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No Excuses

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Water chillers come in all shapes and sizes. You can choose between air-cooled, water-cooled or remote condenser, depending on your circumstances and personal bias. Plant size ranges from a few kilowatts of chilling capacity in a unit the size of a small filing cabinet up to packages the size of a bus whose cooling capability is measured in tons.

When I was a kid, “tons” was just a way of expressing a large number, as in:

“How many people were at the match?”

“Tons.”

“What did you get for your birthday?”

“Tons of stuff.”

“How much sugar would you like in your tea?”

“Tons, please.”

The only things not measured in tons were time and distance, both conveniently expressed in “miles.” Unfortunately, the practice of measuring chiller capacity in tons seems to encourage the same vagueness about actual quantity. A ton of cooling is actually a very precise amount of heat transfer, equivalent to the removal of 3,517 Joules per second. I use a conversion factor of 3.5 kW for quick mental arithmetic (hint: multiply by seven then divide by two).

If the chiller’s cooling capacity is being measured in tons, with all the implicit fuzziness that brings (at least in my head), then there seems little point in being any more precise about the electrical use. That would be like bothering about the price of pizza but not caring what size you got.

“Ten inch, sixteen inch or just a slice?”

“I don’t care so long as it only costs me five bucks.”

I remember as a student in the 1980s being told that there was, at that time, more computing power in a digital wristwatch than there had been on the Apollo 11 moon shot. Now, with a handheld phone, I can listen to music, watch movies, play video games, read emails. I just discovered recently that I can even phone people with mine. We also have huge capacities for measuring

values and recording them built into our refrigeration systems, including chillers. With most refrigeration systems, it is rather difficult to measure efficiency in thermodynamic terms, but with chillers everything you need to know is handed to you on a plate. Inlet and outlet temperatures are there. Flow rate can be estimated quite accurately by measuring pressure drop in and out of the chiller, weather conditions can be measured or downloaded from the web, and of course electrical use is easily captured. So why are we so shy about chiller efficiency?

We have transitioned from the era when plant readings were laboriously handwritten in a logbook every day, but

there was never enough instrumentation to enable a true evaluation of performance to the point where we have too much information and too little time to do anything with it. As a result, on many chiller systems, even those doing hundreds of tons of cooling, we are now recording less than was being logged a hundred years ago. More information

is not the answer; the key lies in what you do with what you have already.

Every chiller should be shipped with software that measures key parameters, calculates cooling capacity and COP, compares it with what would be expected for the load and weather conditions, and presents the answer in terms of opportunity for cost savings. This should be made available in a variety of formats, including wirelessly to smartphones, with the facility for comparing current and historic values so the effect of improvement initiatives can be quantified, again in terms of cost savings. ■



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