Are Open Bottom Electrical Handholes a NEC Violation?

Proposals to Change the 2002 NEC
Traffic Signal and Roadway Lighting Related

Introduction
One of the proposals to change the 2002 NEC adds a provision to recognize the common traffic signal and roadway lighting open bottom electrical handhole as a NEC wiring method (see illustration). The proposal is to include handhole enclosures in the Scope of Article 314.1 (Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Manholes). Since handhole enclosures are not included in the scope of Article 314, it could be maintained it is not a recognized wiring method. However, for traffic signal and roadway lighting, open bottom handholes can be a safe and practical wiring method, when installed properly with the cover and frame bonded to an equipment grounding (bonding) conductor (to provide a low impedance path to the source to quickly open the circuit breaker or fuse). This article will explain how you can comment on this and other code proposals to change the 2002 NEC.

Is this open bottom electrical handhole a NEC violation?

The National Electric Code
The NEC was first issued in 1897 by the New York Board of Fire Underwriters, and has been published by the National Fire Protection Association (NFPA) since 1911. While the NFPA has over 140 standards, the NEC comprises over 60% of the NFPA’s income. The NEC is revised every three years on a 104 week cycle, and anyone can submit a code change. The NEC has 19 Code Making Panels (CMP’s), down from 20 in the 2002 cycle. The CMP’s are made up of representatives from manufacturers, users, installers, maintainers, labor, testing laboratories, enforcing authority, insurance, consumer, and special experts. There are 12 members per panel, with alternates. A Technical Correlating Committee (TCC) has oversight of the CMP’s and provides coordination between the panels. A list of TCC and CMP members is in the NEC.
The traffic signal and roadway lighting industry would be represented on a CMP by manufacturers and the National Electrical Manufacturers Association.

**About Proposals and Comments**

At the time of this publication, some 4,500 proposals have been submitted to change the 2002 NEC, and the proposals are open for comment by the public. This is an excellent time for users to comment either for or against the proposals. The NFPA will publish the 2002 NEC ROP (in both electronic and paper versions) in July. Copies are available by contacting the NFPA at 1-800- 344-3555 or www.nfpa.org

Proposals can also be made by a CMP, these are indicated with “–a” (Proposal 5-19a). Often a CMP, not sure of a change, will make a proposal to gage the reaction of the electrical community form its comments. Sometimes the CMP’s statement on a proposal clarifies the intent of the NEC; see Proposal 1-19 for an example of a CMP comment.

Your comments and proposals must be supported with a technical reason. Forms are available electronically from the NFPA and in the back of the NEC. Proposals and comments are sorted by CMP, and then article.

**2005 NEC Cycle**

- Nov 1, 2002: Proposals due (4,767 received)
- Jan 2003: CMP’s meet to act on proposals, 2/3 approval to forward proposal
- April 2003: TCC meets
- July 11, 2003: ROP mailed
- Oct 31, 2003: Comments due
- Dec 2003: CMP’s meet to act on each public comment received. 2/3 approval to forward
- Feb 2004: TCC meeting
- April 8: ROC mailed
- May 23-27: NFPA Annual Meeting, Salt Lake City, to act on committee report (ROP or ROC). At the annual meeting, motions may be made on the floor, to reject or accept a proposal or to go back to the original language. No new material may be introduced. Floor action may require the CMP to reconsider its vote. Appeals may be made within 20 days.
- In July 2004, the NFPA Standards Council meets and votes to adopt the 2005 NEC.

**When will the 2005 NEC be Available?**

In one year the 2005 NEC will available - September 2004. Typically local jurisdictions will then adopt the NEC by ordinance.

**Draft Version Available now as Free Download**

The Draft of the 2005 National Electrical Code® is available as a free 709 page Adobe PDF document, go to [http://www.nfpa.org/PDF/70NECDraft03.pdf?src=necdigest](http://www.nfpa.org/PDF/70NECDraft03.pdf?src=necdigest), subject to change as the code cycle progresses. The draft version of the 2005 NEC identifies each proposal that was accepted.
**Significant Traffic Signal and Roadway Lighting 2002 NEC Proposals**

Since there were more than 4,500 proposals to change the NEC, only a few of the more important ones are covered. Your comments can make a difference in the CMP’s decisions. Proposals are arranged by CMP and then by Code Article. Most of the Proposals and comments are edited for brevity. A statement following SUBSTANTIATION is from the ROP. You should consult the ROP for the complete text of proposals given here, or the draft version of the 2005 NEC, as discussed below.

