

# Water Heater Installation Contractor Hiring Guide & Checklist

Plumb Bob  
Press



Tim Carter

# Water Heater Installation Contractor Hiring Guide & Checklist

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What is more frustrating than no hot water? Considering the tankless water heater? A water heater installation requires at least five things to be successful. This Contractor Hiring Guide & Checklist will guide you when replacing your water heater.

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.

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.

## Water Heater

[Tankless Water Heaters](#) - Tankless water heaters may not be as energy saving as you think. A tankless water heater has a large gas appetite. These heaters are sometimes called on demand water heaters. What's more, some people who buy a tankless water heater end up using more hot water and fuel since the heater never runs out of hot water. This tends to erase all of the projected energy savings.

[Water Heater Anode Rod](#) - Adding a second water heater anode rod will often double the life of a common water heater. The additional anode rod takes the place of the plastic dip tube that is found inside the cold water inlet of the heater.

[Water Heaters - Expansion Tanks](#) - Water heaters can be fitted with expansion tanks to capture expanded water and prevent water heater malfunction. Sizing water heater expansion tanks is easy for your hot water heater, and adding a hot water expansion tank can be done within 30 minutes.

[New Water Heaters are Safer](#) - Water heaters fueled by natural gas and other fuels have been safety concerns. Newer hot water heater designs have safety devices built in.

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[AsktheBuilder.com](http://AsktheBuilder.com) - Go to the AsktheBuilder website and use the search feature for "water heater." This will provide a listing for additional columns on water heaters.

## House Plans & Planning

[Home Plans](#) - House plans with detailed interior and exterior elevations and exact specifications will help make your dream home become reality. Be specific with house floor plans, and make your plans reflect exactly what you want down to the smallest detail. Avoid problems by drawing up precise home plans before your new home construction begins.

[Building a New Home - Get Organized](#) - Building a new home requires hundreds of choices. Get organized by keeping all of your choices and plans for your new home building project in a binder so no decisions fall through the cracks. Blueprints and specifications along with this binder will keep track of the entire project. Select amenities for your new home at the start so that workmen can plan openings and utility adaptations to stay on schedule.

[Detailed Plans and Specifications Minimize Mistakes](#) - Detailed blueprints, plans and specifications will help you avoid being sued by a contractor. Keeping a detailed account of work each day, along with photos, will arm you with data should a problem with your contractor arise.

[Home Remodeling](#) - Remodeling and new home construction share a lot of common items. But they differ in one major area - remodeling is done in the house where you are living. Daily routines are altered. Certain areas of your house may be unavailable during remodeling. No kitchen or bathroom will be a real problem. Read these tips to help minimize your interruptions.

[House Plans](#) - Additional columns covering house plans can be found online in the House Plans section of [Askthebuilder.com](http://Askthebuilder.com).

## 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.

[When to Pay for Remodeling Plans](#) - Never pay all of the money due for remodeling plans before the plans are complete. Once you give cash in advance for incomplete work, you lose all of your leverage. Up-front payment has left tens of thousands of people disappointed when the person never finished the job after being paid.

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

The columns shown above are only a sampling of the columns available to help you. Check the [AsktheBuilder](http://AsktheBuilder) 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

What type of water heater do you intend to install?

☐ Natural Gas ☐ Electric ☐ LP ☐ Other \_\_\_\_\_

Who is the manufacturer of the water heater you intend to use?

\_\_\_\_\_

What is the model number of the water heater you intend to install?

\_\_\_\_\_

What is the **manufacturer's** warranty?

\_\_\_\_\_

What is the capacity of the water heater?

\_\_\_\_\_ Gallons

What is the efficiency rating of the new water heater?

\_\_\_\_\_ %

What is the BTU input?

\_\_\_\_\_ BTU

Electrolytic corrosion can occur if copper pipe is connected directly to the iron inlets of the hot water heater. This can be avoided by installing special fittings.

Do you intend to install di-electric union connections or insulated nipples as a part of your installation?

Yes ☐ No ☐

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Installing a valve on both the cold water inlet and hot water outlet line can lead to a dangerous and explosive situation should the pressure relief valve fail and someone turns off both valves. Will you be sure to install a shut off valve on the cold water inlet pipe only? Yes ☐ No ☐

If you are installing any new valves, will they be ball valves as opposed to standard washer / seat valves? Yes ☐ No ☐

It is not a good practice to reuse the old pressure relief valve from the old heater. What's more, it may not match the new heater's pressure/temperature limits. Will you install a new pressure / relief valve? Yes ☐ No ☐

Does the local code require the installation of an expansion tank as a part of this installation? Yes ☐ No ☐

Do you intend to install a new flue pipe as a part of your installation? Yes ☐ No ☐

Will you check to see if the chimney is free of obstructions? Yes ☐ No ☐

Will the water heater be installed plumb and level? Yes ☐ No ☐

Will you install the new water heater in accordance with the manufacturer's specifications? Yes ☐ No ☐

Will you obtain a plumbing permit? Yes ☐ No ☐

Will your installation be inspected and approved by the proper building department officials? Yes ☐ No ☐

Will you install a combustion air supply for the water heater? Yes ☐ No ☐

If the water heater is electric, does your quotation include the reconnecting of all 120 /240 volt wiring to the new components? Yes ☐ No ☐

Will all wiring be installed according to the National Electric Code? Yes ☐ No ☐

Does your quotation include all necessary modifications to the fuel supply lines to the new water heater? Yes ☐ No ☐

Who will perform the work?

☐ Own employees    ☐ Sub-contractor    ☐ Combination

Will you remove all debris, including the old water heater, from the jobsite? Yes ☐ No ☐

Will you supply a written copy of the manufacturer's warranty and installation specifications? Yes ☐ No ☐

What is the length of your **(installer's)** warranty? \_\_\_\_\_ Years

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Does it cover all labor and material?

Yes ☐ No ☐

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## OPTIONAL ADDITIONAL NOTES

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## JOB COST BREAKDOWN

<b>Materials</b>	
Permit	
Demolition and Debris Removal	
All Necessary Materials	
<b>Labor</b>	
Total Labor	
Insurance	
Workman's Compensation	
Unemployment Tax	
<b>Overhead</b>	
<b>Profit</b>	
<b>TOTAL JOB COST:</b>	

## PAYMENT SCHEDULE

Excessive advance or periodic payments before or during the work is completed often put a homeowner at risk. The homeowner basically become 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:

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Second Payment: \_\_\_\_\_% of Total Job Cost.

To be paid when the following work is complete:

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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

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### 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 Checklist(s). Some will reject it entirely. That is OK. Be patient and continue to call contractors until you find one who accepts the Checklist at face value - a document that protects both you and the contractor.

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## 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 sub-contractors 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!

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9. Contract Documents - Give serious consideration to attaching/referencing the Checklist as a part - or 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 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.

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## 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 Plumbers. 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.

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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](http://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!

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## HOME PLANS

Home plans are the core documents that communicate what the home owner wants and what the builder needs to build. Without great house plans, a new home construction project can quickly become a sea of confusion, frustration and arguments. Many people think that house plans are just pretty pictures and floor plans, but believe me, they serve a far more important purpose.

Can you remember the last time you were involved in a dispute over anything? Chances are you prevailed if you had some form of tangible written evidence, photograph or object that proved your statements were true. But all too often people argue about spoken words that frequently turn into broken promises, simple misunderstandings, or worse yet - deception. This misery takes place everyday in the residential building arena. Homeowners get into heated disputes with builders and remodelers about any number of issues.

