



Consumer Opinion Forum, Survey #2

GFCI Receptacles

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This report was prepared by the CPSC staff, has not been reviewed or approved by, and may not reflect the views of, the Commission.

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Appendix A: Printout of Survey

Background

The Consumer Opinion Forum is an internet-based survey application that is available for voluntary participation by interested consumers 18 years of age and older through the U.S. Consumer Product Safety Commission (CPSC) website. The Forum is managed by the staff of the CPSC Division of Human Factors and is used to assist in making more informed and accurate expert judgments on consumer behavior, perceptions, and attitudes. The Forum periodically posts surveys to solicit information of this type from those who have registered to participate. Because this respondent population is a convenience sample rather than a random sample, the survey results may not be representative of the general population. Nevertheless, the results do provide preliminary data on consumer behavior that is otherwise not available. Moreover, this respondent population is more likely than the general public to be aware of safety issues, so unsafe behaviors or low hazard perceptions among this population would most likely point to problems that would be even more prevalent among the general consumer population.

On October 7, 2008, the Human Factors staff began distributing e-mails to all registered participants, inviting them to complete a survey about their experiences with electrical outlets that contain ground fault circuit interrupters, or GFCIs. A printout of the survey appears in Appendix A of this report. At the time invitations were distributed, 1588 people had registered to participate in the Forum. The staff distributed the invitations in three roughly equal-sized batches over three successive days and received 105 automated “undeliverable” or similar e-mail responses, presumably because those e-mail addresses were no longer valid.

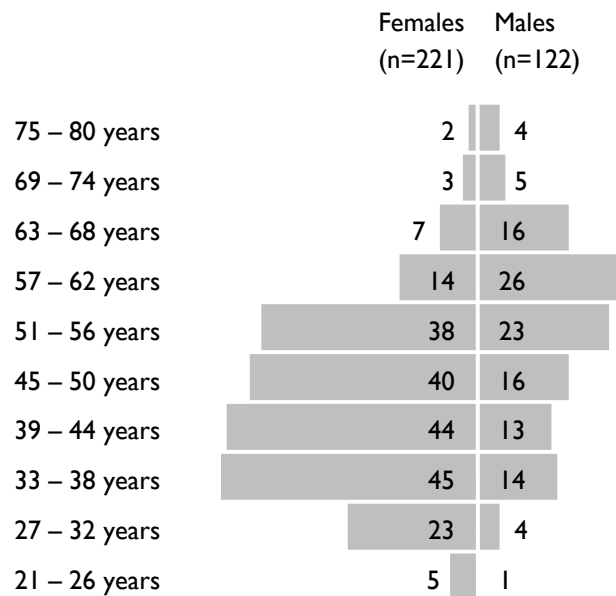
The survey closed on October 31, 2008, with 343 respondents having provided responses. This number corresponds to a response rate of about 23 percent.¹ Some (14) respondents exited the survey before reaching the final survey page. Among those who did complete the survey, however, the mean and median completion times were 5 minutes and 3 minutes, respectively. Ninety-five percent of respondents who completed the survey did so in less than 12 minutes.² The following report summarizes the survey results.

¹ If one considers all e-mail invitations that were distributed, the response rate is about 22 percent. The rate increases to 23 percent if one considers only those e-mail addresses that are likely to be valid; that is, the 1588 invitations distributed minus the 105 automated “undeliverable” responses.

² The 95th percentile duration for those who completed the survey was 11.5 minutes.

Respondent Population

Survey respondents ranged from 22 to 80 years old,³ with a mean and median age of 47 years and a standard deviation of 12 years. Nearly two-thirds (64 percent) of all respondents were female; 36 percent were male. The relationship between respondent age and gender is highly significant, with females strongly dominating the younger respondents and males dominating the older respondents.⁴ A chart that summarizes these data follows.



³ For improved accuracy when analyzing the data, the staff rounded respondent age to the nearest year. For example, the age of a respondent who was 31 years and 10 months would be classified as 32 years even though the general public would refer to that person as a 31-year-old.

