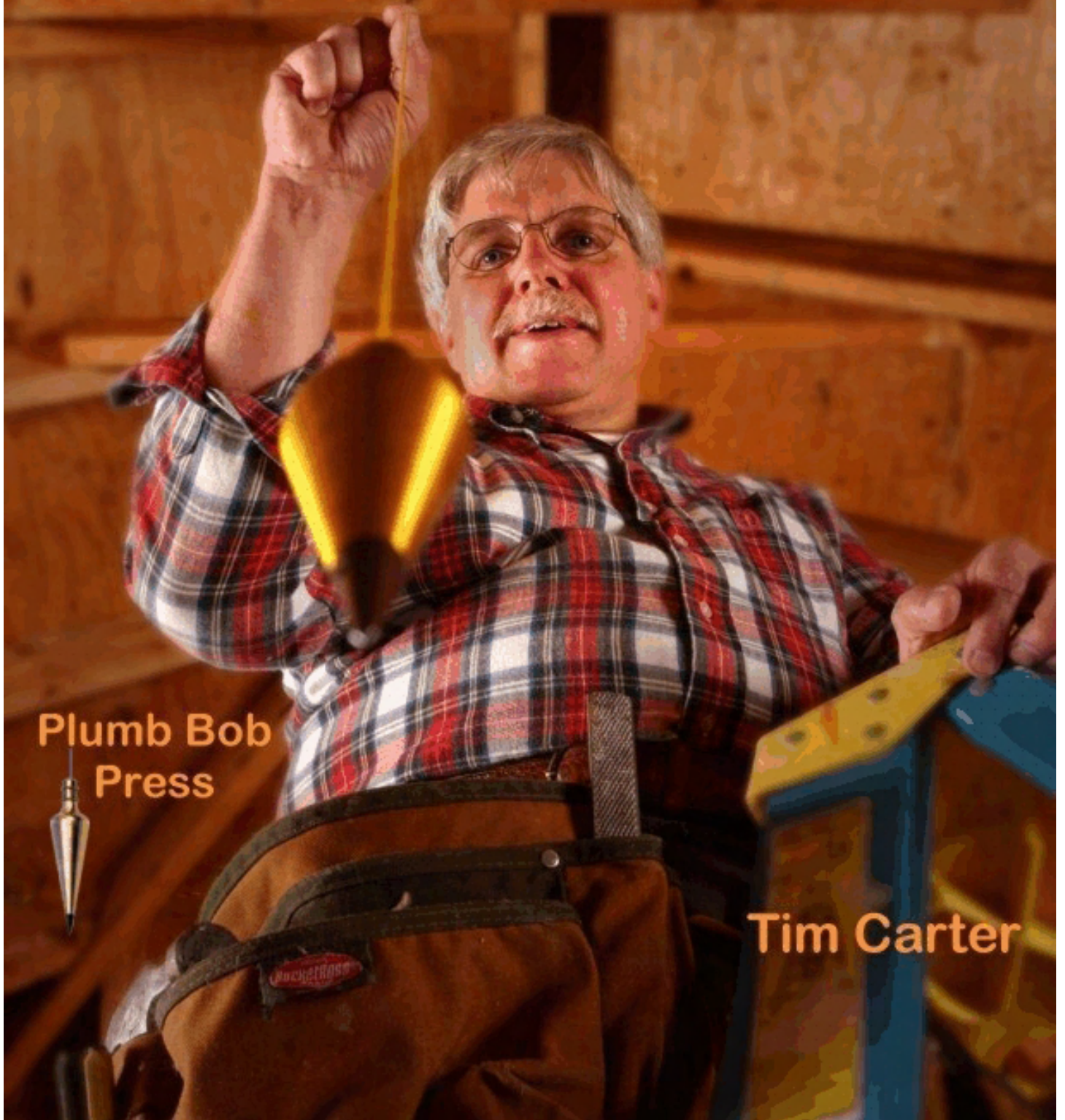


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Plumb Bob
Press

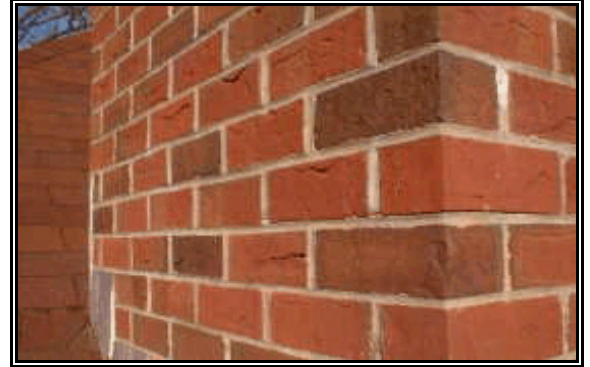


Tim Carter

Chimney Repair Contractor Hiring Guide & Checklist

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Do you have cracks running along the brick line on your chimney? Can the new mortar match the color of the existing mortar?



This Contractor Hiring Guide & Checklist will assist you in getting that contractor who can give you the correct results when it comes to repairing your chimney.

Click on the titles to read these columns, contained right here in this document. At the end of each section, there is a link to more information available at the [AsktheBuilder's web site](http://AsktheBuilder.com).

But first, here are links to four exclusive Contractor Hiring Guide & Checklist videos that will help you with Finding a Pro, Contracts, Payments and Change Orders.



[Finding a Pro](#) is not always done on the Internet or using the phone book. Tim explains a better method.



After the bids are in and the contractor selected, what should be in the [contract](#)? Tim outlines eight items that must be in your contract.



[Payments](#) are important. When do you make them and how much? Tim explains three important concerns regarding your payments.



[Change Orders](#) can cost more than just additional money. They can delay the whole project. Discover what to do ahead of time.

Chimney Repair

[Matching Mortar](#) - Texture and color matching of your mortar to use in a brick or masonry repair job takes a bit of legwork. You will have to determine the size of the sand used in your mortar. Your mortar will also need cement and lime. Bricklayers from your area may be able to direct you to the source of sand used in older homes.

[Mortar Mixtures for Tuckpointing](#) - If you think mixing mortar for your repointing job is going to mimic what you see on residential construction sites today, forget it! The mortar mix you see in those bags is probably not going to match your existing mortar in color and strength. This is especially true if your house was built prior to the 1950's. Houses built prior to the 1950's used site-mixed mortars rich in lime. When mixing your own mortar, first mix a small batch of 7 to 8 ounces and keep track of your proportions.

[Tuckpointing](#) - Cracks in masonry work stand out like a sore thumb. Repair efforts to solve these blemishes are often shortsighted and done in a hurry. A repair person or homeowner will run to the

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hardware store and grab a bag of premixed mortar and try to fix the cracks in an afternoon. This is a recipe for aesthetic disaster. The mortar joints will be completed that afternoon. However, the repair results will very likely look like a scar running diagonally across the face of your house. Don't disfigure your home - take the time to do the repair properly.

[Cracks in a New Chimney](#) - Chimney failure can occur for various reasons. Small hairline cracks in chimneys need to be monitored. Concrete footers may not be adequate for the chimney. Chimney block and brick can also be defective. The chimney crown must be watertight. Chimney sweeps and structural engineers can inspect your chimney.

[Chimney Caps](#) - Chimney caps should be checked for leaks. A chimney cap can be the cause of a damp attic. If there are cracks in the cement cap, water can get into the inner layers of the chimney masonry. The bricks, stones or block around the chimney may also be a source for the leaks.

