



The Commercial FLOORING REPORT

Pooling, Watermarking, Pile Reversal and Shading



These issues - and the terms are somewhat synonymous in their meaning - continue to plague carpet manufacturers. Pooling, Watermarking, Pile Reversal and Shading are manifested in different ways but primarily give the appearance of water having been spilled on a carpet causing

irregularly shaped light and dark areas in or out of the traffic lanes of carpet. Shading is more a highlighting or a light and dark mottled appearance in a carpet. More expensive woven wool or wool blend carpets are the most severely affected but the conditions can occur on nylon, polyester and polypropylene carpets as well. These conditions also don't discriminate against the type of manufacture of a carpet, be it woven, tufted or fusion bonded, nor whether it is a rug, broadloom or carpet tile, commercial or



Pile Reversal & Shading – Elevator Lobby

residential. All of these

terms refer to the shading or perceived color change and textural change effect that occurs when the pile in random or concentrated areas of the installed carpet undergoes a vertical re-orientation of the face yarns. This in turn causes light to be reflected off the ends of the pile in different directions, thus creating the "shading" effect. This condition is much like the shading that can occur in suede or velvet upholstery fabric. No dense, high quality cut pile carpet or rug is immune to this condition whether it is hand or machine made. And the condition appears almost exclusively in cut pile carpets.



Watermarking & Pile Reversal - Residential

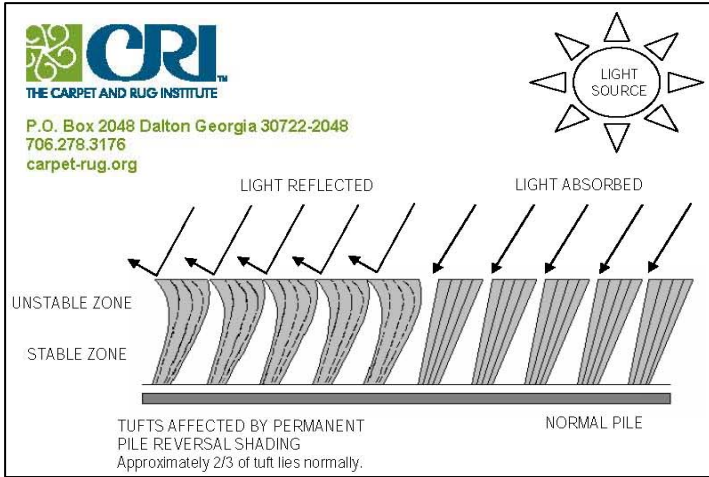
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Cause:

No one knows why this phenomenon occurs. We know what it is - the vertical reorientation of the face yarns of the carpet but not why it happens. And it can manifest itself in and out of traffic areas.



This condition has existed for centuries and has been seen in woven rugs that are hundreds of years old. Carpet manufacturers all over the world have tried desperately to determine the cause without success and despite all efforts, there continues to be no scientific explanation for its cause. There have been many theories as to what happens but none have been proven. It was theorized that the movement of air currents or changes in positive and negative charges had something to do with the

condition but that is not the case. Sometimes the substrate, with normal undulations, can influence a change in the carpet if it is glued direct because of the force of foot traffic on the carpet. However, much of that is actually shading and alteration of the surface which may be interpreted as pooling, watermarking and pile reversal. This is not to discount the fact that the substrate may create conditions which would instigate pile reversal. Shading, highlighting, matting and crushing are not pooling, watermarking and pile reversal. Shading and highlighting are inherent characteristics of the carpet caused by the face yarns being moved in one direction or the other which in turn alters the light reflectance of the carpets surface and thus makes the color look lighter or darker or more or less shimmering. Matting and crushing occurs primarily in traffic lanes and is caused by the forces of compression from foot traffic and rolling traffic on the carpet. This can and will occur in concentrated, unalterable and pivotal traffic areas.



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Shading & Highlighting – Locker Room

There are some conditions which we know can cause pile reversal, watermarking and pooling. Rolling a carpet up warm, allowing moisture to form inside plastic wrappings and letting the carpet sit for a period of time, in transit or in a warehouse, can instigate a form of pile reversal. This can particularly affect woven wool or wool/nylon blend carpets. Covering a woven wool or wool/nylon blend carpet with plastic – especially plastic that has pressure sensitive adhesive on it - immediately after it has been glued to the floor or to a cushion in a double stick installation will alter the face of the carpet creating a type of pile reversal, distortion or mottling effect. This will not come out. Besides the pressure sensitive adhesive will adhere to the face fiber and stick them together and also attract soil to the surface of the carpet; this creates even more problems. The carpet should only be covered with Kraft paper and Masonite sheets, never with plastic.

