HOW TO INSPECT YOUR OWN HOME

STRUCTURE TECH

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STRUCTURE TECH

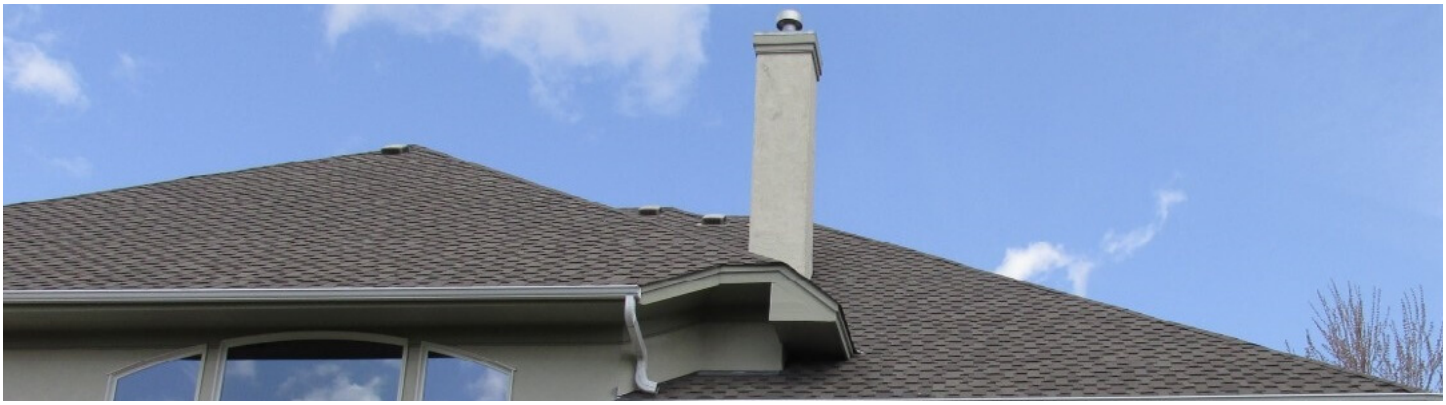
Part 1

ROOF & CHIMNEY

ROOF

The best way to inspect a roof is by walking its surface. If it's safe to do so, get on the roof to inspect it. Or, if you can't access the roof, lean a ladder against the edges in several places to get a close look, or walk around the exterior and carefully inspect all sides of the roof, using binoculars while slowly scanning the entire surface. Pay special attention to the south-facing portions of the roof as these areas are usually the first to fail.

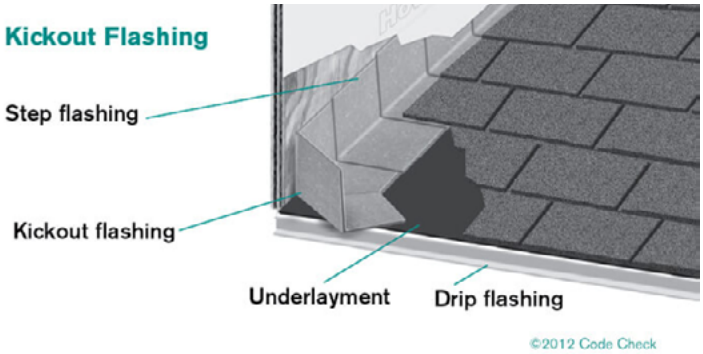
There are many things to look for on a roof. Curled or deteriorated shingles are worth having a follow-up inspection done by a trusted roofing company. Loose or missing shingles should be addressed immediately. However, identifying loose or missing shingles can be difficult from the ground. Look at the photo below—do you see the missing shingles?



The missing shingles were located at the ridge, right by the tree. Again, if you're using binoculars to inspect the roof, scan everything slowly. You should conduct roof inspections at least once a year

We have several examples of other roof defects that can typically be seen from the ground at the very beginning of this post: Home Inspection Checklist.

Also, make sure kickout flashing is installed at all of the locations where the roof edges end at walls. Kickout flashing is one of the cheapest, easiest, and most critical methods to preventing major water damage to a home. We wrote a whole blog post about kickout flashing here: Kickout Flashing.



If there are any tree branches in contact with the roof or even close to the roof (or siding), trim them away. Tree branches prevent the roof from properly drying, provide an easy way for pests such as raccoons to get on the roof, and can easily rub holes right through the shingles. If the roof is covered with debris, such as leaves and tree branches, clean the roof off.

MASONRY CHIMNEYS

Chimneys can only be fully inspected by getting up on the roof or by using a ladder that's as tall as the chimney, if the chimney is located along an outside wall. Perhaps the most important part of the chimney to inspect is the crown, which is the top of the chimney that sheds water and prevents water intrusion. If the crown is cracked or washed out, water can get into the chimney and cause deterioration, and may even leak into the house.
The photo below shows a chimney crown in need of repair or replacement.

If the chimney flues have missing rain caps, have them added. Rain caps make a big difference when it comes to preventing moisture intrusion and damage. Here's a nice PDF from Kuhl's Contracting with more information on this detail: Rain caps on chimneys. When installing a rain cap, it's a good idea to use one with a built-in spark arrestor (screen), which will help to keep out pests.

Look for damaged or missing bricks, cracks, and missing mortar at the walls of chimneys.

When it comes to recommending repair to masonry chimney walls, we typically use an awl as a gauge. If an awl or screwdriver can go into the side of a chimney, it needs repair.

If a chimney has a bunch of black goop at the intersection between the chimney walls and the roof, it's an unprofessional installation or a DIY repair that will probably leak soon. Hire a trusted professional to have the flashing redone before it leaks.

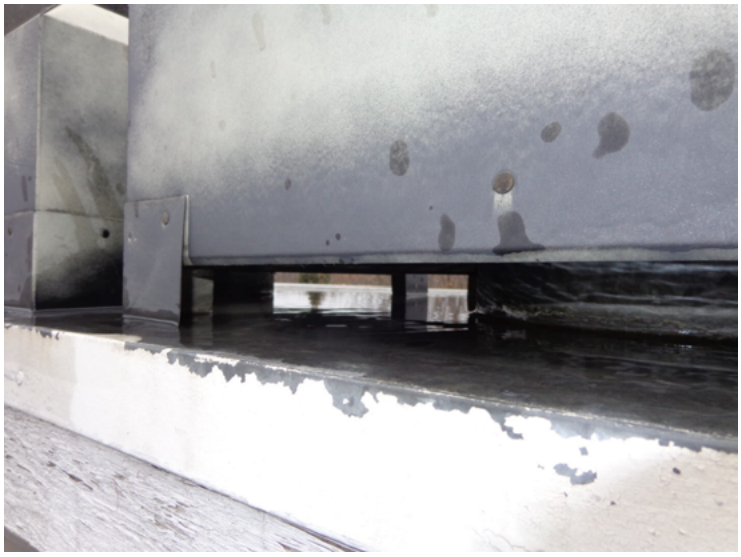
OTHER CHIMNEYS

Wood chimneys, or wood chimney chases, are especially vulnerable to moisture intrusion and rotting at the walls because they're completely exposed to the elements on all four sides—no soffits, no gutters. Get up on the roof or use a ladder to get a good look at any wood chimney chase, especially if the chimney is clad with some type of siding that needs to be caulked at the ends, such as lap siding. Wood and older wood composite siding are specially prone to rotting.

If there is rotted siding, replace it. If the siding needs caulk at the ends, get out your caulking gun and go to town. For more info on wood chimney chases, check out Reuben's blog on the subject: Inspecting Wood Chimneys.

For chimney chases with a metal top, make sure that the top slopes away from the center of the chimney to prevent water from ponding on the top of the chimney. If water ponds, it will only be a matter of time before it begins to leak down through the center of the chimney. We've inspected many wood chimney chases for gas fireplaces where water was leaking in right at the vent because the metal cap wasn't properly sloped away from the center. The photos below show a metal chimney cap that was leaking.

To verify the cause of the leaking, we simply dump a couple of gallons of water on top of the chimney. Water will typically begin to drip into the fireplace shortly after that.



Part 2

ROOF WATER MANAGEMENT

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Roof water management is a HUGE issue. Experienced home inspectors can drive up to a house and instantly know where there will be water problems, just by paying attention to where water gets directed from the roof when it rains. The best way to inspect the roof water management at the exterior of a home is to walk around the house during the middle of a big rainstorm. You'll notice problems that you never would have noticed otherwise. This video shows a home with an undersized drain system for the downspouts. You can see that the small corrugated drain couldn't handle all of the water coming off the roof, so water was shooting all over the place.

