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# Arc Fault Circuit Interrupter Tester? Not Really.

The proper way to test an AFCI is to use the push-to-test button located on the device. Using an AFCI indicator, also referred to as an “AFCI tester,” may yield confusing and conflicting results.

The electrical industry has always had a fascination with testers. There are testers for ground fault circuit interrupters (GFCIs), voltage drop, circuit polarity, circuit continuity and now the latest addition … the arc fault circuit interrupter (AFCI) tester.

2005 NEC® Section 210.12 requires AFCIs on 15 and 20 ampere branch circuits that supply bedrooms in dwelling units, and the 2008 NEC expanded this requirement to include family rooms, dining rooms, living rooms, parlors, libraries, dens, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas. The intent of the AFCI is to detect hazardous arcing and turn off the circuit in order to reduce the potential of fire from an arc. AFCIs are available from a variety of manufacturers and have been installed in thousands of homes.

To capitalize on this new device, the AFCI “tester” has shown up in the market place. Many electrical inspectors and home inspectors have purchased the tester with the idea that it will tell them whether an AFCI is functioning properly. Unfortunately, confusing and conflicting results can occur.

Testers of many kinds can be very useful tools for accomplishing specific tasks and some are more useful than others. Before deciding whether a tester may be useful for the installation and inspection of AFCI circuits, you might find the following facts helpful.

## The Nature of AFCI Designs

The UL standard for AFCIs (UL 1699) sets forth the requirements for the proper functioning of an AFCI. A number of the tests are efficacy tests that subject the AFCI to various arcing scenarios. The AFCI must detect the arc and open the circuit before the cotton fire indicator ignites at the arcing location. In addition, the AFCI has to be able to resist tripping under a number of “normal arcing” scenarios (e.g., thermostatically controlled contacts) that are established in the standard.

It is important to recognize that the standard does not set forth the method that a manufacturer must use to detect the hazardous arcing conditions and resist the normal arcing conditions. Manufacturers can utilize different and unique methods to achieve the expected result. Therefore, manufacturer A may use one algorithm for detection and manufacturer B may use something completely different. Both meet the standard and are acceptable AFCIs; they just get there by traveling down different paths.

This is an important concept to grasp in order to understand why the testers may not necessarily work properly in the field.

## It’s An Indicator, Not A Tester

The reality is that there is no portable AFCI tester on the market today. If one looks closely at the products, they carry a listing as an “AFCI indicator.” UL 1436 – Outlet Testers and Similar Indicating Devices is careful to refer to an AFCI indicator, not an AFCI tester.

In fact, the standard recognizes the differing nature of arc detection and requires a marking or notation in the instructions[1] that states:

*"CAUTION: AFCIs recognize characteristics unique to arcing, and AFCI indicators produce characteristics that mimic some forms of arcing. Because of this the indicator may give a false indication that the AFCI is not functioning properly. If this occurs, recheck the operation of the AFCI using the test and reset buttons. The AFCI button test function will demonstrate proper operation."*

Because of the variation in AFCI designs, an AFCI indicator that may work with one manufacturer's product may not work properly with another. It is also important to remember that AFCI manufacturers are constantly improving their products. These improvements can also result in an AFCI that functions properly and meets that standard, but no longer works with a specific AFCI indicator.

In addition, the manufacturer of the AFCI indicator will not be familiar with the tolerances that are acceptable within the design of the AFCI itself. The AFCI indicator may function correctly with a device that falls into the middle of its tolerance band, but not work with one that is at the high or low end of the tolerance band, even though all of the devices represent a properly functioning AFCI.

## Use the Test Button

To determine whether an AFCI is functioning properly, use the test button on the AFCI. Pushing the test button should result in the device opening. This is not a "mechanical" test. Pushing the test button imposes a simulated arcing condition on the circuit and the AFCI must be able to detect that arcing condition and open. If the device does not open, then the AFCI should be replaced. If the device opens when the test button is pressed and it can be reset, then it is a properly functioning AFCI and it has been "tested."

## Don't Toss a Perfectly Good AFCI

As stated earlier, the best method for testing an AFCI is the integral test button. If the test button shows proper operation, then the AFCI is functioning correctly. This is true even if your AFCI indicator device does not trip the AFCI. It is unfortunate that some properly functioning AFCI have been replaced in the field due to a false indication of their status from an AFCI indicator. Upon return to the manufacturer, the AFCI is evaluated and frequently found to be functioning properly.

## Summary

The bottom line is that the test button on the AFCI is the only recognized method for testing the proper operation of the AFCI. An AFCI indicator may be a nice way to determine if a particular circuit is connected to an AFCI, but it provides no definitive answer on whether an AFCI is properly working or not.

[1] UL 1436, paragraph 31.8.1(f)

**For More Information:**

For further information on this topic, please reference:

UL 489, 10th Edition, Sections 7.1.4.3, 9.1.4.4 and 9.1.4.5
UL 1436, 4th Edition, Section 31.8.1(f)
NEC 2005 and 2008 Editions

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