What does not cause it?

The type of fiber, the manufacturing type or process, the yarn construction – although the more twist in the yarn the less likely it is to occur. The backing type, the method of installation and atmospheric conditions, positive or negative charges in the air, or the weather do not cause pooling, watermarking and pile reversal.

Is It a Manufacturing Defect?

Watermarking, pooling, pile reversal and shading are not a manufacturing defect. They follow none of the lineal directions in which carpet is manufactured and it can occur in or out of traffic areas. The condition will cross over colors, seams, patterns, yarn blends and subfloor surfaces. It can occur inside, outside, high in a building or below ground. Once it occurs it typically cannot be corrected or



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The Commercial FLOORING REPORT

Lew Migliore
President and Owner

LGM Enterprises, LLC
*519 Oxford Street
Dalton, GA 30720*

P-(706) 370-5888

F-(706) 270-0482

Email:

lgmtcs@optilink.us

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reversed. It occurs in carpets and rugs made of all kinds of fibers without discrimination. The severity of the change will depend on the color, pattern and luster of the carpet surface. In appearance it may look as if water was actually spilled on the carpet, thus the term water marking and pooling. If a carpet is replaced that has been afflicted with this condition the replacement, in greater than two out of three cases, will also experience the same conditions. If an affected carpet is removed and

Pooling and Watermarking in Commercial Rug



replaced with another carpet from a different area, the condition is likely to occur again. Most of all no one knows why or if it will occur in any roll of carpet – it can not be predicted. The condition can occur within a short period of time after installation, sometimes as soon as 6 to 8 weeks. If the carpet is a solid color with a lustrous yarn it will exacerbate the condition. In some carpets shading is actually an inherent characteristic.

The Carpet and Rug Institute, in their technical bulletin on shading specifically states that “pile reversal is not a manufacturing defect and does not affect the durability of the carpet. Pile reversal is not due to the materials used to produce the carpet, the manufacturing process, or any combination of these factors”. It then goes on to state that “It is not possible to assume that pile reversal will not develop in any carpet”. The bulletin further notes that “although brushing or vacuuming may create some degree of temporary appearance changes...the pile will return to the reversed position after it is again subjected to foot traffic”

Chances are all of you have seen this condition somewhere; we’ve included some great photos if you haven’t seen it. If you sell carpet in the hospitality market you have undoubtedly seen pooling, watermarking and pile reversal and had complaints on it numerous times. It is almost always interpreted as a defect or problem with the carpet and it’s just as frustrating for manufacturers as it is for end users, architects, designers and specifiers.

Some Tips for Avoidance:

There are several things you should know to avoid the pain of pooling, watermarking and pile reversal. The more texture and twist a cut pile carpet has the

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less likely it is to experience these conditions or shade. Texture and twist give the yarn more stability and resiliency keeping it from bending and thus preventing any vertical re-orientation. For cut pile woven goods you can busy the pattern. The busier the pattern the less visible the conditions will be. If you have a carpet that is experiencing pooling, watermarking, pile reversal or shading already and replacement is being thrust upon you, do not replace the carpet with the same thing – that would be suicidal. Busy up the pattern. Chances are the new carpet will be afflicted with the same condition so avoid giving it the opportunity to make your life miserable. By making the pattern so busy it won't be blatantly obvious when it does occur, the condition will be masked. Replacement may not have to be everywhere, just the areas that get seen the most that are causing concern for the visible discomfort. Don't use or allow to be used, plastic covering or plastic covering with pressure sensitive adhesive on it. If this plastic is used you can count on a problem with the surface of the carpet. It is forbidden from use by most carpet manufacturers and the carpet industry. Whoever puts plastic on the carpet and ruins the carpet owns the carpet. In fact the architects spec should state that no plastic be used to cover the carpet. You can also pull that information off CRI's website from CRI – 104. Their site is www.carpet-rug.org.

