

### **Indoor Air Quality – General**

Many factors determine the indoor air quality of homes and buildings. Most new interior products have the potential to emit volatile organic chemicals (VOCs). The extent of this effect on indoor air quality is dependent upon the combined emissions from products such as paint, cleaning materials, building materials, furnishings, fabrics, etc. In order to minimize any impact, all products should be low VOC emitters with emissions that dissipate quickly.

Activities and conditions in the building such as tobacco use, pets, and inadequate ventilation add to the potential for poor indoor air quality.

### **Indoor Air Quality and Carpets**

Carpet has been used for years by millions of people. Carpet is made primarily of the same materials found in clothing and other everyday fabrics; i.e., polyester, nylon, olefin fibers, latex (synthetic rubber) and polypropylene (olefin) fabric backing.

Scientific studies have demonstrated that new carpet is one of the lowest emitters of VOCs in the indoor environment and those emissions dissipate very quickly. The low-level VOC emissions from new carpet normally dissipate within 48 to 72 hours after installation when accompanied by good ventilation.

The carpet industry has always regarded IAQ safety as important and has worked closely with the Environmental Protection Agency (EPA), the Consumer Product Safety Commission (CPSC), academic institutions, and independent laboratories to evaluate carpet's role in the indoor environment. Throughout those evaluations, scientific evidence has indicated no specific links of adverse human health effects to the low, fast dissipation of chemical emissions from carpet.

A review of the scientific data completed in 1994 by ENVIRON, an independent research company, assessing the risk of emissions from carpet, states that “no cancer or toxicity health risks were identified that would be considered of public health concern”. This review also stated, “There are no human safety concerns with components of, or emissions from, carpet”. Following his in-depth study, Dr. Alan Hedge, professor of Environmental Analysis at Cornell University, reported that “concentrations of VOCs in carpet emissions are substantially below any known thresholds for toxicity effects – orders of magnitude lower than those known to produce effects, -- a hundred, a thousand, ten thousand times lower than any known effects. New carpet emissions should not create health problems for people – any people”.

## **CRI's Indoor Air Quality Carpet Testing Program**

The carpet industry members are committed to improving the quality of indoor air and reducing the VOCs from its products. To help consumers identify new carpets which are truly low-VOC emitters, CRI in 1992 established a testing and labeling program. The program's green and white logo displayed on carpet samples informs the consumer that the specific manufacturer's product type has been tested by an independent laboratory and has met the program criteria for very low emissions. The manufacturer's carpet sample is tested for chemical emissions using the most up-to-date dynamic environmental chamber technology. The test methodology was developed by consensus during an official dialogue with the EPA and has been adopted by the American Society for Testing and Materials (ASTM) as D 5116 – Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.

Since the inception of the program in 1992, the carpet industry has reduced the overall level of emissions by selective raw material usage and other process modifications. The maximum allowable emissions for acceptance are measured in  $\text{mg}/\text{m}^2\cdot\text{hr}$  and are as follows:

Total Volatile Organic Compounds	0.50
4-PC (4-Phenylcyclohexene)	0.05
Formaldehyde	0.05
Styrene	0.40

The carpet manufacturer is encouraged to attach the CRI IAQ Carpet Testing Program label to approved products. The product type number on the label identifies the manufacturer of the carpet and tells the buyer that the manufacturer has produced a product that meets the industry standard for low emissions. Products are regularly monitored for continued compliance with the test program requirements.

## **CRI Indoor Air Quality Adhesive Testing Program**

In 1996 CRI established a program to test floor covering installation adhesives. The authorized CRI IAQ Adhesive Testing Program label helps the carpet manufacturer, installer, and end-user identify and select low emission adhesives. Those adhesive products meeting the program's emissions criteria are allowed to display the green and white label. Various categories of adhesives, such as multi-purpose floor adhesives, cove base adhesives, seam adhesives, cushion adhesives for tackless installations and contact adhesives are part of the program. Products are regularly monitored for continued compliance with the program. Consumers seeking a low-emitting adhesive can confidently select those bearing the label.

Criteria for acceptance in the program are based on an emission factor measured in  $\text{mg}/\text{m}^2\cdot\text{hr}$  that takes into account that adhesives are a wet substrate when applied during the installation process. The maximum values acceptable are as follows:

Total Volatile Organic Compounds	10.00 $\text{mg}/\text{m}^2\cdot\text{hr}$
2-Ethyl-1-Hexanol	3.00 $\text{mg}/\text{m}^2\cdot\text{hr}$
Formaldehyde	0.05 $\text{mg}/\text{m}^2\cdot\text{hr}$

### **Carpet Cushion Program**

Carpet cushion, or carpet pad, is now part of the CRI family of programs designed to aid consumers in selecting low VOC products. Like carpet and floorcovering adhesives, those cushion products bearing the CRI IAQ Cushion Testing Program green label indicates the product meets strict standards for emissions. The maximum criteria in  $\text{mg}/\text{m}^2\cdot\text{hr}$  established for the cushion program are as follows:

Total Volatile Organic Compounds	1.00
4-Phenylcyclohexene (4-PC)	0.05
Formaldehyde	0.05
Butylated Hydroxytoluene (BHT)	0.30

### **Carpet's Holding Characteristics**

Since gravity causes airborne particles to settle on the floor, carpet provides an extra benefit by holding dust and dirt until it can be removed by routine vacuuming with a well-functioning vacuum cleaner. The holding characteristics of carpet, as opposed to a smooth surface floor covering, benefit residents of the home or office by keeping particles of dust from being continually blown around and made airborne by foot traffic and air circulation. Only if particles are airborne might they affect the allergic person.

