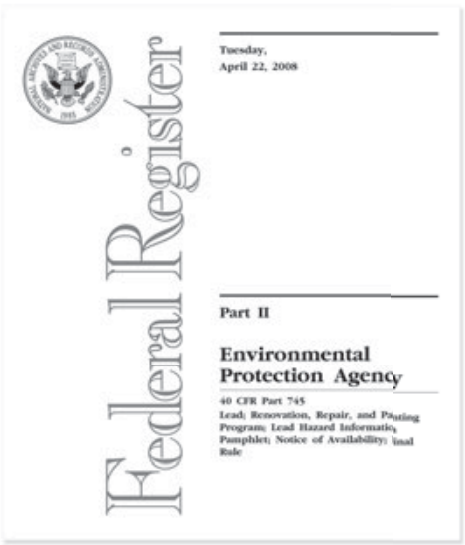
JLC Report

EPA Waffles on Which Vacuums Can Be Used to Clean Up Lead

Contractors seeking to comply with the new Renovation, Repair, and Painting (RRP) rule know what supplies they need to buy: tape, polyethylene sheeting, mops, wipes, and the like. What they may not know is which HEPA vacuum to use for cleanup in buildings containing lead. Under the RRP, a HEPA vacuum is defined as one that "has been designed with a high efficiency particulate (HEPA) filter as the last filtration stage." But the definition does not include any standard for testing or certifying the machines, and it's not yet clear how EPA inspectors will decide which vacuums qualify. The agency chose not to provide a list of approved vacuums because models are constantly changing.

An official EPA commentary on the development of the RRP sheds some light. (Both it and the 20-page rule are part of a 79-page document the agency has made available to the public. You can download a copy at jlconline.com/pub/epa or at epa.gov.) According to this commentary, the EPA did not intend to approve the use of inexpensive vacuums retrofitted with HEPA filters. Such vacuums "are not necessarily properly sealed or designed so that the air flow goes exclusively through the HEPA filter," the agency has found; instead, the vacuum should be designed for the "integral use of HEPA filters" (see page 46 of the pdf). The RRP requires vacuum cleaners to be designed "so that all the air drawn into the machine is expelled through the HEPA filter with none of the air leaking past it" (page 69).


Federal Register

Tuesday,
April 22, 2008

Part II

Environmental Protection Agency

40 CFR Part 745
Lead; Renovation, Repair, and Painting Program; Lead Hazard Information Pamphlet; Notice of Availability; Final Rule

This 79-page document contains the new lead rule itself (which runs about 20 pages), commentary about its development, text from the lead-hazards pamphlet that renovators are required to give homeowners, and lots of other information. You can download a pdf from the EPA's Web site (epa.gov).

Vacuums leak. Leaks have always been a problem with vacuum cleaners. Gore CleanStream, which manufactures retrofit filters for Ridgid, Craftsman, Shop-Vac, and Genie machines, says its HEPA filters should not be used to collect hazardous materials because the vacuum might leak. And Tom Wangerin, an environmental consultant and long-time trainer of abatement contractors, cautions that "even the good vacuums tend to leak and must be adjusted before use. If we're involved with an environmental cleanup, we get the vacuums tested."

■ A Bakersfield, Calif., couple and their builder are headed to court over persistent foundation cracking. According to an engineering firm hired by the plaintiffs, the cracks — which first appeared soon after the home was completed seven years ago — are caused by an underlying earthquake fault that should have been detected during construction. The builder, Lenox Homes (not to be confused with the modular home builder Lennox Homes), contends that the homeowners have not cooperated with repair efforts and have yet to demonstrate the fault even exists. "If it's there we don't know about it," Lenox president David Cates told KBAK/KBFX. "Nobody's known about it. The city didn't know about it, Kern County didn't know about it, the engineer didn't know about it."

■ Although a plague of misbegotten rabbits isn't the sort of problem ordinarily associated with a structural failure, that was the result when heavy snows took down the roof of a tennis-court complex at a prestigious rabbit exhibition in Nykoping, Sweden, last month. According to the Swedish news agency TT, the collapse broke open many of the cages, allowing the occupants to hop about in the debris and breed like, well, rabbits. At least 50 exhibitors report that their recovered animals have since given birth to surprise litters, including such oddities as Dwarf Hotot/British Giant hybrids. "They made new friends," one rabbit breeder reportedly said. "The builders told me it was a veritable circus in there."

HEPA Vacuums
continued from page 1

According to Wangerin, the existing methods for testing vacuums were developed for the nuclear industry and are impractical for use on most job sites.

The Indoor Environmental Standards Organization (IESO) is developing a standard known as PHEAF testing, which would make it easier to test portable vacuums. This method uses a hand-held laser particle counter to compare the number of particles going into the vacuum with the number coming out. Tom Neltner of the National Center for Healthy Housing suggests that "the EPA could come out and say, 'If a vacuum meets the IESO standard it probably meet ours.'" There is, however, a drawback to counting the particles in a vacuum's exhaust air: A laser particle counter cannot distinguish between particles of lead that bypass the filter and metal shavings, carbon dust (from brushes), and lubricant coming out of the motor.

