

Sound Absorption in the Workplace

Acoustic Benefits of Polyurethane Carpet Cushion in Commercial Installations



Alliance for Flexible Polyurethane Foam

The results are in.

Recent studies conducted by an independent testing laboratory show that when it comes to acoustics, commercial cushion makes carpet even better. To specifiers and end-users, it will come as no surprise that properly specified carpet cushion reduces noise when used in a commercial installation. What will be of interest is the degree of improvement that has been quantified in scientific studies.

The combination of a commercial carpet and commercial bonded polyurethane cushion was found to have greater than double the noise absorption capability when compared to the same carpet without cushion. More absorbed sound means a quieter workplace and fewer distractions to the employees — paving the way for productivity gains and greater satisfaction in the workforce.

Comprehensive noise management has become an integral part of interior design, driven by the need for improved productivity. The results of this study continue to build upon a sound, technical foundation supporting the choice of commercial cushion for your next carpet installation.



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Noise in the Workplace

Management of noise in the workplace is receiving attention due to its potential impact on productivity and the associated value to an organization. Unlike individual productivity issues such as absenteeism, negative workplace conditions can affect large numbers of employees on a regular basis.

Cumulative productivity problems can present a staggering penalty to the health of a company, a situation made more critical in today's competitive environment. Likewise, the cumulative effect of productivity improvements can present a compelling justification for investment. The key is understanding the impact across the workforce over the life cycle of the improvement.

One recent study found that productivity improvements of only 0.33% could provide justification for significant upgrades in certain systems that impact the working environment¹. That such a seemingly small improvement in productivity could provide an attractive payback is an indicator of the potential value of this investment.

Sound Basics

To effectively deal with noise management, it is helpful to have a very basic understanding of sound and how it moves through a building. Much like the expanding ripples that result from tossing a pebble into a pond, sound begins from a point of disturbance. From that point, a series of pressure waves expand out in all directions. When these pressure fluctuations reach our ears, they are processed by the brain and interpreted as sound. The objective in noise management is the control of these pressure waves, typically by the use of materials that will absorb the waves before they arrive in a location occupied by people.

The sources of unwanted noise in the workplace are numerous and varied. Foot traffic, phone or local conversations, machinery, and workstation noises are but a few examples. To the employee, each source combines with others creating unwanted noise distractions and a counter-productive work environment.

Acoustics Research

A comprehensive acoustics research project involving multiple carpets, cushions, and installation techniques, was co-sponsored by the Carpet Cushion Council and the Alliance for Flexible Polyurethane Foam. Testing was conducted by Intertek Testing

Services (ITS), an independent laboratory with specific expertise and capability in acoustic evaluations under controlled conditions. The accompanying chart (below) shows the outstanding contribution of commercial bonded polyurethane carpet cushion in absorbing noise. The results are reported as the Noise Reduction Coefficient (NRC). R. Kring Herbert, FASA, Ostergaard Acoustical Associates, lends his insight on this measurement, "The Noise Reduction Coefficient is a

standard metric describing the overall sound-absorbing characteristic of a material." A material with a NRC of "0" would absorb no noise, whereas one with a NRC of "1.0" would theoretically absorb all of the sound that hits its surface.

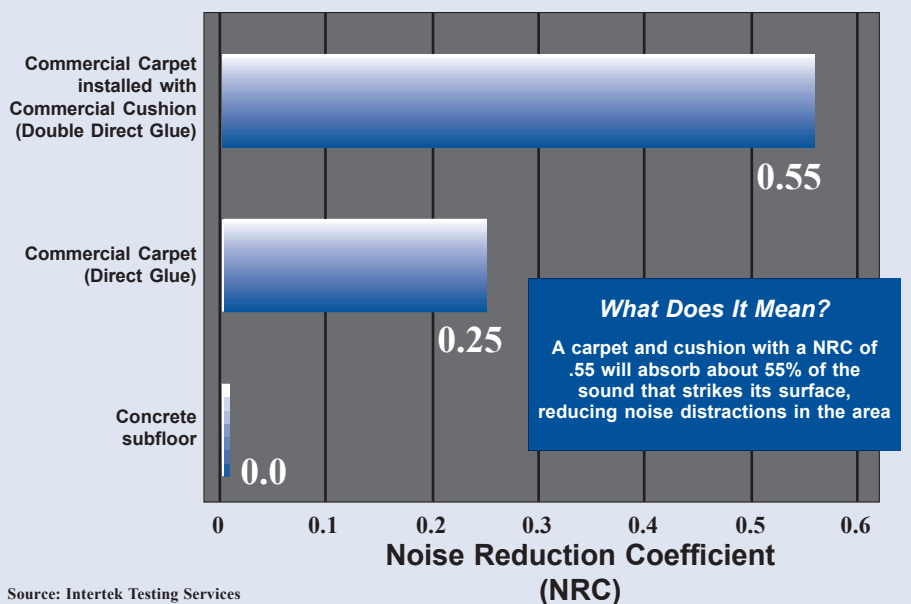
Using a commercial cut pile carpet having a face weight of 36 ounces per square yard (osp), it was found that the carpet alone (installation method: direct glue to concrete substrate) absorbed approximately 25% of the sound directed at it, hence a NRC of 0.25. When a commercial bonded polyurethane carpet cushion was installed with the same carpet (installation method: double direct glue, also known as "double stick"), the NRC rose to 0.55 indicating that 55% of the sound directed at the carpet/cushion composite was absorbed – over twice that of the carpet alone.