This video shows a new construction home in Chaska that had water shooting off the roof right against the window and the stone veneer siding. This wall will almost certainly experience major water intrusion problems if this isn't corrected very soon.

The simple fix for water being directed against the window in the video above is to have gutters installed at the house. We can't stress enough the importance of gutters. We've seen hundreds of water problems with decks, windows, doors, and siding that could have been prevented if gutters had been installed. Gutters prevent water problems, and should be installed on almost every home, new or not. For more info on water management at new construction houses, read this blog post: New construction water management.

If gutters are already installed, pay attention to where water from the downspouts is directed. Downspouts should extend well away from the house, and water should flow away from the house at the downspout terminals. If downspouts end short of walkways or landscape edging, they're basically draining into a moat around the house and possibly doing more harm than good when it comes to preventing basement water intrusion. Get that water draining away from the house.

Also, make sure the gutters and downspouts aren't leaking. It's easiest to see that when it is raining.

GROUND WATER MANAGEMENT

Ground-water management is all about preventing basement water intrusion, and preventing foundation problems. Water needs to drain away from the building. That's the long and short of it. The best time to inspect this on your own home is during the middle of a rain storm. Look for ponding water next to the house, and look for any water that doesn't drain away.

For more information about ground-water management and preventing basement water intrusion, click the following link: Wet basements.

Part 3

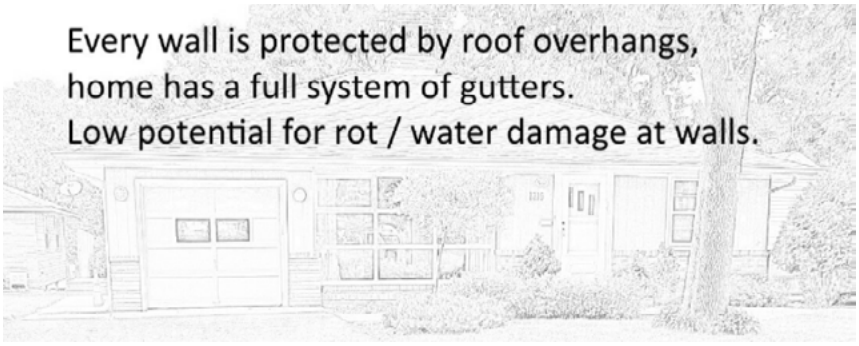
SIDING

WOOD SIDING & TRIM

The two most common problems with wood siding and trim are peeling paint and rotted wood.

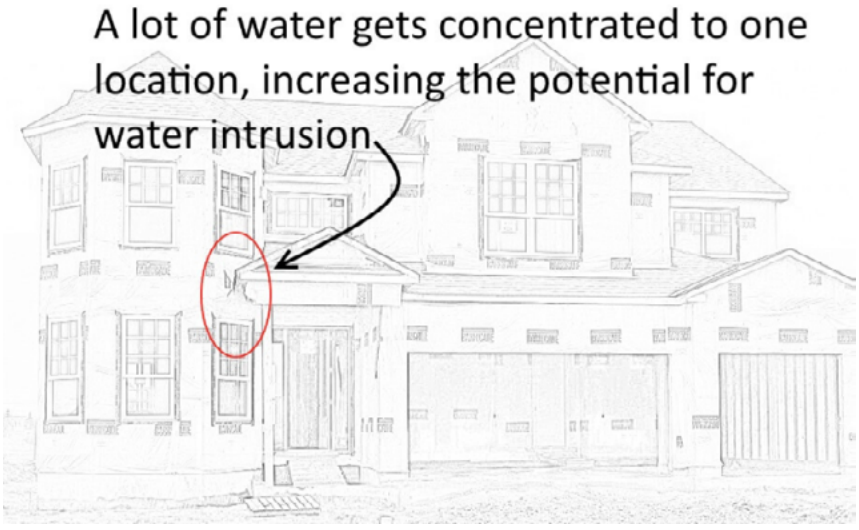
Peeling paint is an obvious defect that can be spotted easily. Paint is meant to protect wood surfaces from decay and rot, but it's not common to find rotted wood siding because of lack of paint. The main issues with peeling paint at siding are that it looks horrible, it's an environmental hazard if the paint contains lead, and it may violate a maintenance code for the city. For example, section 244.500 (d) of the Minneapolis Housing Maintenance Code says "No exterior wall of any dwelling or building accessory thereto shall have paint which is blistered, cracked, flaked, scaled, or chalked away." We don't have any inside tips to share on peeling paint, if you need more info on that topic, check out what Dr. Lstiburek, building science guru, has to say about it.

Rotted wood siding isn't much of an issue at old houses in Minneapolis and Saint Paul that have been sided with old-growth wood. Typically, issues with rotted wood siding come from more modern homes with 'new wood' siding. To inspect your own home for rotted wood siding, start by figuring out which areas will be prone to rotting first. If you've already taken the advice given earlier in this document, you'll probably have a good idea of which areas you need to pay the most attention to - the areas where water gets concentrated.



Areas of the house that are covered by big soffits or overhangs will probably be fine.

The areas that turn into problems are the areas where water gets concentrated.



Other areas to pay special attention to are the siding below roof ends with missing kickout flashing, below bay windows, and at wood chimney chases. Also, any areas that have water splashing against them will be prone to rotting. To check for rotting at wood siding, start by looking for obvious things like holes in the siding. Be sure to look at everything. As shown in the photo to the left, this might require walking the roof.

The next step is to go around and poke at the areas that will be most susceptible to water intrusion and rotting. You can sometimes just push on the siding with your fingers to find rotted or soft areas.

Look for areas with missing or dried out caulking that need attention. If rotted siding is found in several areas, there's a good chance that there's rotted wall sheathing behind the siding. There are two ways to check for rotted wall sheathing—remove the siding and check it out, or have moisture testing performed on the home by a company that specializes in this, like us, Structure Tech. When we conduct moisture testing on wood siding, we start by scanning the siding with a non-invasive moisture meter.

Areas with elevated moisture levels will need to have invasive testing—two small 3/16" holes are drilled, and a moisture probe is pushed into the wall to determine the moisture content and condition of the wall sheathing."

VINYL SIDING

First, a quick primer on vinyl siding: Love it, tolerate it, or hate it, vinyl siding is very good at what it does. Vinyl siding is an exterior cladding that reduces the amount of rain that reaches the stuff underneath, which is referred to properly as a water-resistive barrier, but more commonly as Tyvek®, which is a brand name. Vinyl siding is not watertight and isn't designed to be watertight. Vinyl siding should always be installed over a water-resistive barrier, but this wasn't required by code in Minnesota until 2003. If you have a home built before 2003, you may or may not have a water-resistive barrier behind the siding. After 2003, it should definitely be there.

The most common visible problem with vinyl siding is physical damage from hail, basketballs, baseballs, weed trimmers, or rocks thrown from lawnmowers or snowblowers. Small chips and nicks aren't big performance issues. Remember, vinyl siding is not watertight. The main issue with physical damage to vinyl siding is that it makes the house look bruised up. The photo below shows an extreme example of a house with some nasty hail damage, as well as some makeshift repairs by someone with a short ladder and a long roll of tape. This siding is clearly in need of replacement.

Vinyl siding can also melt or deform when someone has a grill too close to the siding, or from reflected sunlight on low-e windows. The photo below shows an example of deformed siding caused by reflected sunlight. This is a cosmetic issue, however. The vinyl will still do its job even though it looks terrible.

Unfortunately, homes with vinyl siding can experience water intrusion just like homes with other types of siding. There is typically no visible evidence of moisture intrusion with vinyl siding... at least not until it's too late. The nice thing about vinyl siding is that it's fairly easy to pull apart and put back together without any tools. This video shows us pulling apart vinyl siding on a bank-owned property that had experienced major water intrusion. As you can see, it's pretty easy to open vinyl siding up.

If there are areas where moisture intrusion is suspected, pull the siding apart and check it out. There are plenty of videos on YouTubeshowing how to open up vinyl siding and put it back together.

STUCCO SIDING

Old stucco houses typically don't have big problems, while newer stucco homes (typically built after the late 80s) often do. There's not much that can be seen to identify major problems with stucco houses. Stains below windows and other similar penetrations in the walls are cause for concern, but they're not necessarily a problem.

