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# The Attributes of Carpet for the Education Market

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## EXECUTIVE SUMMARY

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- Diverse studies from reputable institutions including leading universities and the federal government clearly find that well-maintained carpet is a far superior flooring choice for learning environments than vinyl composite tile (VCT) or other hard surfaces.
- A nationwide study of more than one thousand public school teachers found that teachers believe carpet helps provide the safety, comfort and acoustics that create the “ideal learning environment” for students. The majority of teachers preferred carpet, believed carpet contributed to student attendance, increased individual safety, and had a strong impact on students’ learning and achievement. (*National Survey of Public School Teachers*, Beth Schapiro & Associates, 3/01)
- According to the U.S. Consumer Product Safety Commission, flooring materials directly contribute to slip/fall accidents. For instance, in wet conditions, the risk of a slip on hard surfaces is two times greater than on carpet. Plus, hard surfaces are less forgiving and more likely to result in greater injury. Yet there has been a trending away from carpet installation in schools, especially in hallways and stairs where more slip/fall accidents occur.
- Schools need to take into account the true life-cycle cost when making a flooring decision. Initial installation is only part of the equation; maintenance costs including labor, materials and equipment quickly add up. As a result, carpet is a more economical choice for cash-strapped school systems. In addition, Lees carpet with its lifetime warranty and Duracolor® stain resistance system offers even greater savings.
- Today’s energy-efficient sealed buildings have made indoor air quality (IAQ) a major concern.

VCT and other hard-surface flooring installation and maintenance cause large spikes in VOC (volatile organic compound) emissions. On the other hand, an installation of Lees carpet, a CRI Green Label certified product, emits minimal VOCs. Routine maintenance of carpet, and particularly Lees carpet with Durasafe® cleaning products, results in miniscule off-gassing, seven times lower than industry standards. However, routine maintenance of VCT and other hard-surface flooring causes enormous spikes in VOC emissions. Even 72 hours after cleaning VCT, its VOC level is 211 percent above CRI Green Label certification limit. Lees six foot is 892 percent below the limit.

- Due to public and official concerns about carpet, allergy and asthma, Sweden reduced its carpet use by 38 percent since the 1970s. Yet, a study by the Swedish Institute of Fibre and Polymer found that despite the dramatic decline in carpet use, there had been a marked increase in allergic reactions among the general population.
  - In April 2002, Lees commissioned independent testing to study the effects on air quality of foot traffic emissions over carpet and over vinyl. Results of the testing show airborne particulate levels were much higher over hard-surface flooring than over carpeted surfaces.
  - It’s a natural fact, wherever moisture and carbon are present, mold will grow. When conditions are mismanaged indoors, mold may be found on any and all surfaces—porous or non-porous, hard or soft. Thus carpet is not the culprit in the battle to stop indoor mold. The most important step schools can take to prevent indoor mold growth is to follow standard practices for maintaining clean water-proofed buildings. When mold is discovered in schools, the problem can be remediated with thorough cleaning of all affected surfaces and proper temperature and humidity maintenance.
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# CURRENT FINDINGS ON THE BENEFITS OF CARPET VERSUS HARD-SURFACE FLOORING IN SCHOOLS

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## INTRODUCTION

This paper is designed to let the facts about carpet in schools speak for themselves—that not only is carpet a good choice, carpet is the best choice for learning environments. A wide variety of reliable and quantifiable independent research from leading universities, the U.S. federal government, and reputable private research points to the many distinct advantages of installing carpet instead of/or over VCT (vinyl composite tile) and other hard-surface flooring.

There is an overwhelming body of evidence in support of carpet instead of hard-surface in schools. Study findings on using carpeting in schools versus hard-surface flooring reveal the following:

- Carpet creates an improved learning environment by enhancing student comfort and concentration levels, and has even been shown to result in raised test scores.
- Carpet makes more financial sense for cash-strapped school systems than does hard-surface flooring.
- Carpet improves safety by greatly reducing the incidence and the severity of slip/fall accidents.
- Carpet leads to improved indoor air quality (IAQ).
- Carpet maintenance and cleaning procedures produce far fewer VOCs (volatile organic compounds) than do maintenance procedures for VCT.
- Carpet is proven to reduce indoor allergen levels by holding down potential airborne particulates, including mold spores, and keeping them from entering the breathing zone.