[Chimney Crown Repairs](#) - Chimney caps or crowns can stop damage from happening to your chimney. These chimney caps / crowns are simply roofs for your chimney. Water will be kept from entering the chimney and causing deterioration of the brick and masonry. Chimney flashing must also be installed to stop any water.

[Roof Leak - Ten Most Common Leak Locations](#) - A roof leak is a major nuisance for most homeowners. Finding a leak can be frustrating or relatively simple, depending on location and weather conditions. Leak detection may go easier with these tips for locating a water leak and roof leak repair.

[Roofing - Roof Flashing](#) - A large number of roofing problems are due to leaks caused by faulty roof flashing. Residential roofing has transitions at junctions of projecting objects. These areas of the roof require special treatment with flashings to prevent leaks. These roofing tips cover advisories for residential roofing and flashing that you need to know to avoid problems and to hire the best professional for this very important roofing material.

[Roofing](#) - Read my other articles on Roofing on my AsktheBuilder.com web site.

Payments

[Contract Payments](#) - Detailed contracts noting exact contractor and homeowner specifications and listing payment schedules help avoid payment disputes.

[Payment Suggestions](#) - Before payment or work begins, establish detailed contracts, building plans, payment dates, affidavits and helpful construction reports.

[Payments](#) - Read other online columns regarding making payments during construction at the AsktheBuilder.com website.

The columns shown above are only a sampling of the columns available to help you. Check the [AsktheBuilder](http://AsktheBuilder.com) website for more information on this and all aspects of Home Improvement.

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Homeowner: _____ Contractor: _____

Address: _____ Address: _____

City/State/Zip: _____ City/State/Zip: _____

Phone: _____ Phone: _____

Email: _____ Email: _____

Contractor's License Number # (where applicable): _____

Project Location (Jobsite Address): _____

Date Bid Submitted: _____ Date of Plans & Specifications: _____

CHECKLIST

Tuckpointing a brick chimney is often necessary, but if not done with care the mortar will not match the existing mortar. Will you provide me with a piece of the existing mortar from my chimney that clearly shows the sand in it? Will you then get sand from a local supplier that has the same sized pieces and ones that match closely in color? Yes No

When my chimney was first built, the mortar looked different from it does now. Weathering has removed the thin film of cement paste that coated every piece of sand in the mortar. To ensure the new mortar matches the old mortar, the cement paste that coats the sand needs to be acid washed 60 days or more after the repairs are complete. Does your price include this extra step to make my tuckpointing not stand out like a sore thumb? Yes No

The leaks in my chimney may be from a poorly designed chimney crown. If you intend to rebuild my chimney crown, will you do it according to all the steps as outlined by the Brick Institute of America and referenced in this checklist? Yes No

The material used to pour the chimney crown should be concrete as it's often 2 or 3 inches thick. Using just bricklayer's mortar is an enormous mistake as you'll almost always get immediate plastic shrinkage cracks in the crown. Will you use concrete that contains regular stones in it or smaller pea gravel stones as aggregate? Yes No

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The concrete for the chimney crown needs to be made with Portland cement, not a bag of bricklayers mortar mix. Portland cement is far more durable. Will you use Portland cement in the crown mix? Yes No

The leaks in my chimney may be caused by wind-driven rain that enters at the seam where the mortar contacts the edges of each individual brick. Will you apply a clear silane-siloxane sealer that's meant to seal these entry points? Yes No

What's the name of the sealer?

What's the website address of the sealer so I can read up on the use and specifications:

<http://www.>

If a new roof is not part of this chimney repair, describe how you will protect the roofing around the chimney so it will not get stained:

Cold weather and cold brick temperatures can freeze tuckpointing mortar repairs. If this happens, the new mortar crumbles and eventually fails. Will you only do repairs if the temperature of the brick is above 27 F and the air temperature is forecast to rise above 38 F that day? Yes No

After the mortar is installed in cold weather, it must remain above freezing for at least 24 hours to prevent failure. If there's a chance the temperature will drop below 32 F within 24 hours of tuckpointing, will you wrap the repaired work with insulated blankets? Yes No

If you wrap the chimney with blankets or plastic, will you ensure that no furnace or water heater vent is blocked that could cause carbon monoxide poisoning? Yes No

In extreme hot weather, newly installed mortar can dry too quickly. After removing all bad mortar, will you saturate the chimney with fresh water getting the brick damp before you install the new tuckpointing mortar? Yes No

In hot weather, it's important that the new mortar is kept damp for at least 24 hours. After the new mortar is set and hard, will you lightly spray the entire chimney with water saturating all brick and then immediately wrap it in plastic so the moisture is trapped? Yes No

Will you then come back in a day or two and remove the plastic? Yes No

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Flashings for chimneys that have been leak-free for 50 or 100 years are normally made from tin or copper. These metals can be soldered to create leak-free joints, especially at the corners of a chimney. If new flashing is being installed as part of this repair, will it be 40-pound tin or copper? Yes No

Some roofers think that caulk is the new solder. It's not. Caulk is a temporary roofing material that will fail, sometimes as quickly as five years. Will the corners of the base and head flashings be soldered Yes No

Chimneys that protrude through the middle of a roof can be problematic. Water that flows down the roof can crash into the back of the chimney and back up creating a leak. A cricket is a tiny sloped roofing structure that eliminates these leaks. If this chimney repair requires a cricket on the uphill side of the chimney, will the cricked be constructed so that it has a ridge that is perpendicular to the uphill side of the chimney? Yes No

Smaller crickets are almost always covered with 40-pound tin and all joints soldered to create a leak-free surface. Will you cover the cricket with this 40-pound tin and solder all the joints? Yes No

After all new tin flashing is installed, it needs to be painted. The tin should be washed with soap and water and rinsed to remove all mill oil and any flux. This ensures the metal paint will adhere well. Will you wash the tin with soap and water, rinse and let dry before painting? Yes No

Some fireplaces smoke and don't draw well. Homeowners believe the chimney may be defective, when it's really a backdrafting issue. Before initiating expensive repairs, will you test the fireplace to make sure that the smoking issue goes away when plenty of fresh intake air is allowed to enter the room or the house? Yes No

The chimney crown material is not permitted to touch the flue liners. When the liners get hot, they expand and can cause the crown to crack. If you intend to rebuild the chimney crown, will you install a 3/8-inch expansion joint around the clay liners? Yes No

The expansion joint material is not to be exposed to the weather because it will leak. The material needs to be cut away to a depth of at least 1/2 inch and filled with a special caulk. Will you cut away the expansion material and then caulk the crack with NPI Polyurethane Sealant? Yes No

A flashing material should rest on top of the entire chimney and project out beyond the face of the brick. This drip edge helps direct water away from the chimney. Will you install this continuous flashing and drip edge? Yes No

Will you take photographs of this installed flashing and drip edge before the crown is poured and provide me with copies of the photos? Yes No

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Will you install reinforcing fibers or steel mesh in the crown to prevent it from cracking? Yes No

If there are cracked or damaged flue tiles, will you install a UL approved chimney liner system? Yes No

If you intend to install a stainless-steel liner to take the place of the damaged clay liners, will the diameter of the new liner be sufficient to handle the combustion gases? Yes No

Some chimney companies use subcontractors (Subs) to install their products. Subs sometimes are not adequately covered with proper liability and Workman's Compensation insurance. They often get paid a fixed sum of money which drives them to work faster. Subs are often not as responsive when a problem happens at a later date. Employees of the chimney company are often a better way to go. Who will perform the work on my house?

