

Solar Water Heating Tools of the Trade

If you're handy around the house, and have some plumbing experience, a solar water heating system is within the realm of a do-it-yourself project. But before you get started, make sure you have the right tools.

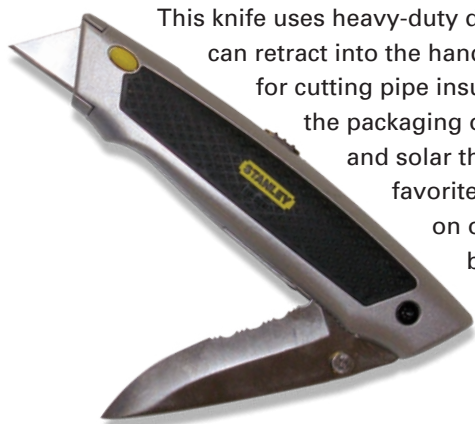
by Chuck Marken

The right tools can make the difference between a job going fantastically—or frightfully. Here's what you'll need in your toolbox to tackle a solar water-heating installation. We'll cover most of the bases for those who are newer to home improvement projects, but bypass describing and listing basic hand tools.

Besides choosing the *right* tools for the job, buy quality ones that will last a lifetime. And never try to get by with using the wrong tool for the job. This can cost you time, lower the quality of the finished installation, and might lead to some bloody knuckles—or worse!

Small, But Significant

Utility Knife



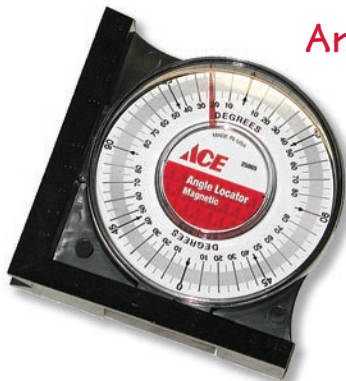
This knife uses heavy-duty disposable blades, which can retract into the handle for safety. Used for cutting pipe insulation and opening the packaging of all your new tools and solar thermal equipment. My favorite has a permanent blade on one side and disposable blades on the other. \$15



Tube Cutters

Copper tubing (pipe) cutters are just what the name implies—and the small cutters fit in tight locations, allowing you to easily rotate the cutter around the pipe. Tube cutters make a very clean cut when working with copper, and clean-cut pipe-ends are the first requirement for leak-free solder joints. \$20

Angle Finder



An angle finder (locator) allows you to set your solar collectors at the exact tilt angle to maximize the amount of solar exposure—and your system's performance. Many have a convenient magnetic base, which allows you to place the tool on the collector, leaving both of your hands free for mount adjustment. \$10

Soldering Tools

Most solar water heaters are plumbed with copper tubing because of the high fluid temperatures they can produce. The easiest way to fit copper pipe together is by soldering. I like to keep all my soldering tools in a 5-gallon bucket with a tool organizer. Kept in the bucket are (clockwise from top): a small fire extinguisher; a Mapp gas torch (burns hotter than propane); a spritz bottle for cooling solder joints; Teflon tape; lead-free solder, flux, and brush; and a pipe tube-and-fitting cleaning brush. **\$100 for all**



Lighter

If you're finishing an installation at night or on a rainy day, a lighter can simulate the heat of the sun. Use it to test the differential controller's sensors and controls to make sure they are working correctly before you pack it in for the day.

\$0.99

Torpedo Level

A torpedo level is a must in any tool kit if you want the job to look good. For leveling equipment and pipe runs, this is the tool to have on hand. You can use your angle finder in a pinch, but a level is easier to use and read in most cases. **\$15**



The Big Ones

Solar Site Analysis Tools

These can help you find the best location for your solar collector(s) by showing you where shading will occur from buildings, trees, or other objects. Several are available, from the lower-tech, but highly reliable, Solar Pathfinder (**\$255; or \$319 with software interface**) to Wiley Electronic's ASSET, a digital camera, mount, and software package that crunches solar access data on your computer from a set of photos you shoot at your site (**\$699**). Solmetric's high-tech (and higher-priced) SunEye is a handheld digital tool that provides solar access and shading information with the touch of a button (**\$1,255**).





