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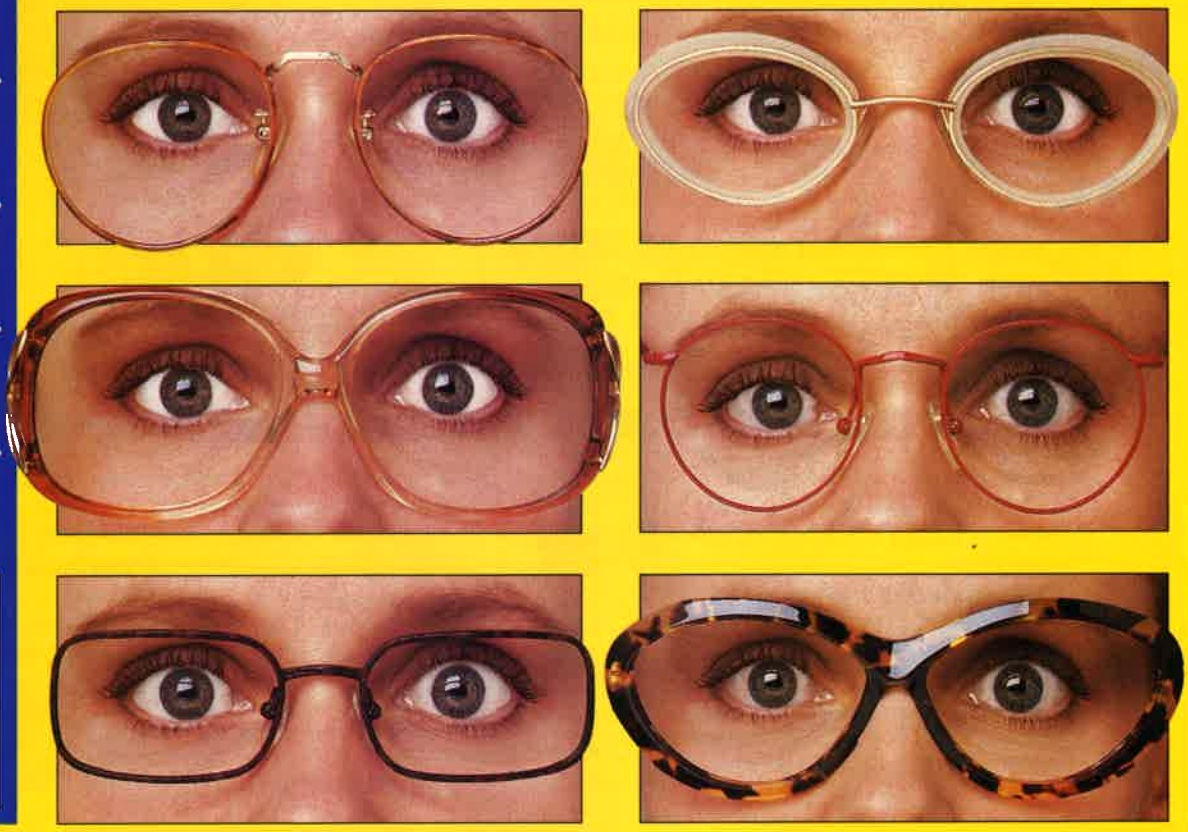

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Should you use a water filter?

HERE'S HOW TO CHECK YOUR WATER FOR PROBLEMS AND HOW BEST TO REMOVE IMPURITIES.

IN SHORT

Mail-order labs can reliably assess your water, often for not much money.

If you have a contamination problem, check our Ratings of 32 water filters and filter carafes on page 30.

Despite occasional reports of unsafe drinking water, and advertising designed to raise suspicions about the quality of what's coming out of your kitchen faucet, the tap water available to the vast majority of Americans is safe.

Five of six Americans get water from a public water system, where it's almost always been tested, aerated, and treated under regulations based on the Federal Safe Drinking Water Act. And that largely successful 20-year-old law, we were pleased to see, was further beefed up last year.

Unfortunately, people who get their water from a private well or from one of the thousands of small water systems that serve only a few thousand customers can't be as certain about the quality of what they're drinking. And even water from large systems may be contaminated by pipes in your neighborhood or your own home or may be subject to breakdowns at the treatment plant.

