

LETTERS



GFCI Questions

To the Editor:

Regarding "Safe Wiring With GFCIs," by Rex Cauldwell (12/92): The last paragraph under the heading "Incorrect Wiring of GFCIs" states that "the incorrect hookup would be immediately apparent if the test button doesn't trip the device." Unfortunately, this is untrue. The test button is valid only if the device is wired correctly regarding load and line. I first suspected this after testing many GFCI receptacles with a plug-in tester and finding that if load and line connections are reversed, the GFCI will only trip for ground faults downstream from the device, and not at the device itself. The best advice to your readers is not to rely on the built-in test button for verifying correct installation, but instead to use an independent tester such as the simple one described in the article.

Bob Reeds, Home Inspector
American Inspection
Mission Viejo, Calif.

To the Editor:

One thing that I have never been able to understand: Why is it that double-pole circuits (220-volt) don't require GFCIs? A few companies do make double-pole ground fault breakers, so under what conditions would one use them? For a 220-volt heater, for example, is it hazardous to use a double-pole ground fault circuit breaker?

Herbert L. Cares, M.D.
Surgical Neurology Inc.
Newton, Mass.

To the Editor:

Rex Cauldwell's excellent article on GFCIs has stirred a debate. If, in the movie scene mentioned, the bathtub had been acrylic and the plumbing entirely plastic, would the bather have been electrocuted?

Richard Elsbree
Sayre, Pa.

Rex Cauldwell responds:

The paragraph Mr. Reeds mentions refers to GFCI breakers, not to GFCI receptacles. GFCI breakers should test properly (using their built-in button) as soon as they are stabbed into the main bus and their curly white wire is attached to the neutral bus. Like all breakers, they will carry current even if the outgoing wires (line and neutral) are reversed, because electrons don't care what color the wire is. That's all the test button on a GFCI circuit breaker is supposed to tell you — that the device is stabbed and

wired into the panel properly.

However, even if the GFCI breaker tests okay at the panel, it will not test properly (with an independent push-button tester) at the downstream (protected) receptacles if the line and neutral wires are reversed.

So, without opening the panel, how does an inspector know if the outgoing (load-side) wires are reversed or not? This will be obvious, because the downstream receptacles will all test "reverse polarity" and the button on the independent tester will not trip the GFCI breaker.

When it comes to miswired GFCI receptacles, the plot thickens. I tested two brands of GFCI receptacles to see how they worked when miswired. Here's what I found: If a GFCI receptacle has its black wires (line and load) switched, but not its neutrals, the GFCI will immediately kick when power is applied. However, if both hot and neutral wires are switched, the GFCI receptacles I used in my experiment still worked and tested properly, both at the receptacle and downstream. I spoke with a GFCI designer to find out why, and he compared it to driving your car backwards to work: You might get there, but it sure isn't the best and safest way to do it. Also, this apparently varies from manufacturer to manufacturer, since the reverse-wired receptacles Mr. Reeds encountered tested fine downstream but not at the GFCI receptacle. (Which is why, when it comes to testing, it's best to use both the built-in test button and an independent tester, since you might get uncertain results when using only one or the other.)

The bottom line is that no manufacturer will guarantee what will or will not work when their product is incorrectly installed. I can't help but wonder who is doing all this reverse wiring in Mr. Reeds' area. Hopefully it's the do-it-yourselfers, and not certified electricians.

In answer to Dr. Cares' question, you should use a double-pole GFCI breaker whenever a product manufacturer requires it for liability reasons or a testing lab requires it for product certification. The most common example is a spa. Some have built-in GFCI protection, but the ones that don't usually require protection at the panel. Another example is a whirlpool tub motor that comes in contact with the water. Most of these motors are 120 volts and use a single-pole GFCI. However, in the case of a universal motor converted to 220 volts, a double-pole GFCI breaker would be required.

I haven't found anything in the National Electrical Code that prohibits you from wiring a specific appliance to a

GFCI, either 110 or 220. And I can think of no instance where it would be directly hazardous to use a GFCI. However, GFCIs should never be used where life or property will be at risk if power is removed by a nuisance trip, as in the case of a heater protecting plumbing from freezing.

Mr. Elsbree raises a question that I've often thought about. However, everyone I ask to jump into the tub to help me verify it one way or the other has refused. So until someone proves me wrong, I would guess that the bather would not be electrocuted. Here's my logic: In an insulated tub, and assuming heavily mineralized water (which is a semiconductor), the current will flow from one pole to the other. If you are anywhere between the two poles, the electricity will pass through as well as around you. I've seen this happen to fish in a fish bowl. However, inside a radio these poles are only about an inch apart. This means that following the shortest path, the current would stay inside the radio and the bather would survive. But I am not so confident in my theory as to try it.

One last thing: If anyone who is grounded touches you while you are in the insulated tub with the radio, then you're grounded, too — consider yourself zapped.

Builders Need Education

To the Editor:

We value your journal highly, both in our structural engineering office and in our general contracting field crew. Our superintendent and carpenters have their own subscriptions and read it with interest.

I have been building, designing, and inspecting projects which meet the Uniform Building Code, the American Concrete Institute Code, and the American Institute of Steel Construction specifications since I graduated from Iowa State University in 1946. I find there is surprising variation in the quality of construction and conformance to codes from one community to the next.

In my opinion, a better education is needed for most people in the world of construction. A system of teaching, testing, and certification has been part of the process for plumbers and electricians for many years and it is long overdue for carpenters and their associates in general contracting.

Eldon L. Schroder, PE.
E.L.S. Construction Inc.
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Backer Rod Source

Polyethylene backer rod is available from HBI products (2 New Rd., Aston, PA 19014; 215/459-1800), not from Majeske Inc., as mentioned in January's *Focus on Energy* column.

Catalog Homes Researcher Needs Help

To the Editor:

As a graduate student in Eastern Michigan University's Historic Preservation Program, I am doing research on catalog houses. From the early 1900s through the 1950s, between 500,000 and one million homes in the United States arrived by rail car at job sites, pre-cut and ready to be assembled by a contractor or owner over a prepared foundation. Several companies marketed this type of home, including such familiar names as Sears and Wards. The most successful company was Alladin of Bay City, Mich. Others included Sterling, Lewis, Harris, and Gordon Van Tine.

Somewhere among your subscribers there may be a contractor who built one of these houses or knows someone who did. Perhaps in the corner of an attic is a set of instructions left over from an Alladin House or a catalog from Sears-Roebuck or Lewis Homes.

After studying the catalogs and the one set of instructions I have been able to obtain, I still have many questions. I hope someone who has actually built one of these homes can answer them for me. I would happily pay postage for any catalogs, plans, or instructions people might send me for my research. Thank you.

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