For good air quality while vacuuming, the cleaner unit should have good suction, adjustable brushes, and enclosed vacuum bag (not just a fabric cover). Additionally, a disposable high-efficiency filtration bag should be used. To minimize the dust becoming airborne during vacuuming, it is important that high traffic areas be vacuumed often. To increase efficiency, change the vacuum cleaner filtration bag often. These guidelines for a vacuum cleaner apply whether the floor is a smooth surface floorcovering or carpet.

### **Dust Mites**

Dust mite allergen is commonly found in homes. The highest concentration of dust mite allergen can be found in mattresses (60%), followed by furnishings, such as upholstered furniture (20%), and then on the floor (20%). The key to preventing allergic reactions is containment and keeping allergens from becoming airborne and into the breathing zone. Only those allergens that are in the breathing zone affect the nasal passages. As noted in a "Design Review on Carpets" published in *Architectural Review* "... the fact that carpet may collect and hold more lint and dust than a smooth surface may be

considered an advantage, as it is better to have dirt and bacteria-carrying particles held down in the carpet until it is vacuumed than to have it stirred up and airborne by continual shuffling of shoes – as is the case with smooth surfaces”. Outside pollutants are tracked onto all types of floor covering, but carpet is the only floor covering with an effective method of “extraction” cleaning.

Dust mites thrive in warm, humid conditions and feed upon dead skin flakes from humans. Most people with allergy to dust mites (only 10 to 15% of the population) are allergic to the airborne, respirable, dust mite feces and not the mite itself; therefore, regular, effective, cleaning is necessary. To minimize mite population and the generation of dust mite feces in the home, clean interior furnishings regularly and effectively; monitor and maintain humidity below 55%.

### **Myths about Carpet**

**MYTH:** Animal experiments prove new carpet emissions are related to human health problems.

**FACT:** This myth may have been created by flawed test methods and experiments. Tests conducted by government laboratories have not duplicated any animal test results that suggest new carpet emissions are relative to human health problems. Replication of a test method and duplication of test results are the means of determining credibility in scientific testing.

Victor Kimm of the EPA announced at a hearing before the subcommittee on Environment, Energy, and Natural Resources of the U.S. House of Representatives, on June 11, 1993, that in EPA’s own extensive testing “we did not independently replicate the severe toxicity described by Anderson Laboratories. In fact, we did not produce any convincing signs of even mild toxicity attributable to carpet”.

**MYTH:** Formaldehyde is used in manufacturing of carpet and rugs.

**FACT:** Formaldehyde is common in the air and is a part of many products, even our clothes. Referral to formaldehyde as a component of carpet is incorrect because it is not used in modern carpet manufacturing. The CRI testing programs assure that only extremely low levels may be present in carpets, adhesives, or cushions.

### **Installation Guidelines**

Following are recommendations for common sense procedures during installation of new carpet:

- Install a carpet with CRI’s Indoor air Quality Carpet Testing Program green label, indicating that the product type has been tested and meets the low TVOC emissions criteria. If a cushion is used, again, look for the CRI IAQ green label.

- When the carpet is to be glued down (not usually in residential applications), ask the installer to use a low VOC adhesive displaying the CRI's Indoor Air Quality Adhesive Testing Program green label.
- Vacuum the old carpet prior to removal and the floor after the old carpet and cushion has been removed to minimize airborne dust and other particulates.
- Ventilate with fresh air (open windows, operate a fan, and/or run the fan of the heat/air system continuously) during the removal of the old carpet and the installation of the new carpet, and up to 72 hours after installation.
- Use a professional installer and insist that the minimum industry-accepted installation standards of CRI-104 and/or 105 are followed.
- Those who consider themselves unusually sensitive or prone to allergic reactions may wish to leave the premises while the old carpet is being removed and the new carpet installed.

In general, follow the same common sense ventilation precautions used when painting, wallpapering, or renovating any area of the home.

### **The Importance of Routine Maintenance**

The most important element in maintaining good air quality in a home is to remove dust and soil often from all surfaces and to maintain a well-functioning heat and air system with effective, clean filters. Regular carpet maintenance is essential to preserve the carpet's initial appearance and for maintaining good indoor air quality. Regular, proper vacuum cleaning with an effective, well-functioning vacuum cleaner that has strong air flow, adjustable brushes, and an enclosed high-efficiency filtration bag removes and traps indoor contaminants. Quick removal of spots and spills is important to avoid stains and fungal growth. Have carpet extraction cleaned, either professionally or with home methods, every 12 to 18 months. Clean more often in high-traffic, commercial areas. Ventilation during the cleaning process is recommended. If a wet method of cleaning is used, do not over-wet and be sure to dry quickly.

For your assistance on all factors concerning carpet, CRI provides a consumer information toll-free number, 800 882 8846, which is serviced Monday through Friday 8:00am-6:00pm by knowledgeable carpet specialists. Brochures about selection, maintenance, and indoor air quality are available free of charge. Technical materials are available at a nominal charge. Additional information about the CRI Indoor Air Quality programs and other CRI activities is available on our website, [www.carpet-rug.org](http://www.carpet-rug.org).