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—COMMERCIAL GETS A 21ST CENTURY

New technologies, smaller systems and changing regulations are changing the way commercial water-heaters are specified and installed.

BY
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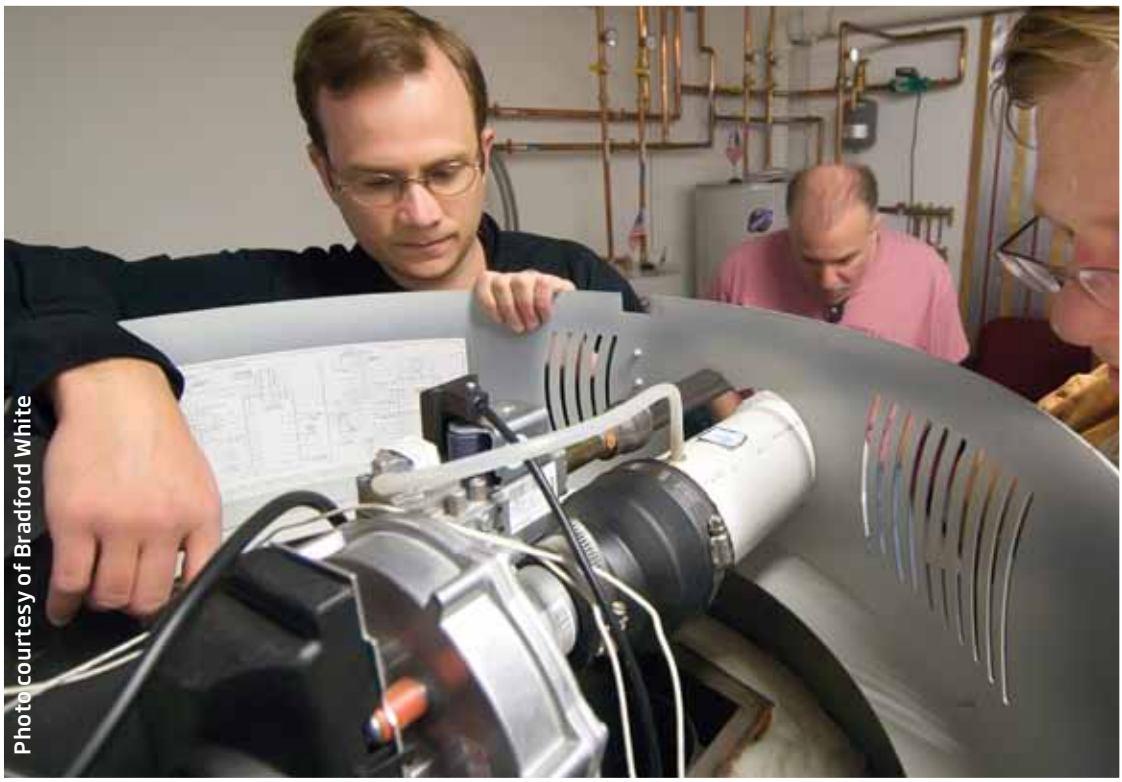
Photo courtesy of Bradford White

Chuck Appleby, President of Old Lyme, CT-based Appleby Plumbing Co., often finds himself on the receiving end of calls regarding an emergency job. But an urgent, Christmas-day plea from a restaurateur that needed half a million Btu of water-heating at the height of their busiest season is one that stands out in his mind.

After Appleby arrived and studied the customer's hot-water needs, he discovered that the restaurant's old, leaking beast of a hot-water heater was sized for peak load—making it at least 20% too large 90% of the time. The big, atmospheric system could be replaced by a 400-MBh condensing unit that would be smaller in size, much less expensive to operate and—if need be—could be coupled with a smaller indirect water heater to meet peak loads.

The new water-heater, which offered a much greater recovery rate, also was much less burdensome to install and it did not necessitate the use of a large, ducted air vent. The new condensing gas water-heater only required a 3-in. PVC air intake and a 3-in. PVC flue-gas discharge; "A piece of cake," said Appleby, who was amazed by the extraordinary efforts (and expense) taken to install the intricate air passageway for the unit that would soon be replaced.

"The new unit's sealed combustion is a *huge* benefit for restaurant jobs, eliminating all concern about one of the trickiest challenges with commercial facilities where food is prepared," added Appleby. "Large ventilation hoods are notoriously adept at stealing combustion air from atmospherically fired systems. Those days—thanks to new, sealed combustion technology—may soon be gone."

Changing the Game

Appleby's experience with the system he replaced illustrates the way water-heating technology has evolved over the past few years. Not long ago, contractors, engineers and building owners were routinely challenged by an inability to easily place and locate commercial water-heaters. The limitations of atmospherically vented systems, facility design, aesthetics and close proximity to other buildings all were factors that had to be dealt with.

Today, it is not uncommon for facility managers, late in

WATER-HEATING FACE

New advancements in commercial water-heating have simplified the ducting process that allows technicians to connect PVC pipe—which is matched exactly to the blower-motor assembly found at the top of the heater.

