

Troubleshooting Resilient Flooring: How to Identify Flooring Failures

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Troubleshooting is one of the things I do for a living – analyzing why floors have failed and offering recommendations on how to fix the problem. I also try to incorporate this knowledge into the work I do in technical writing, to use industry standards in the manufacturer's guidelines I am commissioned to write – and when I work on the sales side to help architects, dealers and installers to take the steps necessary to prevent failures.

Unfortunately, when a floor fails, the fix is more often than not to take up and replace the floor and that is a shame for several reasons including the tremendous inconvenience to the customer who owns the floor, the cost to whomever is responsible for the failure – often a shared expense the installer, dealer, distributor and/or manufacturer of the floor covering, and the impact on the environment when a perfectly good floor is removed and thrown away.

In last year's troubleshooting issue, I pointed out several ways in which floors fail, hoping that knowing how floors fail can go a long way towards helping installers and dealers prevent problems before they happen. However, once they do happen, how do we investigate the problem?

Certified Inspectors



A close-up view of the gapped vinyl plank shows visible ridges of hardened adhesive. Since the tile was supposed to be laid into wet adhesive, this would indicate that the adhesive open time was exceeded.

I have been inspecting flooring failures for almost 15 years, and for the past ten years I have been helping develop inspector training and certification programs through my volunteer work with the IICRC, the Institute of Inspection, Cleaning and Restoration Certification, a not-for-profit ANSI accredited standards writing organization. Last year I passed the IICRC Introduction to Substrate/Subfloor Inspection (ISSI) course and the IICRC Resilient Floor Inspector (RFI) course, and I am working on becoming an instructor of those two courses. I thought I'd like to tell you how I go about the process of troubleshooting flooring failures, which for me is a step-by-step process from gathering information to writing a report. This process can be helpful to anyone involved in investigating a flooring failure, and can also provide some insight on how to prevent problems.



Lifting this curling tile showed that the patching compound was separating from the substrate. Microscopic analysis by the patch manufacturer showed old adhesive, paint and dirt on the substrate, indicating it had not been properly prepared to receive the patching compound.

Step 1: BACKGROUND



Unfortunately this was a busy corridor in a hospital so cutting open the bubbled sheet vinyl was not practical. An educated guess points to moisture, contamination or other cause of adhesive failure.

The first step in the process is to gather as much information as possible about the job – what product was installed, when was it ordered, received and installed, how long the product was acclimated to site conditions, what type of substrate testing and preparation was done, what type of adhesive and trowel were used and so on. If you are a dealer or installer doing the investigation, you may know all of this information already.

The important thing to remember during this phase is to approach it from a mindset of trying to figure out the problem. Finger pointing, or as I call it, “the blame game” causes more problems than any other part of the flooring complaint process. Manufacturer’s reps often are accused of always blaming the installer and installers often say something like “I did everything right so it’s not my fault”. Instead, a statement like “I am not sure exactly what happened but I will try to find out” is an

acceptable statement to the customer, and will facilitate a cooperative problem solving process between the installer, the dealer and the manufacturer much more than “the blame game” will.

For an independent inspector, we don’t necessarily have a vested interest in anything other than finding an answer, so we don’t get involved in the blame game. Our job is to gather information and submit a report to whoever commissioned us to do the investigation. Some of this information can be gathered before going to look at the job, some is gathered during the inspection and some is part of an interview process once you know a bit more about the job and who the interested parties are.

Step 2: OBSERVATIONS



This broken chair glide was the culprit in a complaint for “cuts in the floor.”

Once you arrive at the site, it’s time to look at the floor and what the owner is complaining about, and to interview the owner or their representative and get their side of the story as far as the history of the job and the problem. This part of the process that I have worked hardest to improve on because inevitably I get back to my office to work on the report and find there is something I forgot to look for or a question I did not ask. The observation mindset is gathering information and photographs for someone who cannot go to the site. You need to be their eyes and ears. A good report will allow someone to picture the jobsite and understand the problem without actually being there. It helps to not only observe the flooring problem in specific but also look at adjacent areas and even outside the building and take pictures. Here are some

examples:

A concrete moisture problem in a retail store was identified and found isolated to one corner of the building. Because the inspector walked the perimeter of the building, she identified a broken downspout that was draining right up against the concrete slab. The problem was repaired and once the concrete dried out, the floor in that

section was replaced. Popping underlayment staples in a residential kitchen were found to be too long because the inspector looked in the basement and saw the staples protruding through the subfloor.

Removing the carpet tile adjacent to a failing vinyl floor showed signs of visible moisture.

Observations of the flooring itself can go a long way towards identifying the problem. I find that in many cases it is important to look under the flooring material at what is going on in the substrate, so getting permission to lift a section of flooring is important. The condition of the adhesive, trowel notch size, substrate condition, moisture readings, and so on are all parts of the investigation that often provide the clues to identifying what went wrong.

