Scientists stick to their story

Tests indicate duct tape is terrible for taping ducts

By GLENNDA CHUI
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SAN JOSE, Calif. – Popular wisdom claims you can use it to patch a canoe, repair a dangling fender or keep an alligator's mouth shut. But according to scientists at Lawrence Berkeley National Laboratory, there's one thing duct tape is no good for: taping ducts.

In tests that mimicked conditions in the forlorn and hidden spaces where ducts reside, "What we found was that duct tape almost always failed," said Max Sherman, a physicist who ran the tests. "It failed reliably and often quite catastrophically. And nothing else except duct tape failed."

Although you can buy duct tape T-shirts, duct tape hats and little books that suggest a million uses for the silvery stuff, the new study is no laughing matter to energy efficiency experts. They estimate that 30 percent of the heat or chill generated in the average home is lost before arriving in the rooms where it's needed.

And since most ducts are inaccessible – hidden in crawl spaces, attics or inside walls and swaddled in insulation – people rarely notice a key component of their home's circulatory system is failing. This can lead people to replace costly heating or air conditioning equipment unnecessarily.

Sherman, who heads a group at the laboratory that studies the energy performance of buildings, said while duct tapes have been rated for safety and strength, no one, to his knowledge, had ever tried to determine how well they hold up.

The impetus for his study was an invention. Colleagues at the lab came up with an aerosol foam that can be sprayed into ducts to seal leaks, then developed tests to see if it worked. They have since formed a company, Aeroseal Inc., to market the stuff.

Sherman's group also got a grant from the California Institute for Energy Efficiency, which is financed by the state's utilities, to test more traditional sealants.

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They tested the stuff commonly known as duct tape. By definition, it combines a rubber adhesive with a fabric backing. Although the classic version is silver, it also comes in an array of colors and in a number of grades, from economy to professional and even nuclear.

But duct tape is not the only kind used to seal ducts. The people who install heating and air conditioning systems also employ gooey black tapes, clear acrylic ones and foil-backed ones. The scientists tested those, too, along with the aerosol foam that had been invented at the lab and mastic, an adhesive that's glopped on like glue and left to dry. All are supposed to withstand the 200-degree temperatures encountered in heating systems.

The researchers applied each sealant to gaps on pieces of sheet-metal ducting. They baked the ducts to simulate conditions in a hot attic and blew air through them at temperatures ranging from subfreezing to 180 degrees. By cycling from heat to cold every few minutes, the scientists got the sealants to deteriorate much faster than they would in normal usage – although exactly how much faster it's hard to tell.

"We assumed we would get a whole spectrum of failure. There would be good products, bad products, products in the middle," Sherman said. "Duct tape tended to fail very quickly – in as little as three days in our testing system to as long as two months."

At a meeting of energy efficiency experts in Monterey, Calif., this week, Sherman and colleague Iain Walker passed out pieces of duct tape that had been through the tests, each encased in a plastic bag.

"You can see with a lot of these failed tapes there is a lot of shrinking, drying and separating," Sherman said. "Some are dried to a crackly crunch."

Of the two dozen people at the session, nearly half said that while inspecting homes they had found duct tape that had lost its usefulness. Based on many such reports from the field, the California Energy Commission is now considering new standards that would require home builders to use something other than duct tape in heating and cooling systems if they want to get special credits for saving energy, according to Scott Matthews, the commission's deputy director for energy efficiency.

The lone representative of a duct tape manufacturer at the meeting was Jerry Serra, vice president for research and development for Kendall Polyken in Massachusetts.

"I can honestly say I have not had one field failure come back to my laboratory," he said. "Maybe they're just not complaining, I don't know. But whatever it is, we want to make a product that works."

Gerard Lamarre, marketing director for the firm, said the company wanted to gather more information about the study before responding.

Matthews noted the Berkeley results have not yet been duplicated in other laboratories: "You should have more than one test that shows something before you reach scientific conclusions."

But he said the study is just the start of a process that may lead to energy efficiency ratings for duct tapes and other sealants, similar to the ones now in place for air conditioners and windows.