What qualifies as HEPA? The EPA defines a HEPA filter as one capable of removing at least 99.97 percent of particles down to 0.3 microns in size. Although standards exist for testing filters, the EPA chose not to include them in the RRP. In the absence of a specified standard, there's no way to be certain that a particular filter complies.

Most of the industrial-grade vacuums used by lead- and asbestos-abatement contractors have filters that have been individually tested and certified, usually to MIL-STD-282 (the U.S. military standard) or IEST-RP-CC007 (an Institute of Environmental Science and Technology standard). The vacuums themselves typically accept only HEPA filters that, to prevent leaks, are tightly bolted or clamped to the machine.

JoAnn Copperud, an RRP trainer for RGA Environmental, an environmental consulting firm, recommends buying an industrial-grade machine like a Nilfisk GD930, a $600 canister-style vacuum that's popular with lead-abatement contractors. According to Copperud, "any vacuum good enough for lead and asbestos abatement is good enough for the RRP. It will be more expensive than the cheap shop vacs contractors are accustomed to, but it will work a whole lot better." Among the better-known makers of industrial HEPA vacuums are Nilfisk, Euroclean, Pullman-Holt, Nikro, Minuteman, Kent, and Mastercraft.

It's not clear how the dust-collecting vacuums commonly used by carpenters will fare under the rule, because most can be equipped with more than one kind of filter. Darren Diess of Dustless Technologies says he is aware of instances where OSHA objected to contractors vacuuming lead dust with machines that take more than one kind of filter. This is because inspectors want to be able to look at the machine and know what kind of filter it contains without having to open it. According to Diess, the HEPA version of his company's vacuum takes only HEPA filters tested to IEST-RP-CC007.

Bosch and Porter-Cable say their dust-collecting vacuums should not be used to collect toxic materials like asbestos or lead, even when equipped with optional HEPA filters. Fein, on the other hand, has issued a letter stating that its dust extractors comply with the RRP because they're "designed to provide internal HEPA infiltration." If the EPA decides to exclude vacuums that accept both HEPA and non-HEPA filters, this could spell trouble for current models from Fein, Festool, and Hilti.

The safest bet. Until the EPA clarifies what it will and won't accept, there's no way to know for sure which vacuums — or filters — meet the new regulations. But in the interim, remodelers who don't want to wait can probably safely assume that any pro-duty HEPA vacuum used in the abatement industry is good enough. — *David Frane*

Low-E Windows Blamed for Melted Vinyl Siding

Last winter, when Urbandale, Iowa, builder Mark Parlee was asked to investigate a case of thermally distorted vinyl siding, he was surprised at what he found: A trio of small windows located high on the south-facing wall of a neighboring home was reflecting sunlight onto the north-facing wall of the affected home, creating three focused hot spots — each about 6 inches square — that moved diagonally across the siding in the opposite direction of the sun (see photos on page 22). Parlee measured temperatures on the surface of the siding in excess of 200°F at one of these spots, even though the air temperature was only 10°F that day.

That's plenty of heat to damage vinyl, which softens and starts to melt at about 165°F. In this case, much of the

Melted Vinyl Siding
continued from page 2

siding along the entire wall suffered from thermal distortion, from about 12 inches above grade up to more than 6 feet above grade.

A growing problem. Though not exactly common, incidents of thermal distortion aren't that unusual either, particularly in recently built subdivisions where houses with insulated glass windows are built in close proximity. The Vinyl Siding Institute is reluctant to discuss the issue, but as early as 2002 it was warning that there had been "... rare incidents of thermal distortion of vinyl siding due to reflected light or radiated heat."

In its own 2008 technical report on vinyl-siding distortion, Cardinal Glass confirmed the institute's findings, stating that reflected light from windows can indeed produce temperatures well above 165°F on a sunny day. The glass manufacturer's study showed that relatively small amounts of deflection in window glass from 1 mm to 4 mm produce increasingly smaller and more focused reflective beams. Deflection is fairly common in IG units and results when there's a pressure differential between the interior of the glass panels and the atmosphere. Even when the deflection is very slight, the resulting concavity can focus reflected sunlight sufficiently to produce much higher temperatures than would be produced by a flat reflective surface. Low-E coatings contribute to the problem, since they are more reflective; but under the right conditions, clear insulated glass can produce vinyl-melting temperatures, too.

The NAHB recently released its own report on the problem, saying that "... observed incidents have risen proportionally with an increase in the use of low-E windows in residential construction." While exact numbers are unknown, incidents have been reported in all geographic regions and climates, according to the association.