"Unfortunately, at this time we cannot take for granted the safety of our drinking water," says Carol M. Browner, head of the U.S. Environmental Protection Agency.

The breakdowns often are widely publicized. In Washington, D.C., unsafe bacteria levels prompted a "boil order" last summer. In Milwaukee, a waterborne parasite killed 100 people a few years ago. A test of more than a dozen Midwest communities' tap water found excessive concentrations of a weed-killer.

Meanwhile, almost 100 companies sell, and sometimes oversell, filters that promise to remove bad taste and contaminants. Prices range from less than $20 to nearly a thousand dollars. A bright yellow sticker on a *Pollenex* model shouts: "Filters Out 95% of Lead." A sheet with an *Amway* filter claims to reduce more than 100 EPA "priority pollutants" and "other contaminants"—with multisyllabic monikers like bis(2-ethylhexyl)phthalate and tetrachlorodibenzo-*para*-dioxin. (Less conspicuous: "These contaminants are not necessarily in your water.")

The problems

Here are some of the most common problems:

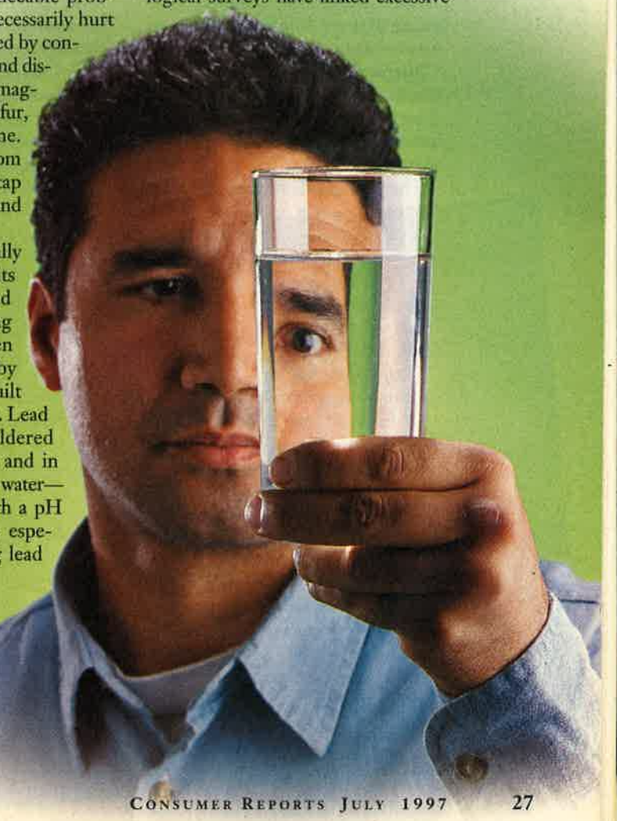
Aesthetics. Bad taste, color, and odor are the most noticeable problems, but they won't necessarily hurt you. They may be caused by contaminants such as rust and dissolved iron, calcium, magnesium, manganese, sulfur, sediment, and chlorine. Often these come from water systems that tap wells instead of rivers and reservoirs.

Lead. There's virtually no lead in water at its source. It's added by lead service lines connecting mains to homes, often in older cities, and by plumbing in homes built more than 30 years ago. Lead is also found in soldered joints of copper pipes and in brass fixtures. Corrosive water—which is soft water with a pH on the acidic side—is especially good at leaching lead from plumbing.

For infants and young children, chronic exposure to lead can cause brain damage, learning disabilities, and hyperactivity. In adults, lead has been linked to kidney problems, high blood pressure, anemia, and nerve damage.

"Flushing" the lines can lower lead concentrations significantly. Faucets should be run for a few minutes at the start of a day and when the tap hasn't been used for several hours, although this technique may not help in high-rise apartments, where pipes are long. Also, use cold water for food preparation; lead dissolves more easily in hot water.

Organic chemicals. In industrial and agricultural areas, herbicides and other organic compounds sometimes wind up in drinking water. Some organic pollutants are, ironically, by-products of water-chlorination systems: Chlorine combines with decaying plant matter to make chloroform and related compounds. Animal studies and epidemiological surveys have linked excessive



Testing the water *Mail-order labs gave reliable analyses*

The only certain way to find out if you really need a water filter for health reasons is to have your water tested by a reliable laboratory. We evaluated four mail-order labs to see how quickly and how well they sized up lead and chloroform problems we deliberately concocted. All did a good job of analysis; the primary variations were in how the services operated.