Impact Isolation Class (IIC) testing was also conducted to understand the ability of carpet and cushion to lessen the sounds transferred from one room or office to the room or office below. The higher the rating, the more efficient a material is in reducing the impact sound transferred between floors. For example, in

...70% of the office workers surveyed responded that their productivity would be positively impacted through reduction of noise distractions in the workplace.

"Sound Solutions"
ASID Research Study

Commercial Carpet and Cushion Combine for Outstanding Sound Absorption



the current test a bare concrete slab had an IIC rating of 19. This improved to 58 with the addition of the 36 ospy carpet. When the carpet and the commercial bonded polyurethane carpet cushion were tested as an installed composite (double direct glue installation method), the IIC class increased to 69, representing nearly a 19% improvement over carpet alone. (See chart at right).

Multi-Industry Support

Carpet cushion in commercial installations has broad support from key industry groups. Responding to years of installation experience across the country, the consensus is clear: cushion works!

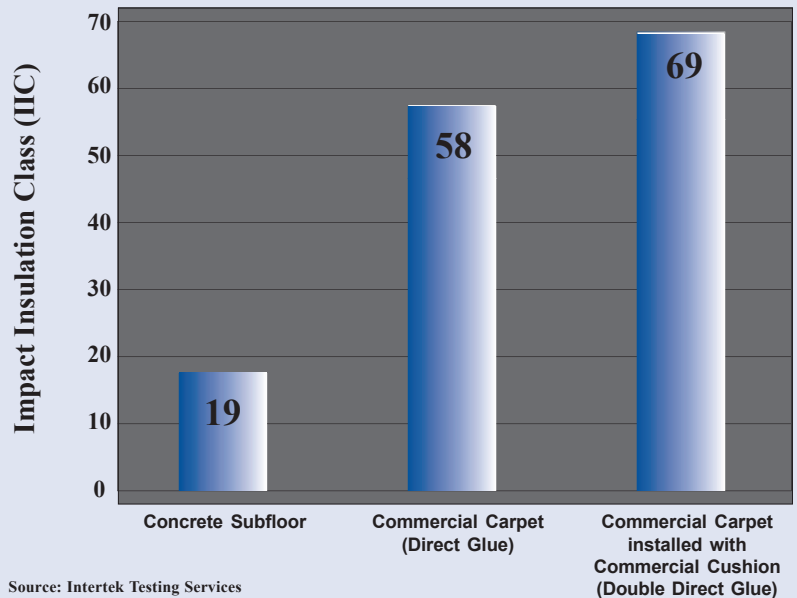
The relationship between noise distraction and productivity has been documented in a study reported by the American Society of Interior Designers (ASID), where 70% of those surveyed responded that their productivity would be positively impacted through reduction of noise distractions in the workplace³. One solution proposed in the ASID study was the proper choice of floor covering, which was determined to be an important element in minimizing unwanted noise in the workplace.

The importance of acoustics on productivity is reinforced by work reported by Amory Lovins, co-founder of the Rocky Mountain Institute. Relative to productivity enhancements, Lovins states, "...buildings with superlative lighting, thermal and acoustic comfort, and air quality have consistently shown 6- to 16- percent higher labor productivity, where it was rigorously measured."

The Construction Specifications Institute (CSI) has also reported on the use of carpet cushion for acoustic control. An article published on the CSI web site states, "The floor is another major design area affecting noise levels." Focusing on solutions, the article continues, "...for added sound absorption, lay carpet over a pad with adhesive on both sides for long-lasting placement."² The approach, commonly known as the double-direct glue or double-stick installation method, is the same as that employed in the current test program. It is an approach widely used in commercial carpet/cushion applications.

The Carpet & Rug Institute and the Carpet Cushion Council have each published information supporting the value and benefits of commercial cushion. According to Bill Oler, executive director of the Carpet Cushion Council (CCC), "We have long promoted the many benefits of carpet cushion in the commercial arena. The acoustic improvement that can be achieved through the use of commercial cushion is one benefit that has become more important with the increase in open-office plans."

From One Floor to the Next Commercial Cushion Helps Reduce the Noise



Performance-in-use

Field installations bear out the results, providing validation of the current study. For example, input concerning carpet and carpet cushion from John Mazlin of the internationally accredited acoustical and vibrational engineering firm of CAMETS Acoustics, confirms that results from field installations are consistent with those of the current study. Mazlin states, "The absorption coefficient differences between carpets lies with the type of pile, and its thickness. The manner in which the carpet is attached to the underlay is very important, as is the closed or open celled nature of the underlay, open cell being much more acoustically desirable." As the results show, commercial bonded polyurethane cushion with its open cell design significantly enhances the acoustical absorption characteristics over those of the carpet alone.

Specification Time

In the hectic days leading up to specification deadlines, budget overruns or time constraints sometime lead to last minute substitutions. When it comes to sound, deficiencies are obvious. The occupants hear it without fail; it is always in their consciousness, never hidden, never missed. Obtaining expert acoustical guidance and utilizing proven products — those having the credentials of performance-in-use and independent test results — are steps toward a comprehensive acoustic management program and ultimately, a satisfied client.

"...for added sound absorption, lay carpet over a pad with adhesive on both sides for long-lasting placement."

"Designing for Tomorrow, Technologically Speaking"
CSI web site

¹ Improved Productivity and Health from Better Environments; W. Fisk, and A. Rosenfeld (Department of Energy, Senior Advisor to the Assistant Secretary for Energy Efficiency and Renewable Energy), Indoor Air; 7:3

² Designing for Tomorrow, Technologically Speaking; R. Bell, A. Johnson, and L. Ingram. Published on the web site of the Construction Specifications Institute: www.csinet.org

³ Sound Solutions, A professional paper from the American Society of Interior Designers, 1999.

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