Own employees Subcontractor Combination

If subcontractors will work on this job, please attach their current Workman's Compensation & General Liability insurance documentation. Attached

Will you install all materials according to the manufacturer's instructions, guidelines, and specifications? Yes No

Will you remove all debris from the jobsite? Yes No

What is the length of your **(installer's)** warranty? _____ year(s)

Does it cover all labor and material? Yes No

OPTIONAL ADDITIONAL NOTES

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JOB COST BREAKDOWN

MATERIALS

Permit

Demolition and Debris Removal

All Necessary Materials

LABOR

Total Labor

Insurance

Workman's Compensation

Unemployment Tax

OVERHEAD

PROFIT

TOTAL JOB COST:

PAYMENT SCHEDULE

Excessive advance or periodic payments before or during the work is completed often put a homeowner at risk. The homeowner basically becomes a lender. This is especially true if the job does not require any special or custom ordered materials at the beginning of the job. A fair payment schedule is one that allows the homeowner to pay only for labor and material that has been completed in a satisfactory manner. Periodic payments can occur every 3 - 4 days for small jobs or each week or month for large jobs. On large jobs, the amount of money paid out at any given time should not exceed the total sum of the items listed in the above cost breakdown plus a proportionate amount of contractors overhead and profit for completed in-place work. A homeowner should not have to pay full price for work that is unsatisfactory or incomplete.

Do you agree with this philosophy? Yes No

If "Yes", please complete the Payment Schedule on the next page.

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PAYMENT SCHEDULE

First Payment: _____% of Total Job Cost.

To be paid when the following work is complete:

Second Payment: _____% of Total Job Cost.

To be paid when the following work is complete:

Final Payment: _____% of Total Job Cost.

To be paid when all work is complete and satisfactory and all debris is removed from jobsite.

INSURANCE DOCUMENTATION

Contractor's Workman's Compensation Risk number or Private Policy number and Carrier number:

(PLEASE ATTACH A COPY OF YOUR CURRENT STATE CERTIFICATE OR PRIVATE CARRIER CERTIFICATE)

Contractor's Liability Insurance Company and Policy number:

(PLEASE ATTACH A COPY OF CERTIFICATE OF INSURANCE)

ANTICIPATED STARTING DATE: _____

PROJECTED COMPLETION DATE: _____

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REFERENCES (List only jobs of similar scope and nature)

Job completed approximately 4 years ago:

Name: _____

Address: _____

Phone Number: _____

Job completed approximately 2 years ago:

Name: _____

Address: _____

Phone Number: _____

Job completed within the past 60 days:

Name: _____

Address: _____

Phone Number: _____

Bidding Contractor's Signature: _____

Date: _____

OPTIONAL COMMENTS

End of Checklist

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CONTRACTOR HIRING GUIDE & CHECKLIST HELPFUL HINTS

Thanks for purchasing one or more of my Contractor Hiring Guide & Checklist products. I am quite sure you will be pleased with how they help you find a professional - or more importantly - allow you to quickly spot a scoundrel!

You will run into some resistance from contractors when they see the Contractor Hiring Guide & Checklist(s). Some will reject it entirely. That is OK. Be patient and continue to call contractors until you find one who accepts the Contractor Hiring Guide & Checklist at face value - a document that protects both you and the contractor.

USE TIPS

1. Insist that all questions be answered. Incomplete answers can lead to incomplete jobs.
2. Test the contractor's phone number on several occasions. Do you get a machine, voice mail or a human? Humans solve problems, not machines. Note response times. If it takes days to get a return call, this could spell trouble if you start a job with this type of person.
3. The cost breakdown is so important. It allows you to compare quotations quite easily. You can see why one quote is low and another is high. On larger projects, a blank space in the breakdown tells you an item has been forgotten!
4. Insurance coverage is mandatory. You want real copies with current dates to show that you will be covered if someone gets injured on your job. Remember that subcontractors must have their own separate insurance coverage!
5. Start - Stop Dates will help you determine if the contractor is serious about your job. Ask about who will be working on your job and when they intend to show up. Ask about delays - what causes them and how long might they last.
6. References are critical. The key is to find ones from the different time periods. Ask the people different questions. The most recent reference can provide you with interesting data. For example, did the workers arrive when promised? If there was a delay, what was the problem? How long was the delay? Was the jobsite kept clean? Did anybody play loud music? What would the referral do differently if allowed to start the job over from the beginning?
7. Ask the referral from two years ago about warranty claims. Was repair work necessary? Were their severe problems? Was the contractor responsive? Were the defects fixed correctly the first time or were repeated attempts necessary?
8. The oldest referral has good information too. Ask how well the work has held up. Ask what they would do differently? Would they hire the contractor again, OR have they since found a different contractor who does better work? You might be surprised by their answers!
9. Contract Documents - Give serious consideration to attaching/referencing the Checklist as a part - or an addendum - to your contract that you and the contractor sign. It can be used as a fact sheet/specifications describing what was promised by the contractor. Since I am not an attorney, I can't

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give legal advice. You may wish to consult with an attorney to see if your state law permits these kinds of attachments or addendums. I believe that virtually every state permits you to do this.

HOW TO REALLY FIND A PRO

Finding a reliable, competent and skilled builder or remodeling contractor that can do all of the work will take some time but it is by no means impossible. If you understand some of the basic principles by which these people work, the task is not as mystical as it may seem. Quality contractors are proud of their work. They want it to be perfect or nearly so and they do not want any call-back or warranty problems. To achieve trouble-free results, they know that high quality materials are an integral part of each project. Real professionals know that problems are public relations nightmares and drain profits.

Knowing this, you start your search for contractors by visiting the businesses that supply quality materials to these individuals. You might be surprised to find out that these businesses are often places that you have never heard of. In your instance, open the Yellow Pages and look under the heading Drywall Supplies. Many of the listings under this heading will be businesses that cater primarily to contractors and not consumers like you. Visit two or three of these places if possible. Try to do this in the middle of the morning or the mid-afternoon. Never go early in the morning, at lunch or the end of the business day. These are busy times when contractors are picking up supplies.

Once there, ask to speak with the manager or possibly the owner. Briefly describe your job to this person. Ask for a customer who has been buying for 15 or more years, one that routinely buys the highest quality materials, and who pays his monthly bill on time. If the business manager obliges you, you will have a list of high quality candidates. The final question to ask, if possible, would be names of contractors that this person would use to work on his or her own home.

If the manager will not release names, then go to Plan B. Do a stakeout of the business in the early morning and get business cards from the contractors who are buying supplies. Look for ones who are driving well-kept vehicles that project a look of professionalism. You will still need to do more detective work, but your chances of hiring a pro are quite good.

Thanks again for your purchase. Don't hesitate to email me if I can help you in any way. Simply go to my website - AsktheBuilder.com - and look for the [Ask Tim](#) icon on the home page.

[Click here for other Contractor Hiring Guide & Checklists](#) available from AsktheBuilder.com.

Best regards!

Tim Carter - AsktheBuilder.com

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CONTRACT PAYMENTS

DEAR TIM: You and other people constantly write about how homeowners need to protect themselves from contractors who take their money and perform shoddy work or no work and disappear. What about homeowners who don't pay for work? I have had several customers who nit picks a job to death and withhold tens of thousands of dollars until several small items are completed. I have bills to pay just like everyone else. What is a fair way to solve money problems between homeowners and contractors? Robin S., Kansas City, MO

DEAR ROBIN: Touche! Years ago, I was in a similar situation. I am convinced that hundreds and thousands of homeowners torment contractors for all sorts of reasons. Some of them are legitimate while others are based on past bitter experiences, lack of goodwill, and distrust of contractors as a whole. Unfortunately, there is a small group of very bad homeowners who simply wish to cheat contractors out of money just as there are deceitful contractors who abscond with hard earned homeowner dollars.

