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How to Repair Excess Deflection or Slope in a Subfloor

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This floor has quite a slope. Corrective measures need to be taken if a customer wants the floor to be level.

Deflection, or movement, of a subfloor can cause a floor to buckle because of adhesive bond breakdown or cause a floor to crack if the movement is severe enough. For a floor covering installer, sometimes this movement can be repaired and sometimes it's better to walk away. If the floor is concrete and there is movement, that is probably the time to walk away. There may be structural problems in the building or in the concrete itself that need to be addressed.

However, in the case of a wood subfloor, there are a number of things an installer can do to get ready for a new floor installation. Slight movement in the subfloor can show up as squeaks in the floor or soft spots. Sometimes this is due to poor workmanship when the building was built, or poor choice of materials such as chipboard, particleboard, or plywood that is not thick enough. This condition can usually be corrected by re-nailing the floor. However, be sure the customer understands that there are no guarantees for a "squeak free floor," because it may not be possible to get them all out.

The best way to tighten up a floor and minimize squeaks is to re-nail the entire floor. I asked my brother, Andy, who has done a lot of this type of work, about how he does it. Locate the floor joists, and mark them on the surface. Snap chalk lines along the beams and nail away every 6 inches or so. A 2-inch or so deck nail or rosin coated nail usually does quite well because the nails are engineered to hold, as opposed to a "common" nail that may back out again in the future. Some might prefer to use screws, but there is always the risk of hitting a hard spot and having the heads break off, plus screwing rather than nailing the floor usually takes longer.



Soft spots, water damage, or other unacceptable subfloors should be cut out and replaced prior to the installation of floor covering.

Threaded or coated nails are just as effective.

Soft spots caused by damage to the subfloor, such as water damage, need to be removed completely. Again, find the beams and mark them. Cut only the thickness of the subfloor, down to the beam, and place the cut in the center of the beam so that the existing good subfloor still has support and so the new piece you put in will also have support. Once you remove the existing subfloor, measure the thickness and replace the cut out piece with plywood of that thickness. Do not build up thinner layers of plywood such as 1/4-inch because they will not be as strong as a single layer. Use one piece. If the repair is in a heavy traffic area, use cross pieces (2-by-4 or 2-by-6) between the beams for extra support.



This floor was not only out of level but had a very rough surface, so a self-leveling underlayment was used to correct both conditions.

Once the floor is or the damaged section is replaced and re-nailed, check to be sure the whole floor is solid. If you only nailed the squeaky spots, those squeaks may have moved so be sure you are close to squeak free. If it is, it is ready for a carpet or nail down wood floor. If installing resilient flooring, an underlayment is usually necessary. The industry standard (ASTM F 14) calls for a minimum of one inch total thickness for the subfloor/underlayment system so if the existing floor is 3/4-inch plywood, plan to install a minimum of 1/4-inch plywood. If, after nailing the existing subfloor, it still seems to have some movement, it may be a good idea to use thicker plywood than just 1/4-inch.

Sloped floors present a number of challenges and questions to answer. The industry standard for resilient flooring specifies that The surface of concrete floors shall be flat to within the equivalent of 3/16-inch. (3.9 mm) in 10 feet,**. That's a reasonable number for wood substrates also. However, if a floor is out of level to a greater degree than this, corrective measures may be difficult or expensive, so this is a situation where the customer has a decision to make about how much slope that can tolerate in the floor.

I remember an old house I lived in where the floor sloped quite a bit in one corner of the kitchen.

It was solid as a rock, so I just left it. It became, as we said, "part of the charm." However, if it is decided to leave the floor alone, and the floor is in a traffic area, especially in a public building or other commercial setting, it would be wise to specify some type of slip retardant floor covering such as rubber, slip resistant vinyl tile or sheet vinyl. These days, if someone slips and falls there is often some type of legal action, and if the wrong floor is installed, someone in the flooring industry may be held responsible.



Self-leveling underlayment can be used in small areas to correct sloped or rough substrates. Small patches can be mixed and poured by hand.

If it is decided to level a sloped floor, self-leveling underlayments are the best way to go, and the only way to go for a concrete floor. With proper preparation, a floor can be leveled up to four inches in one application of the proper product. This is far easier than trying to build up the floor with multiple layers of troweled on patching compound or plywood or whatever other "cheaper" alternative you might be inclined to use. Self leveling does it the best and does it the fastest.

Before proceeding with a self leveling underlayment job, make sure all instructions are followed to the letter, especially the mix ratio of the underlayment powder to water. Too much water may make the mix go further, but it will result in a weaker mix so don't add extra water no matter what. Also, pay attention to things like moldings or wall coverings when leveling – they may need to be removed, changed, or protected.

Floor preparation is a big part of what we do in resilient flooring installation. Sometimes the jobs get into a lot of carpentry or masonry, as I have noted here, while other times it is as simple as putting down plywood or doing a troweled underlayment. Either way, if the job is specified and estimated correctly, there should be enough money in the job that the installer can be properly paid for the effort. If you know what you are doing, an installer who is good at floor prep is a valuable asset to any dealer or flooring contractor.

- ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

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