The sad fact is a vast majority of new home construction disputes can be settled quickly and efficiently with crisp plans and specifications that are developed long before the first spade of soil is turned at the jobsite. There are many reasons why good plans and specifications never get developed. Often the customer is unwilling to pay for the time and effort to produce the documents. Another common reason is the homeowner looks at a set of blueprints and thinks they are sufficient. Without ever seeing a first-class set of prints I can see why they might feel a deficient set will make do. After all, if they are good enough for the building department then they must be good enough for all involved.

Perhaps a few examples of dispute issues might convince you that you need top drawer plans and specifications for your new home. Imagine if you will a discussion between you and your builder about crown molding. You say you want it in all downstairs rooms. The builder agrees and draws one simple squiggly line on the plans in the cross section and adds "Crown Molding" with an arrow pointing to the line.

Months later while walking through the house as the finish work is being completed you see a small and simplistic paint-grade crown molding that is barely noticeable up in several rooms. You grumble and wonder why the carpenter didn't install the two piece stained oak crown molding you "thought" you mentioned to the builder.

As you walk into the bathrooms upstairs you shake your head and wonder who in the world put the toilet paper holder on the opposite wall from the toilet. It is barely reachable. Fortunately the carpenter who installed it walks in and you ask about the placement of this fixture. He simply states that is where he always put them. Need I go on?

The failure to develop good specifications and plans can also lead to cost overruns and a limited product selection for your finishes. A great set of plans includes numerous interior elevations that show you in two dimensions what a wall will look like when it is finished. These elevations can be as detailed so as to show exact locations of electrical outlets, switches and yes, toilet paper holders. New computer software allows architects and designers to show these in three dimensions as well.

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Knowing what you are going to see before it happens can often prevent costly change orders. Many people are unable to visualize what something might look like looking at a simple floor plan. Elevations help solve this problem.

Plans and specifications that do not include the actual selections of all fixtures, cabinets, tops etc. can cause you problems if you try to decide what you want during construction. A builder may ask you to go to the tile store 6 weeks before he needs the tile. But once there you fall in love with a special order tile that take 10 weeks to get. Who will pay for the time delay should you decide to order the special tile?

There are hundreds of scenarios that can be described. But one thing is for sure: Detailed plans with clear and precise specifications that outline each and everything you want will save you if push comes to shove. Time and again when I consult in the forensic construction expert work I perform I find that a great set of plans that were ignored by a builder or sub leads to their capitulation if the dispute is headed for a courtroom.

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## BUILDING A NEW HOME - GET ORGANIZED

**DEAR TIM:** My husband and I are getting ready to build a new home. I am astonished at all of the details that need to be addressed. Each time we have a meeting with our builder all sorts of decisions need to be made. I am afraid that lots of information is going to fall through the cracks before the final walk through. What is a good way to keep track of all of this information? Julie J., Stillwater, MN

**DEAR JULIE:** Many people decide not to build a new home for this very reason! They are overwhelmed with the decision and product selection process and simply don't know where to start. Many people are afraid of making the wrong decision. The key is to approach the task in an orderly manner and start making product selections and decisions long before ground is broken.

The building and remodeling playing field is actually a minefield. Making decisions out of order or selecting a product without checking for conflicts with other products can trigger an explosion of extra costs and delays. Once upon a time a client of mine picked two elegant wall light fixtures that hung on each side of a bathroom medicine cabinet. Once they were installed I quickly discovered they prevented the medicine cabinet from opening. Because the homeowner had fallen in love with the fixtures, the problem was solved by relocating the electrical boxes. It was a costly mistake that I paid for.

You can avoid nightmares like mine with a simple job organizational binder. This is a nifty tool that works alongside your blueprints and any written specifications. I have found that the binder works best when it contains a section for each room of the house as well as a separate section for the exterior. Typical things you would find in each section would be photographs or illustrations of fixtures, installation instructions for appliances, fixtures or products, technical information showing supply pipe sizes, wire sizes, and the proper rough-in locations of these utilities.

Each section of the binder should also have a room finish schedule. This is a table that communicates to the builder and his subcontractors exactly what you want on every wall, floor ceiling, trim, door surface in each room. If the data in these schedules is accurate it is entirely possible for the workers to finish the job with little or no verbal communication.

You will need more than one binder for the job. At the very minimum you need three: one for you, one for the builder and one that is safely stowed in a lockbox at the job site. The subcontractors need the job site binder to refer to as they work each day. Use clear plastic pocket protectors to keep the individual pieces of paper safe from wet job site conditions.

Creating a complete organizational binder means that you need to make product selections before construction begins. This may seem unusual but you might as well resign yourself to it. There are numerous advantages. Pressure decisions are eliminated. Because it is early in the process, you have time to get items that might have to be special ordered. Waiting until the last minute to make selections often eliminates certain items because the job may have to grind to a halt for weeks or months.

Carpenters, plumbers and electricians need to know what they are installing three or four months from now so they get openings, pipes and wires in the correct spots. Every time I have tried to use

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ESP because I was trying to guess what a customer would want, I guessed wrong. Providing your builder with the correct information simply takes the guesswork out of the process.

If you really want your job to run smoothly you and your builder need to look at all of your selections and insure that there are no conflicts. Imagine your dismay when you discover that the electrical outlet for your night stand is behind your bed. Similar frustration happens when a central vacuum outlet becomes hidden behind a door that is always open. Pesky mistakes like this can be avoided with a little thought and attention to detail.

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## DETAILED PLANS AND SPECIFICATIONS MINIMIZE MISTAKES

**DEAR TIM:** Recently, I received a summons to appear in civil court. The contractor who walked off my job is suing me for the remainder of the unpaid money stated in the contract. Because he avoided repeated calls and letters, I hired other workers to finish the job. What do you think is the best evidence I can produce to prove to the court system that I was a victim? In my opinion he deserves no money. Sue D., Sedona, AZ

**DEAR SUE:** Let me begin by telling you that I am not an attorney and can offer no legal advice. I can tell you, based upon my many years of being involved in differences of opinion with homeowners, what has saved me from having to work for free. The items that eventually become supporting evidence can be a thorn in one's side as the job progresses, but they are worth their weight in gold if a dispute arises at a later date. Hopefully you have many of the following things.

Perhaps the most powerful weapon a homeowner can possess when the going gets rough is an excellent set of plans and specifications. All too often standard plans have far too little detail. Too much is left to interpretation. For example, if the plans say you are to get crown molding does this mean a small thin piece of molding or a large combination crown molding? Detailed plans and specifications make these issues black and white not various shades of gray.

Almost every job requires multiple face to face meetings where many issues are discussed. It can be hard to take notes during these meetings, but this written record of the discussions can help jog the memory of a participant when the wrong light fixtures or floor tile are delivered or installed. These notes become iron clad if you write a letter summarizing the key points and send a copy to all who participated in the meeting. To make the notes armor plated, consider including a sentence stating that if a participant disagrees with anything in the letter they must respond in writing in a timely manner.

Photograph or video tape the progression of the job. Be sure to use a camera that can burn the date onto the image. Take many photographs, including close up photos, of things that will be hidden at a later date. Photos of structural connections where things are nailed or bolted together are often critical. Try to photograph concrete forms just before the concrete is poured. Imagine how difficult it is to guess the thickness of a concrete slab without doing destructive testing or using an expensive diagnostic device. A 35 cent photograph may come to your rescue.

A detailed diary of the events that happened each day can be very helpful. Long delays or periods of time when no one showed up to work are cast in stone with written daily notes kept in a journal. It is very hard to reconstruct events if they are taken from memories that are six or nine months old. Write down who showed up and what was accomplished. Photographs can be added to the diary that show daily progress.