When I perform autopsies on these problems, I typically discover a common flaw. The contract between the parties is very vague about the payment terms and conditions. In some instances, wording allows contractors to get too much money in advance. In other instances, homeowners advance money to contractors in a spirit of good faith. Unless these homeowners are working with a contractor who has the highest level of professionalism and honor, the advancement of money before certain things are complete can be a recipe for disaster. The incentive to continue to work at the highest level of efficiency and quality has been removed once the money has been paid.

Contractors routinely present contracts to homeowners that contain loopholes. Imagine language that states, "Payment is due upon completion of work." Well, if I were a homeowner, I could feel justified in holding back the monies if the job were not completely finished. Imagine the nightmare of a job where \$100.00 worth of exterior work can't be completed until the spring thaw yet \$80,000.00 or more is due upon the total completion of the job. If both parties agree to the terms of a contract, then I maintain that they should abide by what the contract states.

There are countless ways to solve payment problems. Several have worked well for me no matter how large or how small a job might be. One element missing in almost every contract I have seen is a tiebreaker clause. It is wise for the parties to agree up front on an independent inspector who is willing to give a ruling as to the quality and completeness of work. In the event of a dispute between the parties, the inspector issues a written ruling that goes one way or the other.

I have found that it is very effective to state that progress payments are made on given dates for the work that is in place and completed to the satisfaction of the homeowner and/or independent inspector. A job cost breakdown that assigns a fair and real number to each aspect of a job is invaluable for this to happen in a fair way for both parties.

The homeowner has a given amount of time to make the payment after the bill is produced. Since the homeowner knows when monies are due, all inspections would have to be scheduled in advance. This allows the homeowner to feel confident the work is satisfactory as he writes the check to meet the deadline. The contract could contain language allowing the contractor to pull off the job if the

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money is not paid on time. No contractor really wants to do this for any number of reasons, but it limits the amount of financial exposure to a fixed sum of money. It also gives the contractor some leverage as very few homeowners want their job to be at a standstill.

Set standards in the contract, if possible and reasonable, with respect to work meeting the building code or more importantly set forth manufacturers' specifications. A benchmark of quality must also be established or you may never meet certain homeowner's expectations. The independent inspector may come into play in this event as well.

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PAYMENT SUGGESTIONS

DEAR TIM: My house was severely damaged by a natural disaster. My husband and I hired a contractor who was referred by a friend and whose state license is in good standing. We visited other smaller jobs to review his work. We signed a contract with him to perform \$250,000 in repairs. He has taken all of our money and only 1/3 of the work is complete, much of it against code. What should we have done to avoid this nightmare? J.C.

DEAR J. C.: After reviewing all of the details of your story, I can see that this person was a con artist from the start. All of the facts that you have presented indicate that this individual was not capable of performing a job of your scope. Furthermore, it appears that he had every intention of stealing your money. He has no honor and makes life miserable for all honest, stable, and trustworthy contractors.

Some state laws permit contractors to ask for and accept deposit money the day the contract is signed. In many cases, deposit money forwarded by a homeowner to a contractor is nothing more than a loan. You put yourself and your money at great risk if you advance money to a contractor for no-good reason. Some contractors use deposit money to pay the bills of other jobs currently in progress. This business practice is often referred to as undercapitalization. In other words, their financial gas tank is running near empty.

Contractors deserve advance money in certain instances. For example, they may have to order custom nonreturnable objects such as kitchen cabinets or custom windows or doors. A build/design firm may want the cost of the design work and the building permit covered as these items can only be used on your job. Design and planning costs can be negotiated during the bidding process. Costs for custom materials can be verified by asking for copies of the quotes from suppliers. Honest contractors generally will not hesitate to provide you with these numbers.

I also noticed that you allowed the contractor to begin work without finished, detailed plans that were approved by your local building department. This was a critical error on your part. It is vitally important to have finished plans and specifications BEFORE the contract is signed. The plans should be an integral part of the contract documents. An investment of \$250 or so with an attorney to review your contract would have been very prudent. The contract could have contained language telling the contractor that all work must be performed according to the plans and specifications.

Payments of additional monies as the work progresses must be tied to specific progress points. You can agree to pay weekly or monthly for work that is complete and satisfactory. To aid you in determining what is a fair price to pay at each of these times, a detailed cost breakdown of the job costs is required. Had you obtained this breakdown of costs on your job, the money to pay for the yet unfinished work would still be in your possession.

I suggest that you contact your local building department as well. Often these agencies provide written progress reports during construction. These reports tell you whether or not the work is being completed in accordance with the building code laws. Make the contractor submit these reports, if they are available, at each request for payment.

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In addition, be sure you receive notarized affidavits from each person who has worked on your property or material supplier who has delivered materials. If your contractor has not yet paid these people, your nightmare is just beginning.

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MATCHING MORTAR

DEAR TIM: The mortar between my brick needs to be repaired. I want the patchwork to blend as closely as possible with the existing mortar. Should I use regular premixed mortars that I see on construction sites? What is the best way to assure a color match? Kate, Sarasota, FL

DEAR KATE: Matching mortar color and texture requires patience and persistence. Detective work combined with a little experimentation will yield excellent results. The key to success lies in taking your time. Do not rush into this task.

Believe it or not, the key to a successful color and texture match lies in matching the sand used when mixing the mortar. The sand in mortar accounts for well over 70 percent of the matrix that you see. Brand-new brick joints often have a film of lime or cement produced by tooling the joint. This very thin film is eroded with time. Water, wind and pollution constantly work to expose the sand that was used to create the mortar. Take a close look at an older brick wall and you will see what I mean.



The color of the grains of sand makes a huge difference in mortar color once the actual cement paste wears away. PHOTO CREDIT: Clay Lamb

To determine the color and particle size of the sand used in your mortar you must do a little destructive work. Try to obtain a cubic inch of mortar from several of your brick joints which require repair. Use a piece of wood to gently grind the mortar pieces into a coarse dust. Avoid the use of a hammer. You do not want to pulverize any of the sand particles. Mix 1 ounce of muriatic acid with 10 ounces of water. Stir in your mortar dust. Within two days any and all lime or cement in the mix will have dissolved. The sand will be at the bottom of the container. Use white vinegar instead of acid if your mortar contains crushed sea shells. Do not add water to the vinegar. Use straight from

the bottle.

Carefully pour off a majority of the acid bath into a toilet or laundry tub. Be careful not to lose any sand. Add water to your container to dilute the remaining acid. Pour the sand and water mixture slowly into several folded paper towels to capture the sand. Allow the sand to dry. Store it in a closed, clear glass jar.

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Visit several gravel and sand pits until you find a sand that matches yours in color and particle size. Be sure to look at dry sand samples! Moisture changes the color of sand. If your house is older, try to ask old bricklayers where sand was purchased and/or mined in your area. Trust me, the older the house, the closer the source of sand. Once you have found a sand or a blend that is close in color and texture, you are ready for further experimentation.

Older mortars often had a much greater amount of lime content than today's premixed mortars. You need to locate a building supply house that sells lime, white cement and grey cement. You will need all three components. Old mortar (70 years older or more) may require 6 measures of lime to one measure of cement. Lighter mortars probably require the use of white cement instead of grey cement. You may find that you have to blend both cements to get a perfect color match.