The only way to know for sure is to have invasive moisture testing performed by a trained professional.

STONE SIDING

Stone siding is typically installed only on the front of houses, but it's subject to the same moisture intrusion issues as stucco, and are just as difficult to identify. The only way to really know is to have invasive moisture testing done by a professional. Check out our blog post on this topic: Stone siding installation defects.

HARDBOARD SIDING

Hardboard siding, often called masonite, is a pressed wood siding product that lasts about 20-30 years. When hardboard siding rots, it's usually quite easy to spot, as it really starts to look terrible.

Hardboard siding typically fails at the lowest courses first, usually from water splashing up against siding that has been installed too close to the ground.

When it's just a few pieces of hardboard siding that are rotted, the appropriate repair is to replace the rotted pieces of siding. Once there is rotted siding in many areas throughout the exterior, however, it's time to re-side. We have more examples of rotted hardboard siding at the end of this post: Home inspection exterior checklist.

LP SMARTSIDE / JAMES HARDIE

We lump these two brands of siding together because they're nearly indistinguishable to the untrained eye, nearly 100% of new construction home buyers can't recognize the type of siding on their new home, and the installation instructions for these two types of siding are very similar.

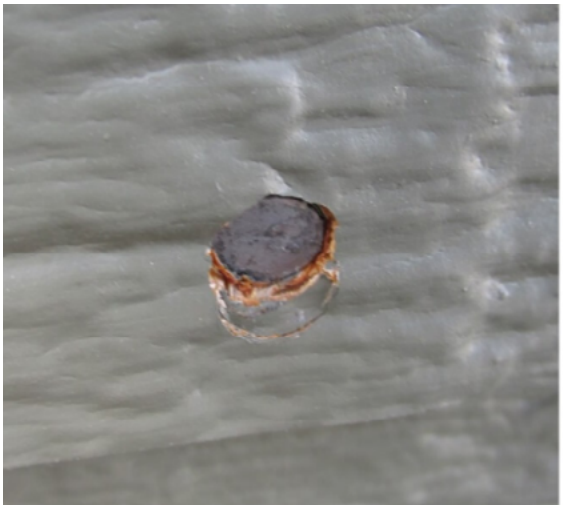
LP Smartside and James Hardie may look similar, but they are very different products. Read this post for more info: James Hardie vs. LP Smartside.

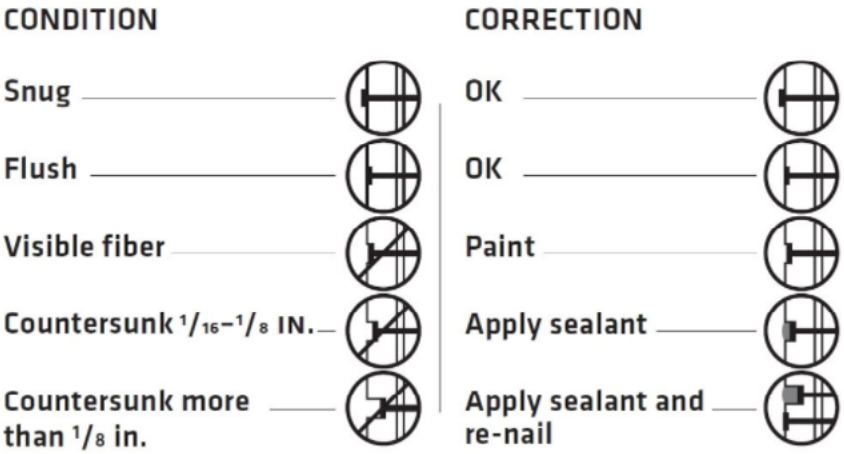
The most common problems we find with these types of siding are improper nailing and improper clearances to grade, hard surfaces, and roof coverings.

Our best advice for inspecting these types of siding would be to read the installation instructions from the manufacturer, then walk around your home and make sure the

installation details match up with the diagrams the manufacturer provided. We have installation instructions for James Hardie siding going back to 1998 at the end of one of our older blog posts about that product: James Hardie installation defects.

While this is obviously not a full list of siding products used in the Twin Cities, these are definitely the most common. Same goes for the list of problems.





Part 4

VENT TERMINALS

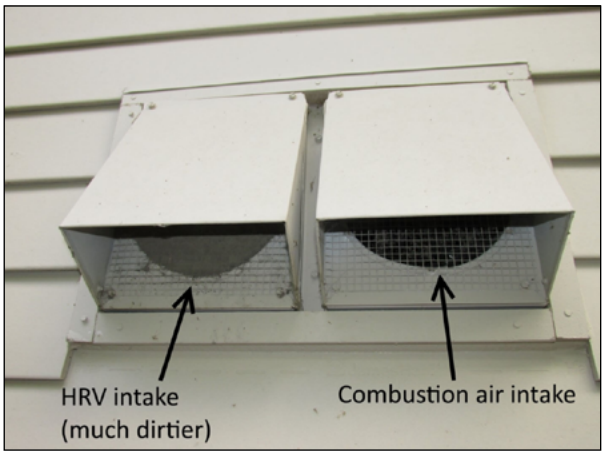
VENT TERMINALS

Before inspecting the rest of the exterior of your home, start by turning on any fans or devices that blow air out of the house. This includes the clothes dryer, bathroom exhaust fans, the kitchen fan if it exhausts to the exterior, and the HRV or ERV, if applicable. Now go outside and locate the terminal for each one of these devices, and make sure there's air coming out of every device.

It's common for these devices to terminate at the roof. If that's the case, you'll probably need to get on the roof to make sure everything is working properly. This is important. When fans exhaust into the attic, they can cause major problems in cold climates like Minnesota. Be careful when looking underneath vents, as wasps love to make nests at vent terminals, both at the roof and on the ground. If you can't account for every device that's supposed to be removing air from your house, or there's no air coming out of a terminal but there should be air coming out, it's something that should be looked into further. For more information about inspecting your bath fan exhaust, click the following link: Inspecting bath fan exhausts.

As we've mentioned many times in previous blog posts, the clothes dryer terminal needs to be cleaned regularly. Ideally, clothes dryers should not be vented through the roof. If there's a screen present at the clothes dryer exhaust, remove it. Screens get clogged and should not be installed at dryer terminals.

Check any intake grills to make sure they're clean—the most common one is the combustion air intake. Take a second to read through our blog post on combustion air duct problems and solutions and you'll know exactly what you should be looking for.



If your home has an HRV or ERV, the combustion air intake and the HRV/ERV intake will probably be located right next to each other, and they look identical. The way to tell them apart is that the HRV/ERV intake usually gets dirty much faster than the combustion air intake... not that it really matters. You just need to make sure they're both clean, and clean them on a regular basis.

If your home has an HRV or ERV but you can't find the intake, you have a problem. Maybe it was covered up when the house was re-sided, or maybe it's located underneath the deck where nobody can ever get at it to clean it. Those are both problems.

WINDOWS & DOORS

If you have old wood windows, check to make sure the paint and glazing putty are in good condition. A good layer of paint will help to protect the windows, and the glazing putty is what holds the glass in place

To check for rot, you don't need to go around poking at every single window and door. As we mentioned earlier in this document about exterior water management and siding inspections, just figure out which areas will rot first. Windows that are covered by big overhangs will probably never rot, while windows that see a lot of water will rot relatively quickly. If you've already had a chance to walk around your house during a heavy rainstorm, this should be very easy to do. Just think about which windows get the most water exposure. For windows located on large gable end walls, like the one shown to the right, check the lowest windows. They'll see the most water.