With U.S. government figures estimating, that in the next three to five years, approximately 50 percent of all schools will undergo significant restoration and renovation at a cost of about \$112 billion nationally, it is vitally important to draw attention to the truth about the profound benefits of carpet in schools.

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## CARPET CREATES 'THE IDEAL LEARNING ENVIRONMENT'

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### In A Nationwide Study, Teachers Prefer Carpet 3 to 1

In a study targeting public school teachers, carpet is the hands-down teacher favorite for a variety of reasons. The 2001 national study by the Atlanta-based research firm Beth Schapiro & Associates surveyed 1,050 public school teachers from across the country. Findings revealed that only 18 percent of respondents give their classrooms an "A" for design, yet 99 percent believe that school design is important in creating a good learning environment. Of the top four design features that teachers believe have a strong impact on student achievement, three—safety, comfort and acoustics—can be addressed by incorporating carpet in classroom décor.

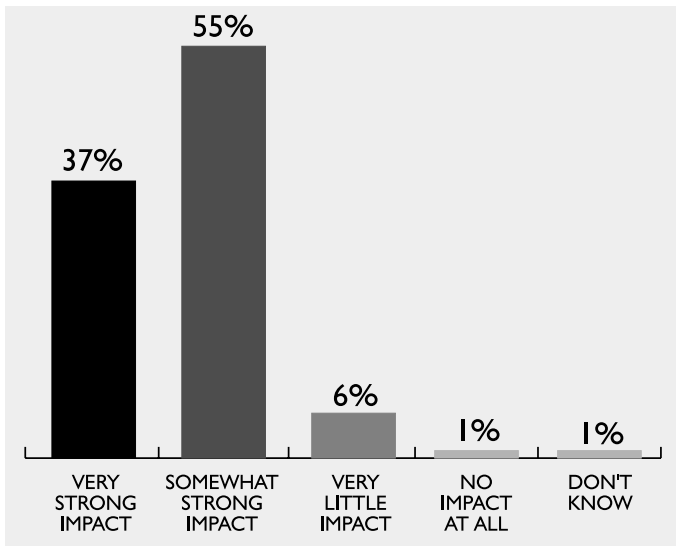
TOP FIVE CLASSROOM DESIGN ELEMENTS	
1.	SAFETY
2.	COMFORT
3.	LIGHTING
4.	ACOUSTICS
5.	CLIMATE CONTROL

Source: National study conducted by Beth Schapiro & Associates for the Carpet and Rug Institute and the International Interior Design Association Foundation

In addition 89 percent of teachers claim that school design is important to teacher retention, and 79 percent believe that school design influences student attendance. A full 92 percent believe that comfortable classroom design has a strong impact on students' learning and achievement.

According to Gaye Elliott, design associate at the nation's largest school design firm, Fanning/Howey Associates, "Carpet can create a quiet environment with good acoustics, which helps students concentrate." ("Open Up Schools... Creature Comforts Can Aid Learning," *USA Today* 3/22/01)

### IMPACT OF CLASSROOM DESIGN



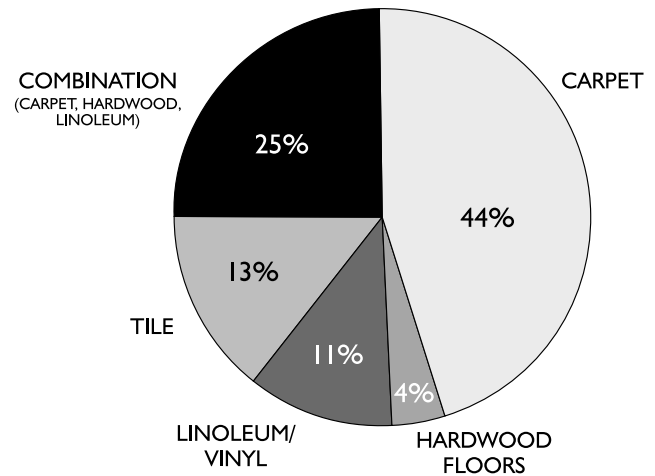
Source: National study conducted by Beth Schapiro & Associates for the Carpet and Rug Institute and the International Interior Design Association Foundation

### HOMEY CLASSROOMS = SMART STUDENTS

*Percentage of teachers who say classroom design influences students' learning.*

A majority of teachers surveyed have carpet in their classroom, and of that group, more than two-thirds prefer carpet. The majority of respondents also cite increased safety from falls, increased comfort underfoot, and better noise absorption. Almost three-quarters of teachers surveyed (69%) said they prefer carpet alone, or a combination of carpet and hard-surface flooring in schools.

