

NEC Art. 501 Summary



Requirements for Class 1 hazardous locations

Mark Lamendola

Article 501 provides the requirements for Class I hazardous locations. These are locations (buildings, areas within buildings, or areas outside of buildings) where combustible gas is present or may be present. If it is (or may be) present under normal conditions, the location is Division 1. If it is (or may be) present under abnormal conditions, the location is Division 2. The requirements for Division 1 are more stringent than those for Division 2 because the risk is greater.

A major goal of the requirements is to contain combustion inside the electrical system (e.g., raceway, enclosures) so it doesn't spread. So when we say an enclosure is explosion-proof, we don't mean the enclosure is designed to survive an explosion originating outside the enclosure or the raceway connected to it. We mean any explosion in that system won't get out through that enclosure.

Articles 502 and 503 deal with combustible dust and combustible flyings, respectively. Gas molecules are much smaller than these other kinds of combustibles, so Art. 501 is much more stringent than either of those two articles.

Article 501 underwent significant revision with the 2003 Code cycle. One thing that hasn't changed is the permitted wiring methods [501.10(A)(1) and (B)(1)] do not include tubing. Five types of conduit are permitted for Division 1 [501.10(A)(1)(1) and (2)] and six types of conduit are permitted for Division 2 [501.10(B)(1) and (6)]. One reason tubing isn't permitted is it would be infeasible to seal.

Boxes and fittings used in Class I, Division 1 must be identified for Class I, Division 1 [501.10(A)(3)]. But boxes and fittings used in Class I, Division 2 need only be explosion-proof [501.10(B)(4)].

Sealing and drainage requirements for Class I locations [501.15] are extensive, taking up over three pages. Contrast this to the less than ¼ page of such requirements for Class II [502.15]. And with Class II Locations, the NEC treats Division 1 and Division 2. But in Class I Locations, even the boundaries between Division 1 and Division 2 have special requirements. Class III doesn't have sealing requirements because with the large particle size sealing would make no difference. The purpose of seals is to prevent the transmission of combustibles from one location into another. It takes much more rigorous sealing to stop gases than to stop dust.

Any installation should be bonded per Part I and Part V of Article 250, and this is echoed in 501.30(B). But it goes on to provide specific requirements, such as saying you cannot depend on locknut-bushing and double-locknut types of contacts for your bonding path. You must use bonding jumpers. Similarly, flexible metal conduit and liquidtight flexible metal conduit must contain an equipment bonding jumper; you can't just rely on the mechanical connections of this type of raceway. The purpose is to prevent an ignition source from occurring.

Part III of Article 501 contains specific requirements for equipment such as generators, luminaires, receptacles, transformers, capacitors, meters, and motors. As with the bonding, the purpose is to prevent an ignition source from occurring.

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