Here's what we found:

• Services vary. Some test for only a few pollutants, others for many; some offer tests piecemeal, while others offer packages. One farm-runoff test measures nitrate and pesticides; a city-drinking-water test checks on lead, copper, cadmium, and fluoride; an "I'm Concerned" package includes weed-killers and PCBs.

• Some lead-test kits include just one sample vial; we suggest you get two of those kits, since it's best to measure lead twice, first when the tap is turned on in the morning and then after water has flowed for a few minutes.

• Some labs want their money up front, when you order the kit; some want to be paid when you send your water in for analysis.

• It took from 2 to 11 days to receive our test kits.

• It then took from 2 to 3 weeks after we submitted our filled vials to receive our reports.

There are hundreds of labs. To find one certified by your state, call your state health department or environmental protection agency. The U.S. EPA Safe Drinking Water Hotline, 800 426-4791, also offers more information on testing.

Mail-order chemistry This package of tests costs $145.

Here are details on the four services we evaluated. The labs are listed alphabetically:

Clean Water Lead Testing, Asheville, N.C. (704 251-6800).
$17 for two-sample lead test; does not offer chloroform test. Payment (check only) must be sent when ordering kit. Least expensive and quickest lab for lead testing. Affiliated with University of North Carolina.

Daily Analytical Laboratories, Peoria, Ill. (800 752-6651).
$20 for single lead test; $100 for chloroform-only kit. Payment (check or money order only) must be sent with samples.

Spectrum Laboratories, St. Paul, Minn. (800 447-5221).
$18 for single lead test; $75 for chloroform-only kit. Payment (check or credit card) must be sent with samples.

Suburban Water Testing Laboratories, Temple, Pa. (800 433-6595).
$35 for two-sample lead test; $145 for "The Basics" kit, the lab's cheapest package that tests both chloroform and lead (it also tests pH, coliform bacteria, fluoride, nitrate, and other substances). Payment must accompany order. Filling lead sample vials was a little harder than for other labs. Lab sent an "early warning" before final results, to tell us our lead levels were high.

intake of these disinfection by-products to bladder cancer.

Nitrate. This problem is more common in rural areas. Nitrate, from chemical fertilizers and manure, works its way into the water near farming areas and feedlots.

The youngest family members and pregnant women are most at risk. Bacteria in an infant's digestive tract convert nitrate into nitrite, which exhausts the blood's hemoglobin, starving the baby's system of oxygen. In the worst cases, brain damage or death results.

Pathogens. Microorganisms from decaying vegetation and human and animal wastes can get into the water supply; water systems check for coliform bacteria as an indicator of overall quality. Most home filters don't claim to stop bacteria; chlorine added at water plants should make that unnecessary.

More difficult for a water system to control is contamination of surface water by the parasites *Cryptosporidium* and *Giardia*. Both cause severe cramping and diarrhea, which can lead to dangerous dehydration. Most vulnerable are the elderly and people with impaired immunity, such as people infected with HIV, transplant patients on antirejection drugs, and cancer patients taking chemotherapy.

Few water companies perform the expensive filtering needed to remove those parasites. In fact, the Centers for Disease Control and Prevention recommends that people at risk take no chances: They should boil all water, filter it properly, or buy bottled water from a known clean source.

Testing your water

While most people won't have any of these problems in their water, you should find out. A useful first step is to ask your water system for a copy of its official water-quality report. Then you should consider testing the water in your home.

Fortunately for consumers, a number of mail-order labs provide independent tests of water quality. We had good results with four we tried (see "Testing the Water," above). Whether to test your water, and what to test for, depends on several factors.

If you get your water from a private well or a small water system, test for nitrate, pesticides, and bacteria if you live in an intensive agricultural area, and test for volatile organic compounds if you live near a landfill or factory.

If you live in an older house or in an older neighborhood, it's a good idea to test for lead. Testing is also a good idea if your water simply tastes bad or looks dirty; those symptoms sometimes are markers for inadequate water purification.

If your water often has a strong chlorine odor, check for chloroform.

The solutions

If you do discover contaminants, you'll probably have a number of options for treating the water, depending on what needs to be removed, how much drinking water you use, and how much spare space you can find in your kitchen.