### TEACHERS' FLOORING PREFERENCE



Source: National study conducted by Beth Schapiro & Associates for the Carpet and Rug Institute and the International Interior Design Association Foundation

### CARPET MAKES THE GRADE

*When it comes to good classroom design, carpet is the top floor covering preferred by teachers.*

### Carpet Improves Safety

Safety issues are a primary consideration in school design, yet the installation of hard-surface flooring instead of carpet is in direct opposition to safe design. The fact is, more than 1 million children and adults each year are involved in slip/fall accidents in North America. (*Canadian Facility Management & Design*, 4/02) And, as acknowledged by the U.S. Consumer Product Safety Commission, flooring materials directly contribute to slip/fall accidents.

For instance, under wet conditions, the risk of a slip on carpet is less than half of that on hard-surface floors. Plus, falls on hard surfaces are less forgiving and more likely to result in greater injury than a fall on carpet. Factor in the inevitable commotion and bustle on rainy school mornings and slick, hard-surface hallways are accidents waiting to happen. (*U.S. Center for Disease Control*)

# CARPET IS THE ECONOMICAL CHOICE

In a time of budget cutbacks and belt-tightening, schools must be extremely dollar-wise when calculating design budgets. Yet the installation of hard-surface flooring and its ensuing high-cost, labor-intensive maintenance, takes a heavy bite out of any school's budget. Planners should look beyond initial cost when choosing flooring for schools. In the short to medium term, "cheap" floors, such as vinyl, quickly become expensive floors. According to *Canadian Facility Management & Design* (4/02): "Maintenance is the single most costly element in most floor coverings. Thus, the most important economic consideration is the true life-cycle cost of a floor covering."

For example, an installation of hard-surface flooring compared with Lees carpet will result in additional costs of 18% in heavy traffic areas.

## FLOOR COVERING INSTALLATION COST COMPARISON IN SCHOOL FACILITIES

*It is advisable to use a well-performing carpet in all areas of schools.*

Examples: Per Square Foot

LIGHT TO MEDIUM TRAFFIC AREAS	CARPET	VCT
Materials plus installation at 0 year	\$2.33	\$0.89
Carpet removal cost at the 16-year and 32-year periods	\$0.66	
VCT removal cost at the 20-year and 40-year periods		\$1.50
Carpet reinstalled (materials plus installation at 16-year and 32-year periods)	\$4.66	
VCT reinstalled (materials plus installation at 20-year and 40-year periods)		\$1.78
Cost of floor covering system for 40 years	\$7.65	\$4.17
Cost of cleaning and maintenance for 40 years, including labor, cleaning supplies, equipment, and equipment maintenance	\$12.71	\$19.62
<b>TOTAL LIFE-CYCLE COST FOR 40 YEARS</b>	<b>\$20.36</b>	<b>\$23.79</b>

Examples: Per Square Foot

HEAVY TRAFFIC AREAS	CARPET	VCT
Materials plus installation at 0 year	\$2.33	\$0.89
Carpet removal cost at the 16-year and 32-year periods	\$0.66	
VCT removal cost at the 20-year and 40-year periods		\$1.50
Carpet reinstalled (materials plus installation at 16-year and 32-year periods)	\$4.66	
VCT reinstalled (materials plus installation at 20-year and 40-year periods)		\$1.78
Cost of floor covering system for 40 years	\$7.65	\$4.17
Cost of cleaning and maintenance for 40 years, including labor, cleaning supplies, equipment, and equipment maintenance	\$23.18	\$32.25
<b>TOTAL LIFE-CYCLE COST FOR 40 YEARS</b>	<b>\$30.83</b>	<b>\$36.42</b>

A 1990 study by the Building Office Managers Association (BOMA) compared cleaning rates of carpet versus hard-surface floors. The study states that hard-surface floors required two and a half times more cleaning time than carpet on an annual basis. Cleaning supplies were about *seven times* more expensive for vinyl floors than for carpeted floors.

