

HVACR & PLUMBING

Video Showcase

March 22-June 25, 2021



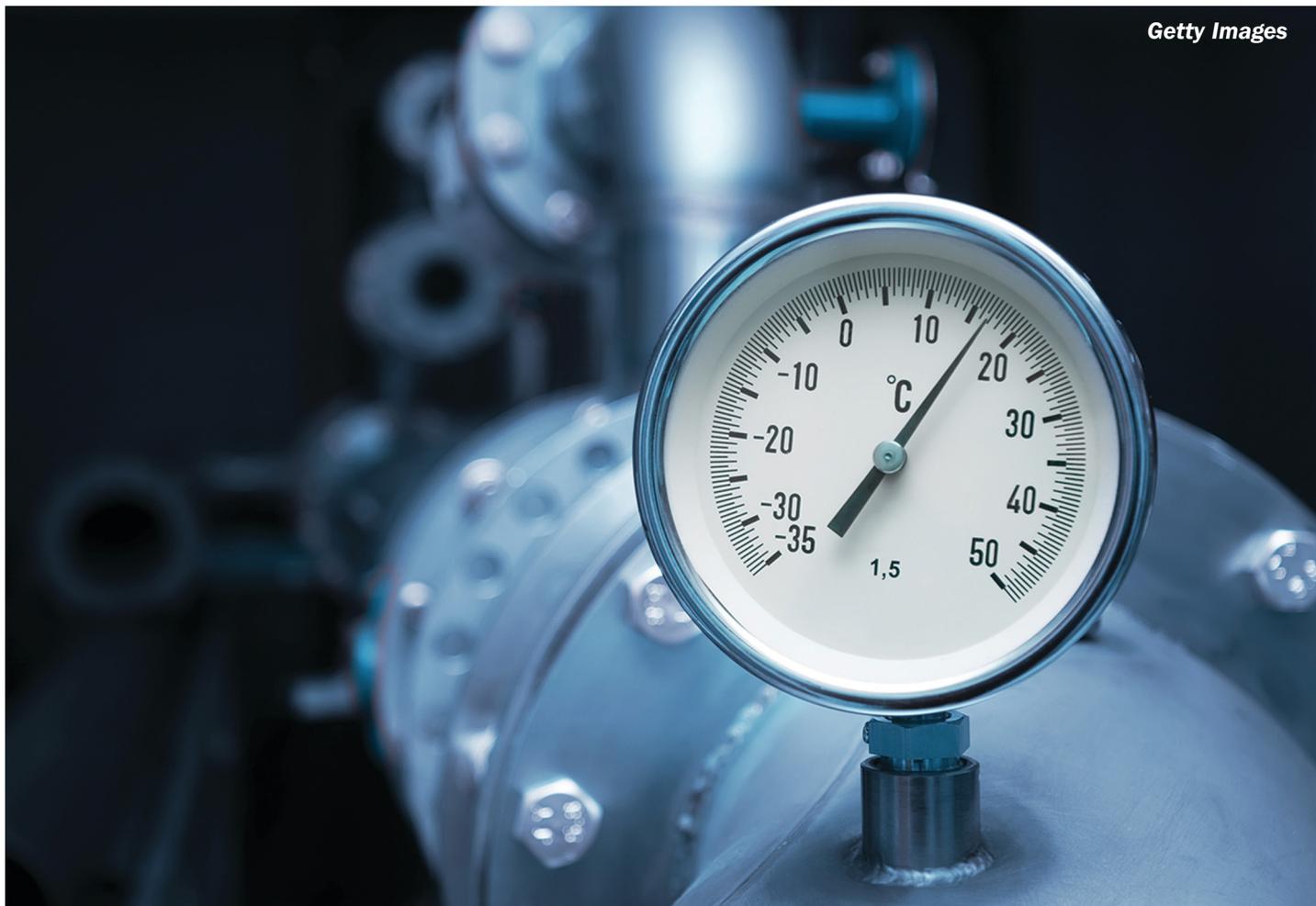
Partners:

Contracting
Business

CONTRACTOR

HPACEngineering

Getty Images



What's the Temp?

Somewhere along my 35+ years of doing this, the question of the outdoor temperature started to complicate my life.

By Patrick Linhardt

I ask about temperature all the time. I'm nosy that way. Techs call in with problems or questions on their boiler service calls and frequently I ask questions about temperature to help in the troubleshooting process. It used to be mainly the temperature of the supply water leaving the boiler and occasionally the return water from the system. Things were simpler back then.