⁴ Based on a chi-square test of independence, $\chi^2 (9, N = 343) = 46.77, p = 0.0000004$. The mean age of male respondents was 53 years and the mean age of female respondents was 44 years.

GFCI Receptacle Locations

Most respondents (87 percent) claimed to have at least one GFCI receptacle in or around their home, and virtually all (99 percent) of those respondents identified the locations of their GFCI receptacles. The most common locations cited were the following:

	Percentage of Respondents
Bathroom	91%
Kitchen	68%
Exterior of House ⁵	40%
Garage	31%
Crawlspace/Unfinished Basement	9%
	295

Other, less common, locations identified by respondents included laundry rooms, basements (finished), and living rooms.

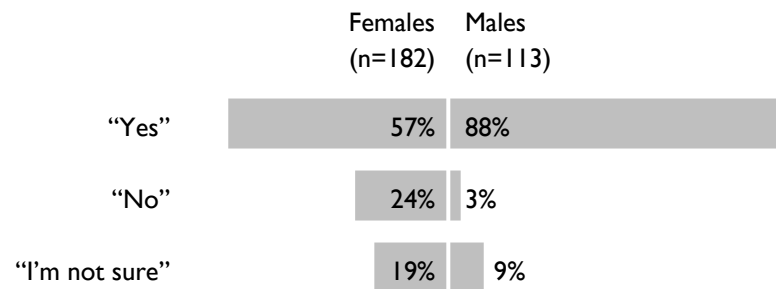
When asked whether any of their GFCI receptacles were covered or blocked in a way that would prevent them from being able to see a small light built into the front of them, 22 percent of respondents replied “yes.” Additionally, 10 percent of respondents who claimed that they do know or might know how to test a GFCI receptacle (see next section) indicated that at least one of their receptacles was blocked, hard to reach, or otherwise hard to access.

⁵ Some respondents did not identify “exterior of house” but did specify “carport” or “porch” within the “other” category. Including these responses would raise the percentage for all respondents to 41.

Testing Likelihood and Location

Respondents who reported having GFCI receptacles were asked whether they know how to test them to make sure they are working properly. Ninety-nine percent of respondents provided a response, and 69 percent of those claimed to know how to do so. Thus, nearly one-third (31 percent) of respondents were not sure how to test a GFCI receptacle. These respondents were about evenly split between not knowing how to test them (16 percent) and being uncertain whether they know how to test them (15 percent). As shown in the chart below, male respondents were more likely to report knowing how to test a GFCI receptacle. Nearly 90 percent of male respondents claimed to know how to test a GFCI receptacle, but little more than half of the female respondents made the same claim; nearly one-quarter of female respondents reported that they did not know how to test a GFCI receptacle.

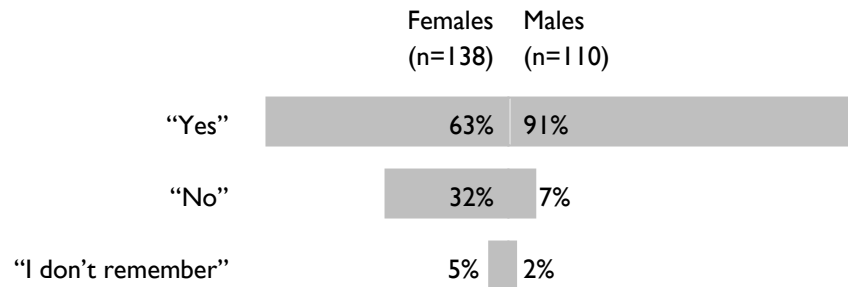
“Do you know how to test your GFCI receptacles to make sure they are working properly?”



Three-quarters of those respondents who claimed that they do know or might know how to test their GFCI receptacles reported having actually tested one.⁶ These responses appear to be strongly dependent on the sex of the respondent, as shown in the following chart. More than 90 percent of male respondents who claimed that they do or might know how to test a GFCI receptacle have actually tested one, but only about two-thirds of female respondents who made a similar claim have actually tested one.