VISIBLE DEFECTS OR INSTALLATION ERRORS



Reporting on the entire flooring system is important on many complaints. For example, this report contained information about the type of maintenance equipment being used so a photo of the floor machine was helpful.

Sometimes the problem is easily identified as being related to the product, or is a blatant installer error, but these types of failure are actually rare for an independent like me to get involved with because these issues are not covered under warranty. Rare or not, they do happen. Sometimes an installer will try their best to install a product that is visually defective or damaged, only to have an unsuccessful result.



This complaint was easy to diagnose: mismatched sheet vinyl. Photo by Jon Namba.

Product defects are often incorrectly identified. For example, as we discussed in my column on Vinyl Composition tile ("VCT Tips From the Pros," FCI August 2006) pattern "run off" is often identified as "off square tile," when it is actually related to undulations in the substrate.

"Defective adhesive" is another thing that is extremely rare. More often, the adhesive is applied over a substrate with excessive moisture or pH readings, the wrong adhesive is used, the wrong trowel notch is used or the open time is not followed. For example, in a "wet lay" installation on high end resilient products such as solid vinyl, rubber or cork, if the adhesive is left open to the air for too long, it loses some of its strength so the product is not held firmly in place. This can result in curling or gapping seams.



>The problem with "defective material" complaints is that if a floor with visible defects is installed, the responsibility falls to the installer or the person who gave the installer the go-ahead to install the floor. Every manufacturer of every product, whether it's a floor covering, wall covering, auto part or whatever, will say something like "do not use a product that is visually defective,"

Trowel notch is such an important part of many resilient troubleshooting inspections so I travel with a variety of small trowels for comparison purposes and to glue flooring back down if I take it up.

or “installation of a product deems acceptance.” What this means is that if the product is the wrong color, is out of square, has curling edges, is damaged, or has some other kind of problem that you can see before installing it, it is not covered under the warranty if the product is installed anyway. I often counsel architects or owners to be sure they are there when the job is started to confirm that the right product is on the job and I advise installers that if something doesn’t look right, don’t be afraid to stop the job and get confirmation that it is okay to proceed with the installation. However, be aware that even if someone gives you a “sign off” to do the job it may still be your

responsibility if the job fails, so it may be wise to not do the job. We’ll cover “sign offs” in a future column.

If a product defect is thought to be the cause of the complaint it is important to have the product tested to confirm the defect – preferably by an independent lab. For example, ASTM test methods can be used for size and squareness, dimensional stability (shrinkage), indentation resistance, stain resistance or any number of other physical or performance characteristics. The same goes for moisture or pH testing, which should always be done independently following ASTM Test methods to the letter.

Step 3: ANALYSIS

The mindset of analyzing the problem is to look at the published documents related to the installation. What do the manufacturer’s guidelines say? Refer to the installation manual that was in effect at the time the floor was installed – an important point if you are looking at an older installation because this year’s instructions may not be the same as last year’s. Adhesive labels can also be used as a reference. Are there industry standards that apply? ASTM standards are often referenced in the case of resilient flooring failures just as the Carpet & Rug Institute (CRI) would be referenced for carpet or NWFA (National Wood Flooring Association) standards would be referenced for wood floors, and so on

Step 4: CONCLUSIONS

This is the section where background plus observations plus analysis are added together to draw conclusions to the probable cause of the problem. If the analysis reveals that the product use, substrate preparation, installation procedures or other published guidelines are not the same that the observations or background revealed, and then a conclusion can be drawn as to the cause of the problem. Sometimes there is a “smoking gun” or at least a trail of investigation that will allow a conclusion to be drawn and sometimes it will take further testing or investigation to get to the causes. For example, I recently identified a job that was supposed to be a “wet lay” installation, but there was no transfer of adhesive to the back of the tile so it was obvious that the adhesive had dried before the tile was set. In another case, a floor failed because of moisture but no testing was done before installation, even though the manufacturer’s instructions and an industry standard (ASTM F 710*) specifically

stated that, "all concrete slabs shall be tested for moisture regardless of age or grade level". In a third case, I inspected a vinyl plank job where everything appeared to have been done correctly, but the product still had gaps between the planks so the manufacturer had the product tested for dimensional stability and had the adhesive manufacturer come out to the job to have a look.

Recommendations



The author's basic inspection kit for resilient inspections. More detailed forensic work such as moisture testing will require a great deal more equipment than this.

Because I have often worked for manufacturers, I am usually asked for a recommendation on how to correct a flooring failure or how to prevent it in future installations. However, for an independent inspector, recommendations may or not be in the scope of work. Often these recommendations will be given to the manufacturer or other commissioning party and they will make the recommendation.

If you're an installer, dealer or specifier, knowing how failures happen can help to prevent them, and knowing how the process of investigation works may help you diagnose problems when they do happen, and can help you in a conversation with an independent inspector or manufacturer.