ALL Alloys Available

Centrifugal, Absorption, and Reciprocating tubes available in days, not weeks.

For a quick quotation, call us toll-free (877) 966-TUBE or FAX (909) 590-3446.

eProduct #104 at achrnews.com

What's the Difference Between Delta P and Delta T?

Contractors should believe in metrics, not magic

There's no such thing as magic in hydronics. There are no magic boilers, controls, or circulators that know what to do. If someone can't explain to you exactly how a delta (Δ) P or a ΔT variable-speed circulator works, and why, without using the word "magic" or some derivative thereof, there's one hydronics expert I know who says, "They either went to hydronics school at Hogwarts, or they don't really know."

That expert is Taco Inc.'s training pro, and *The NEWS'* 2015 Best Trainer, John Barba. I've learned a lot about hydronics from him and my local rep, Anthony Reikow, through the years.

So, to polish my familiarity with the art of hydronics, and to equip myself with the terms necessary to better explain it to others — and you — I occasionally pick up the phone or email Barba. Or, better yet, I visit with him while he's training in the field or at Taco's facility in Cranston, Rhode Island.

Einstein once said, "If you can't explain it simply, then you don't understand it well enough." I love hydronics and am now developing — thanks to great guidance and a lot of on-the-job-training and field experience — an intuitive sense of understanding. As the great Dan Holo-han says, "Be the water."

DECIPHERING THE DELTAS

While I'm gradually getting better at being the water, I still have a hard time explaining what I know. So, when it came to the topic of how ΔT and ΔP circulators work and when it's best to use either one of them, I touched base with my trusty friend, Barba.

"There's no such thing as 'push the button and walk away' with any variable-speed circulator, no matter what sales people may tell you," he said. "Ha. In fact, you may find yourself having to 'walk back.'"

Now I'm laughing, too. That's

another pleasant advantage of talking with John; he makes you laugh — all the time.

ΔT According to Barba, ΔT is easy to grasp, in concept. When you

design a hydronic system, you always calculate flow rate around a ΔT , or temperature drop, between the supply and return. This little factoid is found in the ages-old Universal Hydronics Formula, which states:

GOING WITH THE FLOW: Anthony Tosco, owner and operator, Avanti Plumbing, Heating, and Cooling Inc. in Collegeville, Pennsylvania, prepares to install a Taco Zone Sentry zone valve. A Taco 00e 1816 circulator governs flow to and from the boiler to an indirect-fired water heater set up as the priority zone.



WIRED IN: Tosco carefully wires together a new Taco 00e 1816 Delta-T circulator on a Pennsylvania job site. In the background, five Taco Zone Sentry zone valves control flow to and from the home's five space-heating zones.



PLAIN AND SIMPLE: "I love simplicity," said Tosco, referencing hydronic HVAC systems. Einstein once said, "If you can't explain something simply, then you don't understand it well enough." It's the same with my work; an elegantly simple approach is often the most advantageous approach."

CLIPLIGHT
LEADERS IN LIQUID SCIENCE.

MADE IN USA

Now part of the DiversiTech family

SUPER CHANGE™ FAST & EASY R22 SYSTEM RETROFIT

- / REPLACES R22 line set conversion flush
- / IDEAL for dry charged units, retrofits & drop in refrigerants
- / MAXIMIZES oil return & heat transfer, including POE charged compressors

- 100% Compatible
- Eliminates Moisture
- Equipment Safe
- Reusable Hose



ELIMINATES OIL CHANGE OUT
by linking all oils to any HFC refrigerant

DOING MORE FOR YOU.

SUPER SEAL TOTAL™ **SUPER SEAL ADVANCED™**

3-in-1



SEALS & DRIES + DYE

100% Permanent + Prevents Leaks

Boosts Efficiency

Equipment Safe

Hose Included

2-in-1



SEALS & DRIES



VISIT US AT AHR EXPO BOOTH #1938

cliplight.com

eProduct #93 at achrnews.com

Gallons per minute (GPM) = Btuh ÷ (ΔT × 500).

- Btuh is the heating load you're trying to satisfy at a given point in time;

- ΔT is the designed-for fluid temperature drop as it goes round the system;

- 500 is a constant when using 100 percent water. Glycol changes things; and

- We tend to use a 20°F ΔT when designing residential hydronic systems here in North America.