Somewhere along my 35+ years of doing this, the question of the outdoor temperature started to complicate my life. Contractors were installing separate indoor-outdoor con-

trols on boilers that had a digital readout. Back then, digital readout was pretty special. Now, we take it for granted. It is also on your Smart Phone. The kid probably has it on all of his devices.

As an old curmudgeon, I give technology a hard time. But when I'm in a boiler room looking at the outdoor temperature on a mod-con's display, being able to verify the outdoor temperature on my phone sure is handy. I'm verifying the outdoor temperature because what I see on the screen is not always what I think it should be.

There could be snow on the ground when I go down the basement stairs, but the boiler display is reading a balmy 60 some degrees. When this happens, I ask the contractor how cold he thinks it is outside, as I am reaching for my phone. Generally the contractor is already on his phone at this point, on his weather app. His phone might say 27 degrees and mine might say 28 degrees.

That difference is close enough for boiler work—but the outdoor sensor is reading 62 degrees. The 34-degree difference of outdoor air temperature is going to be a problem. Since the supply water temperature is based on the outdoor temperature on mod-con boilers, the building is going to have a hard time satisfying any thermostats or angry tenants.

This scenario played out last year. I was at lunch with a contractor that I've known since I have been in the business. In fact, we started working at the same supply house within days back in 1983. I was fresh out of the Air Force and he was fresh out of high school. About five years ago, he earned his contractor's license to specialize in boiler work. He's been buying boilers from me ever since.

We were enjoying Cincinnati style chili when he got a call from a customer saying the tenants were complaining of being cold. He had recently installed a high efficiency mod-con boiler in a 12-unit apartment building. It was a bright sunny day with snow on the ground. The building wasn't far away, so we stopped after lunch to take a look.

I try to not decide what the problem is until I get to the job, but I was already suspecting the outdoor sensor location because it was sunny and cold. We went to the boiler to check its status. The contractor was suspecting it was some kind of fault that caused the boiler to lockout. The modern boilers do that more than the older boilers because they are smarter and looking at lots more things than they did in the past. The closer you look for problems, the more you find.

However, according to the boiler display, everything was working just fine. The boiler was at a low rate of modulation and very close to its target water temperature. So much for the theory of boiler malfunction. What jumped out to me was the 62-degree outdoor temperature on the display. I asked where the outdoor sensor was located. That's when he got that funny look on his face and started with the excuses.

You see, they were in a hurry to get the heat on, he sent his helper to wire it up, and he was planning on moving it... I followed him outside where he pointed to a metal conduit with the outdoor sensor strapped to it. We were on the sunny side of a brick building. I took off my glove and felt the

warmth of the metal conduit. The sensor wasn't bad, just the location.

I have seen a brick surface on a sunny wall artificially raise the sensed outdoor temperature by up to twenty degrees, but the metal conduit was artificially influencing the outdoor temperature even more. The boiler was targeting a supply water temperature of just 108 degrees based on the 62-degree sensed outdoor temperature. The boiler wasn't having any trouble maintaining that. It just wasn't close to being warm enough to heat the building.

If it would have been sensing the true 28-degree outdoor temperature, the target water temperature would have been 140 degrees. At almost every apartment building in our area, there aren't any thermostats. They operate on a reset water temperature based on outdoor temperature and outdoor shutdown. That's how this one was set up.

The building was incorrectly getting close to the outdoor shutdown temperature on a cold day, and not getting any warmer until the sun went down. Probably hadn't seen a sunny day since it was installed, so nobody had complained yet. The outdoor sensor should always be installed so that it is not affected by the sun. Anywhere in North America, that location is on a north-facing wall. But, of course that isn't always convenient.

East, west or south facing walls can be used if you don't use the wall. If the roof has an overhang, that could be a good location, just make sure it isn't near a glass wall. That scenario played out two weeks ago. The contractor located the sensor under the overhang on an east facing wall, but it was one of those glass walled office buildings. The reflection of the sun off the glass was keeping the outdoor temperature 6 degrees above actual.

Window wells are bad spots for the outdoor sensor. I've found they can be warmer. Another bad spot is anywhere within 10 feet of the flue outlet. Sounds obvious, but I've seen that too. It seems like a small detail, but the proper location of the outdoor sensor is critical for proper operation of boilers using a reset water temperature. Avoid callbacks for low heat output by making sure the outdoor sensor is not affected by the sun or any other source of heat. Have a happy heating season!

Patrick Linhardt is a thirty-five-year veteran of the wholesale side of the hydronic industry who has been designing and troubleshooting steam and hot water heating systems, pumps and controls on an almost daily basis. An educator and author, he is currently Hydronic Manager at the Corken Steel Products Co.