Photo courtesy of Bradford White

Changing codes and more stringent environmental regulations mean that technicians and contractors need to be well trained on proper equipment installation, troubleshooting and product development.

the game, to express an aversion to visible venting, based purely on aesthetic reasons—especially in historic districts. Fortunately, many of the obstacles preventing the easy placement of water heaters—at least those tied to building design and construction—have been defeated with the emergence of new water-heater systems, as they make it much easier to achieve manufacturer-specified combustion air or venting runs.

Higher-efficiency condensing systems are great for end-users in terms of energy consumed, chiefly because they harvest heat from waste condensate. The energy advantage requires modest design and installation changes to meet the need for condensate treatment and drainage. This may translate to an inability to use existing venting if the original water heater was atmospherically vented, and the availability of electricity. Some systems require hard-wiring; other commercial systems only need a simple wall plug-in.

The arsenal of commercial water-heater products and associated technology has grown considerably, giving HVACR professionals a wide range of fuel, venting and combustion-air options. There also are many new, application-friendly components and techniques to enable trouble-free specification and installation, though—with the new, "green" systems—a few new needs have emerged.

Condensate drainage—In all likelihood, this will be a necessity. Often, the fluids that must be drained are too acidic for metal drain lines. Routing the condensate through a simple, lime-bed acid neutralizer may solve the problem easily. Another, perhaps better, option is the use of CPVC or PVC drain lines that can handle the acidity. Condensate typically has a pH of 4.0, about that of soda pop, making it just acidic enough to at-

tack any metal to which it connects. Over time, the cumulative effect of exposure to acidic runoff threatens the integrity of the drain lines.

Venting—If new, high-efficiency water-heaters are planned as a retrofit, technicians must replace existing, single-wall B-vent lines with PVC, CPVC or ABS plastic. The majority of venting lines are 3 in.–4 in. in diameter, and are precisely matched to the design requirements of new blower-motor assemblies that discharge from the top of water heaters.

Plastic vent materials are inexpensive and easy to work with, and yet present no compromise in safety or performance. Some new water-heater systems have the ability to vent through the roof and pull air in for combustion through the wall; this is a big advantage. The need to improve flexibility of installation and placement has driven the development of power; power direct vent; through-roof; and side-wall venting options.

Finally, if the application offers abundant atmospheric combustion air, some water-heater models require only one pipe for venting.

Building challenges—Multistory and high-rise installations challenge traditional venting. High-efficiency water-heaters can accommodate the long venting runs that these applications may require. Often times, there is no need to run vertical venting all the way to the roof, requiring roof penetration; now, many systems are just as well served with side-wall venting.

New codes—Changes in building codes are forcing contractors and technicians to be attentive to a broad range of emerging requirements. The green movement has been a driving force in altering national, state and local codes, including more stringent environmental policies and initiatives. For example, among the applicable national codes, any water-heater system over 199,999 MBh must be ASME-certified.

Maintaining history—Historic settings are commonly guarded by restrictions that regulate the presence and appearance of modern building systems and attachments (i.e., wire, regulators, transformers and venting). In fact, the presence of old and unsightly or loud venting systems has actually encouraged the replacement of aging atmospheric water heaters.

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Cooking up More Energy Savings

Founded in 1776 near the banks of the Connecticut River, nestled among many old and beautifully preserved buildings, the 232-year-old Griswold Inn is a testament to the history of New England. But recently, the Inn needed a substantial overhaul brought on by the sudden death of an eight-year-old, half-million Btu commercial water-¬heater—the only source of domestic hot water for the Griswold Inn's award-winning kitchen.

"Of course, the old Inn wasn't built to accommodate modern mechanical systems," said Appleby Plumbing Co. Owner Chuck Appleby, who was on the receiving end of the emergency replacement call. He specified a new, 400 MBh, LP-fired, high-efficiency water-heater to replace the quickly deteriorating system installed by another firm.

The water-heater that was replaced had required a 12-in. stainless-steel draft hood and chimney. "Too bad they had to spend that kind of money on a water-heater with such a short life span," said Appleby. "The new system we installed requires only a simple, 4-in. PVC stack, and at 98% efficiency, would cost them a whole lot less to operate. The key advantage was the new condensing unit's super-high recovery rate. Because they (the staff) could heat so much more water, we were able to size it at 100,000 fewer Btu—a move that also had a huge impact in their fuel consumption."

Another plus is that there are no stack losses, since the new system is equipped with sealed combustion and uses both PVC exhaust- and combustion-air lines. The water-heater also offered several venting options, electronic controls, four protective magnesium anode rods, a sediment-reduction system and factory-installed dielectric fittings.

Considering the sad waste of resources on the stainless-steel stack, which Appleby left in place, he devised a plan that gave it new purpose. "We used it as an intake-air ventilation duct to cool the restaurant's large refrigeration equipment," he said. "They had a growing problem there because the equipment had been running hot, and this was consuming electricity—the highest, by far, of all energy sources in the state—at an alarming rate. Typically, the air around the refrigeration systems was 120°F–130°F year-round. Using the 12-in. duct to bring fresh air in, we were able to get those temperatures down substantially.

"The biggest benefit of all was in the energy savings," concluded Appleby. "Today, no one can responsibly afford to waste energy."