In certain instances, weather data may help support your arguments. If you are not a trained meteorologist, data that you keep may not be considered accurate or true. Fortunately you can obtain vast amounts of weather data at little or no cost from your local National Weather Service office. They keep hourly logs of temperature, humidity, precipitation etc. On more than one occasion this precise data has won a court case for me.

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Almost all jobs have changes as the work progresses. These change orders must always be in writing. In addition to the description of what is changing and the cost of the change, each change order must contain a section that states how much extra time the change will add or detract from the job. You can see the value of this added feature when it is used in conjunction with the start and completion dates that are contained in the original contract.

Finally, if all communications break down, then all contact with the contractor must be in writing. All letters must be sent certified mail with a signed receipt request. You want to be able to prove that you tried your best to keep the lines of communication open at all times.

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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 pick 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 under-capitalization. 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 non-returnable 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 a 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 in accordance 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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## WHEN TO PAY FOR REMODELING PLANS

**DEAR TIM:** My husband and I are remodeling our home to accommodate for our new arrival. We've been working with an architect who is not fully licensed at this time. This individual has been drawing up plans for our new project. The plans are not yet signed and sealed as he wants to send them to a licensed architect to have this done. But he wants us to pay the full amount of the plans prior to getting them signed and sealed. We're not sure if we should pay for the plans until everything is finalized. Please let me know if we should pay for them up-front or if we should wait until the plans are completely done. Julie S., Orlando, FL

**DEAR JULIE:** Congratulations on the expanding family! The answer is very simple if you ask me. I feel you should never pay in full for something until such time as you are completely satisfied. The fact that the unlicensed architect-to-be asked for the money before the job is complete is very troubling to me.

There are all sorts of reasons you should not pay in full until the job is complete. The money in your account is the only leverage you possess. The instant you hand over all of the money for the plans, you then rely on integrity, hope and good will to get what you want. This individual may have all of these qualities and more, but I do know he does not yet possess good business sense.

I can produce countless examples in the real world where you do not pay for things in advance in-full before you get them. There are many things where you do put down a deposit and possibly make timed payments as the work progresses, but to pay in full before delivery is a recipe for disaster.

Here is a true story that just happened to the son of a close friend. This young man wants to become a commercial pilot. He signed up for flying lessons and all the necessary ground school training to get the commercial license. The cost was staggering - somewhere above \$15,000. My friend co-signed a loan for his son with a bank, took the funds and paid the flight school for the flying lessons and schooling. They did this in advance to get a slightly reduced price. A month ago the flight school went bankrupt and the son only had 10 percent of his training complete.

The son and father still owe the money to the bank and they have virtually nothing to show for it. A similar thing could happen to you. This unlicensed architect may have made an enormous amount of mistakes in your plans. It could take many hours of redrawing to correct them. Once he has the money, he may be reluctant to make the changes in a timely manner. One thing we know for sure is that his incentive to do so will be greatly reduced. In fact, he will find that the additional work will create a large mental obstacle as he feels he is not getting any money to correct his mistakes should they exist.

At this point in time, you have enormous leverage. The plans he has been working on are of no value to anyone but you and your husband. No other homeowner would have interest in them as they are house-specific remodeling plans.

You simply tell this person that you are more than willing to write a check for 90 percent of the total due once the plans are signed and sealed by a real licensed architect. You then tell the architect-to-be that the remaining 10 percent of the money will be paid as soon as the building permit

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is issued. Keep in mind that the building department may request minor changes in the plans before a permit is issued. You still want to have some financial leverage in the event this happens.

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## HOME REMODELING

### 25 Things You Must Know If You're Remodeling

Remodeling is as different from building a new home as night from day. When you visit your new home construction site, you can look around and then go home. You don't have to deal with the workers and the mess.

Remodeling is the exact opposite. Your normal routine is rocked to its core. Strangers, whom you have never seen, invade your home. The excitement of the job starting soon wears off and becomes a dull headache.

If the remodeling job is a major one, such as kitchen remodeling, or bathroom remodeling or even a room addition, the impact on your life will be significant. Many people are not prepared for the disruption, dust, and missed deadlines.

To make a remodel job go smoothly, it requires enormous amounts of planning. Be sure to convey your bathroom remodeling ideas or basement remodeling concerns or whatever room you are doing to your contractor at the beginning of the remodeling projects. The remodeling contractor is responsible for this, but you must make sure he or she has covered all of the bases. In my opinion, you can only do this if you have a clear understanding of all of the things that can go wrong during the remodeling process. With this knowledge, you can already have a strategy in place to eliminate problems before they happen.

### Asbestos and Lead

Harmful basic chemical elements lurk like hidden time bombs in many existing homes. Two of the most prominent are asbestos and lead. Asbestos was commonly used in insulation pads that sat on top of furnaces and was used in wrapping materials around forced-air heating and cooling ducts.

Asbestos was also used in floor tiles, roofing, piping, adhesives, etc. In other words, it can be found just about everywhere. You need to make sure you identify potential trouble areas in your home and make sure your contractor deals with the danger in an approved manner during the asbestos removal.

Lead is a very serious hazard that can be found in many homes built prior to 1978. If your remodeling job involves scraping, sanding or removing anything that might contain lead paint, you better make sure all precautions are taken so your home does not become listed as a Superfund site. Lead poisoning is a possibility if not handled properly.

### Bid Breakdowns

When you are soliciting bids from different contractors for your upcoming remodeling project, it is imperative that they submit detailed itemized bids. You need to know how much money is allocated for the labor and material for each part of the job.

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This information will be used by you to why the low bidder is low and why the high bidder is high. If there is an enormous amount of disparity between contractors when you compare the cost of the same task, this is an area that needs further discussion. For example, if you are getting a new roof put on and painting done and you have specified the exact shingle you want, then the actual itemized number for the shingles should be within \$50 or so of one another as both contractors should have calculated the same number of shingles.

The breakdown will also be an invaluable tool when you need to make payments. When a payment is requested, it becomes your job to view the work that is complete and ensure it is satisfactory. Refer to the initial bid breakdown and make sure to only pay for that amount of work along with a pro rata portion of contractor overhead and profit.

## Customizing Touches

One of the most fulfilling things, I experienced as a remodeling contractor, was doing extra special things for customers. Creating special nooks or crannies, delightful custom window seats, maybe it was a special set of steps leading from a deck to a patio.

If you start to gather photographs from magazines and even the Internet that depict things you especially like, an experienced carpenter, painter or other trades person might be able to create it for you with very little extra work.

But you need to communicate these wants and desires in the planning stages. Photographs are an ideal tool for communicating what you want. My wife did this exact thing with me as she saw a gorgeous wood picket fence in a magazine. Without any plans and just working from the photo, I created a nearly exact copy. It doesn't cost one dime to ask for a price or express an idea.

## Debris Removal

It is surprising to many people how much debris and garbage are created during a moderate to large remodeling job. The problem on a remodeling job is that you don't want it scattered or piled in the yard or left inside if at all possible. Any trash that is combustible represents a serious fire hazard as it is commonly stacked so there is lots of air around it. A spark from a plumber's torch, a carelessly discard cigarette, etc. can create an inferno that can cause serious damage.

To make matters worse, when debris is being created, often the structure is being altered. Some structures can lose much of it's fire stop characteristics, especially if drywall and plaster have been removed. Open walls and ceilings provide a pathway for rapid fire spread.