Furthermore, if your brick and mortar are old and dirty, you may want to wash the brick before you begin the repair job. If this is not feasible, you may have to age or stain the repair job after it dries to make it appear dirty. The trick to matching color while you are mixing is to get the existing mortar wet. If the wet mixture in your wheelbarrow looks close or identical to the wet old mortar in between the brick, you may have a perfect match when it dries. Do a test batch and let it dry for two weeks to see if your recipe is right. If not, keep trying.

If you are building a new home, save two or three five-gallon buckets of the sand used to mix your mortar. In addition, save a bag of mortar if possible. Wrap and tape it tightly with two or three plastic garbage bags to seal out water vapor. This pack rat mentality will come in handy if a storm damages your chimney or someone bumps a wall with a car.

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MORTAR MIXTURES FOR TUCKPOINTING

A Blending Experiment

The mortar mix you see used by brick layers today contains two ingredients: lime and Portland cement. In fact, the Portland cement ratio is quite high. Old brick layers used to mix their own mortar on the site by blending lime with Portland cement. Old houses, say more than 100 years, rarely had any Portland cement in the mortar. The bricklayers just used lime and sand.

Lime and Portland cement are available at building supply houses that supply bricklayers. If you look in the Yellow Pages under "Brick - Supplies" you will eventually find a company that sells bags of lime. It is inexpensive and it is white - pure white!

Mortar Strength / Self-Healing Properties

Brick walls are constantly on the move. The heat of the sun causes them to expand and contract. If the mortar between the brick is too hard, the brick will crack. Portland cement makes mortar hard. Older brick tends to be softer than today's brick. Thus, old mortar had much less Portland cement than today's mortar. The lime content of the old mortar was very high.

Lime adds another benefit, one we could use in today's mortars. Lime is somewhat water soluble and reacts with carbon dioxide and water. As time goes on, the lime in the brick will actually resolidify if a small crack develops. The crack allows water and carbon dioxide to enter deep into the mortar. The lime reacts with the water and gas and heals the crack.

Proportions

The first step in mixing new mortar is to blend Portland cement and lime together. If the mortar is very soft and old, you may choose to blend six parts lime to one part Portland cement. If your mortar is very light in color, be sure to purchase white Portland cement. If the mortar is darker, you may get by with gray Portland cement. Mix a very small batch to begin. I would mix no more than 7 to 8 ounces (by volume) to begin. You then mix two parts sand to one part of the blended lime and cement. Be sure to write down your proportions.

You blend the sand, lime and cement together dry. Then add just enough water to make it wet enough to form into a ball. The color of this mixture should match very closely the color of the existing mortar when it is wet. If not, you need to start over with your lime and cement proportions. Pay attention to the sand proportions too. If the existing mortar has not too much sand visible, you may have to mix 1.5 parts sand to 1 part of the blended lime and cement.

To get a perfect match, you should let the mortar dry for several weeks. Hold the sample next to the existing mortar to see how close you came.

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TUCKPOINTING

In a Rush? - Don't Apply!

Buildings sometimes settle and cracks develop in the mortar joints. Older mortar will succumb to the elements and simply erode away. This is often the case if water leaks from a gutter or downspout and is allowed to stream over the face of a brick or stone wall.

I have chiseled out many a mortar joint. It is tedious work, plain and simple. If you want excellent results, be prepared to take your time. The brick must not be chipped in the process. You can easily chip brick or stone if you aggressively attack the mortar joint. Hard blows from a hammer will transfer concentrated blasts of energy to the mortar. This energy is often absorbed by the brick. Chips and cracks are common if you hammer too hard. The chiseling action must be directed sideways in the joint, not toward a brick.

Mortar Removal Tips and Techniques

The removal of the old, loose mortar is the most important part of a tuckpointing job. If you cut corners here, you might as well forget about doing the job at all.

There are three ways to tackle the job: hand work with a hammer and chisel; the use of power equipment, or a combination of the two. If you have just a little repointing to do, a hammer and chisel may be the trick. However, if there is a significant amount of work, you may combine a grinder or a hammer drill to assist you.

CAUTION: Power equipment will permanently damage brick surfaces. You will become fatigued and a drill, power chisel, or a grinder will slip and scar or chip a brick. I only advocate the use of power equipment for small periods of time when you are fresh and alert.

Pointing Chisels

The task of removing mortar by hand is made easier if you choose the correct chisel. Purchase a special brick pointing chisel. It is a small, flat chisel that resembles a miniature, thickened carving knife. The chisel comes to a point and the shaft of the chisel is approximately 1/8 to 3/16 inch thick. This way it can easily fit between two bricks.

You need to chisel approximately 3/4 inch deep into the old mortar to enable you to get a good bond with the new mortar. The new mortar needs to be able to have adequate brick surface to adhere to.

If the mortar is old lime mortar, chiseling will be easy. If the mortar is a rich Portland cement mortar, you may have to use a roto-hammer with a 1/4 inch bit. Drill straight into the mortar keeping the holes about 1/4 inch apart. This method will allow you to finish the job with the pointing chisel.

Always remove the loose mortar and dust before proceeding. I always squirt out the joints as well with water. The surface of the old joint must be dust and grit free for a good bond.

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Matching Mortar Color

Once you have removed all the loose mortar, you still must invest a lot of time for a perfect match. Mortar texture and color must be matched. Color tinting may be involved. It was not uncommon for masons of old to add natural pigments to the fresh mortar mix. Dirt and weathering forces can cause the mortar to have a different appearance than when first installed. This is especially true of horizontal mortar joints, as you will find in brick walkways. My front sidewalk mortar is very dirty, even though it is only eight years old. When I go to repair a joint, I will be forced to scrub the joints clean with my Stain Solver Oxygen Bleach to make sure the repairs will match.

Sand Colors

Look closely at your existing mortar joints. If your house is older, you will undoubtedly see lots of sand particles. Notice the different sizes and colors of the individual grains of sand. These small dots of color are responsible for a vast majority of the overall color you see. It is no different from the color photographs you see in the newspaper each day. Those photographs are made up of tiny color dots.

If you want your tuckpointing to match the existing mortar, you must start first with the correct sand. It might not be as hard as you think to locate the sand. The key will be to think about when the house was built and where sand pits were located at that time, not the present locations. Freight, or hauling, is the largest cost when buying sand. That is true today and it was true 100 years ago. For this reason, brick masons try to purchase sand from a convenient source.

Ask the experienced employees at the local brick supply houses and gravel pits where the sandpits of old used to be located. Try to see if there is still sand available from these old pits.

Mortar Analysis

To get a sample of sand from your existing mortar to compare with new sand, you need a little bit of muriatic acid. The acid will dissolve the old lime and cement from the mortar. The net result will be sand in the bottom of the glass or other vessel you choose to use for this simple process.

If you live in a coastal area, where sand often contains sea shells and other calcium carbonate pieces, the acid treatment will not work. The acid will dissolve the sand!



The color of the brick and mortar don't match in this chimney repair. This will be noticeable from the ground. PHOTO CREDIT: Clay Lamb

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Mix 1 part of acid to 5 parts water in a clear glass if possible. Drop in some of the old crumbling mortar. If the mortar begins to bubble vigorously, that is usually an indication that the mortar contains a high percentage of lime. If there is minimal bubbling, Portland cement may be a majority binder.

In either case, allow the mortar to sit in the acid solution for up to several hours or days. You can redo the experiment after the bubbling stops to make sure the acid has done all its work. When completed, there should just be sand particles in the bottom of the glass. Pour off the acid and get the sand into a paper towel to dry. Once dry, put the sand into a small clear glass or plastic bottle that you can get from your local pharmacist. It's time to go find the new sand. Be sure you look at dry sand samples at the gravel pits and building supply stores. Pay attention to particle size and color.

