

2011 NEC Study Guide For “Gas Station Wiring”

(This Study Guide was prepared by Gaylord Poe)

What we refer to in the field as “Gas Station Wiring” can be broken down into two basic categories of the NEC. NEC Art. 511 applies to the servicing areas. NEC Art. 514 applies to the fuel dispensing areas. This study guide will address the more common code issues that frequently arise concerning the fuel dispensing areas.

What conditions must be present for Art. 514 to be applicable? –NEC Art. 514.1 states that Art. 514 applies to “...motor fuel dispensing facilities, marine/motor fuel dispensing facilities, motor fuel dispensing facilities located inside buildings, and fleet vehicle motor fuel dispensing facilities.” It should be noted that NEC Art. 514 also applies to diesel fuel dispensing facilities.

1. Classified Areas:

- a. **Wiring Methods – Art. 514.4** – The best reference for determining whether to use Class 1 Division 1, or Class 1 Division 2 wiring methods (as outlined in NEC Art. 501.10) can be found by referring to NEC Tables 514.3 (B) (1) and 514.3 (B) (2). *(Note: Art. 514.3 provides that if it can be determined that flammable liquids having a flash point below 38 °C (100 °F), such as gasoline, will not be handled, the location shall not be considered as classified. Diesel fuel dispensing locations are not considered to be classified.)*
- b. **Wiring Methods above Classified Areas – Art. 514.7** – For wiring methods above Classified Areas, refer to NEC. 511.7 (wiring methods for Commercial Garages).
- c. **Underground Wiring – Art. 514.8** – This rule provides that underground wiring methods be threaded rigid metal conduit or threaded steel IMC and when below a classified location, shall be sealed. Exception No. 2 to this rule permits underground wiring to consist of nonmetallic conduit under very specific conditions: The nonmetallic conduit must have 24” of cover, and threaded rigid metal conduit or threaded steel IMC must be used for the last 2 ft. of the underground run and on to where it emerges from the ground to the connection of the aboveground raceway. Nonmetallic underground conduits must also contain an equipment grounding conductor.
- d. **Seals – Art. 514.9** - In addition to the boundary seals required by Art. 501.5, seals must also be installed in each conduit entering or leaving a dispenser (or any cavities or enclosures in direct communication with the dispenser). The seals at the dispenser areas must be the first fitting after the conduit emerges from the earth or concrete.

- e. **Circuit Disconnects – Art. 514.11 (A)** – Each circuit (including all associated low energy circuits) leading to or through dispensing equipment (including diesel dispensing) must have a disconnecting means that disconnects all of the circuit conductors (including the neutral). This disconnect is typically a switch or a switched neutral circuit breaker. This disconnect shall be clearly identified, readily accessible, and located remote from the dispensing equipment.

- f. **Emergency Controls – Art. 514.11 (B) & (C)** - In addition to the circuit disconnecting means emergency controls are also required to stop all dispensing equipment. Art. 514.11 (B) provides the location requirements for emergency controls at attended self-service gas stations. Art. 514.11 (C) provides the location requirements for emergency controls at unattended self-service gas stations.

- g. **Maintenance Disconnecting Means – Art. 514.13** – A lockable disconnecting means shall be provided for each dispensing device to remove all external voltage sources (including all associated low energy circuits) for maintenance and service of the equipment. This requirement is in addition to the branch circuit disconnecting means and requires a means of disconnecting all voltage sources including low energy wiring (and it’s feedback) such as control wiring, data wiring, intercom wiring, speaker wiring, etc.

- h. **Bonding & Grounding – Art. 514.16** - In addition to the basic grounding rules, there are additional rules for bonding that are found in Art. 250 and Art. 501. Art. 250.100 provides that bonding equivalent to that required for services be provided in Classified Areas for all metal components (conduits, raceways, boxes, enclosures, etc.). Art. 514.16 provides that this bonding shall be maintained from the Classified Areas all the way “home” to the service equipment (or transformer) that supplies the circuits.