Include in your contract that all debris will be cleaned up each day and placed in a metal container that is placed safely away from your home. Request that the work area be broom clean each day and vacuumed at the end of each work week.

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## Duration of Job

The last thing you want is your house torn up for an extended period of time. If you have seen your friends', relatives', co-workers' and neighbors' homes go through a remodeling job of any size, you know it can take a while. Anything that delays the job causes the pain threshold to rise exponentially.

Using your past experience and observations of other people's projects, you might be able to get a feel for the length of time a job should take. If a contractor says they can do a small room addition from start to finish in 10 days, ask him what magician will show up. You may be surprised as he may have the addition pre-built at a modular home factory!

It is possible to compress time schedules, but your job during the bidding process, is to request a detailed time line of what tasks are going to happen each day or each week. Compare the schedules that each contractor provides to see if each one has accounted for each task. If a contractor refuses to produce a schedule, it might be a sign of disorganization.

## Dust Control

Even small remodeling jobs create dust. Large-scale demolition can create dust storms within homes. When you are interviewing contractors, during the bidding process, have detailed discussions about dust.

Take notes during these discussions. If the contractor says something that doesn't sound right, ask for clarification. When you talk with past customers of each contractor, ask specific questions about how well dust was controlled.

Some dust is inevitable, unless the contractor sets up a negative pressurization environment where the work is taking place. This setup costs extra money and is widely used by the mold abatement companies if you or someone in your family is sensitive to dust.

Keep in mind that homes equipped with recirculating forced air systems must be turned off during periods of dust creation. The return air aspect of the system can inadvertently pull dust into the system and broadcast it throughout the home.

## Extra Telephone

It seems as if everyone has a cellular telephone today. But it is entirely possible for a battery to die or a cell phone to be forgotten at home or become damaged at the jobsite.

The last thing you want is a contractor or one of his subcontractors using your phone. One or two phone calls is not bad, but day-after-day use of your home phone can become very annoying.

It gets worse, some contractors give out your telephone number because they might expect a return call. You then become an unpaid secretary or a receptionist for the branch office of your contractor.

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The solution is simple. Place language that your contractor must install a temporary land telephone line or at the very least buy a temporary cell phone that is kept at the jobsite for all subcontractors and employees to use. We have more options now than ever with respect to communication.

## Fumes

Many parts of the remodeling process can and do create fumes. The assembly of PVC plumbing pipes creates very noticeable fumes. Soldering copper tubing creates fumes as well, Drying paint liberates vapors into the air that contain a brew of different chemicals.

Urethanes, adhesives, etc. all create fumes that can invade your home during time periods where windows must be closed. These accumulated fumes can cause discomfort and actually sickness to people who might be acutely sensitive to some of these very peculiar chemical vapors.

Temporary space heaters used for all sorts of heating and drying purposes can create deadly carbon monoxide. Fumes can enter your home quite by accident and cause a problem. A heater placed innocently next to an air intake might cause massive amounts of carbon monoxide to be inject into your interior air. It is extremely important to discuss fumes with the bidding contractors and what they plan to do to minimize them in your home as they work.

## HVAC Sizing

If your remodeling project involves adding additional space, there is a strong possibility you will have to upgrade or modify your existing heating and cooling system. Your existing furnace and air conditioner might be at the limit now with respect to the amount of heating and cooling BTU's they can handle.

It is extremely important that you discuss this possibility with the remodeling contractors during the bidding process. Talk with them about heat gain and heat loss calculations. If the contractor or sales person squints or tilts their head when you mention those words, you might be talking with the wrong person.

Once you have awarded the job to a contractor, it is imperative that the heating and cooling contractor come out and gather the necessary data to perform the needed calculations. These tell them whether or not your existing heating and cooling equipment will work.

## Insurance Certificates

Unfortunately, we live in a society that seems to be over-populated with attorneys. These people need to feed their families and some of them seem to love to work on accident claim cases. You need to make sure you are never named as a party to one of these lawsuits.

You can do this by taking about insurance certificates with the bidding contractors. It is not always enough for a remodeling contractor to show you he has coverage for his employees. What is important is that each and every person who shows up to work at your home is indeed covered.

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Although it is a lot of work, you must insist upon doing it. You must make it very clear to the bidding contractors that they must supply you with current workman's compensation and general liability insurance certificates for all subcontractors who plan to work on your job. These documents need to be produced the day the contract is signed.

## Matching Materials

Clothing, automotive, etc. styles change on a constant basis. The same is true for products used to build your home. Your existing home may have very unusual interior and exterior woodwork or plaster. If your remodeling contractor is a professional, he or she will know how to get exact matches on many of the materials used in your job.

There are many woodworking mills that can easily create identical profiles for door and window casing as well as crown molding and baseboards. It will cost more than buying stock trim, but the long-term value you add to your home by doing this will be well worth it.

With lots of extra effort, it is sometimes possible to get very close matches on brick and even ceramic tile. If you are trying to match brick, always go for the color match first and then the texture match. From the street, you rarely can detect texture but readily notice differences in color.

## Pavement Problems

Do you have a gorgeous driveways, sidewalks and patios right now? If so, it would behoove you to take very good photographs to prove it. Remodeling activity almost always causes damage to existing paving materials around a house.

Dumpster deliveries, concrete trucks, lumber trucks, etc. can not only crack and break apart paving, but they can spill seas of motor or hydraulic oil on pristine concrete or blacktop.

It is imperative that you and the bidding contractors talk about how your paved surfaces will be impacted by the remodel job. Document what each contractor says and decide who has the best plan to protect your current investment. The last thing you need is an argument that a crack or an oil stain was already there. This is the reason for the photos you took prior to the remodeling project.

Be aware that large loaded delivery trucks can weigh as much as 20 times what your car weighs. It is no wonder thin concrete slabs crack and blacktop driveways crumble when a truck backs up onto it. Read the delivery tickets that are signed by the workers and most have damage waivers that relieve the truck companies of responsibility if a person allows them to drive onto your paved surfaces.

## Payment Schedules

This is one of the most important parts of your remodeling job. The money you possess is the only leverage you have to ensure your job gets completed and done to a level of quality you have agreed upon in your contract.

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All too often, people advance large sums of money to the contractor when the contract is signed. The only time this is necessary is when your job requires special order materials to be ordered before the job starts. Examples of this might be semi-custom or custom cabinets, a custom front door, custom garage doors, etc. Any materials that are commodity items that can be purchased at supply house do not qualify.

Keep in mind that your contractor should have open accounts at all suppliers. If he does, why would he need advance money? He doesn't pay workers in advance, nor does he pay for supplies in advance.

You must always retain a sufficient amount of money to complete the project no matter what stage it is in. When you do pay for completed work, the contractor must supply you with notarized affidavits from all who have work on the job as well as all companies that have supplied material. Never issue a payment without having these documents. Get your payment calculator out and be sure the total amount you pay each time needs to match the amounts on all of the affidavits.

## Plans - Triple Check Accuracy

As with new construction, the plans, blueprints, and written specifications are the primary tool that communicates to the remodeling contractor, suppliers and all subcontractors what is going to happen at your home. The ideal set of house plans would be ones that are so complete and so detailed that no one ever has to ask you a question. It is possible to do this as I have been blessed to work on such a job.

But this goal is very hard to reach. It requires you to think through the simplest things, such as the exact place where a toilet paper holder might go. You need to make all product selections, even paint and stain, before the job is even bid.

Is there a value to all of this? Absolutely, yes. If your plans are this complete, the bids you receive should be highly competitive. Dishonest contractors can't play the famous bait and switch game with absurdly low allowances for things when plans and specifications are complete and accurate.