Is the glass to blame, or is it the siding? Because window reflectance can be affected by many different environmental factors, including proximity to neighboring houses, wind speed and air temperature, the presence of nearby foliage, and the angle of the sun, remediating a case of thermal distortion can be complicated. For example, screens, awnings, or foliage can sometimes be used to diffuse or block the reflected light. These solutions are simple but not always practical, especially when the reflecting windows are located on a neighboring house.

In some cases, it may be possible to eliminate the focused reflection by replacing the windows. Most standard IG units are made with single-strength $^{3}/_{32}$-inch-thick glass, but double-strength $^{1}/_{8}$-inch-thick glass is less likely to deflect even when there is a pressure differential, and therefore less likely to create focused beams of sunlight.

Only a few cases of thermal distortion have been reported in the western U.S., and the NAHB report suggests that capillary tubes may be the reason for that. Capillary tubes equalize air pressure inside and outside of IG units and are required by most building codes for homes at elevations higher

Located high on a neighbor's wall, the three south-facing square windows shown above reflect sunlight onto a north-facing vinyl-clad wall (photos at right), producing temperatures high enough to thermally distort the siding. Under certain atmospheric conditions, insulated glass units can develop a concavity that focuses reflected light, and studies have shown that smaller, square panes of deflected glass like these produce higher reflective temperatures than larger panes of rectangular, flat glass.

Melted Vinyl Siding
continued from page 3

than 5,000 feet. It might be difficult to locate windows equipped with capillary tubes east of the Mississippi River, but it's a low-cost option that could solve some thermal distortion problems. However, insulated glass with capillary tubes can't be gas-filled, so energy performance suffers. In fact, with stricter energy standards, local codes in cold climates may not even allow windows manufactured with capillary tubes or clear (rather than low-E) insulated glass.

In cases where the reflecting windows are on a neighboring home, it may be easier to address the affected cladding than the heat source. Simply replacing the vinyl with the same product won't fix the problem, obviously, so some builders choose to replace damaged vinyl siding with fiber cement or other claddings that aren't affected by heat.

Another option is to use specially formulated heat-resistant vinyl siding. Vinyl siding panels typically consist of an extruded PVC substrate covered by a capstock that gives the siding its appearance and weathering ability. But manufacturers can substitute a CPVC substrate, which has a 220°F melting point, for the standard PVC substrate. Because CPVC is more difficult to work with and harder on extruding equipment than PVC, says Brian Martucci of The Foundry, a vinyl siding manufacturer, costs for this type of vinyl siding are considerably higher than for standard PVC siding, and availability is limited. "We don't sell the product as part of our listed offering, but make it available if we have a claim involving intensified sunlight from a window or skylight," says Martucci. Some styles of siding can also be made with polypropylene, which has a higher distortion temperature than PVC but is more likely to fade, Martucci says.

Product defect or design flaw? Most vinyl siding manufacturers now specifically exclude damage caused by excessive reflective heat from warranty coverage, though some may be willing to bend the rules on a case-by-case basis, as Martucci suggests. Meanwhile, the VSI hints that manufacturers are working on improvements to vinyl siding that would raise its melting point beyond 200°F, but these are still in the development stage, according to the NAHB report.

Until that happens, the best way to avoid thermal distortion problems is to carefully consider site conditions before installing any cladding that will start to melt at 160°F, since few homes are being built these days without insulated glass windows. If there is considerable reflected solar radiation (such as in a dense development), or if the building design contains heat-blocking alcoves, overhangs, or corners, vinyl siding might be a risky choice. Choosing a higher-quality vinyl siding that has high solar reflectivity (typically a light-colored vinyl with a solar absorption of less than 50 percent) may lower the risk of damage, but it will not eliminate it. — *Andrew Wormer*

Chinese Drywall Ruling Favors Homeowners

A federal judge has awarded $2.6 million in damages to the owners of seven Virginia homes built with defective Chinese drywall. U.S. District Court Judge Eldon E. Fallon's much-anticipated decision, handed down in April, is widely viewed as a bellwether case for thousands of additional cases now pending (see "Chinese Drywall Liability: Who's on the Hook?," 12/09). The 108-page decision finds that satisfactory repair of the affected homes requires the removal of all drywall, electrical wiring, hvac equipment, appliances, carpeting, trim, and flooring. "The alternative remedies to a complete remediation that have been tried or suggested, such as selective identification and removal of Chinese drywall, 'cleaning' corroded wires, switches, and contact points, leaving corroded wires and splicing wires, or making new junction boxes, will not make the plaintiff whole, will not be adequate from a scientific or practical standpoint, and will not provide safety and marketability to the homeowner," the decision states.

Fallon's ruling appears to go significantly further than the new interim remediation guidelines released by the U.S. Consumer Product Safety Commission several days earlier, which call for the removal of all "problem" drywall, electrical wiring and associated components, gas service piping, and sprinkler systems — but not hvac equipment or plumbing.

Yet to be decided is who will ultimately foot the bill for the mandated repair work. — *Jon Vara*