Installing New Mortar

Once you have found the correct sand, and followed my instructions on how to blend the right amount of lime and cement with the sand, you are ready to point the brick joints. You need two or three simple tools to make this an easy task. Purchase or borrow a regular brick trowel, a small pointing trowel and a tooling jointer. The pointing trowel is simply a thin, rectangular piece of metal that is attached to a wooden handle. They come in different sizes to match the width of the mortar joint. Always use one slightly smaller than the width of the joint. The tooling jointer is simply a tool that creates a profile to match that of your existing joint. Some are concave, others create a V-groove and still others create a line.

You need to dampen the old mortar joint before installing the new mortar. Place mortar on the full sized brick trowel and hold this level with the joint to be filled. Use the small jointing trowel to bulldoze mortar into the joint. Take your time and do not get any mortar on the face of the brick. Strike off any excess mortar and allow the mortar to stiffen before tooling it.

To really match color and texture, you may have to distress the new joint in a month. Acid washing will often create a weathered appearance. Coffee, tea or other colored liquids can add colors to recreate dirt or other stains. Stand back at the street to judge the results of your work.

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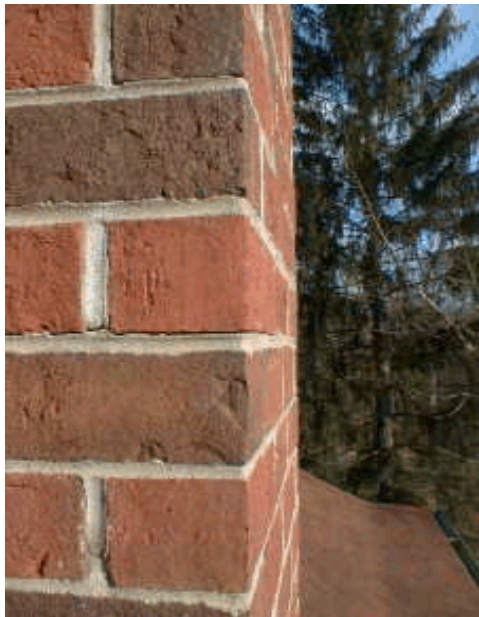
CRACKS IN A NEW CHIMNEY

DEAR TIM: My six-month-old block and brick chimney has developed some cracks. These 30 - 36-inch long cracks run vertical through both the brick, block and mortar joints. Should I be concerned? Are the cracks normal settling? Is the bricklayer to blame? Some joints weep moisture after a rain. Is that normal? Nick R., Middlebury, VT

DEAR NICK: Cracks that pass through either brick or block concern me. A hairline crack that appears every now and then in either a vertical head or horizontal bed mortar joint may be a simple shrinkage crack. But a long, continuous crack such as the one you describe most certainly is something to investigate.

Brick, concrete block and even stone are very strong materials when you attempt to squeeze or compress them. Some can have compressive strengths that easily exceed 5,000 or even 7,000 pounds per square inch(psi). Some granites have an incredible compressive strength of 28,000 psi. But subject these same materials to a different force - tension, and they can readily crack. Tension is a bending or stretching force.

Settlement could be the cause of failure. The soil upon which the chimney rests might not be strong enough to support the enormous concentrated load that is being placed upon it. The combined weight of all of the brick, block, mortar can be in the tens of thousands of pounds for an average chimney, especially one that has been built correctly where the masonry is solid around the flue liner.



The crack in this chimney could be a problem.

The concrete footer for the chimney may also be inadequate. Most chimney footers should be a minimum of twelve inches thick and extend one foot or even 16 inches on all sides of the actual footprint of the chimney. Steel bars, 5/8 inch in diameter, should be placed three inches up from the bottom of the footer. These bars should be placed every 16 inches on center in both directions. Be sure these bars do not droop or fall to the bottom of the concrete during the pouring process.

The actual brick or block may have been defective. But the likelihood of placing several defective masonry units on top of each other where the defects are in perfect alignment is a one-in-a-million possibility in my humble opinion. There is a possibility the mortar below the defective area is of poor quality and the weight of the masonry above it caused the cracks to appear. This is also a low-probability cause.

Believe it or not, the cracks can be wind related. The mortar that is used to cement the bricks and blocks to one another does not have instant initial strength as the chimney is built. It takes weeks and even months for the mortar to develop its full strength. Strong winds on a new chimney can exert a considerable tension force within the masonry. Block and bricklayers know this and the smart ones often insert steel rods within the

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chimney as it is being built to help resist the force of the wind. These same steel rods are vitally important for those that build chimneys in seismic zones.

The weeping joints are somewhat normal. Rainwater, especially that rain blown against the chimney, soaks into brick veneer and brick and block chimneys. This liquid water sometimes dissipates into the masonry, but large amounts of water can work its way down the chimney and find a pathway back to the exterior through a mortar joint.

But liquid water trapped in a Northeast chimney in the winter months is a very bad thing. If large amounts of trapped water freeze, the expanding water can blast the chimney apart. You must make sure the top of the chimney - the crown - is watertight. If there are cracks, you can buy wonderful synthetic polymer compounds that have a color and texture that match the chimney crown.

These are troweled on over the existing cracked crown and provide years of leak-free performance. The actual face of the chimney can be sealed with new clear sealers and compounds that will bridge cracks up to 1/8 inch in width. A chimney that has been weakened by a building defect or even natural deterioration is a dangerous thing. They can collapse with very little notice and cause serious bodily harm or death and do enormous structural damage to the average house.



The crack travels the entire length of the horizontal bed joint.

It is always a good idea to have a suspect chimney inspected by a residential structural engineer, a seasoned chimney sweep or bricklayer who has 20 years or more experience building chimneys. Rebuild the chimney in fair weather when outdoor temperatures are in the 60 - 75 F range.

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CHIMNEY CAPS

DEAR TIM: This weekend I was up on my roof and I believe I may have discovered why my chimney is so wet when I look at it inside my attic. The cement cap that surrounds the clay flue liners has cracks in it and is in very bad shape. Do you think this is the problem? Should I just caulk the cracks and do some mortar repair? What is the best solution to keep my chimney in great shape? Jeff K., Belleville, IL

DEAR JEFF: Your chimney cap is also often called a chimney crown. Just as a crown is the top most thing on the head of a member of the royal family, a chimney crown is almost always the tallest thing on your home. Because they are up in the air and most people don't regularly climb on their roofs, chimney crowns and caps often are neglected.

You bet the crown might be the cause of the dampness you see inside your attic when you look at the masonry chimney in your attic space. The chimney cap is the roof of your chimney. If it has cracks and holes in it, it will allow copious amounts of water into the inner hidden layers of masonry inside your chimney. This water wants to get out, and it drifts to the sides of the chimney as gravity pulls the water down toward your fireplace.

But water may also be entering your chimney through the actual brick, stone or block. The contact zone between the mortar and the brick, stone or concrete block is a place where water can easily enter a chimney, especially during severe rainstorms where wind is pounding raindrops into the sides of the chimney. You would be shocked how much water can enter a brick chimney or brick wall in this manner, even when you can't see hairline cracks in the mortar.

Many chimney caps are not built correctly. They should be made, when possible from precast concrete or cut-stone. The openings for the flue liners should be one-inch larger than the actual flue liner so the gap can be caulked. The flue liners expand and contract as they heat up and cool down. This movement will create leak points if cement mortar is troweled up against a clay flue liner.