Simplest are carafe filters, which typically process a half-gallon in a few minutes. The best are pretty good at reducing bad tastes, lead, and organic chemicals, but they won't eliminate pathogens or fine sediment.

More elaborate are the several kinds of filter systems—faucet-mounted, countertop, under-sink—that treat household water on demand. Typically, one or more specialized filters removes sediment, organic chemicals, and lead. Some filters also have been certified as blocking parasites (look for a label reading "absolute one micron"; "nominal one micron" isn't good enough).

Most expensive are reverse-osmosis units, which add another layer of protection by forcing the water through a membrane. You might need one of these to remove nitrate.

Water filters aren't the only option for clean water, of course.

Bottled water. It's an expensive solution, and the Centers for Disease Control and Prevention advises that not all bottled water is as safe as you might think. Some is simply repackaged municipal water or water drawn from springs and lakes that could have their own problems.

Distillers. Relatively small countertop electrical units, these boil the water and then condense the vapor. They're a sure way to remove microbes, and they remove most minerals and metals, including lead, but they may not eliminate volatile organic chemicals. They can take an hour to process a quart of water and use lots of electricity. Prices are $150 to $350.

Boiling. It's laborious, but it's the best inexpensive method of killing bacteria and parasites if you have been alerted that your water might be contaminated.

Recommendations

If your water passes tests but it doesn't taste good, first try using a carafe filter for your drinking water. Our tests of five models were originally reported last year and updated for these Ratings.

If testing has detected *specific* pollutants in your water, get a water filter system, equipped with the appropriate cartridges, that fits your space and budget. (Annual operating costs of both carafes and filters can far exceed their initial purchase price.)

Our tests focused on filter systems equipped with basic cartridges that remove off-tastes, lead, and organic chemicals. We used filtered water spiked with contaminants. All 27, we found, could cut lead levels in our "pollution solution" by 40 percent or more, reduce organic chemicals, and improve taste somewhat. Many systems offer optional filters for other pollutants. One thing the filter systems could do better is tell you when they need changing; most don't.

Most faucet-mounted filters we tested did only a fair job of getting out the lead; they did a little better with organics (we tested with chloroform). They'll need a new cartridge after less than 100 gallons; their annual operating cost can range from about $20 to $80. The top faucet model: the *Culligan WaterWare FM-2*, at $55.

The best countertop models reduced both lead and organics very well, improved the water's taste substantially, and are not too hard to install. Annual costs: $10 to more than $120. The *Amway E-84*, $310, topped the list; it has a useful cartridge-replacement indicator. The *Shaklee BestWater MTS2000*, $230, performed similarly.

Under-sink filters didn't necessarily filter more effectively than did countertop units, but they won't hog valuable counter space. Annual costs: about $10 to $190. The *Rainsoft Hydrefiner 9878 P-12*, $500, scored highest; but at less than one-third the price, the *Ametek Kleen-Plus SY5197*, $155, is A CR Best Buy.

Most people don't need the heavy-duty filtering ability of reverse osmosis. But if you do, the best unit, the *Kinetico 518*, $900, earned top scores across the board. Reverse-osmosis units cost about $120 to $170 annually; they also waste up to five gallons of water per hour.

One final note: If your water does need filtering, don't stop with the filter. Compare notes with neighbors, notify the water system, and notify local health officials. Where the source of the problem can be found, it should be removed. CR

Reprints of this report (#RO162) will be available in mid-August. For bulk pricing or to order a single copy ($3 each), write CU/Reprints, 101 Truman Ave., Yonkers, N.Y. 10703-1057.

How we tested ***Wet Lab L-141 gurgled day and night for 10 months as computer-controlled pumps directed our custom "pollution solution" through filters. Each filter's output was analyzed periodically.***

Ratings & Recommendations

Water filters

Shopping strategy

Determine your needs before investing in a filter or carafe.

Estimate your usage Use gallon jugs for a few days to estimate your needs. Then use the Ratings to get a good idea of the filters' capacity before cartridges are exhausted.

Know which pollutants Official reports and lab tests can tell you what's in your water. If taste, smell, and appearance are your major concerns, pick a filter labeled as meeting NSF International's Standard 42, for "aesthetic" problems. For basic health problems such as organic compounds and lead, pick filters meeting Standard 53 for the specific contaminant. For parasites, look for the "absolute one micron" label.