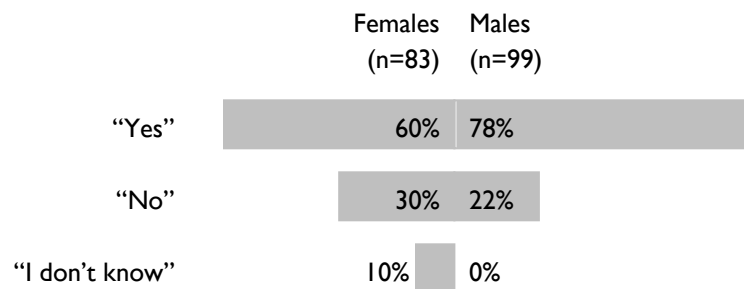
⁶ Of the 248 respondents who responded “yes” or “I’m not sure” when asked whether they know how to test their GFCI receptacles, 187 (75 percent) reported having tested one. This corresponds to about two-thirds (63 percent) of all respondents who reported having a GFCI receptacle in or around their home (298).

“Have you ever tested any of your GFCI receptacles to see if they were working properly?”



Respondents who claimed to have tested a GFCI receptacle then were asked whether they have tested every one of their GFCI receptacles. Ninety-seven percent of respondents provided an answer. More males than females reported testing all of their GFCI receptacles, as shown in the following chart.

“Have you ever tested every one of your GFCI receptacles?”



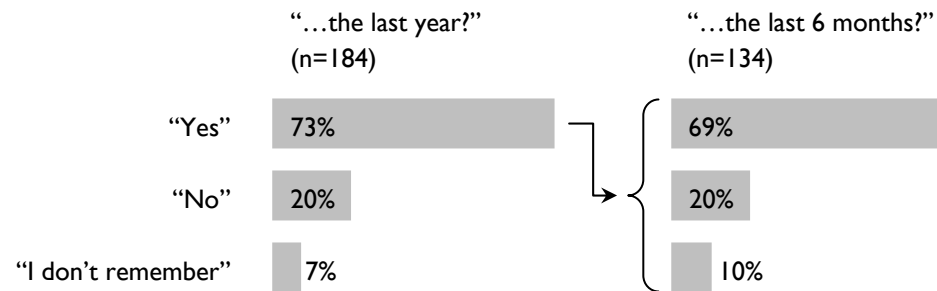
The locations most commonly cited by respondents as having GFCI receptacles that have been tested were similar to those locations identified earlier as having GFCI receptacles installed.⁷ The similarity of these locations to the locations identified earlier as ones that contain a GFCI receptacle, and the similarity of the associated percentages, suggest that the location of GFCI receptacles may have little to no influence on whether respondents test them.

⁷ These locations were the bathroom (88 percent), the kitchen (68 percent), the exterior of house (37 percent), the garage (26 percent), and a crawlspace or unfinished basement (7 percent). Additional, but less common, locations identified by respondents included laundry rooms and living/family rooms.

Testing Frequency and Failures

Respondents who claimed to have tested at least one of their GFCI receptacles were asked whether they had tested one in the last year and, if so, whether they had tested one in the last 6 months. Ninety-eight percent of the respondents provided an answer and, as shown in the following charts, almost three-quarters of these respondents claimed to have tested one in the last year. Nearly 70 percent of those respondents also claimed to have tested a GFCI receptacle in the last 6 months.

“Have you tested any of your GFCI receptacles during...”



Thus, half of all respondents who claimed to have tested a GFCI receptacle reportedly had done so in the last 6 months, and less than one-third (31 percent) of all respondents who reported having a GFCI receptacle in or around the home had tested one in the last 6 months.⁸ Once again, the locations most commonly cited as including GFCI receptacles that were tested within the last year and the last 6 months were similar to those locations most commonly cited as having GFCI receptacles that have been tested at least once.⁹ This suggests that the location of GFCI receptacles may have little to no influence on the frequency with which respondents test them.