## Plumbing Disruptions

Many remodeling jobs involve plumbing. What may seem to be a very simple task of just turning off your main water valve and turning it back on can wreak havoc in an older home. When water lines refill from the rapidly incoming water, it can dislodge pieces of sediment from the sides of the older pipes. This sediment can clog faucet aerators, toilet fill valves and faucet valve cartridges.

It is very important that you discuss all plumbing jobs with your contractor before work begins. If water needs to be shut off to solder pipes, what happens if a small fire starts? If drain lines need to be cut into to install a new branch drain line, how long will the toilets in the house be inoperative? These simple questions need solid answers.

Avoid major plumbing changes on Fridays. If leaks develop after workers go home, will you be able to get instant repair service over the weekend? If you must have work done on a Friday, have a

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contingency plan in place. Make arrangements such that you can easily contact the plumber or the remodeling contractor in the event of plumbing problems.

## Porta-Potty

Bathrooms are private places. The last thing you need is a bunch of strangers with dirty clothes and muddy boots walking onto the clean throw rugs in your bathrooms or powder rooms.

Major remodeling jobs that will see many people at your home for weeks on end need a temporary toilet facility. Many of these are quite discreet and they allow you to maintain control of a very important part of your home. This is an important issue and you should not budge on it.

Make it very clear to the bidding contractors that a temporary toilet must be on the jobsite and that it must be serviced once or twice a week.

## Pre-Order Materials

Any type of delay on a remodeling job creates havoc and stress. You can minimize delays by making sure the exact materials you need are at the jobsite long before they are needed.

This concept may seem simplistic, but it is often overlooked. If you have a safe and secure place to store products that are not readily available, why not buy them in advance and have them on hand?

Examples of this would be specialty faucets, hardware, light fixtures, ceramic tile, special-order windows and doors, and any other material that is not ordinarily in stock. It is also very important to inspect these items to make sure there are no defects and that they are exactly what you ordered. It is not uncommon for the wrong product to be shipped.

## Protecting Finishes

Imagine how many trips up and down your stairs a remodeling contractor and his subcontractors might make as they remodel a second-floor bathroom. Without protection, the stairs, carpeting, handrails, walls, etc. can easily be damaged or scuffed.

I suggest having a very frank and open discussion with your contractor about what steps will be taken to protect all existing surfaces both inside and outside of your home. Take very good notes and write down in the contract any promises the contractor makes with respect to what he or she intends to do.

The marketplace is crammed with many surface-protection products that help contractors keep dirt and dust away from things that are important to you.

But keep in mind it doesn't stop with existing materials. Many a new tub has been scratched by a drywall or ceramic tile subcontractor. Finish carpenters can scratch new hardwood floors with tools when they come back to install toe stripping. Discuss all of these issues with your contractor so things that are in excellent shape stay that way.

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## Scheduling

One of the top complaints of homeowners who have gone through a major remodeling job are delays caused by scheduling snafues. Large construction projects employ special people who are experts at coordinating the arrival of both materials and workers so that the job continues from start to finish with no disruption.

Small remodeling contractors can create simple charts that do the same thing. The trick is to correctly identify the realistic amount of time it takes to do a particular task and then place it in the right position on the schedule.

The next task is to determine which jobs can occur on the job at the same time. It is often possible for a plumber to be working inside a room addition while a bricklayer or siding contractor is applying the outer skin to the job.

Request a written schedule from your contractor in the bidding phase. See if any of the contractors you are talking with can produce one they are currently using on an existing job. If they can't, you better talk with past customers to see if the jobs they did progressed with little or no interruptions.

## Selecting the Real Professional

I often think this is the Holy Grail of both new home building and remodeling. Every homeowner wants the best contractor, who is both professional and honest. These people do exist. They can often be found in just about every city and county in the nation.

If you hope you have the right contractor for the job, you may already be in trouble. You can't ever base decisions on hope. You start the process of finding the professional by conducting a thorough and in-depth interview. This may seem unusual, but it is a common practice in the business world.

You can ask very interesting questions and get some fascinating information. For example, ask a contractor the names of the last three books he has read. Ask if he attends remodeling conventions. If not, ask why. Ask them if they volunteer time. If so, where? Do they coach children's teams? When asked to produce an ID, does the contractor show you a driver's license or some other card? Never forget that it is your home and it represents an enormous investment. You must be sure you and your contractor are a close, if not perfect, fit.

## Temporary Kitchens and Baths

If you have never kneeled down to wash dishes in a bathtub, you are not missing a thing. It is miserable and it is humiliating. It is also unnecessary.

If your kitchen is going to be torn up for several weeks, ask the bidding contractors how they intend to provide you and your family with temporary sinks, cooking appliances and refrigeration. Creative and professional remodeling contractors can often throw together a temporary kitchen that can roll into and out of the kitchen in progress each day.

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Bathrooms are even more critical. It is not uncommon for a professional remodeling contractor to build a temporary shower in some location while the primary bathroom is being remodeled. Sinks and toilets are a must. There must always be functioning sanitary plumbing fixtures for you at all times. Excuses are reasons for failure. Do not tolerate them.

## Trees and Landscaping

The landscaping around your home may be priceless. How many years has it taken a particular tree to reach its current height? You may have tens of thousands of dollars invested in expensive flower, bushes, shade plants, etc. The last thing you need is permanent and irreversible damage to your trees and vegetation caused by an unknowledgeable contractor, subcontractor, excavator or delivery truck driver.

The best way to ensure you preserve all of your plants is to arrange a consult with a certified arborist long before your project begins. Get written instructions from this person as to what needs to be done to make sure all trees and plants will survive the remodeling ordeal.

Make these written instructions part of the bidding documents and part of your contract. Be sure the contractor you choose has sufficient general liability insurance to cover damages and that the policy specifically covers damage to trees and landscaping.

## Valuables

This is an uncomfortable subject, but one that must be discussed. There is no doubt in my mind that your home contains valuables. They may be cash, jewelry, guns, art or stamp collections or even musical instruments.

Remember that your remodeling job will bring with it people you have never met, and employees who work for those people who may have never been properly screened. Never tempt these people by leaving valuable objects in plain view.

If you have things of great monetary or sentimental value in your home, it may behoove you to move them to another safe location during the remodeling process. Accidents can happen. Fires can start. Worse yet, loose talk at a drinking establishment might tip off criminals who learn about all of the wonderful and tantalizing things within the confines of your four walls. Eliminate this problem from the start by eliminating the source of temptation.

## Weather Protection

Many remodeling jobs involve opening up your house to the weather. Extreme jobs could actually involve tearing off your entire roof or a part of it to add a second story or a large dormer. The job might be as small as adding a skylight. But Mother Nature might spoil the fun with a pop up thunderstorm or five days of non-stop rain. A snowstorm may even be thrown in for good luck.

The point is simple. You must know how your remodeling contractor is going to protect your home against all forms of weather while your home's outer defenses have been compromised by

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work-in-progress. You need to understand that giant tarps can blow away in moderate winds. Wind pressure can be enormous over large expanses of plastic or fiberglass.

Not only can rain and wind-driven rain be a problem, but extremes of heat and cold can create enormous amounts of discomfort. Discuss with your contractor, before the job starts, how air leaks will be stopped until such time as enough work is in place to minimize any loss of conditioned air from your home.

