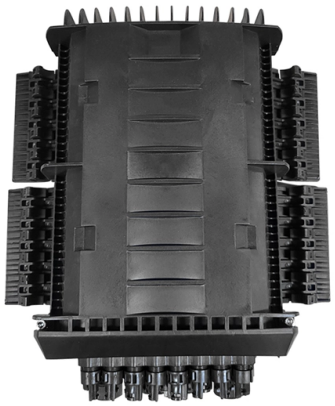
Should round steel be used for grounding secondary distribution boxes



Overview

In order for steel conduit and EMT to perform effectively as equipment grounding conductors, it is crucial that they are installed properly with tight joints.

Key Takeaways

Round steel rods are generally not recommended as the primary grounding conductor for secondary distribution boxes; proper grounding requires materials and methods that ensure low-impedance, continuous paths in compliance with NEC standards.

Material Considerations

For grounding secondary distribution boxes, the National Electrical Code (NEC) specifies acceptable equipment grounding conductors, including rigid metal conduit (RMC), intermediate metal conduit (IMC), and electrical metallic tubing (EMT), which can serve as grounding paths when properly installed with tight joints. Round steel rods, such as plain steel grounding rods, are typically used as grounding electrodes rather than as conductors connecting the distribution box to the system ground. Using round steel as a conductor may not provide the necessary low-impedance path for fault currents unless it is copper-bonded or otherwise treated for conductivity and corrosion resistance.

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Installation and Continuity

Grounding effectiveness depends on continuous, low-impedance connections. In metal boxes, grounding conductors can be attached with ground screws or clips, and if metal raceways like EMT are used, a separate wire-type conductor may not be required inside the box. Any break in the grounding path, loose joints, or corrosion can compromise safety, potentially allowing dangerous voltages to persist on metal parts.

Round steel rods alone, without proper bonding and connection to the box, may fail to meet these continuity requirements.

Recommended Practice

Use copper or copper-bonded steel rods as grounding electrodes driven into the earth, connected to the distribution box via a properly sized copper grounding conductor. Ensure metal raceways or conduits are bonded to the box to serve as effective grounding paths. Test the grounding system to maintain resistance below 25 ohms for safety and compliance.

Avoid using plain round steel rods as the sole conductor between the box and the grounding electrode, as they may corrode and increase impedance over time.

Conclusion

While round steel rods are suitable as grounding electrodes, they should not be used alone as the grounding conductor for secondary distribution boxes. Proper grounding requires continuous, low-impedance paths using approved conductors and bonding methods, typically involving copper or copper-bonded materials, metal conduits, and secure connections to the box in accordance with NEC Article 250. This ensures safe dissipation of fault currents and protection of equipment and personnel.

Article Content

Steel Conduit Tech Talk: Grounding | Steel Tube Institute

In order for steel conduit and EMT to perform effectively as equipment grounding conductors, it is crucial that they are installed properly with tight joints. If a fault occurs, this helps ensure a continuous, low

Good practices in the design and installation of a facility ground ...

Equipment grounding insures that there is no difference of potential, and thus no shock hazard, between noncurrent-carrying metal parts anywhere in the electrical distribution system.

Grounding and Bonding Requirements in the NEC

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For a grounded system, this might mean some current will take a certain path, but it cannot be relied on to take the place of an effective ground-fault current path. To establish the effective ground-fault

National Electrical Code 2023 Basics: Grounding and Bonding Part 15

The high level of ground-fault current obtainable on the line side of the service equipment requires a proper path for returning to the source. For this reason, the bonding constraints are more

Grounding system construction: key points for grounding distribution ...

Everything looks perfect until the moment of truth arrives. That''s why today we''ll break down the life-or-death details of grounding distribution boxes and cable shielding layers using plain

How to Properly Ground a Sub Panel

Proper grounding and bonding of this secondary panel are necessary safety measures. The grounding system provides a low-impedance path for fault currents to safely return to the source,

Article 250

The requirement to use either structural metal or water piping as the preferred grounding electrodes was removed. Metal water piping can now be used for multiple separately derived systems, and the

National Electrical Code 2023 Basics: Grounding and Bonding Part 1

Learn about the general requirements for grounding and bonding in line with the NEC 2023.

How To Ground The Distribution Box

The metal box itself should be processed with a "box grounding bolt" (with PE mark), which must be connected to the grounded PE bus with a copper core wire or a special braided soft wire;

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Grounding

Underground and concrete encased ground connections, all connections to and a-part-of the main substation grounding bar, and all ground connections to structural steel, shall be made using

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Electrical Grounding and Earthing

What is Electrical Grounding or Earthing? Earthing, also known as Grounding, is the process of connecting electrical systems, equipment, and devices to the ground

Section 16450

I. Grounding in Manholes: Per “MV electric manhole neutral and bonding connections” detail drawing. See Section 26 05 43 - Underground Ducts and Raceways for Electrical Systems.

Electrical grounding and bonding per NEC

Electrical grounding and bonding is one of the many misunderstood topics of discussion in the design and construction industry. There are two main reasons for understanding grounding and

Grounding and UL 508A Standards

Additional rules for the grounding and bonding of industrial control panels include the sizing of ground conductors and the conditions that dictate when power supplies and transformers

DUKE UNIVERSITY CONSTRUCTION STANDARDS 1

Grounding bus bars mounted exterior to electrical distribution equipment shall be provided with insulated standoffs. All service entrances shall be solidly grounded using a grounding electrode system

Grounding Paper

Distribution System Grounding Fundamentals Edward S. Thomas, PE - Senior Member Richard A. Barber - Member Utility Electrical Consultants, PC Raleigh, NC 27601 Abstract - The most common

Protective grounding requirements for transmission and

Introduction to protective grounding This technical article covers protective grounding requirements for steel tower and wood pole supported

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