Actual maintenance costs for an installation of VCT compared with Lees carpet will result in additional costs of between 39-54% depending on foot traffic density.

## FLOOR COVERING MAINTENANCE COST COMPARISON IN SCHOOL FACILITIES

LIGHT TO MEDIUM TRAFFIC AREAS				
CARPET	Frequency Per School Year	Minutes Per 1000 sq. ft.	School Year Total Minutes per 1000 sq. ft.	Cost per School Year \$ per sq. ft.
Vacuuming	65	13	845	\$0.120
Spot Removal	180	8	1440	\$0.204
Deep Cleaning	2	75	150	\$0.022
Chemical Costs				\$0.007
TOTAL			2435	\$0.353
VCT	Frequency Per School Year	Minutes Per 1000 sq. ft.	School Year Total Minutes per 1000 sq. ft.	Cost per School Year \$ per sq. ft.
Dust Mopping	65	9	585	\$0.083
Spot Removal	180	6	1080	\$0.153
Wet Mopping	72	24	1728	\$0.245
Spray Burnishing	9	15	135	\$0.021
Scrub Cleaning	2	6	12	\$0.002
Strip/Finish	1	76	76	\$0.010
Chemical Costs				\$0.031
TOTAL			3616	\$0.545

HEAVY TRAFFIC AREAS				
CARPET	Frequency Per School Year	Minutes Per 1000 sq. ft.	School Year Total Minutes per 1000 sq. ft.	Cost per School Year \$ per sq. ft.
Vacuuming	180	13	2340	\$0.332
Spot Removal	245	8	1960	\$0.278
Deep Cleaning	2	90	180	\$0.026
Chemical Costs				\$0.008
TOTAL			4480	\$0.644
VCT	Frequency Per School Year	Minutes Per 1000 sq. ft.	School Year Total Minutes per 1000 sq. ft.	Cost per School Year \$ per sq. ft.
Dust Mopping	180	9	1620	\$0.230
Spot Removal	245	6	1470	\$0.208
Wet Mopping	108	24	2592	\$0.367
Spray Burnishing	18	15	270	\$0.038
Scrub Cleaning	2	6	12	\$0.002
Strip/Finish	1	76	76	\$0.010
Chemical Costs				\$0.041
TOTAL			6040	\$0.896

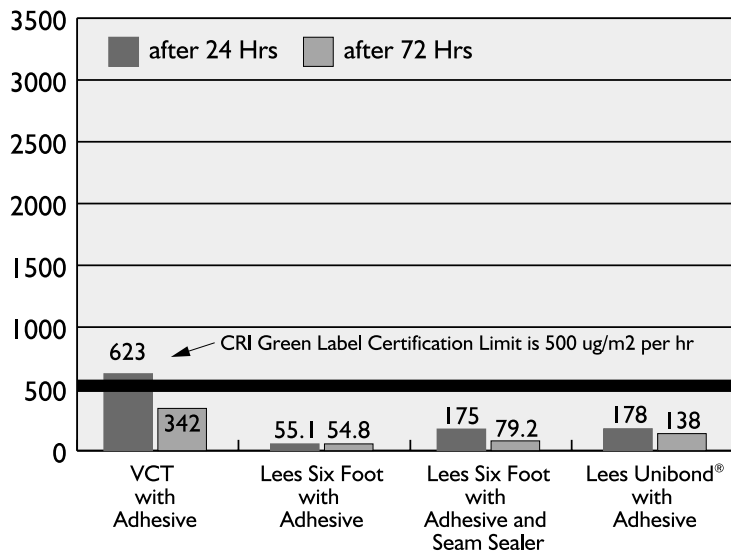
# ACHIEVING THE BEST INDOOR AIR QUALITY (IAQ)

## Installation

In the past 25 years, energy efficiency has been a key element of building design resulting in virtually airtight construction. The creation of the sealed building, however, has led to a new problem: how to maintain satisfactory indoor air quality (IAQ)? Volatile organic compounds (VOCs) are the most significant substances contributing to poor IAQ. This is the off-gassing associated with furniture, finishes, building materials and the maintenance of them.