Respondents who claimed to have tested at least one of their GFCI receptacles were also asked whether they ever discovered one that was not working properly. About one-quarter (26 percent) of these respondents have made such a discovery. The most common action taken in response to the failure was to replace the GFCI receptacle; 79 percent of these respondents took this action. Two additional respondents stated that the GFCI receptacle was repaired or rewired. Three respondents explicitly stated that they still use the receptacle or that they briefly continued to use the receptacle and then had it replaced; in most cases, however, information regarding the delay between the failure and having the receptacle replaced, or whether the receptacle was used during this interval, was unstated.

⁸ Two hundred ninety-eight (298) respondents claimed to have a GFCI receptacle in or around their home, but only 187 respondents claimed to have tested one. Ninety-three (93) claimed to have tested one in the last 6 months.

⁹ Bathroom: 87 percent and 77 percent, respectively; kitchen: 69 and 62 percent; exterior of house: 38 and 35 percent; and garage: 29 and 25 percent.

Respondents who have never found a GFCI receptacle to be working improperly or who cannot remember whether they have ever discovered a GFCI receptacle to be working improperly were asked what actions they would take if they made such a discovery. As was the case for people who have actually had their GFCI receptacle fail, most of the responses (70 percent) suggested that they would repair or replace the receptacle. In many cases, however, this was combined with diagnosing the problem or contacting someone else to diagnose or address the problem.¹⁰ About 37 percent of responses indicated that they would contact someone else to diagnose or address the problem; 16 percent stated or implied that they personally would perform actions such as checking the wiring or retesting the GFCI to diagnose the problem. Only 15 percent explicitly stated that they would stop using the outlet. Four percent stated that they would continue to use the outlet for at least some period of time.¹¹

¹⁰ For example, respondents often claimed that they would contact an electrician, their husband, etc. and have the GFCI receptacle repaired or replaced. It was assumed, then, that the diagnosis would result in having the GFCI receptacle replaced.

¹¹ One respondent stated that he would avoid using it with appliances that “could possibly ground out on something.” Another stated that she would be “very careful” about using it for heat appliances and with water present. One respondent stated that he would ignore the failure as long as the outlet continued to function. Another stated that he might replace the outlet, but with a regular outlet because of the cost of GFCI receptacles. The final respondent simply stated that she would take no action in response to the failure.

Test Procedure

Respondents who claimed to have tested at least one of their GFCI receptacles were presented with an open-ended question asking that they describe, in detail, the procedure they followed the last time they tested a GFCI receptacle. Ninety percent of these respondents provided a response to this question, but the staff considered 8 percent of these responses to be non-responsive because they did not answer the question being posed¹² or stated that the respondent did not remember how the test was performed, did not know how to perform the test, did not personally perform the test, or a similar response.

Of the 155 usable responses, 88 percent stated that testing was performed by pressing the TEST button on the GFCI receptacle. Six percent referred to the use of a GFCI circuit tester¹³ and the remaining 6 percent referred only to pressing the RESET button.

Of those respondents who reported performing the test by pressing the TEST button on the GFCI receptacle, 35 percent claimed to check to make sure that the power was off—for example, by plugging something into the receptacle—or implied that this check was performed. Another 9 percent provided responses that suggested they might have checked the receptacle in some way; for example, by referring to the GFCI tripping or functioning correctly. Two percent claimed to rely upon a light on the GFCI to tell whether power was off. The remaining 54 percent never referenced checking to make sure the power was off at the receptacle. Many of these latter responses provided details that implied hearing the GFCI click or seeing the RESET button pop out was all that was required to know if the GFCI was working properly.

