- **Standard Number:** 1926.404(b)(1) (https://www.osha.gov/pls/oshaweb/owalink.query_links?src_doc_type=STANDARDS&src_unique_file=0&src_anchor_name=1926.404(b)(1))

MEMORANDUM FOR: BYRON R. CHADWICK
REGI0NAL ADMINISTRATOR

THROUGH: LEO CAREY, DIRECTOR
OFFICE OF FIELD PROGRAMS

FROM: PATRICIA K. CLARK, DIRECTOR
DIRECTORATE OF COMPLIANCE PROGRAMS

SUBJECT: Magna Electrical Construction Co, Inc. Letter
Requesting Ground Fault Circuit Interrupter Information

This is in response to your November 18 memorandum forwarding the Magna Electrical Construction Company's request for information on OSHA requirements for testing ground fault circuit interrupters (GFCIs) at construction sites. I apologize for the delay in responding to your inquiry.

Section 1926.404(b)(1) does not reguire GFCIs to be tested. However, 1926.20(b)(2) does require the frequent and regular inspections of equipment. The instructions included with the devices indicate that they should be tested monthly. If an employer can demonstrate, for example, by means of logs or procedures, that he or she tests GFCIs monthly and promptly replaces those found defective, then a serious citation may not be appropriate for defective GFCIs found upon inspection, provided the faulty devices are replaced promptly.

In regard to Magna's remaining two questions concerning the proper procedures for testing GFCIs, I have attached the Electrical/Electronic Technical Note 91-1 which outlines the acceptable test procedure.

Attachment

Electrical/Electronic Technical Note 91-1

December 18, 1991

How to Test the Operation of a GFCI

The Office of Electrical, Electronic, and Mechanical Engineering Safety Standards does not recommend the use of GFCI testers as a means of determining compliance with §1926.404(b)(1)(ii), as such testers may not produce accurate results. Ground-fault circuit interrupters incorporate a testing circuit that can be used to determine whether or not the device itself will function as intended. No further tests are necessary.

Any GFCI tester that puts a resistive load between the ungrounded circuit conductor and the equipment grounding conductor1 to measure the current at which the device trips is subject to errors due to voltage fluctuations. If the circuit voltage is 100 volts, the tester could indicate that a GFCI tripped at 7.2 mA when it would actually have tripped at 6.0 mA. (See attachment.)

Testers like the Greenlee model 5708,(2) described in Mr. Loebach's memorandum (attached), cannot produce a reliable indication of the trip level of a GFCI. This device sends a 200-millisecond pulse through the grounding conductor at various current levels. A GFCI may not trip at minimum current levels (that is, 6-20mA) in such a short period of time. (For example, UL Standard 943 allows trip times of up to 1.5 seconds at 15mA.) This tester provides a 4-second interval between pulses and cannot be adjusted to provide a longer pulse or a shorter interval.

Additionally, an employer cannot reasonably be expected to know at what level his or her GFCIs trip. A reasonable person would only expect the employer to check them periodically using their built-in test mechanisms. Assuming that test equipment could accurately detect a GFCI that trips at too high a current, the employer should not be penalized for conditions beyond his or her normal control.

_____

(1) Deliberately putting current through the equipment grounding conductor is undesirable and, under certain conditions (for example, in a hazardous location), is unsafe.

(2) This device is not currently approved by a nationally recognized testing laboratory and does not meet OSHA's electrical safety standards. Therefore, it should not be used by OSHA compliance staff.

A citation in such cases may be warranted -- penalties are not.

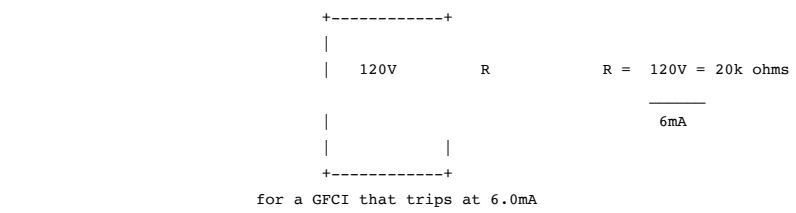
The supervisory circuit built into a ground-fault circuit interrupter is designed to cause tripping even when the circuit voltage is 85 percent of rated voltage (102V for a 120-volt device). At rated voltage, the current employed by the supervisory circuit may not exceed 9mA. Thus, it gives an indication of the operability of the GFCI at currents approaching the trip level. It may not give an indication of whether the GFCI actually opens the circuit; however, this can easily be determined by plugging utilization equipment into the circuit in question.

For these reasons, the Office of Electrical, Electronic, and Mechanical Engineering Safety Standards recommends that the compliance staff use the test button on a GFCI in combination with an attached load plugged into the circuit to be tested rather than a GFCI tester. A plug-in ground continuity tester would suffice as an attached load. If the lights on the continuity tester go out when the test button is pressed, the GFCI can be assumed to be operating correctly. If the lights stay on or if the test mechanism fails to operate, the GFCI is faulty, and a citation would be warranted.

ATTACHMENT 1

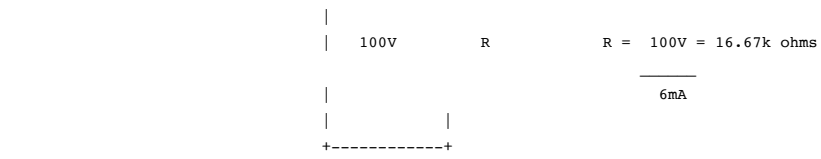
Analysis of Trip Tester Current Levels

Under normal conditions:



for a GFCI that trips at 6.0mA

Under reduced voltage conditions:



However, the tester would indicate that the GFCI tripped at:

$$\text{Trip Current} = \frac{120V}{16.67k\ \text{ohms}} = 7.2mA$$

because the tester assumes a circuit voltage of 120V.

OCCUPATIONAL SAFETY & HEALTH

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