Cordless Drill

From drilling holes to driving lag screws for collector mounts, this tool is indispensable. Tool freaks covet the high-priced, high-capacity, lithium ion-battery drills and impact drivers, which offer high torque and the ability to drive through soft and hardwoods, as well as metals. Some even come with a built-in LED light to illuminate your work. **\$50-\$400**



Cordless Reciprocating Saw

Paired with a variety of blades, this tool can make short work of everything from trimming metal collector mounts to cutting holes through roof decking for pipe penetrations. **\$90-\$150**

Right-Angle Drill

When you need to drill large holes in thick wood, this is the tool you want. Its design lets you work in close spaces, but be careful with these high-power brutes. A co-worker broke his jaw while drilling through two 2 x 4 top plates in a tight attic. The large spade bit hit a nail, and the drill handle spun out of his hand and clocked him in the jaw. Ouch! Tool cost—**\$300**. Taking care to spare yourself an emergency room visit—priceless.



Grip It & Strip It



Lock-Jaw Pliers

Lock-jaw pliers are handy for any number of jobs. They're terrific for holding back pipe insulation on a length of tubing to allow soldering a joint. **\$12**

Slip-Joint Pliers

Slip-joint jaw sizes get smaller and larger by virtue of their ingenious method of varying hinge placement, to accommodate a range of material sizes. You can use these tools when working with smaller pipe and fittings, since they are much lighter and handier than pipe wrenches. **\$20**



Lineman's Pliers

An old plumber once told me that every tool is a hammer first, and whatever else it was made for, second. Lineman's pliers are a good example. Machined from forged steel and with a heavy-duty hinge, these pliers are designed to hold up even after repeated use under extreme force on heavy-gauge wire. And although they are made to cut, twist, and pull wire, I've used them to drive small nails and staples too many times to count—two tools for the price of one! **\$40**



Needle-Nose Pliers

The perfect tool for feeding and pulling small wires through fittings, and aligning wires in terminals for tightening. Best if they also include wire-cutting blades. **\$10-\$40**



Wire Stripper

You don't need these with passive solar hot water systems since there is no wire work involved, but all active systems have some electrical wiring to power the pump(s) or get signals from the sensors. Whether stripping wire for AC-powered system controls or for DC PV-powered systems, wire strippers are the first tool you'll need to make secure cable terminations. The tool shown also has a built-in voltage indicator in the handle to detect live circuits. **\$25**



Adjustable-End Wrenches

These are used all the time on pipe fittings, bolts, nuts, lag screws, and mounting hardware, and when it is impractical to carry a full set of box or open end-wrenches. They are not intended for heavy-duty torquing on hardware. **\$20**



Pipe Wrenches

Pipe wrench teeth are designed to grip pipe when pulling on the wrench and loosen when pushing on it to give a ratcheting motion. Pipe wrenches are typically used in pairs, one for holding and one for turning. If the teeth get worn, it's time for some bloody knuckles—and time for a new wrench. **\$25**



The Finish Line-Up

Caulking Gun

A caulking gun is a necessary tool for sealing roof jacks and roof penetrations. **\$10**



Glycol Pump & Hose

For antifreeze systems, a drill pump chucked into a drill will make filling the system a much simpler task. You'll also need a few 5-gallon buckets and a couple of washing machine hoses. **\$25**

Testing & Inspection Tools

A few different tools are helpful for inspecting and troubleshooting solar hot water systems. Clockwise from the bottom: a propylene glycol tester indicates the minimum temperature a particular glycol solution will withstand without freezing (the floating balls are calibrated a little differently from ethylene glycol testers designed to test automobile antifreeze); calibrated thermometers are used to check water temperature; pH paper is for handy for testing glycol solution acidity; and an inspection mirror is great for doing work in hidden crannies. **\$45 for all**



Digital Multimeter (DMM)

A solar water heating installer can get by with a fairly simple and low-cost DMM compared to solar-electric installers. But some type of multimeter is needed for troubleshooting control or pump problems. **\$12-\$250**

Access

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