Before the survey was launched, the Human Factors staff hypothesized that consumers may not be aware of the need to verify that the GFCI has actually shut off power to the receptacle during testing. Although respondents who claimed to have tested at least one of their GFCI receptacles were already asked the open-ended question about how they performed their most recent test, the staff believed that key pieces of information that would be relevant to determining whether the respondent truly understands the test procedure might be omitted by respondents. Thus, respondents who had previously responded “yes” or “I’m not sure” when asked whether they know how to test their GFCI receptacles were presented with the following test scenario:

Without actually performing the following test, imagine that you have a GFCI receptacle like the one pictured above and have decided to test it to see whether it is working properly to protect you from an electrical shock. You have unplugged everything from the receptacles and pressed the TEST button

¹² For example, one response stated simply, “by water.”

¹³ Three additional respondents referred to the use of a GFCI circuit tester but also referred to pressing the TEST button and, therefore, are covered by the 88 percent who referred to pressing the TEST button. The overall percentage of respondents who referred to the use of a GFCI circuit tester, therefore, was 8 percent.

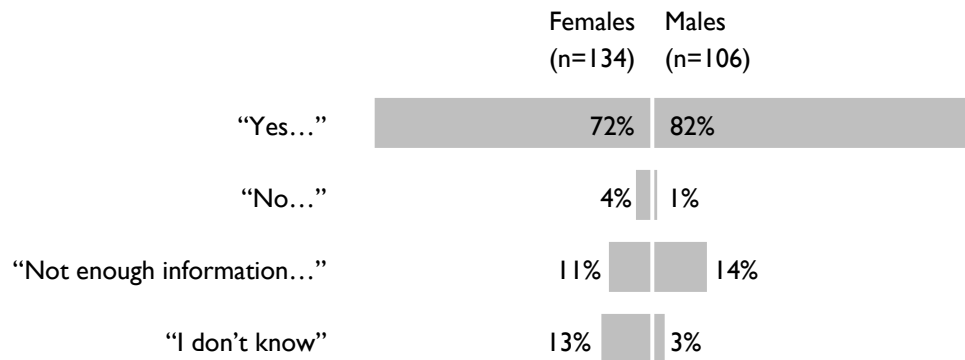
on the GFCI. When you did so, the RESET button popped forward. Based on this test and the results, which of the following statements do you believe best describes whether the GFCI would protect you from an electrical shock?

- Yes, the GFCI is likely to protect me from an electrical shock.
- No, the GFCI is not likely to protect me from an electrical shock.
- Not enough information to answer.
- I don't know

Because the scenario explicitly states that everything was unplugged from the receptacles, a person performing the test would be unable to confirm that the GFCI is functioning properly. Thus, the correct answer is “Not enough information to answer.”

Ninety-seven percent of people who were presented with this scenario provided a response. More than three-quarters (77 percent) of respondents answered “Yes, the GFCI is likely to protect me from an electrical shock.” Only 13 percent of all respondents who provided an answer gave the correct one. This is lower than the 35 percent of respondents who, when asked the open-ended question about how they performed their last GFCI-receptacle test, suggested that they checked the power to verify that it was shut off. This finding might suggest that people do not perform this check as often as they claim. The high percentage of “yes” responses may indicate that many people believe pressing the TEST button is all that is required to perform the test or that either hearing the GFCI click or seeing the RESET button pop forward is a sufficient indication that the test was successful. This hypothesis is consistent with the responses obtained from the open-ended question.

As shown in the following chart, a similar percentage of males and females provided the correct response (14 and 11 percent, respectively), but male respondents seemed slightly more likely to provide an incorrect response (83 percent, versus 76 percent for females) and female respondents seemed more likely to state that they did not know the correct answer (13 percent, versus 3 percent for males).