Except as noted, all these proposals have been accepted by the CMP’s.

**Entire NEC**

Proposal: 4-1 [Entire Document]

**Change:** Change the term "equipment grounding conductor" to "equipment bonding conductor" throughout the NEC.

**Panel Action:** Rejected

The vote was very close, and it could change at the comment stage. CMP 5 accepted it but they were one vote short of the required 2/3s majority. It appears from the TCC statements that if panel 5 would accept the change, then all of the other panels would be required to make the same change.

**Comment:** Grounding and Bonding is widely misunderstood in the electrical industry. One of the reasons why is that the terminology the NEC uses is often not clear. We bonding metal parts of the electrical system to create a low impedance path to quickly clear a fault. The purpose of grounding is to stabilize the system operating voltage and prevent overvoltage from lighting. The equipment grounding conductor is really a bonding conductor.

**Article 90 Introduction**

Proposal: 1-19 [90.2(A)]

**Change:** Revise text as follows:

This Code covers the installation of electric conductors, electric equipment, signaling and communications conductors and equipment, and fiber optic cables and raceways for the following: (2) Yards, lots, parking lots, carnivals, industrial substations and street lights.

**SUBSTANTIATION:**

Street light poles are hit by moving vehicles at night when conductors are energized. When a pole is hit energized conductors become exposed and all metal parts become energized as well. The voltage for street lights is usually 480 volts. By protecting the circuit according to NEC, practical safeguarding of persons will take place.

**Panel Action:** Rejected

**Comment:** This proposal would have added "street lights" to the list of "covered" installations. The Panel rejected the proposal and the Panel Statement makes it clear that the NEC covers street lighting other than those described in 90.2(B)(5)b.

Proposal: 1- 25 – [90.2(B), FPN (New)]

**Change:** Definition of Utility as a FPN under 90.2(B)(5)

Add the following Fine Print Note to 90.2(B) under (5):
FPN: Utilities are organizations typically designated or recognized by governmental law or regulation by public service/utility commissions, that install, operate, and maintain electric supply (such as generation transmission, or distribution systems) or communication systems (such as telephone, CATV, Internet, satellite, or data services). As such the utility is subject to compliance with codes and standards covering these activities relevant to their industry as adopted under governmental law or regulation. Refer to the appropriate governmental bodies such as, state regulatory commissions, Federal Energy Regulatory Commission, and Federal Communication Commission.

Comment: This an Edison Electric Institute (EEI) proposal accepted at the ROP stage that adds a FPN to 90-2(B) (5) that directs the code user to the utility regulating authorities for determination of applicable codes and standards.

Proposal: 140- [100-Utility]
Change: Add the following new definition to Article 100 under I. General: Utility.
SUBSTANTIATION:
This proposal will add a definition of "utility" to the Code.
The term "utility" appears more than 40 times in at least 16 Articles and there is no definition of "utility" in the Code. Deregulation has blurred the distinction of what constitutes a "utility" and a definition in the Code is essential for proper application of the Code. This is a companion proposal to 90. 2(B)(4). This proposal and 90. 2(B)(4) was developed by the Utilities Task group established by the NEC Technical Correlating Committee. While consensus was achieved within the task Group, the TCC ballot was only 70% affirmative and 75% is required for approval on a TCC ballot.
Panel Action: Rejected
Comment: This is a proposal to add a definition of "utility" to Article 100 that originated in a TCC Task Group, but did not achieve consensus in the TCC. Jim Daly, Task Group Chair, submitted the proposal in his own name. EEI had opposed adding a definition and the Panel has rejected the proposal with an excellent Panel Statement.

Article 210 Branch Circuits
Proposal: 2-30 – [210.5(C)]
Change: 210.5(C) (New)
(C) Ungrounded Conductors. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit, where accessible, shall be identified by system. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means and shall be permanently posted at each branch-circuit panelboard or similar distribution equipment.
Panel Action: Accepted
Comment: Add new section 210.5(C) to require branch circuit nominal voltage identification. Section 210.4(D) is deleted, and part of that language is used here. 210.4 (D) only required identification for multiwire branch circuits, now the requirement is for any branch circuit, a much more restrictive requirement. A 480/277Y service with a 120/240 step down transformer would require identification of ungrounded conductors, and the colors used would be posted on panelboards.
Proposal: 2-70 [210.8(A) & (B)]
Change: 210.8(B) (4) Outdoors in public spaces—for the purpose of this section a public space is defined as any space that is for use by or is accessible to the public
Panel Action: Accepted
Comment: This proposal would require GFCI protection in locations accessible to the public.