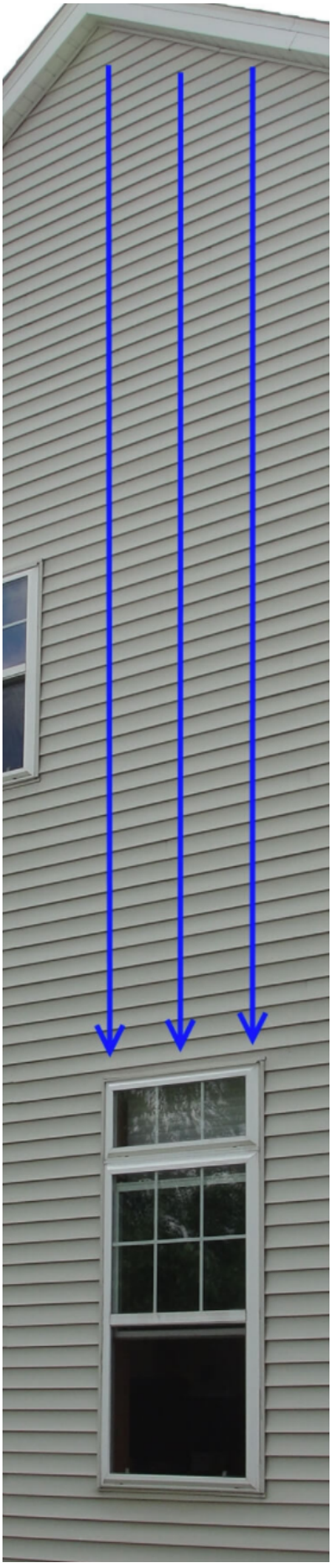
If you have wood windows, take an awl or a screwdriver and give the bottom corners of the windows a poke to check for rotted wood. If you have wood windows with aluminum cladding, give your window sashes a push and a squeeze. We made a video showing how to do this.

The same advice applies to wood doors and aluminum-clad sliding glass doors.

If you have an older home with windows and doors that have been wrapped with aluminum, make sure all of the joints and seams in the aluminum are properly caulked to prevent water intrusion, and re-caulk any areas with dried out or split caulking.

CAULK

Every homeowner should own a caulking gun and caulk. Go around the outside of your house and look for dried out / split caulking that needs to be serviced.



This is a topic that we could blog about for weeks, so we won't go into too much detail here. Just be aware that not everything on the exterior should be caulked—some areas are supposed to be left open to allow water to drain out. We have a couple of examples of places that shouldn't be caulked in some older blog posts: Don't Caulk Here. This might be one of those topics where there are just too many variables to cover every potential situation.

VEGETATION

This one is easy. Keep vegetation away from your house. For trees and tree branches, keep stuff trimmed at least six feet away. No trees too close to the house. One foot of clearance for bushes and smaller stuff. No ivy, period.

Oh, and if you have trees growing right out of the shingles on your roof... don't forget to water them.

FOUNDATION WALLS

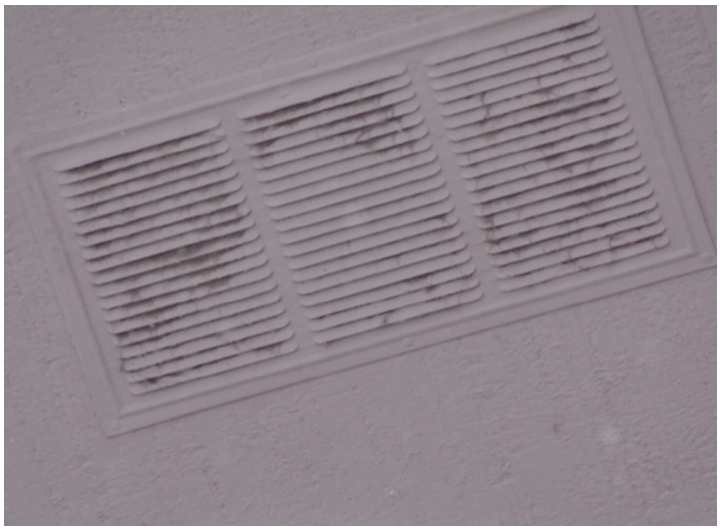
Small cracks in foundation walls are normal, and usually not worth getting excited about. What's small? For a concrete block wall, cracks that are less than 1/4" wide. For poured concrete, cracks that are less than 1/8". That's certainly not a hard and fast rule, but it's a good general guideline to go by.

The trick is to figure out whether cracks in the walls are caused by active movement or not. To help determine this, cracks can be patched with cement or mortar. If the cracks open up again, there's probably active movement, which is a structural concern that should be further inspected by a foundation specialist.

The other concern with cracks in foundation walls is that water can leak right through the cracks. The photo to the right shows a small crack in the foundation wall of a new-construction home. This crack resulted in water leaking right through the wall and into the basement.

SOFFITS & FASCIA

Inspect the soffits and fascia for rotted wood and any holes that could admit pests. Also, check your soffit vents to make sure they're clean. A clogged soffit vent will hamper airflow to the attic space. As mentioned earlier about roof vents, proper ventilation in the attic may help to extend the life of the roof, reduce the potential for ice dams, and reduce the potential for frost in the attic. The photos below show a couple of different types of soffit vent grills that need cleaning.



DRIVEWAYS & WALKWAYS

Raised edges in sidewalks and driveways create trip hazards. While this may seem obvious, it's also something to take seriously and have fixed. Falls are the leading cause of unintentional home injury deaths.

DECKS

Decks are deserving of their very own document. Check out this blog post on how to inspect your own deck.

Part 5

ELECTRICAL

There is a ridiculous amount of stuff that could be covered with this topic, and a lot of it takes a lot of explaining. We're going to cover the stuff that takes the least amount of explaining and makes the biggest impact on safety.

OVERHEAD WIRES

If your home has overhead wires bringing in power, check to make sure there are no tree branches rubbing on the wires. It's the homeowner's responsibility to maintain / trim trees on the property that may interfere with the overhead wires coming from the utility pole to the house.

Also, take a close look at the connection point between the overhead wires right before they disappear into the mast head. One wire is the neutral wire. It's normal for this wire to be exposed, but the other two wires shouldn't have any exposed contacts. Exposed contacts are serious shock or electrocution hazards that should be repaired by the utility company. The photo below gives an example of an exposed ferrule at one of the hot wires. Touch that thing with an aluminum ladder, roof rake, or something similar, and it'll be lights out for you.

For more examples of exposed conductors at this location, and for a more in-depth discussion of these issues, click the following link: [Tree Branches, Exposed Power Lines: Who Fixes What.]

OUTLETS

To test the outlets at your home, buy an outlet tester. These are sold at all home improvement stores and hardware stores for about $5, or a little more if the tester comes with a GFCI tester. A GFCI tester makes it a lot easier to verify that non-GFCI outlets in your home are GFCI protected, but it's not a valid way to test GFCI outlets. More on that topic below. The tester shown at right currently sells for less than $10 on Amazon.

So now that you have a tester, go around and test all of the outlets in your home. The light codes displayed by the tester will tell you if the outlet is properly wired, or what the problem is if the outlet isn't properly wired.

Side note: these types of testers will not identify all potential wiring problems, such as a false ground or an outlet with both reversed polarity and an open ground, but they'll probably identify about 99% of the problems that exist.

Here are the potential readings that an outlet tester will give you:

- **Open Ground** – more commonly described as an ungrounded three-prong outlet. Click this link for information about how to correct an ungrounded three-prong outlet. This is a condition that should be repaired by an electrician.
- **Open Neutral** – this is a very uncommon defect. It means there is power at the outlet, but whatever is plugged into the outlet won't work. This is often the result of a switched neutral wire.
- **Open Hot** – there's no "hot" wire at the outlet… or there's a live hot and no neutral and no ground. Whatever is plugged into the outlet won't work. Sometimes this might be the result of a switched outlet and the switch is just off, but in many cases it just means it's a dead outlet.
- **Hot/GRD Rev** – this is an extremely scary condition that we've never actually come across. Plugging in a tool with a three-prong cord would instantly energize the housing of the tool, making it an electrocution hazard. If you find this condition at a GFCI outlet, hit the "test" and then the "reset" button on the outlet and test it again. GFCI outlets will occasionally give funny readings that are not correct.
- **Hot/Neu Rev** – more commonly described as reversed polarity. Click this link for information about reversed polarity. This is a shock hazard that should be repaired by an electrician.

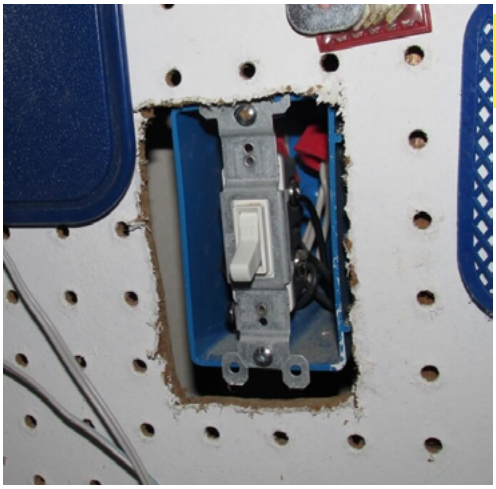
Every once in a while you'll get a different reading, such as all three lights lit up, or a bright middle light and dim lights on the left and right. These readings indicate problems that should be looked into further by an electrician.

