Q What’s this FAQ about? Do you repair shower pans?

This FAQ describes how a shower pan is constructed, some of the reasons why showers leak, how I determine if a shower leak is the result of a defect in the pan or something else, and some of the steps needed to diagnose and repair a defective shower pan. Please note that Paragon Property Services provides leak discovery and identification services only, I do NOT provide any type of shower repair service.

Q. Are leaks in conventional shower pans common?

Fig 1: This shower did not show obvious evidence of damage to the flooring in front of the shower, even though there were leaks in the interior of the shower pan.

Fig 2: As the pan was demolished to investigate the cause of the leak, extensive damage was discovered to the lower portion of the shower door framing and to the sub-flooring beyond the door. This shower is a good example of how extensive damage from a slow leak can spread undiscovered for long periods of time.

A. Properly constructed conventionally tiled showers can last a lifetime, I have seen some from the 1920s or earlier that are still performing properly. However, building a durably leak-proof shower tiled shower requires a craftsman with a through understanding of the process, very careful attention to detail, sufficient time to allow layers of material to “cure” properly before the next layer is installed, and a builder or homeowner willing to pay a premium for the required workmanship.
Unfortunately over time – and especially over the last 15 years - all of these have been in increasingly short supply here in Chicago.

The result has been an increasing number of poorly built and eventually leaking showers, and not just at “low end” construction – I have inspected million dollar plus properties where every tiled shower pan leaked!

Q. My shower floors and the walls near the floor look like they are in they good condition, but the shower pan still leaks. If the tile is in good condition, why is the pan leaking?

A. This is a very common question, and to understand why a shower pan which appears watertight at the surface can cause a shower leak, it’s important to understand the waterproofing in a shower pan is not the tile floor. Instead the shower pan’s “waterproofing” layer is composed of several hidden components of the pan and drain system which are buried out of sight in the mortar bed below the visible tile surface:

This hidden waterproofing layer is necessary because at least some water will likely pass through even carefully installed tile shower floors – most grouts (and some tile materials)
will absorb water, and over time most tile floors will develop cracks in the grouted lines between the tiles which allow water to pass through the tiled floor.

Once water passes through the tile, it soaks into the “mortar bed”, a layer of cement-like material which supports the tile. This water’s downwards movement is stopped by a layer of material called the “pan liner”, or just the “liner”.

The liner in turn is supported by a layer of material called a “pre-slope”, and the pre-slope and liner are sloped toward the drain, where the liner is connected to the shower’s drain system

It’s especially important to understand three things about this waterproofing system:

1) **The liner – not the materials above it - is the waterproofing layer.** The tile floor is *decorative*, and the shower pan should be watertight even if no tile (or the mortar bed supporting it) is installed. This means that a newly installed or repaired liner should be tested for leaks *before* the mortar bed and tile are installed over it, and in fact liner manufacturers require this test be performed before the mortar bed and tile are installed. If the liner passes this test the shower should be durably watertight, and if your shower leaks, likely this test was never performed.

2) **Once the mortar bed and tile are installed, the critical components of the waterproofing system are out of sight, buried below the tile and mortar bed.**

   They cannot be directly observed to discover or correct the cause of leaks through them, and the only way to diagnose and correct problems at the waterproofing layer is to demolish the tile and mortar bed above them to expose the pan liner for inspection and repair.

3) **Because the underlying cause of a leak in a conventional shower pan is buried deep in the structure of the pan, anything you can do to “repair” the problem at the surface of the shower floor (such a “sealing” the tile) is likely to be a temporary and/or incomplete solution.**

Q. How can you determine if a leak is at a shower pan rather than somewhere else in the shower?

Usually, when the source of a shower leak is not obvious, the leak is localized to a shower pan (or some the location in or near the shower) by the process of elimination.

First, the drain plumbing is tested by introducing water into the shower’s drain plumbing below the level of the shower drain assembly.

If a leak is observed, it's in the plumbing below the drain base.

If not, the leak is somewhere in the pan, and at this point you can just demolish and rebuild the pan, or you can try to narrow down the leak's location.
If you want to attempt to narrow it down, the next step to make a dam about 1” high and about 8” in diameter around the drain on the surface of the tile floor (I use plumbers putty) and run water into it.

If this results in a leak, it's almost certainly somewhere in the drain base assembly, most likely at the liner clamp.

If not, you can then start wetting other areas of pan to determine the approximate leak location.

Be aware however that if the leak is anywhere in the pan, you will likely have to demolish the entire pan at least down to the liner and a foot or so up the tiled walls to perform a reliable repair.

Sometimes if it's a slow leak, you will need to hold standing water in the pan for a considerable period of time before the leak becomes apparent. In such cases I use a pneumatic test ball plug. Mechanical stoppers as well, however it's easiest to control the exact location of the stopper with the pneumatic type (I've not had good results with improvised stoppers).