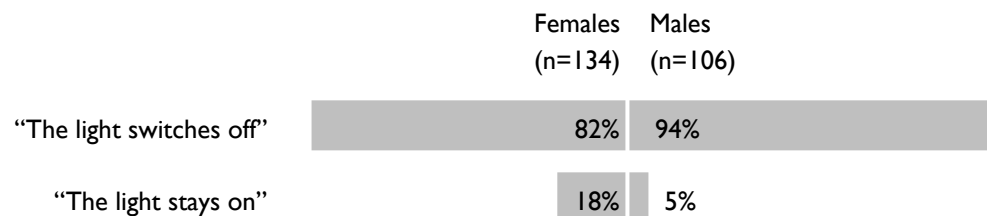
A second test scenario was also presented to these respondents:

Now imagine that a night light is plugged into a GFCI receptacle and the light has been switched on. You press the TEST button on the GFCI. Which result, or results, would lead you to believe that the GFCI receptacle is working properly? If you are not sure, please give your best guess.

- ☐ The light stays on. The RESET button pops forward.
- ☐ The light switches off. The RESET button pops forward.
- ☐ The light switches off. The RESET button does not move.
- ☐ The light stays on. The RESET button does not move.

The correct answer is “The light switches off. The RESET button pops forward.” Ninety-five percent of people who were presented with this scenario provided one or more responses, and most (86 percent) respondents selected the correct answer. Five percent of respondents selected “The light switches off. The RESET button does not move.” Depending on the design of the GFCI receptacle, this answer might be accurate.¹⁴ Furthermore, movement of the RESET button can be very slight and may not be noticed by some consumers. For these reasons, the Human Factors staff cannot say whether these responses suggest a lack of knowledge about how GFCI receptacles operate.

Focusing exclusively on the condition of the light revealed that 89 percent of all respondents correctly concluded that the light would switch off, and 10 percent believed that the light would stay on. As shown in the following chart, female respondents were more likely than male respondents to answer that the light would stay on (18 percent versus 5 percent). Virtually every respondent who had correctly concluded that there was not enough information to answer the first scenario also concluded that the light would switch off in the second scenario.¹⁵



At the conclusion of the survey, respondents were provided with information about correct test procedure for a GFCI receptacle and the frequency with which one should test each GFCI receptacle.

¹⁴ The staff of the CPSC Division of Electrical Engineering is not aware of any GFCI designs that function in this way, but cannot say for certain whether the RESET button will move on all GFCI receptacles.

¹⁵ All but one of the 30 relevant responses stated that the light would switch off. The remaining response stated that the light would stay on.

Conclusions

Less than two-thirds of all respondents who claimed to have a GFCI receptacle in or around the home have actually tested one, and only half of these people claimed to have tested one in the last 6 months. Because this respondent population is more likely than the general public to be aware of safety issues, the general public almost certainly tests their GFCI receptacles less often. The survey results suggest that women may be less likely than men to have actually tested one.

The results of this survey also suggest that only a small percentage of those people who believe they know how to test a GFCI receptacle might actually understand the proper procedure. Most respondents appeared to understand that testing a GFCI receptacle will cause the power to shut off at the receptacle, but most of these respondents did not appear to believe that it is necessary to verify this during a test. Again, given the nature of the respondent population, these problems may be more prevalent among the general public.

Appendix A: Printout of Survey

Survey 02 - GFCI Receptacles

Page 1

Thank you for choosing to participate in this survey, which will ask you about your experiences with electrical outlets that contain ground fault circuit interrupters, or GFCIs. This survey should take less than 15 minutes. If you have any comments concerning the accuracy of this time estimate or have any suggestions for reducing it, please send them to us at cof@cpsc.gov. To avoid influencing other people's responses, please do not discuss this survey or disclose the contents of the survey to anyone until after October 31.