If there are loose outlets, the repair is usually as simple as removing the cover plate and tightening the screws that hold the outlet in place.

Test all of the GFCI devices in your home to make sure they're functional, and replace them if they're not. This is something that's supposed to be done every month… and we're sure that everyone already does this, right? Ha ha. But just in case, here's a short video clip from Leviton showing How to test a GFCI device.

Also, make sure that there is GFCI protection for the outlets where you're most likely to get electrocuted. These areas include bathrooms, kitchens, garages, unfinished basements, the exterior, and many other places near water. Click the link for more information about testing GFCI outlets.

Oh, and if you press the test button and the outlet makes a buzzing noise, the outlet has gone bad and should be replaced.



COVER PLATES

Not only do cover plates help to prevent accidental shocks, but they help to contain any arcing or sparking that might take place within an electrical box, thus potentially preventing a fire. Go through your home and make sure there are cover plates installed for all of the outlets, switches, and junction boxes. A few of the more common places for missing cover plates are in unfinished basement areas, behind refrigerators, inside kitchen cabinets, and at garage ceilings.

While this is usually a very simple DIY repair, the photo above shows a situation where the fix isn't quite so simple; if a cover plate was installed over the pegboard, it would leave a gap between the box and the cover that could allow sparks to escape and potentially start a fire. The fix for this situation would actually involve cutting away the pegboard a little more so that a cover plate could be installed tight against the box.

EXTENSION CORDS

Permanently installed appliances should be plugged directly into their own outlets, not extension cords. Using extension cords increases the potential for a fire. A few of the more common places to find extension cords used in lieu of permanent wiring are at garage door openers, water softeners, and at basement lights.

WIRING

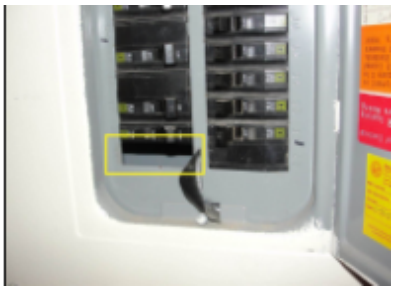
Wiring defects are probably best left up to an electrician for repair.

Open spliced wiring is a potential fire hazard.

Wooden boxes don't cut it either; wire splices should take place within proper electrical boxes.

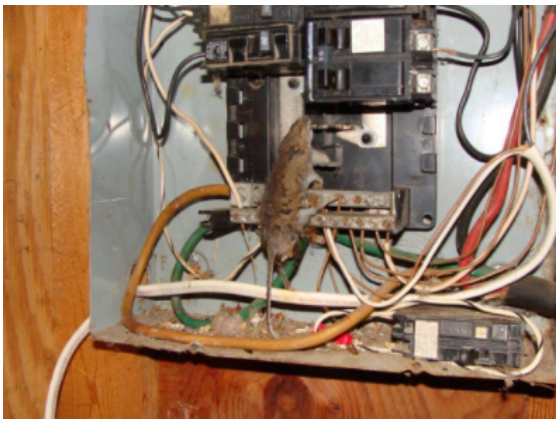
BOX OPENINGS & ELECTRIC PANELS

Unused openings in electrical boxes and electric panels should always be covered. These openings create potential shock



hazards, they might not properly contain a fire that could occur within the box, and can admit unwanted visitors such as mice.

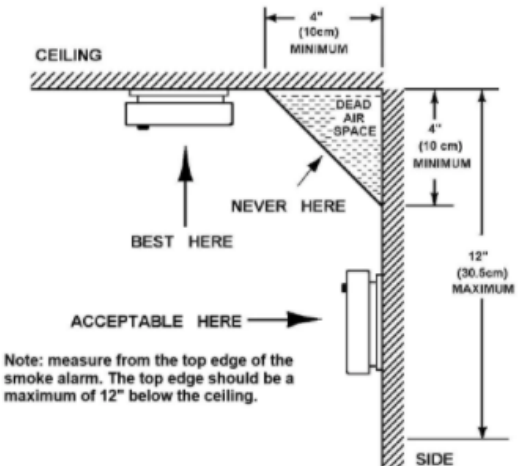
These types of defects are very much a DIY type of repair. For information on how to correct these issues, click here: Missing Knockouts.



SMOKE ALARMS

Check to make sure your home has smoke alarms installed inside each bedroom, smoke alarms installed in common areas on each level, and make sure they're properly located. The diagram below shows where smoke alarms should be located on walls and ceilings. Test smoke alarms monthly, and replace the batteries annually. Replace any smoke alarms over 10 years old. To check the date, take the smoke alarm down and look on the back. If you can't find a date or the smoke alarm has turned yellow, assume it's over 10 years old and replace it.

Please, please, please make sure your home is equipped with photoelectric smoke alarms. If you don't know what type of smoke alarms you have, we can almost guarantee they're not photoelectric, as we've found that the vast majority of smoke alarms are not. While photoelectric smoke alarms are not required, we believe they should be, and we consider this to be an important life safety issue. Click this link for more information about the importance of photoelectric smoke alarms: Photoelectric Smoke Alarms. For more details and tips on smoke alarm safety, click the following link: Four Smoke Alarm Safety Tips.



CARBON MONOXIDE ALARMS

The current standard for safety is to have CO alarms installed within 10' of every sleeping room. CO alarms used to be good for either five or seven years, but Kidde now offers CO alarms that are good for 10 years. If the CO alarms in your home are over 10 years old, they should definitely be replaced. If they're over five years old... maybe.

Part 6

PLUMBING

If it's leaking, fix it. The end.

Just kidding. For this section, we're going to share some home inspection tips and tricks that homeowners can use to identify plumbing problems. You'll want to use a good flashlight for your plumbing inspection, as a lot of this work involves looking underneath sinks and tub drains.

BATHROOM SINKS

Most homeowners already know about the more obvious leaks under bathroom sinks, but to really test these sinks for leaks, fill the sink with water and then let it drain all at once. This test will force a large slug of water through the drain, and will often identify leaks that wouldn't otherwise be seen. Carefully watch the drain while performing this test. One of the most common leak locations at bathroom sinks is at the drain stopper; fixing this leak is usually as simple as tightening the nut.

> **Note: if your drain goes "glug glug glug" after the water has drained out, you're hearing air getting siphoned through the trap, which indicates a problem with the venting. Click this link for more information on that topic: Plumbing Vents: Why Houses Need Them.**

If the bathroom sink drains slowly, it's usually the result of hair in the drain. Fix this by pulling the hair out with a Zip-It tool, which is an inexpensive, effective, and easy-to-use drain cleaning product invented by a Minnesotan. Click the following link for more information, but prepare yourself to see some absolutely disgusting photos of hairballs removed from drains: Zip-It®.

TOLIETS

Stand at the toilet with the front of the bowl between your legs, and give the toilet a little nudge with your shin to make sure it doesn't rock or swivel. A loose toilet can lead to a leaking toilet. Flush the toilet several times times and check behind, around, and under the toilet, (if possible) for any leaks.

If you have a toilet that clogs frequently, replace it. We recommend using Consumer Reports to help decide on a toilet. Their team tirelessly tests the toilets in the most tasteful manner possible to figure out which ones have the best flushing ability. We've trusted them in the past, and they haven't let us down. We'll leave it at that.

SHOWERS/TUBS

We wrote a whole blog post about identifying shower leaks back in 2009, and not much has changed since: How to find shower leaks. To inspect bathtub drains, first make sure there is access to the drain.

Sometimes this will be in the form of a large access panel in the room behind the tub, sometimes it will be an access panel at the ceiling below, and sometimes it will simply be a return register grill screwed to the wall that covers a hole in the wall. The photo to the left shows a comically small access hole for the bathtub drain at a new construction inspection.

This next photo shows a more traditional, old-school access panel behind a basement bathtub. The faucet was leaking profusely, but there were no rooms below, so the homeowner didn't know it was leaking. Once you've established that there is access to inspect the bathtub drain, fill the tub with water all the way to the overflow, and watch the overflow from the back side to make sure that water doesn't leak out. A leaking bathtub overflow can lead to a big mess, and this is one test that is specifically excluded by home inspection standards of practice. After you've made sure the overflow doesn't leak, pull the drain at the tub and make sure the drain itself doesn't leak. If there are any leaks at the faucet, you'll probably find them while doing this test.