If we know the heating load, and we know the ΔT we're designing for, finding the required flow rate is simple math:

$$\text{Gpm} = 70,000 \div (20 \times 500)$$

$$\text{Gpm} = 70,000 \div 10,000$$

$$\text{Gpm} = 7$$

Now, Barba's warming up, and I'm doing my best to keep pace with him.

He's telling me that in order to deliver 70,000 Btuh to this structure at a 20° ΔT, I'll need a flow rate of 7 gpm.

And, now, knowing the flow rate, I can calculate the head loss as best I can through the rest of the system. When I know the flow and head requirements, I can go about selecting a circulator that will deliver that flow and overcome that head loss.

Now, please note there's not a circulator in the world that can be thrown into that application and just figure it out, said Barba.

The term "smart pump" is really inaccurate because none of them are all that smart. No machine can — or should — replace your experience and knowledge when it comes to accurately selecting a circulator, no matter what other manufacturers might say. Machines aren't ready to take over the world just yet.

We, the installers/designers, should be the brains of this operation. If we select a ΔT variable-speed circulator, we'll need to do three things, none of which are very difficult, but all of which are essential:

1. Make sure the circulator can handle the maximum flow and head requirements. If it's not big enough, it's not big enough;

2. Make sure the circulator is programmed for the designed-for ΔT. Taco ΔT circs are factory set for a 20° ΔT, since that's what we use most in North America, but it's easy to change, if necessary, based on the application; and

3. Install the supply and return temperature sensors in the appropriate locations.

"On an initial call for heat, the circulator will run at full speed for a certain amount of time to estab-

lish a temperature difference," said Barba, explaining how a ΔT variable-speed works. "It will continue until it establishes that 20° temperature difference between the supply and return."

In the above example, if all zones were calling at design temperature, the load would be 70,000 Btuh. In order to deliver the 70,000 Btuh and maintain

that 20° ΔT, the circulator would have to provide 7 gpm, presuming your heat loss is dead-on accurate (which it rarely is, but this is an example).

As zone valves close, common sense says the actual Btuh load of the system will be lower. Since the system is taking less heat out of the fluid, the return sensor will pick up an increase in the

return water temperature as the system's ΔT starts to shrink. The logic written into the circulator control takes over and slows the circulator down in order to restore that 20° ΔT. When zone valves open, it does the opposite.

The same thing happens when the outdoor temperature changes. When it's colder out, the system takes more energy

out of the fluid. In order to maintain the 20° ΔT, the circulator will have to go faster. When it's warmer out, the opposite occurs, and the circulator will go slower.

ΔP

As many of you know, Taco now offers both ΔT and ΔP variable-speed residential circulators made right here in the U.S.



AHR Expo Booth
4700

Warm up with AHRI

HVACR and water heating performance certification program



Globally Recognized. Industry Respected.

AHRI administers certification programs for more than 40 products, including these heating products:

- Commercial and Residential Boilers
- Commercial Finned Tube Radiation
- Commercial and Residential Furnaces
- Commercial and Residential Water Heaters
- Direct Heating
- Indirect Water Heaters
- Residential Baseboard Radiation



HYDRONICS ZONE

WET HEAT ELITE

So, to the notion that Europeans are the holders of all hydronic knowledge, and because that's where ΔP circs are broadly used, that doesn't mean they're not best-suited for use here.

ΔP circs were developed by Europeans for the type of hydronic system most common in Europe — panel radiators with thermostatic radiator valves (TRVs).

The circulator in that type of

system runs all the time while the TRVs modulate to regulate flow through the radiator and, hopefully, relative comfort in the room. There are no thermostats.

ΔP works great in that application, and there are U.S.-made circs created precisely for that job. But, the cold, hard reality is, we don't install that many of those systems over here.

"In North America, we use either zone pumps or zone valves," said Barba. "And, we do something really kooky and crazy.

When zones are satisfied, we turn the pump off. That's nuts, huh?"

Barba goes on to explain that ΔP circs work just fine in these zoned, on-off systems. But, when used as a zone pump, it'll never vary its speed. ΔP changes speed based on resistance against the impeller typically caused by modulating TRVs. So, what you have is a ΔP , fixed-speed pump. Yes, it's an efficient electronically commutated motor (ECM) pump, but it will only ever run at one speed.


ΔT , on the other hand, is

designed for use as a zone pump or with zone valves — the types of systems we install here in North America. In either application, it's a variable-curve circulator, meaning the curve will vary and the circulator will speed up and slow down to maintain the designed-for ΔT in the system.