If your mason insists on pouring or creating a cap in place, it should be steel-reinforced, and have an overhang. The cap should project beyond the face of the brick about 1.5 inches, and there should be a drip groove on the underside of the overhang. This groove prevents water from rolling under the overhang and then down the face of the chimney.



This cement chimney cap is like most. It is lacking an overhang, and it does not have a flashing beneath the cement mortar.
PHOTO CREDIT: Tim Carter

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A membrane flashing should also be placed on the last flat level of masonry before the cap is placed. This flashing prevents water from penetrating down into the chimney in the event it makes it past the cap or crown. The flashing should lap up onto the sides of the flue liners and the flashing edge should project out past the face of the brick.

You can purchase some effective restoration products that will allow you to repair and seal your existing chimney cap. Some of these products are a combination of peel-and-stick membrane flashings that cover your existing cap, and then are covered with a special cement-and-sand mixture that bonds well to the membrane. The finished result is attractive, durable and leak-proof if done correctly.

To prevent leaks through the brick face of the chimney, I would suggest applying a silane-siloxane water repellent on the brick. These clear products prevent liquid water from entering the brick and mortar, but allow water vapor to escape. This is very important for those chimneys that experience below-freezing temperatures. If water gets trapped in the brick or mortar, it will expand when freezing weather occurs. This expansion can blast apart well-built chimneys over time.

Be very careful when working on old chimneys. Tall ones, even ones over five feet high, can be very unstable. Years ago I was working on a roof of a home and leaned a ladder against a narrow 8-foot tall chimney. As I climbed the ladder, I thought the ladder was moving. It was, as the old chimney was rocking back and forth. The old mortar between the brick had long ago lost its bond. I carefully backed down the ladder before the chimney tipped over crashing through the roof.

If you are working on a chimney while fuel-burning appliances are in use, be careful of the fumes exiting the flue liners. Toxic carbon monoxide can debilitate you causing you to become ill, lose your balance leading to a fall. If you have little or no experience working on chimneys and roofs, leave this job to a professional chimney sweep. These craftsmen have the tools, nerve and skills to fix your chimney problems. Let them extend the life of your chimney instead of you risking your own for a pile of brick.

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CHIMNEY CROWN REPAIRS

DEAR TIM: My three-year-old house has a brick chimney. While performing a routine inspection of my roof, I noticed numerous cracks in the mortar cap on the top of the chimney. Furthermore, the face of some bricks is beginning to flake. Is it possible that water is entering my chimney through the cracks and causing the bricks to flake? Is it normal for this amount of deterioration to occur in such a short amount of time? Was my chimney constructed properly? P. E.

DEAR P. E.: The photos of your chimney tell the tale. You were victimized by a nonprofessional brick mason. Your chimney crown (mortar cap) has numerous defects. Unless you correct these problems, you can expect further, rapid deterioration of your chimney.



Efflorescence growing in the mortar of a brick fireplace.

PHOTO CREDIT: Michael Hannum

Chimneys are basically very small structures. Just as your house needs a roof to keep water from entering, so to your chimney. Chimney crowns are simply chimney roofs. The crown should slope down from the flue liner. The angle of this slope should be a minimum of 3 inches of fall per foot of run. Flat or low slope crowns can allow water to enter the interior of the chimney. This water can cause efflorescence (white salt deposits on brick surface), brick spalling (the flaking you are experiencing), and the deterioration of the mortar between individual bricks.

All too often, brick masons simply use mortar mix to finish off the top of a chimney. Chimney crowns should be constructed using either precast concrete slabs, cast-in-place

steel reinforced concrete, solid stone, or metal. Masonry crown materials should not directly contact the chimney flue liner. This gap should be caulked with a flexible cement stable silicone caulk. The cracks in your crown possibly occurred because the flue liner expanded from the heat of the fires below. This expansion popped your weak mortar cap much like a chick hatching from an egg. Also, excessive shrinkage cracks often develop in cast-in-place chimney crowns that lack adequate reinforcing steel and/or are not cured properly.

I also noticed that your chimney crown does not extend beyond the outer surface of your chimney. A chimney crown should extend a minimum of 2 and ½ inches beyond the face of the chimney on all sides. This overhang helps to keep water from running down the chimney face. The bottom of the crown should contain a small kerf (drip). Without the kerf, water can roll underneath the crown and flow down the face of the chimney.

Your photos indicate that your brick mason failed to install a flashing underneath the chimney crown. This flashing is the last line of defense in the war against water. This flashing is placed beneath the

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chimney crown. When installed properly, it prevents water from entering the interior of your chimney. Use copper, galvanized steel, or stainless steel for this purpose. Do not use aluminum as a flashing material in masonry chimneys. The chemicals in mortar and cement will cause it to corrode.

The deterioration you are experiencing is normal for a poorly constructed chimney crown. When you rebuild your chimney crown properly, it should perform flawlessly well into the next century.

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ROOF LEAK - TEN MOST COMMON LEAK LOCATIONS

Roof leaks are a nuisance for many homeowners. They can be difficult to diagnose - that is a fact. To make matters worse, different weather conditions will produce leaks in different locations.

The vast majority of roof coverings operate using the principal of gravity. This can be a big help in locating a leak source. However, horizontal roof boards can trick you. A leak may actually be eight to 10 feet sideways from where you see the wet ceiling or spot in the attic.

Finding the source of some leaks is easy. Others will require detective work and possibly a garden hose and an inside spotter. If you don't feel comfortable on a roof, you will have to find an honest roofer to assist you. Sometimes this can be as hard as finding the smallest leak! Here are some tips that may help you find a pesky roof leak:

The Field of Shingles

If your roof is older, it is possible that the leak is within the roof field. This means the expanse of shingles, slate, shakes or whatever. If your roof is asphalt, then you can walk around with ease. Other materials such as slate, concrete tile or clay tile may not be so forgiving. You can crack roofing if you walk on it, so be careful. With regular shingles, look at the tops of the vertical knockouts. Look for missing colored granules. Look for cracks. Possibly a nail has backed itself out of the roof sheathing. Simply take your time and hunt.

Valleys

A valley is a line where two roof planes intersect. Here in Cincinnati we use a metal flashing in the valleys. Some areas use rolled roofing. Other places simply lace the shingles together. Valleys can be big problems if you do not trim the shingles correctly. When you trim a shingle for a valley, you end up with a chisel point on the end of the shingle. If a second cut is not made to make this point like an arrow point, then water can travel along the top of the shingle and find its way inside your house. The shingle wrapper tells you how to make this simple second cut.

Head Wall Flashings

Some roofs stop at a vertical wall. A metal flashing must be in place to direct water streaming down the wall away from the stopping point of the shingles. This flashing may be behind wood siding or in front of a brick wall. The flashing should extend over the shingles at least three inches. If the wall is brick or other masonry, the flashing must bend and extend one inch into a mortar joint. Tar, caulk or roofing cement should never be used in conjunction with these materials. If you see them, it is a sign that someone tried to patch a leak!

Wall Step Flashing

Some roof leaks happen at step flashings. You find these flashings where a roof climbs alongside a vertical wall. As each row of shingles is laid, a step flashing is installed over the shingle next to the wall. Part of the flashing turns up on the wall and the other portion gets covered by the next row of

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shingles. Look for rust or holes in these flashings. In reality, if all is well, you will be able to see only the smallest portion of these flashings.

Chimneys

These devils are the source of many a leak. Chimneys contain four different types of flashing. All must be right or you will have a leak. In addition, the counterflashing that goes into the brick mortar joint must be right. A hairline crack above the flashing can allow vast amounts of water to run behind the flashings. Look for soldered corners of flashing that might have broken or have holes. Do not use caulk to repair these flashings!