The other common issue with showers and tubs is a slow drain, again, usually because of hair. Get a Zip-It®.

KITCHEN SINK

For the kitchen sink, fill up both sides of the sink with water, pull the stoppers, then immediately turn on the garbage disposer if present. This will force a lot of water through the drain all at once, and will often identify leaks and drain problems that nobody knew about. Sometimes this test will even force water to shoot out of a crack in the side of the garbage disposer.

If there's a problem with the sink drain, water will typically back up on the side of the sink that doesn't have a disposer, as shown in the photo to the left.

The culprit is typically old galvanized steel drain lines, which accumulate sediment on the insides of the pipes, making the internal diameter smaller and smaller over time, to the point where the fixtures drain very slowly, or not at all. The fix for this condition is to replace the drains, which is an expensive repair.

This test on the kitchen sink will also sometimes expose problems that show up in other areas; we've caused water to back up through reverse osmosis water dispensers, basement bathroom sinks, basement floor drains, basement laundry sinks, and basement standpipes by doing this test. After conducting this test, go downstairs and make sure none of the other plumbing fixtures have backed up. If they have, there's a problem with the drains.We have a few short clips of these things happening in our "47 Home Inspection Issues in Under 3 Minutes" video. At the 12 second mark, you'll see a basement bathroom sink overflowing (we had fun cleaning that up), a standpipe overflowing (we had fun cleaning that up, too), two more clips that aren't related, then a water dispenser overflowing at a kitchen sink.

FLOOR DRAINS

The most common issue with a floor drain is a missing clean-out plug. This will allow hazardous, stinky sewer gas into the home. For information about how to identify and correct this condition, check out our blog post on floor drain basics.

Side note: floor drains are usually the focus of attention when a main building drain is clogged. We've received more comments on our blog post about floor drains than any other post. Most of the comments were from frustrated homeowners dealing with clogged main drain lines. If the main drain line in your home is clogged, water draining from the upper fixtures will start backing up out of the lowest fixture. The lowest fixture is almost always a floor drain, so that's where water comes out. This really has nothing to do with the floor drain, it's just were the problem manifests itself because the floor drain is the lowest fixture.

WATER HEATERS

We've already blogged about water heaters ad nauseam on our website, so we'll make this short and sweet. Perhaps the easiest thing to check on your water heater is to make sure it's set to a safe temperature, which is about 120°–125° Fahrenheit. If your water heater has a draft hood, make sure your water heater drafts properly under a worst-case scenario. Also, check the relief valve discharge tube for signs of leaking. Leaking can lead to corrosion, and corrosion can lead to failure (and failure can lead to the dark side).

If your water heater is leaking from the bottom, it's time for a new water heater.

Part 7

PROTECT YOUR WATER

The most important job of any plumbing system is to deliver clean water, and to keep that water clean from sewage and other contaminants. This makes up the most basic plumbing principals of any plumbing code.

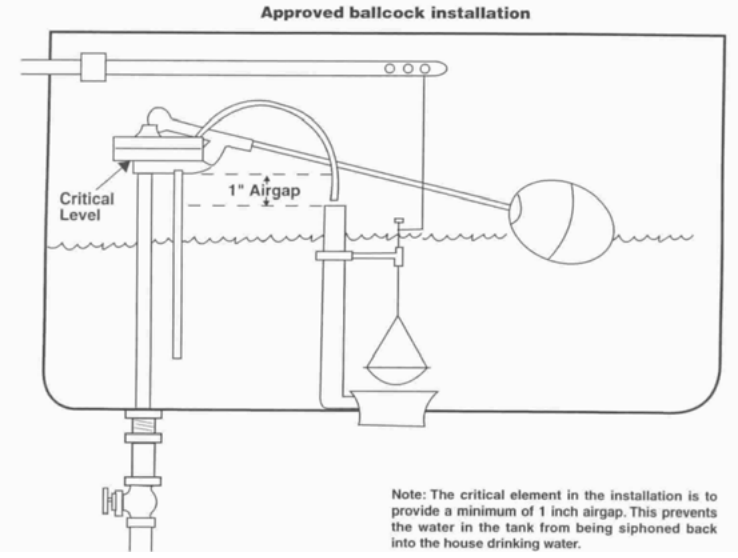
> **A.** All premises intended for human habitation, occupancy, or use shall be provided with a potable water supply which meets the requirements of the commissioner of health. Such water supply shall not be connected with unsafe water sources nor shall it be subject to the hazards of backflow or back-siphonage.
>
> **B.** Proper protection shall be provided to prevent contamination of food, water, sterile goods, and similar materials by backflow of sewage. When necessary, the fixtures, device, or appliance shall be connected indirectly with the building drainage system.

A large section of the plumbing code is dedicated to protecting our potable water supply, so it's a good idea to check your own home for some of the most obvious violations and fix them. Truth-In-Housing Evaluations have a big focus on protecting the municipal water supply, and homeowners are typically required to repair conditions that could contaminate the potable water supply before they put their home on the market.

Check out this old video clip for some good information about the importance of protecting the municipal water supply. The first minute and forty-five seconds waxes on and on about who made the video possible, then they get to the actual content. As mentioned in the video, any potential cross-connections are potential sources of contamination.

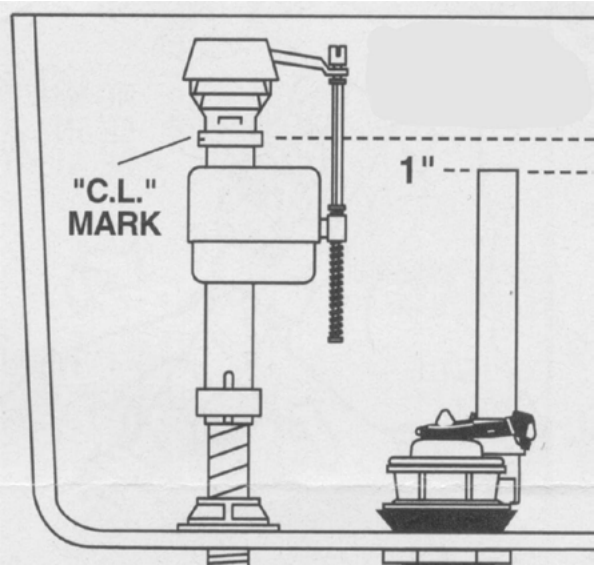
TOILETS

A cross-connection between the water in a toilet tank and the potable water supply can be made if the toilet fill valve or toilet ballcock is improperly installed. There are three most common types of toilet fill valves: the old style ball-cock, the new style fill valve, and the clam-shell type. The ballcock relies on a floating ball to shut off the water supply when the water in the tank gets high enough. The approximate height at which the fill tube connects to the ballcock is considered the "Critical Level" line, and it needs to be at least 1" above the top of the overflow tube. The diagram below illustrates this.



By far the most popular type of fill valve today is the type with a float attached to the stem of the fill valve, which is shown in the diagram below.

Again, the critical level line needs to be 1" above the top of the overflow tube.



Here's a short video clip that we made back in 2009, showing homeowners how to adjust the height of the fill valve in an existing toilet. One quick warning though: the installation instructions for these fill valves actually says to adjust the height of the fill valve before it's installed, and that the little ring on the bottom shouldn't be moved at all, as this is what holds the assembly together under pressure.

A far less common type of fill valve is the clam-shell type, which sits at the bottom of the toilet tank. These valves create a potential cross connection and just shouldn't be used. While the risk of contamination to the potable water supply is fairly low, we suspect most people would prefer to not drink the water in their toilet tanks if they didn't have to. While on the topic, here's a fun photo we took during a home inspection. We flushed the toilet as we were filling the bathtub, and the filthy water in the toilet tank was siphoned into the water going into the tub, instantly turning the tub water black.

Gross, right? That's why the guts of the toilet matter.

OUTSIDE FAUCETS, UTILITY SINK FAUCETS

Anytime a garden hose can be attached to a faucet, the faucet should be protected from a cross connection. On older faucets without a built-in vacuum breaker, this could be achieved by installing an external vacuum breaker, as shown here.

Note: the vacuum breaker shown above doesn't technically meet code in Minnesota, however, Minneapolis and Bloomington allow these vacuum breakers for their Truth-In-Sale of Housing / Time of Sale evaluations. More on that specific topic here: Cheap Vacuum Breakers Don't Meet Code.