## Work Days

Within a week or two, you will grow tired of the flow of people who come to your home to perform the remodeling work. It is important for your sanity and peace of mind for the workers to maintain a strict work schedule. When you get home from work, the last thing you need is noise, dust and activity at your home. Yes, that may be part of your families ordinary activities, but you don't need additional input for the remodeling contractor.

When you are bidding the job, ask each contractor to state the normal times workers will arrive and leave each day. Ask about weekend work. If you do not want workers to be around on weekends, make it clear for the beginning.

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## TANKLESS WATER HEATERS

### IMPORTANT

!!Read Author's Notes at the bottom of this column!!

**DEAR TIM:** I need to install a water heater in my home. I have seen tankless water heaters in stores that sound as if they are a miracle product. Do they really deliver an endless supply of hot water? Do you save money using one? Are they a wise investment? Wesley W., Silverdale, WA

**DEAR WESLEY:** The tankless water heaters you speak of seem to be the rage right now. The marketing campaigns of these companies seem to stimulate the same nerve endings that tingle when the hot water in a shower turns to cold. But you need to look under the skin of these appliances, between the lines of the brochures and do some simple mathematics before you make a decision to buy one.

The tankless water heaters come in many different sizes. These heaters have a voracious appetite for natural gas, often two or three times the amount of a standard residential water heater. If you need one to supply an entire family with hot water, look for one that has an input of no less than 165,000 Btu. Shop long enough and you may find a model with a burner that consumes an astonishing 230,000 Btu of gas per hour.

Even with an enormous gas burner, the tankless water heaters have limitations. Pay attention to flow rates. This number tells you how much water a tankless heater can deliver at a given temperature rise. The flow rate in your home is a function of how many fixtures are demanding hot water. As more hot water faucets are turned on at the same time, more water flows through the heater. When this happens water may exit the heater before it gets to the desired temperature. To add insult to injury, incoming cold water temperatures in many cities vary month to month.

If you live in a cold climate as I do, the temperature of the water can vary drastically from summer to winter. I live in the Midwest and it is common for the incoming cold water temperature to be 40F or so in the middle of winter. Water at this temperature pushes a tankless water heater to its limit in a typical residential setting. A typical tankless heater with a 165,000 Btu burner can raise the water temperature to 110F and deliver 3.8 gallons per minute of this heated water indefinitely.

But is this flow rate and temperature satisfactory? 110F hot water is 8 degrees below the temperature that most adults feel pain (the average shower temperature for most adults is anywhere between 115 - 120F). A code approved typical shower faucet will deliver 2.5 gallons of water per minute. A typical kitchen sink faucet will discharge 2.0 gallons of water per minute. Do the math and you can see that these two common fixtures have exceeded the capacity of the tankless heater.

The cost issue is even more dramatic. The tankless heaters are expensive. A large whole house model typically costs \$1,000.00. A traditional storage tank water heater that has a super-fast recovery time costs less than \$500.00. Add a secondary accessory anode rod to this heater at a cost of \$125.00 and you can have a traditional water heater that may last 15 - 20 years.

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But the cost issue does not end there. The tankless heater manufacturers often claim all sorts of energy savings when you switch to their products. My calculations show just the opposite. Let's use my July 2002 gas bill for a comparison. That month the cost of natural gas in my city was 53.4 cents for each 100 cubic feet of gas consumed. My family used 2,400 cubic feet of gas last July. Most of it went to my traditional storage tank water heater, some went to our gas range that was used each day to cook and the remainder went to our gas clothes dryer. I estimate that it cost me approximately 37 cents per day to provide hot water for my family of five and we rarely run out of hot water.

I also timed our hot water usage. On average, hot water runs in our home approximately 90 minutes each day. 50 minutes of that usage is showers, the rest being cooking and cleaning. If I had a large 165,000 Btu tankless heater at my home, it would have consumed 248 cubic feet of gas each day. Doing the math, I arrive at a cost of \$1.32 per day using a whole house tankless heater. Unless I am mistaken, it would cost 3.5 times more money to use this heater in my home.

There is no doubt in my mind that a tankless water heater works in some warm climates and for certain people who have low or moderate demands for hot water. But there is no way a tankless water heater could keep up with my family, especially my son. In fact, if I had a tankless heater, he alone would bankrupt me as he would stay in the soothing shower all day long.

## Author's Notes:

These additional comments, in-depth analysis and Reader Feedback are constantly growing. I get emails each month from people who bought tankless water heaters and are left somewhat disappointed when they finally see what happens. Wait until you read the email from George McCammon that follows my comments.

## February/March, 2003

In the ten years I have been writing, only one other column has created as much controversy as this one - the one on the Barrier EIFS Nightmare. Wow! The following background information and subsequent fallout after the tankless water heater column appeared in papers across the nation will help you sort through this very complicated topic.

I was flooded with email from people who did not believe the column. Some of it was from people who have tankless water heaters and other mail was from people who were thinking of buying these appliances. I also heard from many people who know very little about how water heaters work. It is astonishing how much mis-information is out there. I also received mail from people who verified my facts with their own experiments. Several of the emails are below. Here are some facts you should know before you go any further:

It takes the same amount of energy input to heat water no matter what type of device you use. Ask any thermodynamic engineer and she/he will tell you that you must expend one Btu of energy to raise one pound of water one degree Fahrenheit. This simply means that a tankless heater and a traditional storage tank heater must each burn the same amount of energy to heat the water in your home. But, each heater has a different efficiency rating. The tankless heaters are more efficient, but not as efficient as you might think. See below for more on efficiencies.

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The burner on a traditional storage tank water heater does NOT burn 24 hours a day. Do not confuse a water heater with a pot of water heating on a stove. If you turn the stove off, the water in the pot cools. In a traditional storage tank water heater, the high-performance foam insulation keeps the water hot for many hours before the heater needs to turn back on to raise the temperature.

Numbers do not lie. Look at your own utility bill for last June, July and August. If you live in the Northern Hemisphere, you typically do not use any gas during those months for heating your home. The usage in these three months gives you a very good idea what you spend each month to heat water. Granted, some gas goes for cooking and clothes drying if gas fuels those appliances.

Also, you will spend more money to heat water in the winter as the incoming water is colder and needs more energy to raise the temperature of the water. But this is also true of the tankless heaters, so it is a wash with respect to cost.

Some people who have tankless heaters have reported to me that their utility costs stayed the same because they used more hot water. Why? Since there was now an unlimited supply of hot water they stayed in the shower longer. Not only did they use more gas, but they also used more water than they would normally. While researching the column, I didn't see any warnings on the tankless heater literature about this possibility.

Click [here](#) to view a scanned copy of my July 2002 utility bill. (Click unavailable.) Many people thought I had a crack pipe in my hand while I wrote the column. Remember, subtract the \$6.29 customer service charge. That has nothing to do with the actual cost of the gas. Everyone would pay that fee no matter if they had a water heater as I do or a tankless heater. You are just interested in the actual usage and cost of the gas. The usage says 24 CCF of natural gas. CCF stands for \*hundreds of cubic feet\*. This means my family of two adults, and three kids used 2400 cubic feet of gas in July, 2002.

Your cost of gas compared to mine means nothing! In other words, if I pay more or less it does not matter. You are simply concerned with how much gas will you use with a tankless heater vs. a traditional tank heater. Every person needs to compute their own usage and cost. Do not rely on numbers printed in a brochure. Those are average or blended costs.

You NEVER experience savings until you pass the break even point. In other words, if you pay \$400.00 more for a tankless heater and think you are \*saving\* money the instant it turns on, you are crazy. You first must get back the extra money you spent plus the interest on that money. Once you get all of that back, then you can talk to me or others about saving money. It could take you years and years to achieve the break even point.