If you are installing a new pan or repairing an existing installation you use the same stopper approach, however be aware though that if the backer board has already been installed water wicking up and behind the backer can lower the water level in the pan and be mistaken for a leak.

At some point in this process, if appropriate the supply plumbing to the shower heads(s) may also be observed for leaks.
Sometimes additional observations outside the shower will help in more precisely locate the leak.

For example when I encounter a leak at a finished ceiling, I use techniques such as thermal imaging with an infrared camera and moisture surveys with a moisture meter to attempt to relate the leak’s location to the shower pan above, and provide initial guidance to determine where to open walls and ceilings to allow more precise visual identification of leak sources.

Pan leak investigations can also work in the other direction, attempting to isolate and water test specific portions of the shower pan while using visual observation, thermal imaging or moisture meters to attempt to relate the observations at the shower pan above to the observed moisture on the ceilings below.

Unfortunately these techniques are often of limited value, or even misleading. Water may exit the shower pan at some distance from the location of a “leak” at the tile surface, and if the underside of the pan cannot be directly observed water may exit the ceiling below at some distance from the point where it leaks from the pan.

(I can also use infrared imaging and other moisture observation techniques to investigate other sources of leaks and elevated moisture if I determine that they are not from a shower leak, see our infrared moisture and leak detection services page at: http://paragoninspects.com/articles/infrared_top_page.php ).
Because of such limitations, often the only way to determine the actual cause and location of a shower pan leak is to demolish all of the tiled surface of a pan down to the liner or beyond – it is not unusual to end up demolishing the entire pan when it was hoped that there would be a less destructive alternative.

Also, if certain types of defects (for example fasteners passing through wetted areas of the liner or incorrectly waterproofed corners) are found at one location under the shower floor, they are often present at others as well, and in these cases I recommend that the entire pan be demolished down to the liner to discover any additional defects. (See Fig 9 and 10 below for examples)

Q. Given the increasing difficulty of building a high quality conventional shower pan, what can be done to improve the chances of building one, or of obtaining a satisfactory repair when a pan fails?

A. Probably the single most important step is to thoroughly water test the pan for at least 24 hours. At a new shower pan this test should be performed on the liner before tile is
installed, when localized repairs have been performed to a shower pan water testing should be performed before any replacement tile is installed.

There are a few types of defects (for example, a sharp fastener carelessly left on top of a liner) which can take months or years to cause a leak, but in the overwhelming majority of cases a defect in pan material or construction will be detected by correct water testing at the time of construction or repair - if a recently constructed pan is leaking, likely it was not properly tested at the time of installation.

Q. I already have a leaking pan. Are there alternatives to demolishing and rebuilding a leaking conventional shower pan?

A. There are a number of possible alternatives to a completely rebuilding a shower pan.

One common method is to clean the tile within the pan with diluted muriatic acid, seal any visible defects such as cracks and missing grout with caulk or grout, and then seal the tile of the shower pan with multiple coats of a masonry sealer. Another approach is to attempt to determine where the pan is leaking, and then selectively remove and replace the pan above the liner at this location, repairing the liner as required.

In my opinion there are often significant drawbacks to such repairs:

1) Sealing tile surfaces does not address the underlying cause of the leak, such repairs are attempts to make a shower water-tight despite the fact that its primary water seal has failed. The tile floor and walls of a conventional site-built shower pan are not intended or expected to be water-tight - the grout (the mortar between the tiles) and even some types of tiles themselves are at least somewhat permeable to water. The primary water-seal should be provided by the shower pan's liner. Applying sealer to the tile is like putting a tarp over a leaking roof; the tarp (like the sealer) is an improvised attempt to deal with the fact that an intended water barrier is failing.

Because the leak at the liner remains unrepaired, one problem with “sealant” repairs is that the sealant may be slowing – but not eliminating – the leak. Even small amount of leakage can severely deteriorate building materials, and a slow leak may cause greater damage that more dramatic leakage because it can continue undetected for a much longer period of time. (See Fig 2 above for an example of such damage from a slow, “minor” leak.

Also, the effectiveness of the sealant may deteriorate over time. The sealer is likely correcting for progressive deterioration of the tile and materials below (for example failing grout, poor adhesion of the tile to the mortar bed supporting it and similar problems). These problems may continue to worsen, and when they do the leaking will resume – and likely at first as a slow leak which may escape detection until considerable additional hidden damage has occurred.
Still, because such sealant is far less expensive (at least at first) than rebuilding tile shower pans some tile installers and repair companies will attempt such repairs on a “no guarantee” basis, and some homeowners attempt the same repairs themselves.