Plumbing Vent Flashings

Newer vent flashings are a concern of mine. Many of these incorporate a rubber seal with an aluminum flashing. The rubber can fail in as little as 10 to 15 years. Look for cracked rubber around the plumbing pipe. The flashing should dive up and under the shingles that extend up roof from the middle of the plumbing vent. The bottom half of the flashing should be exposed and actually cover the shingles.

Furnace or B-Vent Flashing

These flashings are basically identical to plumbing vent flashings. However, they sometimes have a metal storm collar. These simply fit tightly around the vertical pipe that exits the roof. If they become loose, the storm collars can cause leaks.

Ice Dam Leaks

An ice dam leaks plague people in the snow belt. These leaks can happen even if everything on your roof is just fine! Ice dams block the natural flow of water down a roof. The water begins to back up under flashings, shingles, tar paper, etc. Once water begins to flow into the house, it can drip for days. The only means of prevention is to install membranes under the roofing. The membranes won't stop the ice but will stop water leaks if installed properly.

Wind Blown Rain Leaks

Wind driven rain can also be a major problem. Once again, you could actually have a good roof and wind will drive water up and under your roofing materials. The only lines of defense are tar paper and the ice dam membranes.

If you have metal valleys, you may want to hem the edges. This means that the hidden edges of the valley actual have an 180 degree bend. This creates a channel that directs wind blown rain back to the bottom of the valley.

Roofing cement under shingles on the edges of roofs that face the wind are also a good idea. Don't underestimate the power of a 70 mph sustained wind-driven rain.

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Non-Roof Leaks!

Sometimes you think you have a roof leak when in fact the roof is fine. Attic condensation is a prime example. High humidity can cause condensation and "rain" to fall in your attic. It can also make the underside of the roof sheathing look wet. You think you have a leak instead.

Chimney crowns can develop cracks. The inside surface of the chimney gets discolored or the plaster bubbles. You think a roof leak is the cause.

Siding can be missing above a roof. This can cause water to enter behind head flashings. Be a good gumshoe and snoop around for the leaks!

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ROOFING - ROOF FLASHING

The sources of a wide majority of residential roof leaks are roof flashings. For the most part, the correct installation of flashing material is what determines whether or not your roof will leak. The reason for this is quite simple. The vast majority of roofing products are quite easy to install. The manufacturers have engineered these products to be practically leak proof when they are installed on a simple roof.

However, there are very few simple roofs. Examples of simple roofs are dog houses and small outdoor sheds. Rarely will you find a plumbing vent stack, chimney, fan vent, pot vent, valley, side wall projecting above the roof, etc. on a dog house. You will, on the contrary, almost always find one of these items projecting through a residential house roof.

The engineering concerning flashings has been known for hundreds and hundreds of years. It is, in fact, very simple engineering. The system depends almost entirely on gravity. Gravity works with the flashing material and sheds the water onto the regular roofing materials. If you use a flashing material that depends on some other method to shed water you can quite possibly develop a leak. Caulks, roofing cement, pitch and similar materials depend on their stickiness or adhesive qualities to seal out water. These qualities can easily break down under constant exposure to the elements. If you want a leak-proof roof, stay away from these type of compounds.

Flashings

For the most part, flashings are the transition materials and media between the primary roofing materials and the things that don't get covered with roofing materials. For example, when a chimney projects through the center of a roof, the roofing products must terminate against the chimney. However, this junction must be engineered to allow for expansion and contraction and be leak-proof. This sounds like a difficult task, but it is not.

This same condition is true for any other thing that projects through your roof or where two sloping roofs form a valley, saddle or a cricket.

Many people expect roofs to perform for a minimum of 15 to 20 years. Some roofs can be expected to last 50 to 80 years. This means that the materials which are used for flashings must have the same, or greater, life span as the roofing material itself. These materials must also be able to be shaped easily and have the capability to be easily soldered, brazed or welded. This second point is crucial. Copper, tin coated steel, lead and galvanized steel are examples of traditional flashing materials.

The reason the flashing materials must have the capability of being soldered or brazed is quite simple. The soldering or brazing process of metal is similar to welding. These processes take two separate pieces of metal and make it one. There are many, many times in flashing work where one has to bend around corners or splice two pieces of metal together. These instances create seams which must be soldered or brazed. As I mentioned earlier, the flashing material must have a projected life span equal to or greater than that of the roofing material. Soldering or brazing metals together passes this test.

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Flashing systems must also pass another test. They must be able to handle the constant expansion and contraction between roofing products and those things which are not roofing products. This battle of expansion and contraction can take place on a daily or seasonal basis. The sun can create extremely hot surface temperatures during daylight hours, causing roofing materials to expand. At night, the temperature drops and the materials contract. Seasonal changes can cause the framing lumber to shrink and swell depending upon humidity and wood moisture content. This shrinking and swelling cause the roof sheathing and rafters to move. The flashing materials must be able to withstand this movement and continue to be leak-proof. Well-engineered and installed two-part metal flashing systems can handle this movement with no problem. On new construction, the framing lumber can shrink dramatically in the first year after construction. If one-part flashing systems are used, leaks can easily develop from the gaps that develop from the shrinking lumber.

Two part flashing systems consist of a base or step flashing which is usually in contact or laced into the primary roofing material, and these are then covered by a counter flashing. The counter flashing is a separate piece of metal or building material which laps over the base or step flashing. It should not be attached (mechanically or soldered) to the base or step flashing. The two materials must be able to move independently of one another. The counter flashing can be made of a wide variety of materials. It can be wood siding, stucco, vinyl or aluminum siding, or other material which forms the outside surface of a wall. In chimneys and along brick walls, the counter flashing is almost always the same metal which is used for the base or step flashing.

Two part metal flashing systems are not harmed in any way by the sun's ultraviolet (UV) rays. UV rays can easily defeat caulking, plastic roof cement or most other flashing substitutes. UV radiation can remove the elasticity of these products and make them brittle. When they become brittle, they can no longer handle the daily expansion and contraction. Also, very few of these products have a life span equal to or greater than roofing products. They are temporary remedies at best. Only consider using them for emergency type repairs.

Flashing materials which can rust (tin coated steel or galvanized steel) should always be painted. They often are not painted correctly by roofers. These metals must have special primers applied first and then the proper number of finish coats of paint. Also, it is extremely important to wash these metals with soap and water or paint thinner before painting!!! These metals have a very light coating of oil which is applied during the milling process. If the oil is not removed, the paint job will fail. You will be battling peeling paint long into the future.

Avoid using aluminum flashing material. Aluminum cannot be soldered. Also, if it is used in flashing chimneys or brick walls, it will rapidly corrode. The chemical makeup of the mortar attacks and eats the aluminum! Do not allow your roofer to use aluminum!!!

Flashings are, for the most part, the most technical aspect of roofing. Their installation requires an experienced individual in almost all cases. Soldering vertical surfaces requires skill and knowledge. Professional roofers possess these talents. Professionals realize the importance of flashings. They know that flashings are the weak link in the chain. You should realize this also.

The art of installing flashings cannot be described in this short bulletin. In fact, many books do not fully cover the subject. You have to research several books to get the full picture. I have developed a

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partial list of some publications which do a good job of illustrating and explaining roof flashings. Many of these are available at libraries or larger bookstores. I highly recommend that you consult several publications to get a full understanding of the complexity of roof flashings. The more you realize how complicated flashings are, the better your chances of hiring the best professional. Good luck!

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