Know where to shop Filters are sold in water-treatment stores, hardware stores and home centers, department stores, and mass merchandisers, as well as door-to-door.

The tests behind the Ratings

All the filters we tested meet NSF International's Standards 42 and 53, except for three that don't claim to remove lead. We spiked filtered water with roughly 80 parts per billion (ppb) of lead and 150 ppb of chloroform, demanding but not unrealistic levels. We sent about a gallon through each filter once every 90 minutes and determined how many gallons it could process before chloroform removal dropped below 60 percent.

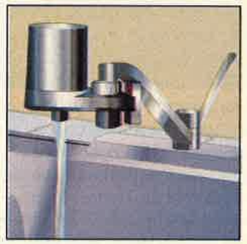
Price is approximate retail and includes initial set of cartridges. **Overall score** is based mainly on ability to remove the two contaminants and improve taste; filters lost points for clogging before they were spent and for difficult installation. **Cartridges** lists the total **price, number,** and **model number** of the replacement cartridge(s) we chose for our tests. **Capacity** estimates the volume a filter could process before its chloroform removal dipped below 60 percent—or before the flow slowed to a trickle. Our concentrated solution probably shortened filter life: You may get up to 50 percent more gallons. **Annual cost** is our estimate to run a filter for a year, if you use one gallon of water daily (your cost may be lower). We recommend changing cartridges at least once a year, even if they are not exhausted. **Organics** summarizes results from chloroform tests. The best filters, when relatively new, removed more than 95 percent of the chloroform; the next best, better than 80 percent; the worst, less than 40 percent. For **lead,** the best filters when relatively new removed more than 95 percent; the next best, more than 90 percent; the worst, less than 65 percent. **Taste** shows reduction of sulfur taste in dilute cabbage water. **Parasites** identifies filters certified as "absolute one micron." **Flow rate** is based on processing of a half-gallon. High: less than 30 sec. Avg.: 30-60 sec. Low: more than 60 sec.

Overall Ratings *Within types, listed in order of overall score*

CARAFE MODELS

•Inexpensive units, simple to use •Reasonably good filtration of lead and organics

These pitchers hold a half-gallon; pour water into the top and the filter in most models will process it in about 5 to 10 minutes. They get costly if you use a lot of water; gallon for gallon, their filters may cost more than those in other water-filter systems.



FAUCET-MOUNTED MODELS

•Cheap and easy to install yourself •Some are pretty effective •Filters must be changed often

These fist-sized devices screw onto the faucet nozzle. A diverter valve (push-in or twist) shunts water through the unit and out its own opening, for filtered water on demand. All improved the water's taste. The best excelled at removing organic chemicals, but lagged a notch or more in handling lead. With our "pollution solution," all clogged—to an anemic flow—before processing even 100 gallons.

COUNTERTOP MODELS

•Easy to install yourself •Easy to maintain •Capacity of hundreds of gallons

These often rely on a single cartridge that sits on your kitchen counter (and can take up as much space as a coffeemaker). Typically, you engage a diverter valve, and flexible tubes carry water from faucet to filter and back again, albeit at reduced flow. Do-it-yourselfers can easily install these filters. The best removed more than 95 percent of the chloroform and lead in our tests; even runners-up cut more than 85 percent of the lead.

UNDER-SINK MODELS

•May need a plumber to install •Generally solid performance •Capacity of hundreds of gallons

These are bigger and often use two or three cartridges in a series. They must be plumbed into the cold-water line and usually come with a separate spigot mounted on the sink. They're slightly harder to maintain, since there are multiple cartridges to change. These filters did a good job on the pollutants, but not necessarily better than countertop units.

REVERSE-OSMOSIS MODELS

•Highly effective against widest range of pollutants •Typically need a plumber to install •Expensive, cumbersome, slow

These can take up most of the space under the sink; the spigot is mounted on the sink. They combine conventional filters with a reverse-osmosis unit—a special cellophanelike membrane through which water is forced. This removes many organic and inorganic substances, including industrial chemicals, lead and such heavy metals as arsenic, barium, and chromium, and nitrate, which regular filters cannot purge. An under-sink tank holds the output (typically about two gallons). These systems waste several gallons of water for every gallon they purify.