Tankless heaters have governor gas valves. This means that the amount of gas burned is a function of the rate of flow. If you just turn on your vanity hot water valve a little bit, then the gas valve supplies the needed gas to heat that smaller flow of water.

Tankless heaters come in various sizes. Many are rated for just one fixture. This means, you get an unlimited amount of hot water if just one fixture is asking for water. This is great if you are single or

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have no kids. But always pay attention to the flow rate! See how much hot water can flow through the heater before it is overloaded.

Some people remove flow restrictors. It is a common practice. The low flow shower heads can be turned into a high flow fixture in about 3 minutes. My house already had high flow shower heads. Some fixtures / sinks have huge flow rates. My laundry sink where I fill buckets of water to wash cars, windows, etc. has a standard valve on it. If I open just the hot water valve alone to full flow, it consumes an astonishing 4.2 gallons of water a minute. That single faucet could overload a high capacity tankless heater on a cold winter day. If you have a large whirlpool tub, place a 5 gallon bucket in the tub and turn on just the hot water for one minute. See how much water is in the bucket 60 seconds later. These tubs often have high flow valves.

**Read this most interesting email** I received on March 5, 2003 - three weeks after the column was published - from a gentleman in Boston:

Dear Tim,

I have appreciated your newsletter and website for some time. I was intrigued by your remarks on the topic of tankless water heaters, because a month ago I had a new hot water boiler installed, including a tankless heater. To be honest, I had a hard time accepting the calculation you provided showing that a tankless heater would use 3.5 times more gas than your present water heater. So I decided to do an experiment.

As it happens, I have a 165,000 Btu input system, and I live in Boston, where my cold water comes in at 41 F at this time of year. I turned down the thermostat, so that the boiler's output could be directed entirely to hot water. I turned on my shower and adjusted the water temperature to 120 F using my instant-read kitchen thermometer (and I should add that is definitely hotter than what I would use for a shower!). I turned on the hot water faucet at the same time. Then I went downstairs and watched the usage indicated on my gas meter for ten minutes, which came to 16 cubic feet. This would translate to 144 cf over the course of 90 minutes. This looks to be about 2.1 times the rate you describe for your water heater. If I were doing the measurement in July, when your home data was measured, it would be lower because the incoming water would be warmer.

Still, I confess that this surprised me. I do wonder about a house (like mine) where hot water usage is not uniform during the day. Hot water usage in my house is basically after 6 PM and before 8 AM; the other ten hours a day, my water heater was keeping the water at temperature. I've noticed that my hot water is 5-10 degrees hotter now than it was when I had a water heater, so I could adjust the mixer valve and reduce gas consumption further.

I may try this again in the spring; if the results are significantly different, I'll let you know.

Best wishes,

Tom Fisher

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Dear Tim:

I read you article about tankless water heaters on the Internet, which I found most enlightening and informative. Like many people my wife had read all the hype about how tankless water heaters were much more energy efficient and good for the environment. So I set out to find the "right" tankless water heater for our house.

It took some time to do the homework, but I eventually decided on a whole house natural gas unit that delivered 175,000 BTU and flow rate of 6 gallons per minute. Yes, we finally got rid of that ugly, inefficient tank water heater and replaced it with our brand new small-profile tankless water heater. Of course, the initial cost was a bit of a shock; cost of the unit (\$1025) plus the cost of installation (\$1100) came to an initial investment of \$2100. Oh, but it would all be worth it; think of the all the money we would save on natural gas and let's not forget the environment!

One problem is that our average natural gas usage (in cubic feet) has actually increased by 40% compared to the same three months from last year. Perhaps I need more data, but it appears that at best we are at a break-even point with regard to natural gas usage.

Another problem is that the "on demand" only applies to the natural gas and not the hot water. This means that we are now letting the water run longer in order to get "hot" water. Compared to our ugly old tank water heater we must wait up to 60 seconds or longer in some instances to finally get "hot" water.

Since the kitchen takes the longest for "hot" water to arrive, my wife has taken to heating a large pot of water on our gas range to overcome this issue (perhaps a contributor to the increase in natural gas usage). Based on this data, I have come to realize that we will never make up the additional cost for the tankless water heater from energy savings! The bottom line is that we spent \$2100 dollars for a tankless water heater that doesn't conserve energy, takes at least 1 minute to deliver hot water, and that has the same warranty as a conventional water heater. Forget about making up the cost in energy savings ... you can purchase 3 conventional water heaters at \$700 each that combined will last for a least up to 30 years. Just taking into consideration the debt in initial cost for a tankless water heater compared with a conventional water heater, your energy savings would have amounted to \$1400 before there is any payback. Assuming that a tankless water heater lasts for 12 years, that's \$120 per year or \$10 per month. Even if that were achievable, it may be time to replace that tankless water heater. The replacement costs should be less since the initial installation has been done, so assume \$1200 for tankless heater number 2. (This time it's probably only \$1400 which for some people may be possible (I don't see how)) cost for the tankless water heater from energy savings!

Still looking the bright side, we tell ourselves that the tankless water will last twice as long as a conventional water heater (20 years versus 10 years), so we can at least count that as a savings! Wrong again; although the literature talks about 20 years, the actual warranty is only for 12 years. Upon further investigation, I find that there are several conventional water heaters that also have 12 year warranties.

George McCammon

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**Author's Note:** You can easily \*double\* the life of a traditional storage tank water heater by installing a [second anode rod](#).

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Tim,

I have a tankless water heater, a Bosch Aquastar 250 SX. I have had it for about a year. I talked my husband into one based on the projected energy savings.

I did not know about your article previous to today- it sure could have saved us some money. You are so right. Not only have we spent more on the initial costs of the heater and the installation (about \$2000), but we have found that since it's installation we have not saved anything, it has consistently cost us more in natural gas.

The manufacturer acted like I was crazy when I called to report these facts. They so much as told me I was the only customer they had spoken to that had such an experience. I am now 'stuck' with this tankless energy monster as I also installed a water softener and no longer have space for a regular tank style water heater. I also do not think the store I purchased it from will take it back after almost a year.

Maybe between your article and my actual experience someone else will not make the same mistakes. For the month of August our usage was up 9ccf from last year. I hate to see what it will be when we start using the central heat!

Stacy V.  
Weatherford, OK

Emailed, Sept. 28, 2006

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## WATER HEATER ANODE ROD

**Dear Tim:** In your response to the writer who asked you about tankless water heaters you mentioned adding a secondary accessory anode rod to the traditional storage tank water heater. How do you do that? Would an installer of the tank know how to do that? And, how do you find the correct one (anode rod)?

After reading your article and many other home forums, I think I've changed my mind about getting a tankless water heater. I've been trying to search for recommendations on the traditional tanks (brands) but have not found sufficient information. Are most of them pretty much the same? Kenmore vs. Whirlpool, etc. ? Thanks, Patricia M., Pacifica, CA.

**Dear Patricia:** The secondary anode rod is placed in the cold water inlet portion of the heater. When shipped from the factory, the water heater has a plastic dip tube that forces the cold water to the bottom of the tank. This secondary anode rod is shaped just like the dip tube and performs the same function of sending cold water to the bottom of the heater, but it also adds another layer of electric protection to the water heater.

Any plumber worth his salt knows about these extra anode rods. If the person you are working with does not know, that tells you he is a rookie, does not pay attention to updates, and/or does not stay current with changes in the industry.