Article 220 Branch-Circuit, Feeder, and Service Calculations
Proposal: 2-298 [Article 220]
Change: Article 220 was rewritten.
Comment: A proposal by the NFPA Task Group on Usability resulted in Article 220 being rewritten for ease of use.

Article 225 Outside Branch Circuits and Feeders
Proposal: 4-9a – [225.17]
Change: Revise text to read as follows:
225.17 Masts as Supports. Where a mast is used for support of final spans of feeders or branch circuits, it shall be of adequate strength or be supported by braces or guys to withstand safely the strain imposed by the overhead drop. Where raceway-type masts are used, all raceway fittings shall be identified for use with masts. Only the conductors specified herein shall be permitted to be attached to a mast.
Comment: Outside feeders are often attached to buildings in the same manner as a service using masts. No other attachments will be allowed to masts for outside feeders and branch circuits.

Article 230 Services
Proposal: 4-103 – [230.82]
Change: 230.82 Equipment Connected to the Supply Side of Service Disconnect. Only equipment included in this section shall be connected to the supply side of the service disconnecting means.
230.82(2) Meters, meter sockets, meter socket transfer switches, or meter disconnect switches nominally rated not in excess of 600 Volts, provided all metal housings and service enclosures are grounded.
SUBSTANTIATION:
This proposal is intended to be read as fully supportive of the technical objectives of the 2002 NEC change in this section that added meter disconnects. The problem is to achieve those objectives in a way that does not create confusion and controversy around a fundamental principle of code application, namely, the determination of exactly which device located where constitutes the service disconnect.
Comment: This section now allows disconnects ahead of the meter. Many Electrical Utility meter standards require a disconnect ahead of the meter, especially on 480/277Y services. This disconnect is installed per their requirements, and may have the Electrical Utility lock on it. It looks like a service disconnect but is not.
Article 240 Overcurrent Protection
Proposal: 10-35 – [240.15]
Change: Add new text as follows:
240.15 Circuit Breaker as Overcurrent Device. Circuit breakers shall open all ungrounded conductors of the circuit both manually and automatically, unless otherwise permitted in 240.16.
Comment: This proposal clarifies that common trip circuit breakers are required and handle ties are not allowed except for multiwire branch circuits

Article 250 Grounding
Change: Revise the Title of Article 250 as Follows: Article 250 Grounding and Bonding
Comment: This change will clarify the scope of Article 250 includes bonding.

Proposal: 5-154 [250.64(B)]
Change: Add new language as follows: A bare or insulated direct burial grounding electrode conductor from the building surface to the grounding electrode or run between grounding electrodes shall be installed to a depth of not less than 300 mm (12 in.) below grade. The depth of burial shall be permitted to be reduced to 150 mm (6 in.) where the cable is beneath concrete or similar material with a thickness of not less than 50 mm (2 in.).
Comment: To prevent damage due to shallow burial.

Article Conductors for General Wiring
Proposal: 6-45 [Table 310-16, Table 310, Table 310.18, Table 310.19]:
Change: (c) Installations Outdoors in Direct Sunlight. Where feeders or branch-circuits are installed in raceways outdoors on rooftops that are exposed to direct sunlight, the ampacities of Tables 310.16 and 310.18 shall be derated by a factor corresponding to an outdoor ambient temperature, plus 17°C (30°F).
Comment: Recent experimentation shows that a significant temperature rise can be expected for any conductor within a conduit installed outdoors in direct sunlight. Data indicates that a rise of 30 F (17 C) can be expected for bright metal conduits in direct sun. Where this temperature rise is disregarded it could lead to overloaded conductors. Currently NEC does not address temperature rise from solar exposure.