Illustrations by Gary Cox

Brand and model	Price	Overall score (0 P F G VG E 100)	Cartridges: Price	Cartridges: No.	Cartridges: Model no.	Cartridges: Capacity	Annual cost	Organics	Lead	Taste	Parasites	Flow rate	Comments
Ecowater 25001	$22		$12	1	50006	100 gal.	$44	◓	○	◓	—	low	Very convenient.
Home Water 62290	10		5	1	62247	100	18	●	◓	●	—	low	Least convenient carafe. Extremely slow.
Brita Standard 35507	20		7	1	OB03	40	64	○	◒	○	—	low	Very convenient.
Shaklee BestWater 51100	26		12	1	51101	30	146	○	◒	○	—	low	Very convenient.
Teledyne Water Pik WF-1	6		.50	2	WR-1	1	183	◒	◓	●	—	low	Less convenient carafe; revamped model now more convenient.
Culligan WaterWare FM-2	55		12	1	FM2RR	80	55	●	◓	◓	✔	low	—
PUR FM-1000C	40		15	1	RF2050	90	61	●	○	◓	✔	low	Hard to change filter.
NordicWare 78100	30		15	1	78110	70	78	○	◒	●	✔	low	—
Ametek FF-100	16		5	1	FC1	90	20	○	◒	◒	—	high	Does not claim to remove lead.
Sears WaterWorks Deluxe 625.345300	45		9	1	4234532	50	66	●	○	◓	—	low	—
Teledyne Instapure F-2C	20		6	1	R2C	60	37	○	●	○	—	avg.	Does not claim to remove lead.
Pollenex WP300	20		12	1	FWP300	70	63	●	●	○	—	low	—
Amway E-84	310		85	1	E85	800	85	●	●	◓	✔	avg.	Useful filter-change indicator.
Shaklee BestWater MTS2000	230		95	1	52301	800	95	●	◓	●	✔	avg.	—
PUR CT-6000	70		15	1	CTR5050	250	22	●	◓	○	✔	avg.	—
Kinetico 6500	250		50	1	7268	210	87	●	◓	●	—	avg.	—
Home Water CB50C	80		27	1	CB50HMR	500	27	●	◓	○	—	avg.	Hard to change filter.
Ametek Kleen-Plus CTR-210	42		10	1	CC-10	450	10	●	○	○	—	avg.	—
Omni Total OT1	64		37	2	TC1, TC2	220	61	○	○	○	—	low	Hard to change filters.
Singer WF-26	74		30	1	RWF6	90	122	◒	○	●	—	avg.	Clogged very prematurely. Hard to change filter.
Rainsoft Hydrefiner 9878 P-12	500		55	1	9875	500	55	●	●	●	✔	high	—
Ametek Kleen-Plus SY5197, **A CR Best Buy**	155		45	2	CC-10, CMR10R	800	45	●	◓	●	✔	low	Useful filter-change indicator.
Omni Total Plus OT-5	145		54	3	GAC1, TC3, BC1	200	99	●	●	●	✔	low	Hard to change filters.
Everpure H-200	285		95	1	H-200	500	95	◓	◓	◓	✔	high	Hard to change filter.
Culligan System 201	210		32	1	01005582	440	32	◓	◓	◓	—	avg.	—
Teledyne Instapure IF-10A	45		11	1	IR10A	500	11	●	◒	◓	—	high	Does not claim to remove lead. Hard to change filter.
Omni Total II OT-2	105		34	2	GAC1, TC3	200	62	○	○	◓	—	avg.	Hard to change filters.
Teledyne Instapure IF-100A	130		51	2	IR10A, R70	100	186	●	◓	●	—	avg.	Clogged very prematurely. Hard to change filters.
Kinetico 518	900		165	3	7273, 7034, 5305	400	165	●	●	●	✔	high	Hard to change filters.
Sears 625.347050	450		135	2	42-34709, 42-34706	400	135	●	◓	●	—	avg.	Useful filter-change indicator. Hard to change filters.
Rainsoft 9591	900		145	4	9565, 9547, 9757, 9798	400	145	●	◓	●	—	high	Hard to change filters.
Ecowater ERO292E	700		118	4	CF1512TBD, 7111381, 7150809, 7111399	400	118	◓	●	◓	—	high	Useful filter-change indicator. Hard to change filters.

► **Can't find a model?** Call the manufacturer. See page 52.