Ask Gail

by William D. Frye, Ph.D., CHE

Dealing with unsightly black spots and streaks on bathroom mirrors

Dear Gail:

The mirrors in the guest bath in our hotel rooms all exhibit signs of aging. To be more specific, most have various black spots and streaks, especially around the edges of the mirrors. Our GM doesn't want to replace the mirrors due to the cost. Any suggestions?

Bruce H.
Maintenance Manager
Amarillo, TX

Dear Bruce:

The dark streaks and black spots that you are seeing is the result of tarnishing of the silver backing of the mirrors. This de-silvering is most likely caused by moisture creeping around the rim of the mirror and counteracting the intended effect of the silver backing. Let me explain in more detail.

For the most part, a mirror is nothing more than plate glass (such as the type used in a window) that has been silvered on one side to produce a special effect. Different types of silvering agents can cause different effects on glass, the most common being "reflection".

Reflection occurs when particles of light, called photons, hit a smooth mirrored surface that has been silvered heavily on the reverse side (the backside) of the glass. These photons then bounce off of the surface at the same angle at which they hit the surface, but render a backward image. Thus, when you view yourself in the mirror, everything appears in reverse (i.e., the left is on the right, etc.) but in proportion, thanks to the heavy layer of silvering agent.

However, not all smooth surfaces reflect photons back to us, even though they should bounce back at the same angle at which they hit the surface. This exception typically occurs because some smooth surfaces absorb the light particles hitting them, making it impossible for them to bounce back. Plate glass that is not silvered, but rather translucent, will not reflect an image. Hence, if you look out a glass window (which contains no silvering agent), you see what is on the other side of the window.

Some special windows are coated on the reverse side with only a thin coat of silvering agent, as opposed to a thick coat as used to manufacture mirrors. Glass with a very thin, sparse layer of silver coating will reflect about half the light that strikes its surface, while letting the other half pass straight through. These half-silvered mirrors enable individuals on the reverse side (where the coating is located) to easily see through the pane of glass while the person on the obverse side of the glass will see their reflection, provided that there is sufficient light directed towards the mirror on that side. The windows are commonly referred to as "one-way" mirrors and are used primarily in police interrogations and line-ups and in medical and psychological observation rooms.

Okay…enough with the scientific explanation. The key point is that all mirrors have a silver coating on the reverse side that reflects the light (and an image) back to the obverse side. The silver coating is primarily made of liquid silver and alloys, though many mirrors in the 19th century were also made using mercury as the reflective agent. Once it is applied to the glass and hardened the silvering agent will reflect light and images, to one degree or another. The thicker the coating of silvering agent, the more reflective and less translucent the glass becomes.

If the silvered coating becomes damaged, such as through a scratch, then that area that is scratched will become translucent. But, if the silvered coating comes into contact with moisture, it will discolor and turn gray or black. The more moisture applied to the back of the silvered surface – the more and larger the mirror will emit unsightly black spots or blotches on the obverse side. These spots will generally not render reflectivity, but they will not become translucent either. Moisture and silver do not mix. More than likely, this is what is occurring to the mirrors in your hotel bathrooms.

Unfortunately, once the moisture turns an area of the silvered surface dark, you cannot remedy this defect except to have the mirror de-silvered and then re-silvered. This entails stripping the hardened silvering agent off the glass pane and recoating it.

This process is very laborious and time consuming, not to mention potentially hazardous. There are glass and mirror experts your hotel can retain to perform this task, but it will likely cost you more to re-silver all the mirrors than it would cost to replace them with new mirrors.

If the black spots and streaks are strictly located along the edges of the mirror (see the picture on the next page), you may want to consider placing a decorative frame around each edge of a mounted mirror to hide these blemishes. The frame could be wood, plastic, or even additional panels of beveled mirror affixed to the surface of the existing mirror.

Regardless of whether you keep the existing mirrors or replace them with new ones, the most important thing you must do is seal every edge of the mirror to prevent new moisture from seeping behind the mirror. If the mirror is currently unframed but affixed to the wall, place a thin but continuous solid bead of translucent, waterproof silicone caulk around each edge. For mirrors that are already framed, run the bead of translucent silicone caulk between the obverse edge of the mirror and the frame. Make sure you only use silicone caulk; do not use latex caulk as it contains water and may discolor the silver backing.

Finally, there are two more preventative steps that can help reduce mirror discoloration. First, discuss this matter with the general manager and urge him or her to require that room attendants never spray cleaning agents or water directly on any mirrored surface. All cleaning agents must be sprayed directly onto the cleaning cloth, not the mirror. This will prevent excess chemical from running down the mirror and seeping behind the frame or bottom of the mirror. Second, if the bathrooms do not have exhaust fans, you can expect there to be a build-up of steam in the guest bathroom. Steam is gas moisture that will convert to liquid as it cools if it is not ventilated and exhausted out of the bathroom. Bathrooms without exhaust fans usually exhibit higher levels of mold and mildew growth as well as damage to porous surfaces, including mirrors. While it may not be financially feasible for existing hotels to retrofit their facilities with bathroom exhaust fans, those lodging properties that do contain them can ensure that they do their intended job by wiring them to activate whenever the guest bathroom light is turned on. If the exhaust fan is wired to a separate electrical switch, some guests will shower but choose not to turn on the fan. Remember, if you give guests a choice to turn the exhaust fan on or not, you cannot control their inactions once they have locked the guestroom door. ✧

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