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TOTALLY GREEN PUBLICATION

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HOW MUCH CURL IS ACCEPTABLE

We are running this article, with additional information, which was originally posted in April of 2011 because of the sheer number of complaints being received for curling and lifting edges on carpet tile. Too many of these problems are being blamed on everything but the carpet tile and we want to set that straight.

This article is by Sim Crisler, Vice President of LGM and Associates. By virtue of his background and experience, he is the most knowledgeable individual in the industry relative to carpet tile construction, performance and installation. Sim also has the distinction of being a chemist. He has an extraordinary understanding of what goes into the science of manufacturing carpet tile. In addition, he knows and understands the influences and environmental conditions that can affect carpet tile installation. He's another reason why LGM is the flooring experts with the answers.



Severe Edge Curl

HOW MUCH CURL IS ACCEPTABLE IN MODULAR CARPET?

Essentially every manufacturer that participates in the commercial carpet market has at least one modular carpet – also known as carpet tile - in their product offering. Each of these manufacturers has discovered (sometimes painfully) that modular carpet – if it is to be successful - is not simply broadloom carpet cut into pieces but rather must be engineered literally from the floor up to be a modular product. *Let me add that almost every manufacturer of carpet tile has had, off and on, a problem; it isn't just one company.*

Planar stability or flatness has been and continues to be a significant issue for every manufacturer of modular carpet. This has been the case from the inception of this type of floor covering product. Modular carpet by definition is carpet shipped and installed as small pieces of carpet. Each piece must be capable of performing as a unit and must be engineered to be not only flat, square and stable but to also be able to at least equal if not exceed all of the performance criteria required of carpet sold in roll form. Since each module will have four cut edges that will be butted to the cut edges of adjacent modules, with none of the seam sealing or other edge protection that is required on broadloom carpet, it is imperative that tuft bind strength be excellent. Failure to achieve this will lead to fuzzy and frayed edges with use.



Fuzzy and Frayed Edges

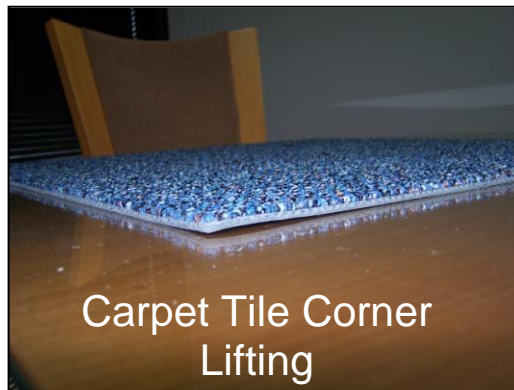
An inherent lack of planar stability in carpet tiles whether it manifests itself as curl – defined as edges and corner of the product lifting off of the substrate – or cup – defined as areas away from the edges of the module lifting – is a potential job site failure waiting to happen.



These product deficiencies not only create visual issues for the end use customer but are a source of potential safety hazards as well.

Planar stability issues are typically caused by differential tension levels within the product. Modular Carpets are complex multilayered constructions. The top layer is the carpet itself which, in today's market is typically a tufted construction of some sort. The selection of the primary backing used to create the base carpet that will become modular carpet is very critical in obtaining planar stability. If the primary backing is not sufficiently stable to withstand the normal stresses associated with the manufacturing processes used in the creation of modular carpet without becoming elongated or compressed or both, curl or cup will happen over time as the primary tries to return to its original undistorted state. Below the primary is an adhesive or binder layer of some sort that secures the tufts and imparts the desired physical properties to the face. Below the binder layer the product can take a number of forms. In some cases, a layer of the backing material is applied directly to the binder. This backing material may be one of a number of different chemistries. The majority of modular carpet today uses some type of thermoplastic material as the backing material. A stabilization element – typically a non-woven Fiberglass fleece - is then introduced to the composite with another layer of the backing material applied. This last layer is the portion of the module that contacts the floor. Typically this layer would be embossed to serve as the floor contact surface of the module.

In some cases a polyurethane cushion is created as part of the process and bonded to the stabilization element. The cushion typically would have as its outer layer a felt or fleece made up of a combination of different fibers depending on the properties desired. Regardless, this is a complex multilayered product. Any differential tension between any of these layers has the potential to create a finished product that is inherently curled or cupped.