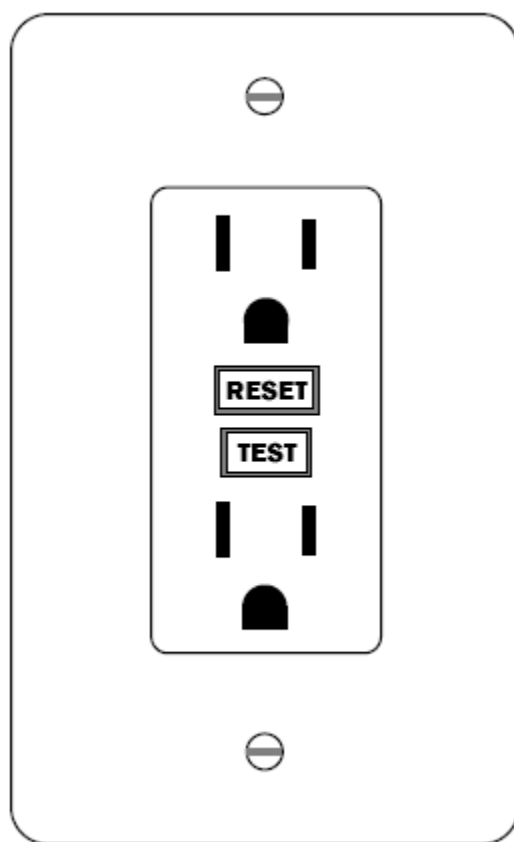
All questions marked with an asterisk (*) are required. To navigate through the survey, please use the buttons provided on the survey pages. Do not use your browser's Back and Forward buttons. Clicking CANCEL will close the survey, but you can always log back into the Forum anytime before October 31 to complete it.

To begin, please click NEXT.

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A ground fault circuit interrupter, or GFCI, is a device that helps to protect you from electrical shocks and electrocutions. Electrical outlets with receptacle-type GFCIs are often located in bathrooms, kitchens, garages, unfinished basements, outdoor locations, and similar areas that may be exposed to water.

The drawing below shows an example of a GFCI receptacle. All GFCI receptacles will have TEST and RESET buttons, but these buttons may be shaped or positioned differently than is shown in the drawing.



1. Do you have any GFCI receptacles in your home or on the exterior of your house?*
- ☐ Yes
- ☐ No
- ☐ I don't know

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2. Please identify all of the locations in and around your home that have GFCI receptacles.
Check all that apply.

- ☐ Bathroom(s)
- ☐ Exterior of house
- ☐ Crawlspace or unfinished basement
- ☐ Garage
- ☐ Kitchen
- ☐ Other, please specify _____

3. Imagine that each of your GFCI receptacles has a small light built into the front of

it. Are any of your GFCI receptacles blocked or covered in a way that would prevent you from seeing that light?

- ☐ Yes
- ☐ No
- ☐ I don't know

4. Do you know how to test your GFCI receptacles to make sure they are working properly?*

- ☐ Yes
- ☐ No
- ☐ I'm not sure

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5. Are any of your GFCI receptacles hard to test because they are blocked, difficult to reach, or otherwise hard to get to?

- ☐ Yes
- ☐ No
- ☐ I don't know

6. Have you ever tested any of your GFCI receptacles to see if they were working properly?*

- ☐ Yes
- ☐ No
- ☐ I don't remember

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7. Have you tested every one of your GFCI receptacles?

- ☐ Yes
- ☐ No
- ☐ I don't know

8. Please identify all of the locations in and around your home that have GFCI receptacles you have tested at least once.
Check all that apply.

- ☐ Kitchen
- ☐ Bathroom(s)
- ☐ Exterior of house
- ☐ Crawlspace or unfinished basement
- ☐ Garage
- ☐ Other, please specify

9. Think about the last time you tested a GFCI receptacle. Please describe, in detail, how you performed the test.
-

10. Have you tested any of your GFCI receptacles during the last year? That is, have you tested any since October of last year?*

- ☐ Yes
- ☐ No
- ☐ I don't remember

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11. Think about your GFCI receptacles that you have tested during the last year. Where are those GFCI receptacles located? Check all that apply.

- ☐ Kitchen
- ☐ Bathroom(s)
- ☐ Exterior of house
- ☐ Crawlspace or unfinished basement
- ☐ Garage
- ☐ Other, please specify

12. Have you tested any of your GFCI receptacles during the last 6 months? That is, have you tested any since about April of this year?*

- ☐ Yes
- ☐ No
- ☐ I don't remember

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13. Think about your GFCI receptacles that you have tested during the last 6 months. Where are those GFCI receptacles located? Check all that apply.

