

TECH TALK

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Dirt Stains on Diffusers and Adjacent Ceiling Surfaces

by Dave Fetters

We've all seen them – ceiling diffusers that are dirt-stained, and the dirt stains usually extend to the surrounding ceiling surface. It is unsightly, especially if one is waiting for a meal in a restaurant. A first reaction from those outside our industry is “Wow, the filters need to be changed.” Hopefully, those of us involved in HVAC businesses know that dirty or poorly functioning filters are not the sole or most common cause.

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Investigations have shown that “smudging,” as we call the deposition of dirt particles on the air outlet and surrounding surfaces, is more likely to be generated from room activity that releases dirt into the room air rather than from dirty

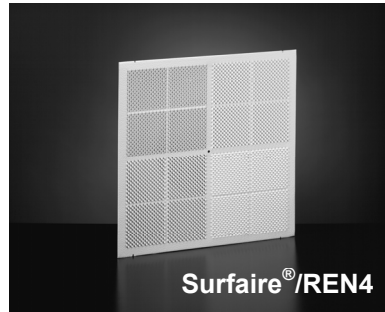
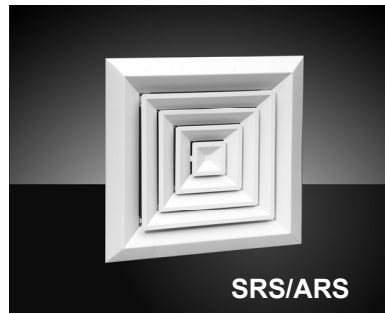
supply air. This dirt suspended in room air, called an “atmospheric aerosol,” can then be entrained (drawn) into the discharge of the diffuser. Additionally, diffusers with tumbling air patterns that contact the ceiling, such as the RENPS, are more likely to generate smudging on the ceiling. This is in contrast to a register that blows air angled away from the mounting surface, such as the 682, although dirt may still stain the diffuser.

Dirt particles can be composed of both natural and man-made materials that are generally common in the immediate area. The amount varies with the geography, season, weather, room furnishings, room construction, and activity. Dust, carpet fibers, tobacco smoke, greasy

fumes, lint, and pollen are some of the particles deposited. The smallest particle sizes are the worst offenders. Heavy foot traffic through a room will stir up these fine particles and keep them in suspension. Cooking, printing, paper dust, and smoking are some other contributing activities to smudging. One interesting example occurred in a new local food store near our offices. Dust from the coffee grinder produced an obvious brown blossom on the ceiling around the diffuser that was located above the grinder with nothing appearing on the more remote outlets, even though they were on the same air system.

How can we control (notice I didn't say "eliminate") smudging in susceptible areas? A combination of keeping the air filters clean, frequent mopping and vacuuming of floors, and room air cleaners can all help, but may not be practical in many areas. A careful selection and mounting of air diffusers will minimize dirt smudging, but recognize that we are addressing the symptoms, not the problem.

A diffuser with a beveled or step-down margin like our SRS/ARS will help deflect the air in a slightly downward angle, keeping the air from contact with the ceiling and, hopefully, lessen dirt staining on that surface.



Another potential solution is to use our Surfaire® or REN4 diffusers that generate a very thin air stream tight to the ceiling that prevents dirt-laden room air from entering the minimal space between the supply stream and the ceiling. Some dirt will still deposit on the aluminum face at the edges of the air pattern and in the center where there is little airflow. These stains on an aluminum diffuser are easy to wipe off compared to ceiling materials.

What we are trying to do is prevent the entrained room air that suspends the dirt particles from reaching the ceiling surface where the forces of electrostatics, vapor pressure, direct impingement, and temperature difference cause the dirt to stick. The (relatively) high velocity of the supply air stream creates a localized lower pressure that the room air-suspended dirt will want to flow toward. As my wife likes to say, "Nature abhors a vacuum" (which she learned from me). That's another way of stating that air will flow from a region of high pressure to one at a lower pressure. Keeping this supply jet off the ceiling surface can help reduce staining.



Hart & Cooley, Inc. 800.433.6341 toll-free
 500 East Eighth Street 616.392.7855 phone
 Holland, MI 49423 800.223.8461 toll-free fax
 info@hartcool.com 616.392.7971 fax
 www.hartandcooley.com