Now the Good News:

If you've ever installed cut pile commercial carpet with an attached cushion back on it, especially pre-coat and foams, you've never experienced pile reversal, watermarking or pooling and the reason for that is the way the carpet is prepared to accept the cushion backing. The carpet is heated and passes over a large drum and the surface yarn is set in one direction with a roller – this is called "setting the nap" or orienting the pile lay. Once the pile surface is set in one direction it is literally bent into that shape and it cannot reorient or change. This simple technology has been used in the tufted carpet industry for years without anyone really realizing what it accomplishes relative to pooling, watermarking and pile reversal. Burtco Enterprises, makers of high quality hospitality, corporate and country club carpet, has eliminated

the chance for any of their cut pile carpet to experience pooling, watermarking and pile reversal. They have done this by setting the nap on all cut pile carpet. To the best of our knowledge they are the only carpet manufacturer intentionally doing this. In fact a few years ago we worked with them on a claim they had on corridor carpet - only one corridor of a hotel was affected. When we researched why only this one section of hallway had watermarking we found that the finishing line equipment setting the nap was not operating for a period of time and the portion of carpet not set experienced the problem. What this proves is that the system works and when it's not operational pooling, watermarking and pile reversal can occur.

Every manufacturer could implement this technology if they wanted to and prevent pooling, watermarking and pile reversal. Several years ago the then Wool Research Organization of New Zealand developed a system called TruTrac to prevent pooling, watermarking, pile reversal and shading from occurring in cut pile wool carpets. This equipment was designed to be installed in a standard carpet finishing line. When I saw the system in operation it was actually performing the same function the equipment on a polyurethane backing line was performing but in a different manner. The carpet industry has the ability to prevent these surface distortion issues. The equipment that can do the job has been in existence, for tufted carpet, for nearly 30 years. For woven carpet it's been around for over 10 years yet almost no manufacturer is employing the technology.

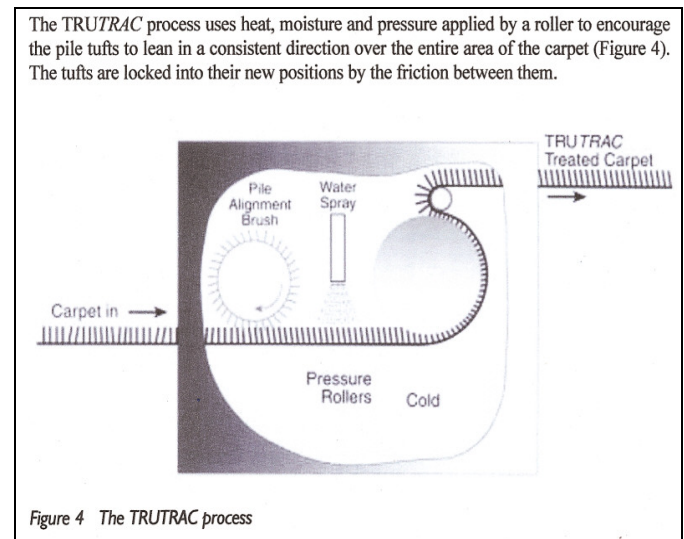


Figure 4 The TRUTRAC process

In Summary:

The chances of experiencing pile reversal, watermarking, pooling and shading on a high end cut pile tufted or woven carpet are pretty high. It is not a manufacturing defect. Solid colors will show the condition more; busy patterns much less. It can occur in and out of traffic lanes. Replacing the carpet with new carpet is no guarantee it won't happen again – in fact it will in 2 out of 3 cases. Putting plastic covering on the carpet can cause distortion that can lead to the condition manifesting itself in some form. There is really no need to know why it happens since that will likely never be known, as long as we know that it will happen with certain carpets and that it can be prevented if simple, currently existing technology is employed.

Remember that if you have questions, need help of any kind with any type of flooring material or flooring issue or you just want to stay out of trouble and avoid having problems, LGM has the experts to make that happen. We are at your service anywhere in the world. We would also be happy to speak at any functions you may have on a variety of flooring subjects or prepare something special for you.

Pile Reversal, Watermarking, Pooling and Shading Solid Colored Carpets



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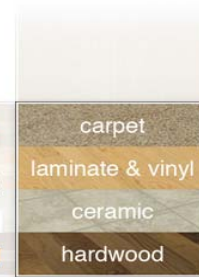


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Our goals are designed to help you and your team understand complaints and problems typical to the flooring industry. We can describe how problems can be caused by manufacturing, installation, or the end user.

We have extensive resources with a wealth of technical information that contains photos, technical bulletins, industry standards, and many documents that identify the concern to explain and describe why problems occur.

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There is little if anything that can escape the scrutiny of someone who knows floor covering as well Lew and his associates.

This would include but would in no way be limited to the following:

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