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Another potential source of planar stability issues is the composition of the backing material. This is true with both PVC and the other lower melting olefinic thermoplastics that comprise the bulk of the products available in the market today. All these chemistries lend themselves to the introduction of “recycled content” from either post-industrial or post-consumer sources. It is a fairly simple process to re-melt the reclaimed material and introduce it into the process stream along with the virgin material. If the process and raw materials used to obtain “recycled content” introduce elements into the structure of the backing that expand and contract in response to environmental variations that are routinely encountered by all flooring products, then the product is a ticking time bomb waiting to fail. This material will curl regardless of how well the installation contractor prepares the substrate and executes the installation. Now, understand that this is a very important statement. **Let me add - No manufacturer of carpet tile intentionally builds the product that curls or lifts on the edges. Understand that in the effort to go “green” we are still at the front side of the learning curve. As the industry wrestles with adapting to the new technology unexpected reactions will occur. That said, manufacturers have taken the position that the adhesive is the problem or the substrate or a combination of things beneath the carpet tile cause the problem. Any planar inconsistency in the product is in the product itself, which is where the problem lays; not in the substrate or the adhesive.**



Example of severe substrate issue (cut back adhesive) but the carpet tiles are still laying flat.

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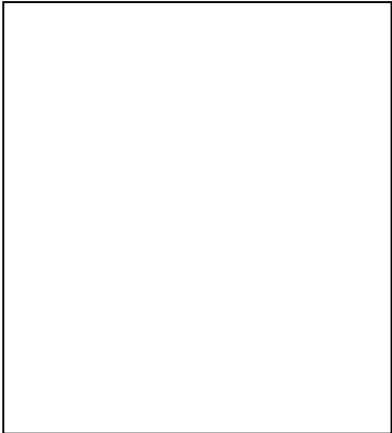
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U.S. Patent 7,231,815 Additional patents pending

Some manufacturers seem to have taken the position that manufacturing modular carpet with an inherent tendency to cup or curl is not a problem. All that is needed is to engineer an adhesive that permanently secures the curled or cupped modular carpet to the substrate. The operating assumption being; "Don't worry about the curl. We've got our



Super Dooper 1000" adhesive. We're going to glue these bad boys down so tight that they won't even be able to think about curling". To use a quote from a well-known college football coach who appears on national TV every Saturday morning in the fall "Not So Fast My Friend".

The assumption that it is acceptable or even possible to use adhesive to make planar stability issues go away is fundamentally flawed. If a modular carpet product has an inherent tendency to curl, it will eventually curl regardless of the type or amount of adhesive applied beneath it. Two part epoxies, polyurethanes, extremely aggressive general purpose adhesives and even various types of contact cements have been used in an attempt to accomplish this. While these adhesives may make the curl go away for a span of a few weeks or months, the curl eventually re appears. What is left and what the customer who purchased modular carpet in good faith is now stuck with – pun absolutely intended - is an installation of modular carpet that still shows curl but which requires the modules to be cut into one inch wide strips just to get them off the floor.

It is extremely important to remember a fact at this point that it would appear that many modular carpet manufacturers have forgotten. Adhesive in a modular carpet installation is intended only to prevent lateral movement of the modules. The effort required to peel a module from the floor should not be excessive and under no circumstances should this effort cause damage or distortion in the module being removed. When customers pay a premium for modular carpet, they have every right to expect that the installed product they receive will meet the serviceability and flexibility requirements that they

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bought and that should be inherent in modular carpet. The end user did not purchase broadloom with a seam every 18", 24" 36" or whatever size the module might be.

The adhesives mentioned above are extremely aggressive and do indeed provide excellent resistance to lateral movement of the modular carpet. That being said these same adhesives- even when properly applied – often create a situation where it is extremely difficult to use the carpet as a modular product. As stated previously, even with their very aggressive tack levels, these adhesives are completely ineffective in the long term elimination of planar stability issues on products that come from the manufacturer with built in curl or cup.

On a personal note, I have been very closely involved in the development, manufacture and installation of modular carpet – aka "carpet tile" – since this product came into the US marketplace in the very early 70's. There is very little that can go wrong with this type of product that I have not seen and/or dealt with directly. This most assuredly includes planar stability issues. As a result of having seen literally hundreds of millions of yards of properly engineered modular carpet installed successfully and performing flawlessly, the fact that the subject question is even asked and that a standard for curl in modular carpet should even be considered defies logic. This is comparable to establishing a standard for an acceptable level of rat excrement in baby food.

In the final analysis, the answer to the "How Much Curl is Acceptable" question is "Zero". Modular Carpet should lie flat on the floor as it comes from the box and should maintain that configuration throughout its expected lifespan.

Any excuse or defense offered or expressed regarding curling, lifting or cupping carpet tile, that something other than the carpet tile itself is responsible for the physical change in the product is inaccurate, to say the least. Remember, out of the box carpet tile must be flat, square and stable anything other than that is an inherent problem with the product.

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