The circulator changes speeds as zones open or close and as the heating load changes with the weather. In addition, when programmed to, say, a 20° ΔT , the circulator will virtually always

send 20° cooler water back to the boiler. That has a tremendous impact on boiler short-cycling and enhances overall system efficiency, not just electrical consumption.

What I've found, time and time again, is that ΔT circs, and pumping strategies built around this type of pump, are an outstanding choice for anyone who wants to maximize the overall efficiency of any system.

And, no — I don't believe in magic. 

TotalSeal
HCP

**No tape.
No mastic.**

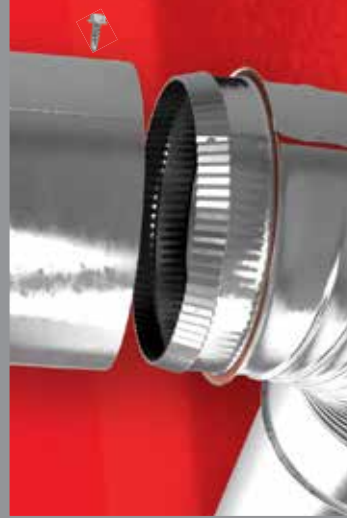
Dramatically reduce installation time with factory-sealed snap-lock pipe and fittings.

Perfect seal every time on both longitudinal & transverse seams



Visit us at AHR
Booth #4000

**Snap,
screw,
sealed.**



eProduct #91 at achrnews.com

ENERGY MANAGEMENT

How Reducing ACH Can Save Hospitals Cash

Guidelines reduce air changes in unoccupied operating rooms

BY RON RAJECKI
THE NEWS STAFF

The Cleveland Clinic is well-known for its world-class care. Patients from around the world come to the clinic, and the clinic comes to them. In addition to its main campus in Northeast Ohio, the Cleveland Clinic has facilities in Florida, Las Vegas, Canada, and Abu Dhabi. All told, the clinic's enterprise consists of 250 buildings encompassing more than 25 million square feet.

With that big of a footprint,

the clinic is always carrying out ambitious projects to optimize the performance of its physical plants. One such project involves adjusting the air changes per hour (ACH) in unoccupied operating rooms. As set forth in ANSI/ASHRAE/ASHE Standard 170-2013, "Ventilation of Health Care Facilities," and the 2010 Facility Guidelines Institute (FGI) guidelines, operating rooms must be maintained at strict temperature and humidity levels. Conditioning air to meet the guidelines consumes a large amount of energy, especially when operating rooms

are occupied and experiencing the required 20 ACH.

Reducing those air changes to six during the hours when an operating room is not being used, however, can provide a tremendous cost savings to the facility while still meeting the ASHRAE standard and the FGI guidelines.



Larry Rubin is senior director of facilities management at the Cleveland Clinic.

Larry Rubin, senior director of facilities management for the Cleveland Clinic, told *The NEWS* that by reducing ACH in unoccupied operating rooms from 20 to six across all 200-plus operating rooms in its enterprise, the clinic stands to save



Dick Starr is president and CEO of Enterprise HVAC Service and Control.

about \$2 million annually.

"We're highly regulated," Rubin said. "The design standard for an operating room is 20 ACH, and we have to be right on the money. But, based on an addendum to the FGI guidelines, we saw an opportunity to bring the ORs down to six air changes per hour when they're not in use. When these rooms are kept at 20 ACH 24/7 — even when no one is using them on nights and weekends — it represents a tremendous waste of energy."

At the clinic, the building automation system (BAS) interfaces with the surgery scheduling equipment (OpTime) program.

Physician Involvement Can Make Doctors Feel Good

When working with hospital clients, getting physician and surgeon buy-in can be very helpful in maintaining a harmonious atmosphere.

Larry Rubin, senior director of facilities management for the Cleveland Clinic, said working at an institution where a doctor is in charge of the energy committee, as is the case at the clinic, helps facilitate dialogue and understanding between the medical and facilities teams.

"For example, docs like the operating rooms to be as cold as possible," Rubin says. "But, overcooling spaces increases humidity levels simply because cooler air holds more moisture, and that increases the risk of mold growth. We know that, but many doctors don't. Having a doctor in charge of the energy committee takes it out of our hands and allows him to explain to his fellow doctors why we, on the facilities side, can do certain things and can't do others. Having a doctor in charge of the energy committee has been fantastic as far as getting doctor buy-in to our efforts."