Lees commissioned Air Quality Sciences to conduct independent tests of its entire product line to determine VOC emissions following both installation and cleaning. Test results comparing VOCs emitted at installation of Lees carpets, and VCT, demonstrate that Lees outperforms VCT in reducing off-gassing at installation. At 24 hours after installation, the VCT emits VOCs at 623 ug/m<sup>2</sup> per hour, in excess of the CRI Green Label Certification limit of 500 ug/m<sup>2</sup> per hour.

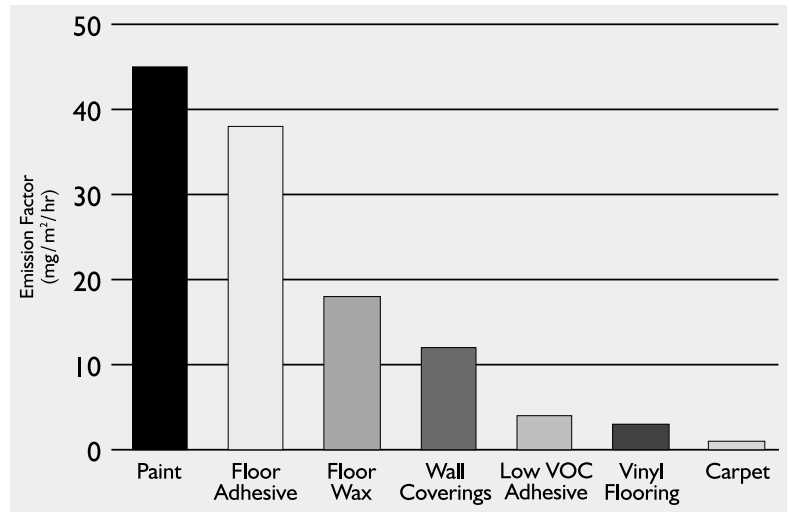
VOCs OF PRODUCT ASSEMBLED WITH ADHESIVE BEFORE CLEANING



## Maintenance

The VOCs emitted after routine carpet cleaning are minimal, especially in comparison with routine cleaning of VCT and other hard-surface flooring. In general, carpet requires few chemicals for cleaning and upkeep. Carpet maintenance, and maintenance of

VOLATILE ORGANIC COMPOUNDS (VOCs) EMISSION FACTORS OF SELECTED INTERIOR CONSTRUCTION MATERIALS

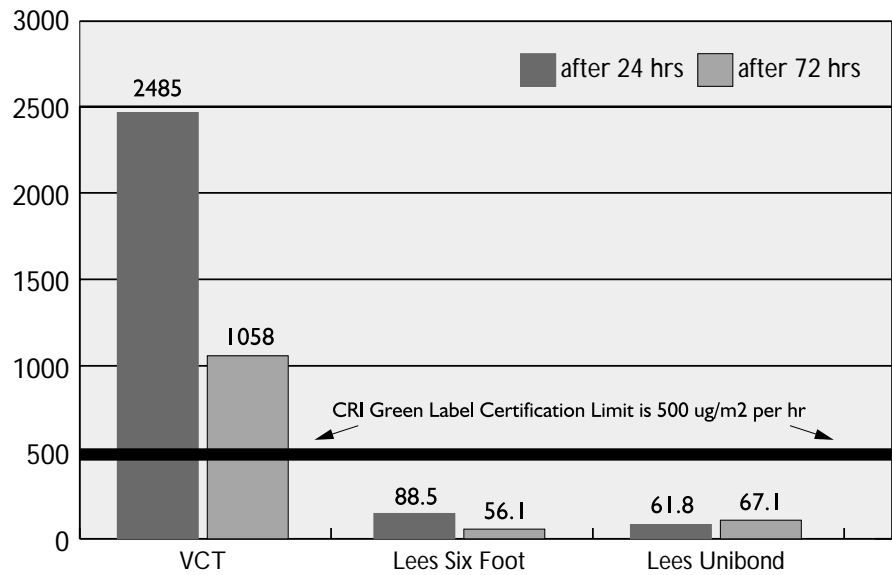


Lees carpets in particular, have been proven to have minimal impact on IAQ. In independent tests of Lees carpets, the combination of strong lifelong stain resistance (Duracolor®) and the use of Durasafe® non-toxic, biodegradable cleaning products mean that few VOCs are emitted into classrooms and hallways during and after carpet cleaning.

