

# ETC Application Note

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Application Note #

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## Understanding Common-Neutral (Multi-wire) Branch Circuits and Phase-Control Dimming Installations

In non-dimmed applications, branch circuits are often installed with three circuits sharing a common neutral conductor, where each of the three circuits is on a different phase. This is known as a "multi-wire" branch circuit arrangement. It is used to save costs because only four total conductors (three hot, one neutral) are used to feed three branch circuits.

This type of multi-wire branch circuit arrangement is not recommended for use with phase-control dimmers on new installations because it can cause voltage-drop interaction between the three branch circuits, as well as neutral conductor overloading.

In a new development, the 2008 NEC section (210.4), adds a new condition requiring multiwire branch circuits to be fed from a multi-pole breaker, or three single-pole breakers with a handle-tie identified for the purpose. **This essentially eliminates new installations or retrofits using common neutrals on branch circuits fed from dimmer racks, because the handles of single-pole breakers in the dimmers cannot be mechanically tied together.** The exact wording of the 2008 NEC is:

2008-210.4(B) **Disconnecting Means.** Each multiwire branch circuit shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates.

If you have any questions about this information, please contact ETC Technical Services.