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UTAH CHAPTER of IAEI

GFCI Rules

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I have noticed myself having to write up a lot of GFCI violations lately, so I thought it would be nice to briefly go over some of the requirements of where GFCI protection for personnel is required. Ground fault circuit interrupters are intended to prevent an electrical shock from becoming fatal. They do not stop a shock from happening; they simply open the circuit before the shock value can reach a magnitude that may become fatal. Since the average female will experience ventricular fibrillation at about 50 miliamperes of shock current, and the average male at 75 miliamperes, GFCI's open the circuit between 4 and 6 miliamperes, providing a substantial level of safety. GFCI's measure the current on the ungrounded (hot) conductor of the circuit, and compare against the current returning back on the grounded (neutral) conductor. If these two values are not identical, the circuit will open. For example, the average male has a resistance of about 1,000 ohms. If a 1,000 ohm resistor is struck with a 120 volt supply, about 120 milliamps of current will flow through the resistor (human body). As we discussed earlier, this is more than enough to kill a full grown human. Because 120 milliamps are flowing through the human body as opposed to the grounded conductor, the GFCI will recognize this imbalance and open the circuit. Because of the increased measure of safety that the GFCI provides, the NEC requires their installation at strategic locations, and gives few exceptions.

In dwelling units, you must provide GFCI protection for all 125 volt, 15 or 20 ampere receptacle outlets installed in (1) bathrooms, (2) garages or other accessory buildings, (3) outdoors, (4) crawl spaces, (5) unfinished basements, (6) kitchen counter tops, and new to the 2005 NEC (7) laundry utility and wet bar sinks, where the receptacle is located within six feet of the edge of a sink.

There are some exceptions to be mindful of, however. For outdoor receptacles in dwellings, GFCI protection isn't required if the receptacle isn't readily accessible, *and* is installed for fixed snow melting or de-icing equipment. If this exception is used, however, ground fault protection of equipment (30 milliamp trip) must be installed, in accordance with 426.28. There is also an exception for a singular receptacle dedicated for a single appliance, but be careful...this exception only applies to garages and to unfinished basements. This exception does not apply, for example, to receptacles in a crawl space, a bathroom, or within six feet of a utility or laundry sink.

For non-dwelling applications, the following areas require GFCI protection for 125 volt, 15 or 20 ampere receptacle outlets. (1) bathrooms, (2) commercial and institutional kitchens, (3) rooftops, (4) outdoors in public spaces (2005 change) and (5) outdoors, where within 25' of heating, air conditioning or refrigeration equipment (2005 change).

The only exception to the rules in other than dwellings is for outdoor receptacles for de-icing and snow melting equipment, which once again must have GFPE protection, as per 426.82. There are no exceptions for a singular receptacle in commercial buildings, contrary to popular belief. For example, an on demand water heater that is cord and plug connected in the bathroom requires protection, the same way a refrigerator in a commercial kitchen requires protection.

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