Every faucet installed on new construction homes today comes with built-in backflow prevention, and can be identified by a slightly longer stem. The photos below show examples of faucets with integral backflow prevention. These faucets don't need an external vacuum breaker.

Utility sink faucets with threads that will accept a garden hose should have an exterior vacuum breaker installed. Don't install vacuum breakers at the hot and cold water valves for the washing machine though. Washing machines are already built with an internal air gap.

BATH TUB FAUCETS

If you have an old bathtub with a faucet located inside the tub, such as the one pictured below, you have a potential cross connection. Don't mind the height of the overflow—the overflow is not the same as the spill line, as a clogged drain would also mean a clogged overflow.

One way to correct this issue is to replace the faucet. A proper faucet for a clawfoot tub will have the opening of the faucet spout located well above the spill line of the fixture, as shown below. You can find a decent selection of replacement faucets at Vintage Tub & Faucet.

If you like the faucet you have or you just don't want to change out the faucet, another option is to have dual in-line check valves installed on the water supply pipes. These valves will prevent potentially contaminated water from flowing back into the potable water supply. If you choose this method, make sure the check valves are accessible; when the next inspector comes through, they'll probably be looking for them.

BATHROOM SINK FAUCETS

Very old bathroom sink faucets that have openings below the spill line of the fixture create a potential cross-connection. This usually happens with the type of faucets shown below, where there is a separate faucet for both the hot and cold water. The tape measure is sitting on top of the spill line of the fixture to show the relationship of the faucet openings to the spill line. The faucet openings should be at the same height as the top of the tape measure to create a 1" air gap.

This is a bad setup to start with, because there is no way of tempering the water coming out of the faucets unless you want to fill the sink to wash your hands... and who wants to do that? The best fix is to replace the faucets with a single faucet, which may also require replacement of the sink. Another option is to install check valves on the water supply pipes.

One non-recommended way to fix this cross connection is to bend the faucets up a little bit to create an air gap. We say non-recommended because there is a risk of permanently damaging the fixtures, but we bring up this fix because we've seen it done many times.

HAND SHOWERS

Hand showers that can sit in bathtub or shower water create a potential cross-connection. Most hand showers already come with built-in backflow prevention, but it's not a guarantee. The most obvious way to prevent a cross-connection at a hand shower is to replace the hand shower with a standard shower head that doesn't have a hose.

HAND SHOWER VACUUM BREAKER

If you don't want to lose your hand shower, install a vacuum breaker with a 1/2" thread, as shown at right. This device installs in-between the pipe coming out of the wall and the shower head.

As with most other potential cross-connections, installing dual inline check valves on the water supply lines that feed the shower would be an acceptable fix as well, but it's a lot more work.

If you live in Saint Louis Park or Bloomington, you'll have to fix this when you have your pre-sale inspection done. For Truth-In-Sale of Housing evaluations, Minneapolis only requires that handheld showers have a hook to hang on that will keep the shower head above the spill line of the fixture.

DISHWASHERS

If the dishwasher drain hose is improperly installed, there's a potential cross connection at the dishwasher. The old Minnesota State Plumbing Code required the dishwasher drain line to be installed as high as possible underneath the sink. That requirement was updated and made to be a little bit more strict in the Spring of 2016. Today, dishwashers are supposed to have an air gap device installed at the countertop. For more on that topic, visit dishwasher air gaps.

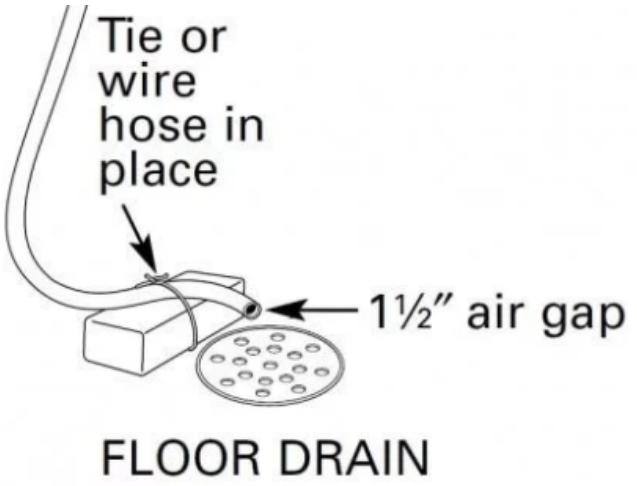
Nevertheless, here's a common installation that we find.

Tsk tsk. As you can see, the dishwasher drain hose isn't even looped as high as the bottom of the sink... and this was from a brand new home in Plymouth that we inspected before air gaps were required.

For more discussion on this topic, check out our old blog post on dishwasher drains.

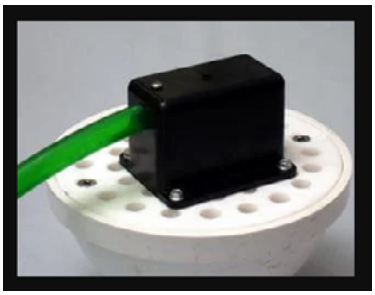
The discharge hose on a water softener needs to have an air gap at its termination. It should never connect directly to any fixtures or drains. The two most common places to terminate a water softener discharge hose are at a utility sink or a floor drain. There are about a bazillion ways to create an air gap, so here are a few nice examples. This first diagram shows the instructions that come with a water softener.

Easy enough.



WATER SOFTNERS

The only problem with the setup shown abo ve is that it will make a big ol' mess of the floor. This next one is a pre-manufactured solution called the Handy Gap, which will prevent water from splashing all over.



If the water softener discharges to a laundry sink, simply figure out a way to make the hose terminate 1-1/2" above the spill line of the sink.

BOILERS

In Minnesota, the minimum type of backflow prevention device required for a boiler in a one or two-family home used to be a double check valve with an intermediate atmospheric vent (DCVIAV). The new requirement, as of Spring of 2016, is either a testable double-check valve backflow prevention assembly, or an RPZ valve. This valve must be installed on the water supply line that feeds the boiler. The image to the left shows an example of a DCVIAV.

For anything other than a one or two-family home, a reduced pressure zone (RPZ) valve must be installed. This valve is also needed if any chemicals are added to the system, such as glycol.

If you have a boiler at your home but you can't find one of the two valves pictured above, consider having this corrected. This is a repair that's best left to a plumber.

Conclusion

These are the most common cross-connections that home inspectors find. If you have any of these cross-connections in your own home, your duty is to fix them.

Part 8

FURNACE

While a thorough furnace inspection is best left to a pro, there are a few basic things that homeowners can inspect to help prevent safety and operational problems.

To inspect your furnace, start by taking a look at the filter and replace it if it's dirty. Religiously replacing the furnace filter is one of the easiest and most important things that you can do to help prevent problems with your furnace. The filter isn't there to clean the air that you breathe, it's there to keep the furnace clean. A dirty filter means restricted airflow, which means less heat being dissipated from the heat exchanger. This can cause the furnace to run hotter than it's supposed to, which can lead to premature failure or complete shut-down of the furnace. This is very important.

If you have a combustion air duct coming into your furnace room, make sure it's not blocked. We gave several examples of blocked combustion air ducts in our blog post about combustion air duct problems and solutions. Here are some self-explanatory photos from that post:





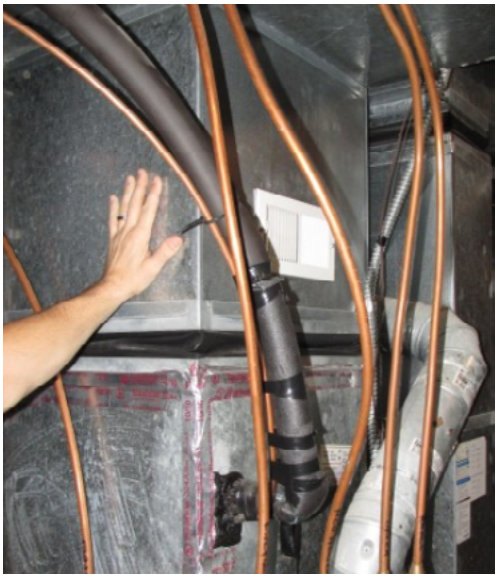

Next, check to see if your furnace is operational. Set your thermostat to heat mode and turn up the heat about five degrees warmer than what the thermostat thinks the temperature is. Now head to your furnace and make sure it fires up. If the furnace doesn't fire up, here are a few more items to check:

- Check the service switch to make sure it's on. This is typically a light switch that's either mounted to the furnace or located on a wall very close to the furnace. If this switch is off, the furnace won't run.
- Check the circuit breaker or fuse at the main electric panel.
- Test or replace the batteries in the thermostat.
- Make sure the blower fan cover is in place. If the cover is removed, a safety switch on the blower compartment should prevent the furnace from turning on.