On the other hand, the chemicals used to clean, strip and wax hard-surface flooring can create huge, "VOC spikes which may be circulated throughout the building and which may partially absorb onto other materials and surfaces to be slowly released into the indoor air at a later time." ("When Clean Is Not Green," *Canadian Facility Management & Design*, 4/02)

“The fact is that the science of assessment of the health effects from gaseous mixtures is in its infancy. Animal studies and occupational studies do not accurately represent the full range of vulnerability in the human population.” (Ibid.) With this information at hand, it is difficult to understand why every school is not carpeted throughout. Even after 72 hours the VOCs off-gassing from a VCT flooring installation are two times greater than the CRI Green Label threshold for a 24 hour period.

VOC's OF PRODUCT AFTER CLEANING

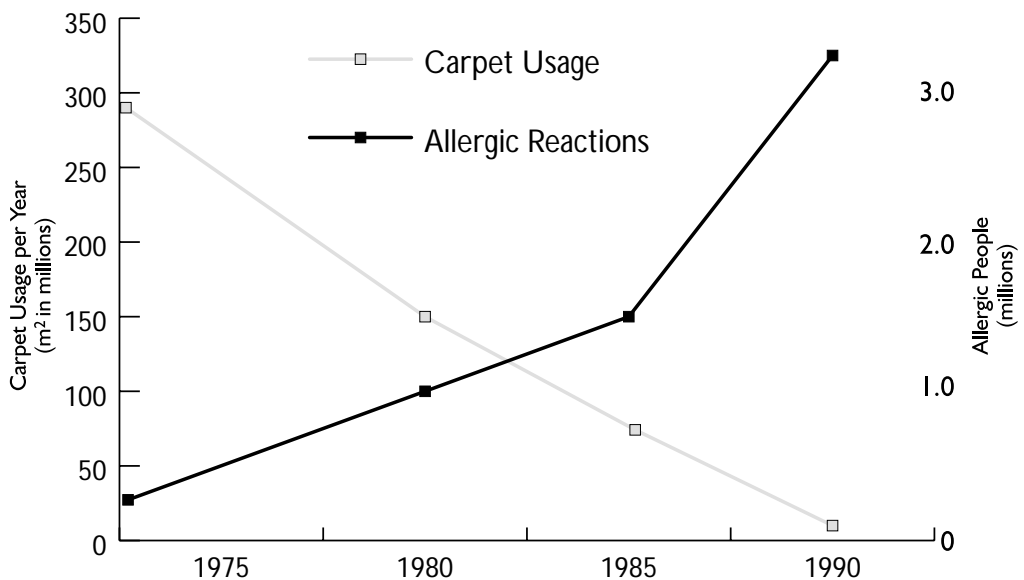


## THE FACTS ABOUT CARPET AND ALLERGENS

### The New Perspective from Sweden

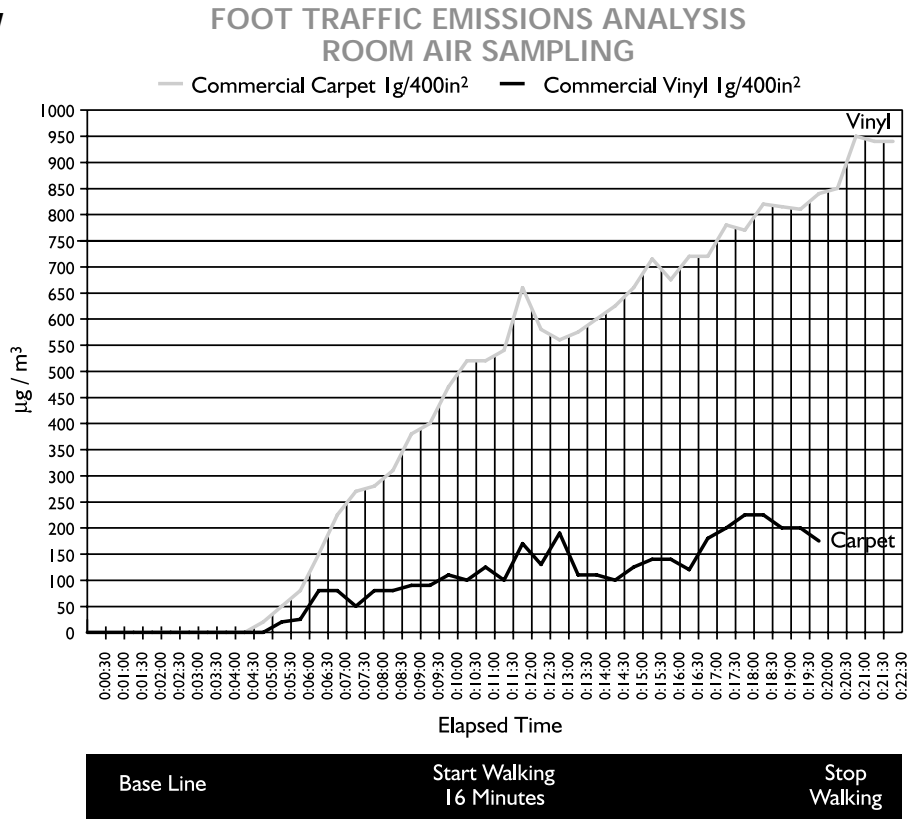
Current research on respirable particulates in carpeted rooms is changing basic assumptions about the link between carpet and allergens. In the '70s, a variety of reports from Sweden claimed that carpet was the source of harmful contaminants resulting in allergic reactions. As a result, Swedish consumers and officials severely reduced their