

Construction Safety Advisory

347-VOLT CIRCUITS

347-volt circuits are commonly used in industrial, commercial, and institutional (ICI) settings for lighting applications. The reason for the circuit's popularity is its economic viability. First, a 347-volt circuit can accommodate more light fixtures per breaker than a 120-volt circuit. Second, a 347-volt circuit can be directly wired to the building with no need for a transformer. The same cannot be said of other voltages.

But working with 347-volt circuits entails inherent risks and dangers. Fatalities and injuries have resulted. Although working on energized lines is the last resort in most electrical applications, it is too common a practice with 347-volt circuits.

Typically, a 347-volt circuit is a multi-wire branch type. Many facilities use a single-pole breaker for a block of lights. This presents two hazards.

Hazard 1

Multi-wire branch circuits use a common neutral conductor (identified conductor). When a single-pole breaker is switched off, the circuit de-energizes only one branch of the circuit while leaving the other two energized. The common neutral conductor maintains the continuity of these two-branch circuits. If the continuity of the neutral conductor is interrupted while other branch circuits are energized, any accidental contact with the neutral conductor will effectively connect the person to ground, thus completing the circuit and causing electrocution.

Continuity of the neutral conductor can be achieved without interruption, provided it is independent of the device connection. The Ontario Electrical Safety Code requires that tap-off means (*i.e.*, pig-tails) be installed so that the device can be disconnected and removed without interrupting the continuity of the neutral conductor.

Hazard 2

A single-pole breaker only terminates power from one end. In most cases, it is cutting power from the positive side. Since a 347-volt circuit connects neutral to ground, it is possible for current on the neutral side to backfeed to the circuit, making the neutral live. Any accidental contact with the neutral wiring will effectively connect the person to ground—again, completing the circuit and causing electrocution.

In addition, a 347-volt circuit typically poses a third hazard related to location and construction.

Hazard 3

Work with 347-volt circuits is often performed in enclosed or confined areas with a high metal content. Hangers, light fixture boxes, and acoustical T-bar ceilings are all made of metal. The potential for electrical contact with metal components is high. Extreme caution is therefore required for work in such areas.

For work on 347-volt circuits, contractors should use only licensed electricians. All installations must comply with the Electrical Safety Code.

Personnel working on 347-volt circuits should be advised to take the following precautions:

- 1) Always work with de-energized lines. This is not only safe practice but the law.
- 2) Always treat the neutral as energized unless it has been verified as de-energized.
- 3) If circumstances require working live, eliminate or minimize hazards. Always use non-conductive access equipment with good insulating properties, such as wooden ladders. Hand tools must also be non-conductive. Drape an insulating (rubber) blanket on the light box and keep your distance from other metal items such as ceiling tracks and hanging wires. Always use Canadian Standards Association (CSA) approved rubber insulating gloves, with at least a class zero rating.

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