

## Soot Staining on Carpets

### WHAT IS SOOT STAINING ON CARPETS?

Soot staining on carpets is permanent, dark staining near baseboards, air registers, under doorways and in other areas where moving air may filter throughout rug fibres.

Soot staining is a relatively new phenomenon in Canada. Builders and new home warranty groups are finding that staining caused by carbon soot cannot be removed.

### WHERE DOES IT HAPPEN?

Soot deposits are usually seen in more recently built homes, but builders have seen soot stains in older homes as well. There have even been cases of staining in newly built, unoccupied residences. Most soot staining has been reported in metropolitan areas, such as Toronto and Vancouver.

### WHAT CAUSES SOOT STAINING?

Dust or dirt causes most marks on carpets, and will wash out quite easily. Staining caused by carbon soot can come from inside or outside the house and often permanently marks the carpet.

Two factors cause soot staining: a source of carbon soot, and air movement causing carbon particles to move through the carpet.

### CARBON SOOT SOURCES

Carbon soot is particulate matter—it is made up of very small particles.

Research shows that houses near exhaust from vehicles, trains or airplanes can be affected by carbon soot stains. Leaky furnaces, gas ranges, fireplaces and cigarette smoke can also cause carbon soot stains.

However, recent studies show that a common cause of carbon soot stains is the use of candles in the house.

Some candles—particularly those made of low-quality paraffin wax and those using oils for scent—produce more soot than others.

Wick length and the amount of oxygen a candle gets can also cause overproduction of carbon soot.

For example:

- Candles inside jars produce more soot because less oxygen reaches the wick
- Incorrectly designed candles will burn the wax too quickly, leaving more of the wick exposed
- Oversized wicks cause the flame to burn too high
- Any draft passing over the flame will cause the candle to smoke.

To find out if a candle produces carbon soot, burn it on top of a turned-on television. After several hours, wipe the screen with a clean, white cloth or tissue. If there is soot on the cloth, switch to another make of candle.

Several candle manufacturers print warning labels about carbon soot on their packages.

## AIR MOVEMENT

Carpets act as filters for airborne particles. For example, if a bedroom door is usually kept closed, positive pressure caused by the supply register blowing air into the room will force the air underneath the door. As the air moves underneath the door, the carpet fibres trap the particles. Over time, the carpeting begins to darken. Staining can become quite noticeable, especially in light-coloured carpeting.

## HOW TO AVOID THE PROBLEM

Prevention is the best way to reduce or avoid soot staining.

- Avoid light-coloured carpet
- Keep soot sources out of the house—choose your candles wisely
- Prevent pollutants from entering the house
- Prevent air from passing through the carpet

Keeping soot from entering your house requires a fairly complicated ventilation system. Preventing air from moving in your carpet requires some thought, good design and quality construction.

Air movement in a house requires a pressure difference and an opening. Air can not pass through a carpet if the floor underneath is continuous. It will move where there are cracks and discontinuities, which can occur at the floor-wall junction,

stairs, near registers or where the subfloor panels join. A continuous air barrier (such as plastic sheeting or sealed subfloor) will prevent air moving through carpet.

A tightly built house, with few or no air leaks, will not have air leaking into the house through exterior walls.

But rooms with supply ducts and no returns could have a problem if the doors are kept closed. Unsealed duct runs, or return air ducts that use the floor joists, are apt to cause pressure differences.

## IN A NEW HOME OR AFTER RENOVATION . . .

There are several ways to reduce the risk of soot staining. Most do cost more, but some will actually save money by improving energy efficiency. Others can make your house healthier by reducing dust.

### Recommended system

To avoid soot staining, consider building an R-2000 home. A house with a very tight envelope will not have wall leaks that drive the dust through the edge of carpet. An R-2000 home must also have a Heat Recovery Ventilator (HRV) to provide all the house's ventilation. Air entering the HRV can be passed through a high-efficiency filter. This treats almost all the air coming into the house and keeps airborne particles out. It is still good practice to ensure that all forced air ducting has well-sealed metal ducts and a balance of supply and return air.

## Other solutions

- Caulk or seal all baseboards before applying trim and installing carpeting
- Use a high-efficiency filter on the furnace or an electrostatic precipitator to reduce staining at the registers and improve air quality
- Install a perimeter of hardwood flooring around carpets
- Use area rugs instead of wall-to-wall carpets
- Have your home and stove, furnace and fireplace performance tested to ensure they meet all recommendations and specifications

## IF YOU HAVE A PROBLEM NOW . . .

Staining may not be caused by carbon soot. Dirt and dust stains are usually grey.

To clean the stains use a carpet cleaning product or shampoo the carpet.

Unfortunately, black carbon soot stains are often permanent. For soot staining at the carpet perimeter, cut off the stained edges, put plastic sheeting over the floor-wall joint (or caulk) to stop air movement, and restretch the carpet to fit. Or, if you can, dye a darker, contrasting stripe around perimeter of the carpet to hide the staining.

## IS THERE A HEALTH RISK?

Concentrations of particles that cause staining are likely to be quite low. It is not yet clear if low concentrations of carbon soot particles inside a house are a health threat.

## FOR FURTHER INFORMATION

You can get information from:

- Your provincial New Home Warranty Program
- Your local Home Builders' Association
- The Canadian Carpet Institute:  
(819) 684-8444

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