Article 314 Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Manholes
Proposal: 9-18 – [314.1] Scope and General
Change: Add text to read as follows:
This article covers the installation and use of all boxes and conduit bodies used as outlet, device, junction, or pull boxes, depending on their use and handhole enclosures, manholes and other electric enclosures intended for personnel entry. Cast, sheet metal, nonmetallic, and other boxes such as FS, FD, and larger boxes are not classified as conduit bodies. This article also includes installation requirements for fittings used to join raceways and to connect raceways and cables to boxes and conduit bodies.
Panel Action: Accept
Comment: To include handhole enclosures in 314.1 Scope. If handhole enclosures are not listed in the scope, are they a permitted wiring method?

Proposal: 9-23 [314.15 Damp, Wet, or Hazardous (Classified) Locations]
Change: Add an exception as follows
Exception: Handhole enclosures shall not be required to prevent the entrance or accumulation of moisture.
Panel Action: Accept
Comment: Goes along with Proposal 9-18

Article 410 Luminaires, Lampholders and Fixtures
Proposal: 18-91 [410.73(F)(5) (New)]
Change: Add new 410.73(F)(5) to read as follows:
(5) Metal Halide Lamp Containment. Luminaires (fixtures) that use a metal halide lamp other than a PAR lamp shall be of the type that encloses the lamp, or shall be provided with a lampholder that only allows the insertion of a lamp that is rated for use in an open luminaire.
SUBSTANTIATION:
Metal halide lamps have been identified as presenting a risk of a hazardous end-of-life failure. This risk is described in papers published by the NFPA, OSHA, FM Global, Industrial Risk Insurers (GE Global Asset Protection Services), and NEMA. An article written by Ronald Stein entitled HID Lighting Advisory, was published in the Section News insert of the April/May 2001 NFPA Update. In this article, Mr. Stein states persistent loss history involving High Intensity Discharge (HID) lighting, particularly for indoor industrial and warehousing applications, has led to increased scrutiny from property underwriters and an escalated assessment by industry of HID lamps as potential ignition sources.
Comment: The substantiation speaks for itself, Metal Halide Lamps can explode and start fires.

Article 525 Carnivals, Circuses, Fairs, and Similar Events
Proposal: 15-92 [525.10(A)]
Change: Generators shall comply with the requirements of Article 445, and, as applicable, Sections 250.30 or 250.34.
Comment: Clarifies the need to install a grounding electrode at the generator. If the generator is used as a separately derived system then a grounding electrode is required.

Article 527 Temporary Installations
Proposal: 3-120 [527.5]
Change: Decorative lighting used for holiday lighting and similar purposes, in accordance with 527.3 (B), shall be listed.
Comment: The vast majority of fire losses from Christmas tree fires are from faulty decorative lighting.

Article 800 Communications Circuits
Proposal: 16-96 [800.40(A)(4)]
Change: Add fine print note to 800.40(A)(4) as follows:
FPN: Similar grounding conductor length limitations applied at apartment buildings and commercial buildings will help to reduce voltages that may be developed between the buildings power and communications systems during lightning events.
Comment: The issue here is the maximum length of the grounding conductor between the communications and power system entrances.

Comments Due Oct 31, 2003
Your Comments on the Proposals to change the 2002 NEC are due by Oct 31, 2003. Your comments on Proposal 9-18 to add open bottom electrical handholes would assure this common wiring method is recognized by the 2005 NEC.

Credit:
Thanks to Charlie Eldridge, Indianapolis Power & Light Co., representing Edison Electric Institute, CMP 10 member for providing me with notes on the ROP meeting; and to John W. Troglia, representing the Edison Electric Institute, a TCC member and CMP 1 member for his notes on proposals 1-19, 1-25, and 1-140.

Next Issue:
When a School Zone Speed Limit with warning beacon sign is fed from a service located down the street, does that sign require ground rods and a disconnecting means? We’ll look at the code rules for disconnecting means and grounding electrodes for remote buildings and structures.

Italic text excerpted from the 2002 NEC, National Electric Code® and the NEC® are registered trademarks of the National Fire Protection Association, Inc., Quincy Massachusetts.

IMSA Member Tom Baker is a Master Electrician, and is certified as an IMSA Level II Traffic Signal and Roadway Lighting Level I. His business, Puget Sound Electrical Training, provides classes on the NEC, Grounding and Bonding, and other electrical subjects. He is the IMSA representative to the Illumination Engineering Society. Contact him via email at tom@psetraining.com