Older furnaces will typically fire up instantly, while newer furnaces often go through a startup cycle, where the blower fan runs for a while, the draft fan runs, then the furnace fires. If the furnace is working properly, the flames will fire up and stay ignited. If the flames go on and then off again right away, there's a problem with the furnace and it's time for a service call.

Once the furnace fires up normally, it should stay running without shutting off until the thermostat is satisfied. If the furnace runs for a few minutes and then shuts off before satisfying the thermostat, it's short-cycling, which is a problem. This could be caused by an oversized system or a thermostat located in a poor location, like right above a heat register. A dirty furnace filter can also cause a furnace to short-cycle, but you already checked that, right?

Now go around your house and check to make sure the supply registers are open and unobstructed, and make sure there is warm air coming out of them. If too many registers are closed off or obstructed, the furnace probably won't operate properly. Check out this post at the Energy Vanguard blog for more information on that topic: Can You Save Money by Closing HVAC Vents in Unused Rooms? The short answer is no, and you can cause a lot of problems by doing this.



After the furnace has been running for about fifteen minutes, put your hand on the ductwork above the furnace.

If everything is operating normally, the ductwork will be hot, but not uncomfortably hot. You should be able to leave your hand on the ductwork without feeling any pain. If the plenum is uncomfortably warm or you'd like to conduct a more technical test, check out our blog post titled: A DIY Test For Furnaces.

Those are the basics, but it's still a good idea to have your furnace professionally inspected annually. More on that topic here: Are Annual Furnace Inspections Really Necessary?

Part 9

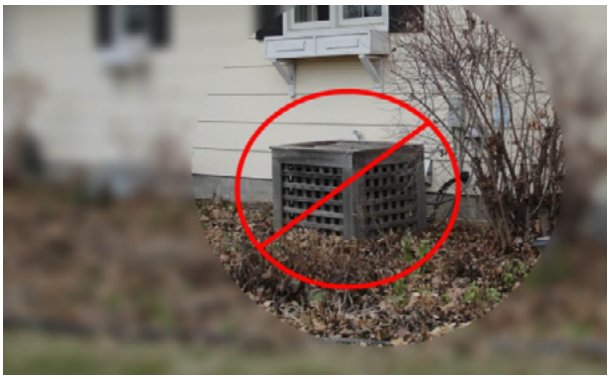
AIR CONDITIONER

Most single family homes in Minnesota have a split-system air conditioner. This consists of a big boxy-looking thing with a fan that sits outside the house, which is connected to a box that sits on top of the furnace through two refrigerant lines; one line is small and runs warm, while the other is larger, insulated, and runs cold.

The big thing at the exterior contains the compressor, a fan, and a condensing coil. It's sometimes referred to as the condenser unit, or the condensing coil.

INSPECT OUTSIDE

Start your inspection of the air conditioner by making sure that the exterior unit is clean and unobstructed. It dissipates heat by sucking in air on the sides and if it can't do that, it won't operate efficiently. This means no trellis attached to it, no ivy, no plants, etc.



Condensing coils also need to be cleaned regularly. When they're covered with dirt, dust, grass clippings, dryer lint, cottonwood seeds and other outdoor stuff, airflow can be severely hampered. Take the time to inspect all sides of the unit and clean the coils off if necessary. This can usually be done by spraying the unit down with a garden hose.

If the unit has protective grills that prevent access to the coils, the grills will need to be removed first. At that point, a little bit of dismantling is involved, and some homeowners might prefer to contact an HVAC tech to do the work.

While inspecting the exterior portion of the unit, make sure it's sitting on a level surface and that the refrigerant lines aren't being stressed. The photos below show some nice examples of air conditioners on top of soils that had settled so much that the units were tipping and the refrigerant lines were being stressed.

This is typically a simple fix, as the portion at the outside is usually lighter than most people think, and there is rarely (if ever) anything holding it in place. Older installations typically had the condenser installed on a concrete or plastic pad right on the ground, but most units installed on new homes today are mounted to the side of the house. The helps them stay cleaner longer, and it usually prevents tipping of the units. Usually.

Turn it on

Next, turn your air conditioner on by switching the thermostat to cool if it's not already there, and setting the thermostat to a temperature about five degrees cooler than the current indoor temperature. This should get the air conditioner to kick on. To be sure the system is running, look outside and make sure the fan at the condenser unit is turning.

If the system doesn't turn on, here are a few things to check which are quite similar to our furnace troubleshooting list, but not identical.

- Check the service switch for the furnace to make sure it's on. This is usually a switch that looks identical to a light switch. It's usually attached to the side of the furnace, or very close to it. The air conditioner won't run if this is off.
- Check the circuit breaker or fuse at the main panel.
- Test or replace the batteries in the thermostat.
- Take sure the blower fan cover is in place at the furnace.
- Check the disconnect at the exterior. Every air conditioner should have a disconnect at the exterior so the power can be safely turned off to the unit by a technician, and they shouldn't have to worry about someone in a different part of the home accidentally turning the power back on while the technician is working with exposed electrical components. This was covered in our blog post about locks at circuit breakers.
- If the disconnect has a pull-out block, make sure the pull-out is installed properly. Most of them can go in upside-down, which will prevent the unit from getting any power. When the pull-out is installed in the "on" position, you'll see the word "on" at the top.
- If the disconnect has a switch, make sure it's on.
- If the disconnect has a circuit breaker, make sure it's on and not tripped or turned off.
- If the disconnect has a pair of fuses, test them to make sure they're still good. Here's how: Test a fuse with a multi-meter.
- If a load-management device, aka a "Saver Switch" is installed, check to see if it's activated. Check out this video clip for info on what these are and how to determine if they're working: Saver Switches.

If you go through that whole troubleshooting list and still can't get your air conditioner to kick on, call a technician.

Once your air conditioner does turn on, go back outside and listen to it. A properly operating air conditioner will make a steady noise. If it makes a surging noise or any noises that seem 'funny', it could indicate a problem with the unit. That would be a good excuse to call a technician.

THE FILTER

The filter for your air conditioner is the same as the filter for your furnace. It needs to be changed during the summer and winter. A dirty filter leads to reduced air flow, which reduces efficiency and increases the potential for problems.

THE TEMPERATURE

After your air conditioner has been running for about 15 minutes, check the temperature of the air coming out to make sure the unit is cooling properly. Air blowing out of registers

always feels cool on your skin, so don't trust the way it feels.
Use a thermometer to verify the air conditioner is actually cooling. This will be similar to testing the temperature differential on a furnace. For more info, click the following link: A DIY Test for Furnaces.

When checking the temperature differential, measurements should be taken as close to the air conditioner as possible. The difference in temperature between the air going in and the air coming out should be somewhere in the neighborhood of 15–20 degrees. If it's much higher or much lower than that, it's probably not cooling properly and it's time to call in a pro.

THE CONDENSATE LINE

An air conditioner's two jobs are to remove heat and moisture from the air. Condensation occurs at the box that sits on top of the furnace. This box is called the evaporator coil and it's usually shaped like the letter "A", so it's often called an "A-coil". There's a concealed drain pan below this coil which connects to the condensate drain line. That's where all the condensate, aka water, goes.

If the condensate line gets clogged or obstructed, you'll end up with a big mess which could cause damage to the furnace, and possibly parts of the building. Keep the condensate line clean to help prevent this. To make sure there aren't any hidden condensate leaks above the furnace, remove the blower door to your furnace and look inside that compartment for moisture. If you find moisture, you have a condensate leak, which is probably the result of a clogged line.

If you'd like to try clearing a clogged condensate line yourself, or you enjoy squeezing blackheads and you'd like to do the equivalent for your air conditioner, check out this blog post with some great DIY advice: How to clean the AC condensate line. Just ignore the part about most units draining to the outdoors, as most units here in Minnesota drain to a floor drain or a condensate pump inside the house.

CONCLUSION

That concludes our list. For the most up-to-date information on these topics, please subscribe to our weekly blog.

Thank you for reading!