In my opinion “sealing” shower pans at the tile surface is a risky choice for the reasons listed above, especially if the shower is installed in a location where the pan’s location cannot be readily inspected from below, or the pan is installed above materials or building contents which would be expensive to replace if water damaged.

For such reasons, in my opinion whenever a sealant “repair” of a pan is performed, the pan should undergo a minimum 24 hour test to determine if all leakage has been successfully controlled

Also, for the same reasons, in my opinion sealant type such repairs are not appropriate at showers in condominium, co-op, rental and similar units where a leaking shower pan could create risks to common elements and adjacent units.

Another possibility is to attempt a “spot” repair (partial demolition and rebuilding) of leaking pans. Such repairs are at least potentially more permanent than surface sealing because if successful they can address the underlying cause of the problem.

The best candidates for this type of repair are single, point source leaks at the corners and sides of the pan when their likely location can be accurately established prior to opening the tile floor of the pan. At such locations - assuming the site of the leak can be accurately determined before removing tile – only a small area of tile must be removed, and the layer of material below the tile and above the liner is thinner than elsewhere in the pan.

Leaks which cannot be located with reasonable certainty before the start of work and leaks resulting from defects such as improper attachment of the liner to the drain are not good candidates for localized repair - the amount of material removed will be large enough so that it is likely cost efficient to replace the entire pan (and thus also making certain that any other defects are discovered and corrected).
Also, some types of installation defects (for example incorrectly installed liner corners and fasteners installed through portions of the liner exposed to water) are questionable candidates for spot repairs as they are often repeated elsewhere in the pan – in my opinion when such defects are discovered serious consideration should be given to total demolition and replacement.

Systemic defects such as leaks resulting from missing pre-slopes should not be “corrected” by spot repairs as such defects create systemic problems which often eventually result in multiple leaks at multiple locations.

Another potential concern which should be considered before deciding to attempt a spot repair is the availability of matching replacement materials such as tile and grout.

For these and other reasons, many experienced tile installers will not attempt a spot repair of a leaking pan, and in my opinion this is a far less than ideal repair method.

For such reasons, in my opinion whenever a spot repair of a pan is attempted, the pan should undergo a minimum 24 hour test before the installation of the replacement to determine if all leakage has been successfully controlled.

Also, in my opinion spot repairs may not be appropriate at showers in condominium, co-op, rental and similar units where a leaking shower pan could create risks to common elements and adjacent units.
Q. Are there alternative construction and waterproofing methods I can use to improve the chances of a durably watertight shower pan?

A There are now several alternatives to conventional pans:

1) In some cases the original shower pan can be replaced with a pre-manufactured pan made of fiberglass, plastic or a similar material, either as a stand-alone replacement, or installed under new ceramic tile. However unless you are lucky enough to have an existing shower size which matches an available pan, substantial modification or even replacement of the shower walls will be required.

2) The are several advanced liner systems available from manufacturers such as Schluter (http://www.schluter.com/5288.aspx). These systems include liner materials that are chemically “welded” together on-site to produce continuous “liners” that can run across shower floors and up walls, integrated drain systems, preformed pre-slopes and similar components that if properly installed produce a result that is much less prone to leakage than conventional site-built pans.

Some of these products can also be used selectively to improve the watertightness of otherwise conventional shower walls and pans.

Such systems are typically a few hundred dollars more expensive than conventional pans

Such systems but can be retrofit to almost any exiting shape and size shower after removing the existing pan.

All such advanced systems must be installed by individuals familiar with the specific product and the manufacturer’s installation requirements in order to perform up to their potential water-tightness and durability.

**Given the expense of replacing defective shower pan and the difficulty of producing a durably watertight pan using traditional designs, I strongly recommend that if you replace a shower pan, you consider replacement with a pan made with modern alternative materials and methods.**

Q. Who should perform such repairs?

Depending on the nature and extent of the repairs at least two trades (a shower tile installer and a plumber) may be required. If extensive damage is discovered below or behind a leaking shower, or if the size and shape of the shower are changed, additional trades such as carpentry may become involved. Note that in Illinois all plumbing installation and repairs – including the initial installation or repair of shower drain assemblies – must be performed by a state licensed plumber, and may require a permit and municipal inspection of the work.
Often, shower installers will prefer to work with a given plumber, or the plumber will prefer to work with a given shower installer. In this case make sure that the contract for the work specifies who will be responsible for the correct installation and testing of each component.

If you live in a condominium or co-op, board approval of plumbing work may also be required.

In multi-unit buildings with tiled showers it is often the case that if one tiled shower is failing, others already have. In such buildings I suggest checking with the condo or co-op board to discover if someone has already performed similar repairs. If so, whoever did the work may already understand the likely source of the problem, and you may be able to evaluate the quality and durability of the work they have performed.

If you elect to use one of the more modern liner systems, make sure that everyone providing bids is experienced with the system they intend to install.