

Carpet Staining

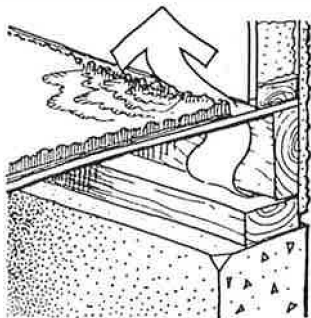
Carpet staining, found most commonly along the outer wall but also along some inner walls, is a problem that does not seem to be going away. The popularity of light-coloured carpets has made the problem worse because it makes the stains more visible. The problem is compounded by the fact that the stains are nearly impossible to remove. We cannot insist that everyone use dark-coloured carpets on the assumption that if you cannot see it, it is not a problem.

The stains are causing builders and warranty programs much concern, but there is no certainty about who is liable for the problem. Suggestions have been made that code requirements for sealing the building envelope have altered the air flow patterns in the house, resulting in the carpet fibers acting as filters to airborne contaminants. Polluted urban environments contribute to the problem, but fundamentally they are not the cause.

What is causing the problem, and how can we avoid it?

The physics are that fine dust and dirt particles are being deposited on the carpet at air leakage points. Air leakage is driven by pressure differences from one part of the house to another or from outside to inside. Air always moves from positively pressurized areas to those under negative pressure. If the area under negative pressure is polluted, the pollutant will be carried and deposited on the carpet in the area with a lower pressure through any narrow gaps linking the two spaces. The air flow slows as it enters the larger space, so any particles contained in the air are deposited. At concentrated air leakage points the staining is accentuated.

The pressure differences can be caused by stack effect, or most commonly in houses with forced warm air heating systems, by the leakage of air from leaky ducts. Forced warm air systems are a major culprit because the ducts in the basement or crawl space can pressurize the space compared with the rest of the house. The ducts are usually not sealed and 30% to 40% air leakage is common, so this air leakage effectively pressurizes the crawl space or basement. Dust particles in the air are pushed through leakage points into other parts of the house, usually around partitions.



Stains can also be seen on the second floor, especially when you have a roof space next to an upper floor wall. The air passing under the wall plates moves exterior air inward, staining the carpets. Air can also leak at the rim joist and then enter at interior walls. Infiltration leakage will occur anywhere below the neutral pressure plane - typically near the middle of the house.

Lifestyles and candle use

Lifestyles may also be contributing to carpet staining. The emissions and soot particles produced by scented candles are becoming a more frequent problem. In the USA, some builders and heating companies have been the target of litigation or pending civil action as a direct result of soot deposition from candles.



The soot can not only damage a home, its contents, and the ventilation system, but also presents a health hazard. The cause of the soot is due to new formulations used in some candles, which have greater quantities of fragrant oils (some of which are not even suitable for combustion) and long wicks.

Unfortunately, once staining becomes noticeable it is often too late to prevent much of the property damage. A two or three thousand dollar cleanup bill can result from the use of as few as six candles for a single dinner party. There have been cases where the cleanup cost is in the \$20 -30,000 range! ☹

How can staining be avoided?

Much work remains to be done to identify solutions, and each house has its unique circumstances. However, here are some suggestions to reduce the problem.

- ☞ Heated crawl spaces should have a relief vent to keep them in a negative pressure in relation to the rest of the house. The balance of the house should be kept at an even pressure.
- ☞ Ducts should be sealed, especially if they run in a crawl space or basement.
- ☞ Penetrations in the envelope should be air sealed.
- ☞ Air sealing of the house should be done carefully.
- ☞ Lifestyle practices may have to be modified (especially the use of inappropriate candles).