- ☐ Kitchen
- ☐ Bathroom(s)
- ☐ Exterior of house
- ☐ Crawlspace or unfinished basement
- ☐ Garage
- ☐ Other, please specify

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14. Have you ever tested a GFCI receptacle and found that it was not working properly? In other words, have you ever had a GFCI receptacle fail the test?*

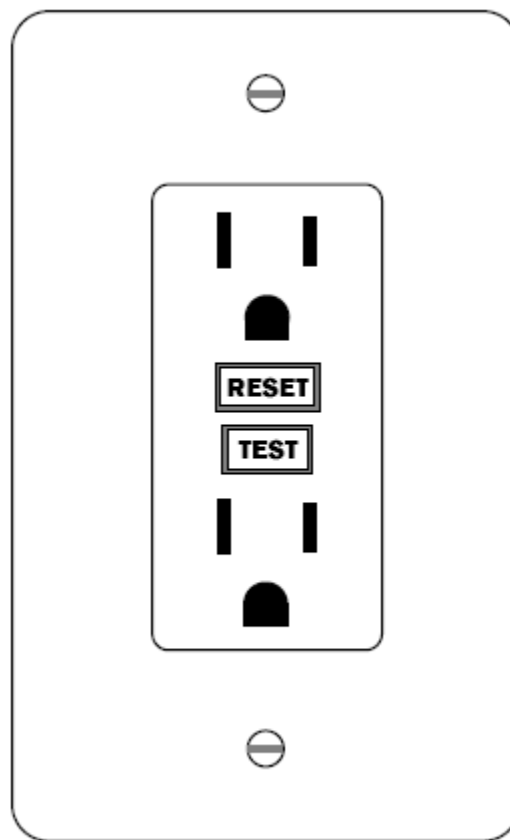
- ☐ Yes
- ☐ No
- ☐ I don't remember

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15. What, if anything, did you do after the GFCI failed the test? For example, did you continue to use the outlet? Did you replace it? Did you do something else?

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16. If one of your GFCI receptacles were to fail when you tested it, what actions would you take, if any?

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17. Without actually performing the following test, imagine that you have a GFCI receptacle like the one pictured above and have decided to test it to see whether it is working properly to protect you from an electrical shock. You have unplugged everything from the receptacles and pressed the TEST button on the GFCI. When you did so, the RESET button popped forward. Based on this test and the results, which of the following statements do you believe best describes whether the GFCI would protect you from an electrical shock?
- ☐ Yes, the GFCI is likely to protect me from an electrical shock
 - ☐ No, the GFCI is not likely to protect me from an electrical shock
 - ☐ Not enough information to answer

☐ I don't know

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18. Now imagine that a night light is plugged into a GFCI receptacle and the light has been switched on. You press the TEST button on the GFCI. Which result, or results, would lead you to believe that the GFCI receptacle is working properly? If you are not sure, please give your best guess.

Check all that apply.

- ☐ The light stays on. The RESET button does not move.
- ☐ The light stays on. The RESET button pops forward.
- ☐ The light switches off. The RESET button does not move.
- ☐ The light switches off. The RESET button pops forward.

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Thank you for taking the time to complete this survey.

All GFCI receptacles should be tested once a month. To properly test a GFCI receptacle, you must first plug a nightlight or lamp into the outlet. The light should be on. Then, press the TEST button. The RESET button should pop forward and the light should go out.

If the RESET button pops forward but the light does not go out, the GFCI has been improperly wired. You should contact an electrician to correct the wiring errors.

If the RESET button does not pop forward, the GFCI is defective and should be replaced.

If the GFCI is functioning properly and the light goes out, pressing the RESET button should restore power to the outlet.

To end this survey, please click on DONE.