use of carpet. By 1992, carpet's share of the floor covering market had dropped to 2 percent. In the early '90s, two professors at the Swedish Institute of Fibre and Polymer Research published their findings that since 1975, occurrences of allergic reactions in the general population had increased. Their hypothesis, that the removal and decline of carpet usage did not mean improved conditions for allergic patients.

CARPET USAGE & ALLERGIC REACTIONS IN SWEDEN



## New Independent Test Study Supports Theory That Carpet Acts as a Filter

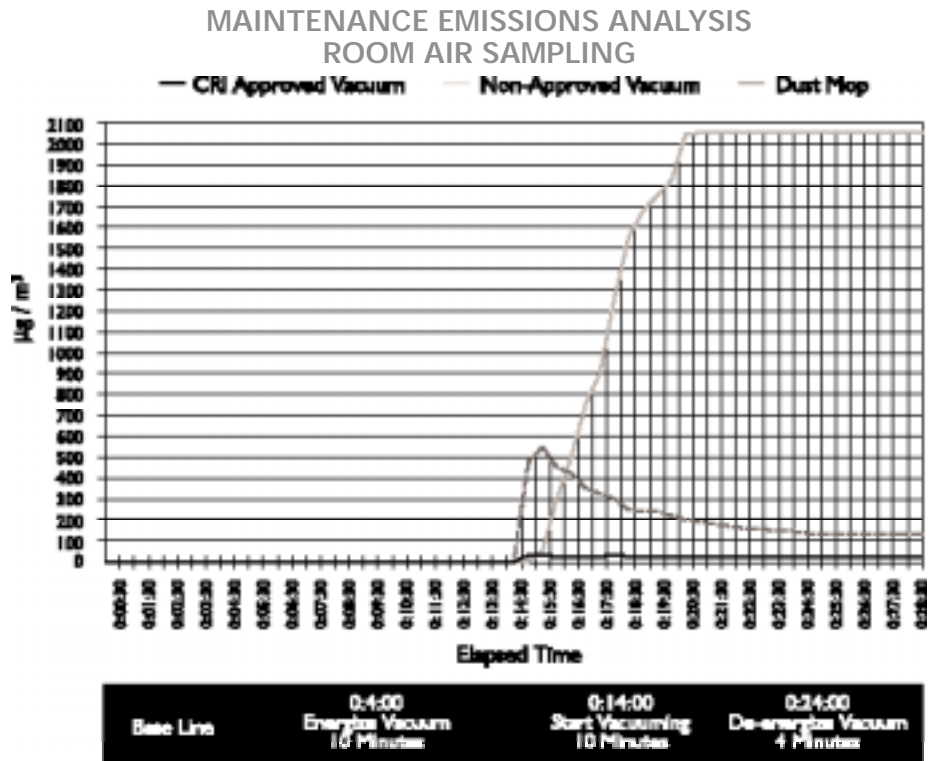
In April 2002, Lees commissioned Professional Testing Laboratory Inc., to study the effects on air quality of foot traffic emissions—on both carpet and vinyl. Particulate monitors were positioned five feet above floor height to continuously measure particle counts during and following 16 minutes of foot traffic on both carpet and vinyl floors. The following graph illustrates the enormous difference between emissions from the two surfaces and provides powerful support for the theory that carpet acts as a filter. (Graph 1)



(Graph 1)

In a second study conducted for Lees, cleaning processes were monitored to study their effects on indoor air quality. The hard-surface flooring was dust mopped while the Lees' carpet was vacuumed in two separate studies using a CRI approved and a non-CRI approved vacuum.