The water heater manufacturer offers these rods as an accessory. Just buy a heater that offers the accessory rod. Go to a real plumbing supply house to find one, not a home center. The heaters sold at plumbing supply houses are usually very good and for the most part let price be your guide. Better water heaters cost more money as they have better parts.

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## WATER HEATERS - EXPANSION TANKS

Virtually, every modern plumbing code requires the installation of an expansion tank on hot water heater installations. The reason is simple. Water expands when heated. This extra volume of water needs to go somewhere. Before the widespread usage of backflow preventers, check valves and pressure reducing valves, this expanded water simply pushed the cold water back into the city water main. If your house has one of the above mentioned devices, you could have problems. These devices prohibit the flow of water from your house back into the public water system.

Without an expansion tank, the expanding water can cause your hot water heater to possibly fail because of the increased pressure. This pressure can cause serious life threatening problems as well, if you heat your water with natural gas or propane. The water heater tank can collapse around the internal flue and cause carbon monoxide to enter your home. It is serious business.

Expansion tanks are really simple devices. They contain compressed air and a special rubber bladder. When your hot water heater turns on, the water within your piping system begins to expand. This expanding water enters the expansion tank. Eventually, hot water is drawn from the system thru a faucet and the expansion tank releases the extra water into the piping system.

Expansion tanks come in various sizes. The size you need depends upon two very important variables. You need to know the capacity in gallons of your hot water heater and the water pressure of your house piping system. The capacity of your hot water heater is stamped on a label or a plate on the side of your hot water heater.

Water pressures within municipal water systems vary widely. Here in Cincinnati, water main pressures vary from 50 pounds per square inch (PSI) to over 200 PSI within a distance of a mile! This same thing may be true in your city. People with cisterns or wells control their own system pressure thru the use of electric pumps.

It is easy to determine your incoming water pressure. Many plumbing supply houses sell a little gauge that attaches to any faucet which has garden hose threads. Or if you like, you can call your local water department. They will possibly send a technician to your house. This person has very accurate gauges which will do the same thing.

Once you have this information, visit a local plumbing supply house that sells these tanks. They will be able to provide you with the proper sized tank to suit your needs.

Be sure to follow the directions that are packaged with the expansion tank. It only takes a few moments to read them. This will insure that your tank will function properly.

If you install a pressure reducing valve to control water hammer, be sure to buy one with a bypass feature. Without this, your water heater will begin to malfunction. You will see water dribble out of the pressure/temperature safety valve without a doubt.

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The reason lies in the fact that heated water expands. Without a pressure reducing valve, this expanded water can easily go right back outside to the water main. Low quality or malfunctioning pressure reducing valves block this backwards flow of expanding water.

An inexpensive expansion tank installed on the cold water side of your hot water heater will solve this problem. The tank absorbs the expanding water and then releases it once hot water is drawn from the hot water heater. They are simple yet effective devices.

## Installing an Expansion Tank

The first thing you need to do is to size the expansion tank according to the size of your hot water heater. The tank manufacturers make this easy. All you have to do is to determine the capacity of your hot water heater. This is always stamped on the side label of the hot water heater. You may have a 50 gallon or 80 gallon or whatever size hot water heater. Take this information to your plumbing supply house to get the right sized expansion tank.

## A Simple Tee Fitting

The expansion tank installation requires you to install a simple tee fitting in your cold water supply line. I like to install these on a horizontal run of pipe, not a vertical piece. A vertical piece of pipe can cause undo stress on the connection point between the tank and the supply piping. I always hang my water-heater expansion tank above the horizontal pipe and recommend NEVER to hang it below. However, ALWAYS read the instructions provided by the manufacturer.

The tanks simply have a threaded connection. You will install the opposite type threaded adapter to your tee fitting. Apply Teflon tape or pipe dope to the male threads and screw the tank onto the fitting. To get a tight fit, you may have to use a pipe wrench or a leather belt around the tank. Most tanks come with a place to attach a tightening wrench. Follow the instructions and this can be done in ½ hour or less!

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## NEW WATER HEATERS ARE SAFER

**DEAR TIM:** I was shopping for a new gas water heater and looked closely at the labeling. I never realized that the pilot light and actual burner flames could ignite vapors from flammable liquids. I have a friend who stores gasoline and other flammable liquids in their garage which also happens to be where their water heater is located. Why hasn't their house gone up in smoke? Is the danger real or imagined? Are gas water heaters safe? Should I buy an electric heater? Sally F., Lansing, MI

**DEAR SALLY:** Existing gas water heaters are safe. The unsafe part of the equation happens to be us. We humans frequently do unsafe things. Stop by your local fire department and ask the officer in charge how many fires they have extinguished that were caused by negligent humans who stored flammable liquids in a very unsafe manner. Common sense should tell you that any flame or spark in the presence of invisible flammable vapors is a recipe for disaster. Loss of life is a reality. But do you need to buy an electric water heater? I think not.

Interestingly enough, the major manufacturers of gas water heaters decided to be very proactive with respect to the flammable vapor issue. With the approval and cooperation of the Consumer Products Safety Commission, these major water heater manufacturers began to jointly study the issue. They shared research and patents while they individually developed separate new gas water heater products that stop the ignition of flammable vapors outside of the water heater. This was a voluntary effort on the part of the manufacturers.

Flame arrestor barriers represent an enormous technological safety advancement for traditional storage water heaters.

Effective July 1, 2003, all new 30, 40 and 50 gallon gas water heaters that use a traditional atmospheric vent must meet a new standard. This standard was written by the American National Standards Institute (ANSI) and it basically states that any heater meeting the above description made after this date must be designed so that vapors created by spilled gasoline near the heater will not ignite outside of the water heater. Thirty, 40 and 50 gallon power vent water heaters must meet this standard on July 1, 2004. All other residential models must meet this same ANSI standard on or before July 1, 2005.

These new heaters are very interesting as they all employ a special one-way technology that allows regular combustion air as well as flammable vapors to enter the combustion chamber of the water heater. But if flammable vapors enter the sealed combustion chamber and ignite, the fire can't go backwards and ignite the rest of the vapors just outside of the heater. More importantly, the heaters have built-in sensors that detect the burning vapors. The designs of the heaters are such that the supply of gas to the heater and pilot light is shut down.

Perhaps the biggest problem that all of the new water heaters face is lint, dust and oil. In the past, many people were not concerned with dusty and lint-covered appliances in a basement or garage. But the new heaters built with this advanced safety technology will work best when you keep them free of as much lint and dust as possible. As you begin to see these new water heaters in the marketplace note that some will have filters and others will not.

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If there happens to be airborne dust and lint in your environment, be aware that this particulate matter can and will find its way into the water heaters unless you stop it in some manner. You may choose to maintain a cleaner environment to stop problems before they begin. You may choose to use a water heater that sports an external filter that is easy to clean. Or you may choose a heater that claims to never need cleaning, although the dust and lint most certainly is accumulating somewhere within the heater. My advice is to do your best to eliminate lint and dust in the vicinity of the water heater and buy a water heater that fits your lifestyle.

If you want to really protect yourself, your loved ones and your possessions, I think the best advice is to schedule a fire prevention meeting at your home with your local fire department. Ask the visiting official about flammable liquids and the absolute safest way to store them. Be aware that these include gasoline, kerosene, paint thinner, etc. I am quite certain the fire official will tell you how to safely store them.

Finally, do not be lulled into a sense of security with these new, safer water heaters. When you buy one, do not think for a moment you can now store or work with flammable liquids and be immune to danger. Gas water heaters are by no means the only thing that can ignite the invisible and deadly flammable vapors!

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