The results speak for themselves. Cleaning hard-surface flooring with a dust mop caused particulate matter levels in the air to spike more than 58 times higher than did certified vacuums. (Graph 2)



(Graph 2)

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## **MOLD: IF THERE'S MOISTURE, IT WILL GROW**

In recent years concern has grown about mold and indoor environments, and often carpet is the scapegoat. Yet in the mold wars, carpet is not the culprit, it's indoor moisture. The fact is, with persistent moisture (24 hours or greater) and a bit of carbon (food source), mold will grow on absolutely any surface—porous or non-porous, hard or soft. Given the “proper” conditions, mold grows on textiles, walls, countertops, hard-surface floors, carpet, sheet metal, books, furniture, bric-a-brac, etc. Indoors, moist conditions yield mold growth, period. According to the EPA:

When excessive moisture accumulates in buildings or on building materials, mold growth will often occur, particularly if the moisture problem remains undiscovered or unaddressed. It is impossible to eliminate all mold and mold spores in the indoor environment. However, mold growth can be controlled indoors by controlling moisture indoors.

(<http://www.epa.gov/iaq/molds/intro.html>  
“Moisture Control is the Key to Mold Control”)

While mold is ever present and an essential part of nature's decomposition process, indoors, excess mold growth can be hazardous to human health as a contact irritant or an airborne allergen. Fortunately, schools can take basic steps to remediate and prevent mold growth by keeping indoor environments clean and relatively dry.

Carpet acts as a filter: It prevents particles such as mold spores from becoming airborne and entering the breathing zone. Carpet, like a filter found at home, must be cleaned to continually provide improved air benefits. The key to improved air quality and mold prevention is maintenance. Lees

provides an in-depth maintenance brochure detailing the proper ways to maintain our carpet. In general, there are two simple ways to maintain a Lees' carpet.

1. Vacuuming
2. Hot water extraction

Both methods are a means of removing dirt and debris in an efficient and safe manner.

For mold to grow, two ingredients must be present: 1) persistent moisture (24 hours or greater), and 2) a food source. By properly vacuuming, you remove potential mold food sources. A good hot water extraction unit will remove the proper amount of moisture to allow the carpet to dry completely within 6 to 7 hours, well below the 24 hours needed to start mold growth.

In the event of a catastrophe, such as a broken water pipe, hot water extraction should be started immediately and the floor covering should be thoroughly dried. These steps will prevent mold growth from occurring.

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## Summary

Carpet is an excellent choice for school settings. In fact it ought to be the preferred choice for a number of important reasons:

- Carpet gives schools the comfortable, homey feel that leads to better concentration, better performance and the potential for higher test scores.
- The life-cycle costs of installing and maintaining carpet are more economical than those of hard-surface flooring.
- An installation of Lees carpet, in particular, will present even greater life-cycle savings, and will contribute to better IAQ—when compared with other carpet.
- The wholesale tear-out of carpet in education settings based on health concerns is completely unwarranted and based on “bad science.”

- Properly maintained carpet improves school safety and school IAQ. Carpet does not increase particulate density in the air—and thus aggravate allergies. In fact, unlike hard floors, carpet actually holds allergens at bay by preventing their release into the air in heavily trafficked hallways and cafeterias.

For more in-depth information on this subject, including copies of the original research studies and articles on which this work is based, visit [www.leescarpets.com](http://www.leescarpets.com).

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US Headquarters Toll-Free: 800 523-5647 • European Headquarters: UK 44 1480-471471, Toll-Free: 44 0800-515673  
International Sales: 336 379-2000 • 3330 West Friendly Avenue, Greensboro, NC 27410 • [www.leescarpets.com](http://www.leescarpets.com)