INSPECTION OF CONCRETE ENCASED ELECTRODES BY BUILDING INSPECTORS

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Act 54 #18036
Presented by Martin Van Berlo #1519
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About the Instructor...

- Martin Van Berlo, Building Official – Emmet County
- Building Official /Building Inspector (7 years/16 years)
- Member of the 2009 & 2012 Building Code Review Committee
- Member of the 2009 & 2012/2015 Residential Code Review Committee
- COCM Board member – 6 years
- NMCOA Board involvement for 16 years
- NMCOA Education Chairman for the past 10 years
- Licensed Residential Builder since 1997
- 22 years experience in residential construction
- 3rd generation carpenter
- Husband, father and grandfather
To introduce program participants to new code provisions for building inspector review and approval of concrete encased grounding electrodes, also known as footing rebar.

New code provisions can be found in 2014 Electrical Code Part 8 Rules, and as proposed for the 2015 Michigan Residential Code (MRC).
In this program we will talk about...

- History of Concrete Encased rebar as a grounding electrode
- Who is supposed to inspect – Building or Electrical Inspector
- Changes proposed to allow Building Inspector approval
- Proposed 2015 MRC provisions
- Benefits to the new code provisions
- How to comply with the new provisions
History of Code Required Concrete Encased Grounding Electrodes

- 2000, 2003, 2006 & 2009 MRC’s contain language that considers minimum ½ inch diameter rebar, with a length of 20 feet or more, and encased with at least 2 inches of concrete, and located near the bottom of a concrete footing or foundation that is in direct contact with the earth, as a grounding electrode.

- Previous electrical codes contain similar language.
2000 & 2003 MRC’s, Section E3508.1 states “where available, the concrete encased electrode was to be used as part of the grounding system.
Code change 2006
MRC, in Section
E3508.1, states that all electrodes specified in
E3508.1.1, E3508.1.2,
E3508.1.3, E3508.1.4
& E3508.1.5 shall be bonded together to
form the grounding electrode system.
2009 MRC Section E3608.1.2 continues to require the use of the rebar, if \( \frac{1}{2} \) inch or larger in diameter, at least 20 feet in length, encased in a minimum of 2 inches of concrete, and in direct contact with the earth, as a part of the grounding electrode system.
Per Section R109.1.1 – “Inspection of the foundation shall be made after poles or piers are set or trenches or basement areas are excavated and any required forms erected and any required reinforcing steel is in place and supported prior to placing of concrete”.

Building inspector approval of the rebar for a code compliant installation is required per Section R109.1.1
Section E3608.1.2 comes from the electrical requirements of the MRC, and therefore the installation of the concrete encase grounding electrode is an electrical code requirement.

Electrical Code requirements are supposed to be verified and approved only by registered electrical inspectors.

Building inspector approval is not allowed per Bureau of Construction Code staff as building inspectors do not have the authority to inspect electrical installations, at least not before the code changes that have recently been made.
Residential Code Change Proposal 001 submitted in the summer of 2014.

Proposal written to address inspection of the installation of concrete encased electrodes required by section E3608.1.2 of the 2012 MRC (soon to be in the 2015 MRC).

Proposed to allow Building Inspector verification of the concrete encased grounding electrode if installed with rebar only protruding out of footing for wire connection at a later time.

Original proposed text amended to include stipulation for agreement between inspectors in jurisdiction to allow Building Inspector to verify for Electrical Inspector.

Proposed amended code change was well received by Bureau staff. Approved by 2012 Residential Code Review Committee.
New code language: Section E3608.1.2.1 Verification of the installation of the concrete encased electrode specified for in E3608.1.2. The inspection of a concrete encased electrode meeting the requirements of E3608.1.2 except for the connection of the grounding electrode conductor shall be completed by one of the following:

(1) The Electrical Inspector for the enforcing agency.
(2) The Building Inspector for the enforcing agency if all of the following conditions are met:

(a) Both the Electrical and Building Inspectors for the enforcing agency shall sign a written agreement which shall remain on file with the enforcing agency that designates authority to the Building Inspector for that agency to inspect a concrete encased electrode.

(b) Upon inspection and verification by the Building Inspector of a concrete encased electrode, the Building Inspector shall provide written documentation to the Electrical Inspector that the installation of the concrete encased electrode meets the requirements set forth in Section E3608.1.2.
Verification of approval of the concrete encased electrode shall be made at the construction site by signature of either the Electrical Inspector or the Building Inspector for the enforcing agency on the field copy of the Building Permit noting that the concrete encased electrode was approved along with the footing inspection or by a readily available inspection tag attached to the accessible grounding electrode reinforcing bar.
(d) The grounding electrode conductor connection to the concrete encased electrode shall be inspected by the Electrical Inspector for the enforcing agency.
Part 8 Rules are Michigan amendments to the National Electrical Code (NEC) and are used as part of the electrical code enforced by Michigan’s Electrical Inspectors. The 2014 NEC NFPA 70 with the Part 8 Rules became effective on June 18, 2015.
R 408.30811 Duties and Powers of code official. Rule 811, Section 80.14.4 added and address changes to verification of approval of the concrete encased electrode meeting the requirements of 2014 NEC NFPA 70 Sections 250.50 and 250.52(A)(2) and (3) except for the connection of the grounding electrode conductor to the electrode shall be completed by one of the following (the same text as E3608.1.2.1 in the 2015 MRC proposed language):

(1) The Electrical Inspector.
(2) The Building Inspector for the enforcing agency if all of the following conditions are met:

(a) Both the Electrical and Building Inspectors for the enforcing agency shall sign a written agreement which shall remain on file with the enforcing agency that designates authority to the Building Inspector for that agency to inspect a concrete encase electrode.

(b) Upon inspection and verification by the Building Inspector of a concrete encased electrode, the Building Inspector shall provide written documentation to the Electrical Inspector that the installation of the concrete encased electrode meets the requirements set forth in 250.52(A)(2) and (3) and 250.68(C)(3).
(c) Verification of approval of the concrete encased electrode shall be made at the construction site by signature of either the Electrical Inspector or the Building Inspector for the enforcing agency on the field copy of the Building Permit noting that the concrete encased electrode was approved along with the footing inspection, or by a readily available inspection tag attached to the accessible grounding electrode reinforcing bar.
(d) The grounding electrode conductor connection to the concrete encased electrode shall be inspected by the Electrical Inspector for the enforcing agency.
Benefits of these added provisions...

- Building Inspector can go to jobsite and inspect the installation of the rebar for both Building Code compliance and Electrical Code compliance.
- Saves jurisdictions from sending multiple inspectors to the site to verify a rebar installation.
- Allows jurisdictions to do so without being in violation of the rules and regulations set forth by the State.
How to comply with the new code provisions...

- Have good communication between the Electrical and Building Inspectors of the enforcing agency.

- Create a written agreement between the Electrical and the Building Inspectors of the enforcing agency.

- Educate the Building Inspector on what the Electrical Inspector is looking for.

- Determine how the Inspector will provide field notification of approval or denial of the inspection.

- Develop a plan on how the Building Inspector will provide the inspection results to the Electrical Inspector.
Communication is key...

Have open communication between the Electrical and Building Inspectors of the enforcing agency.
Create a written agreement between the Electrical and the Building Inspectors of the enforcing agency.

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Internal Inspector Agreement
Inspection of Concrete Encased Electrodes

In accordance with the Part 8 Electrical Code Rules, Article R 408.30811 Section 80.14.4, as adopted by the State of Michigan, effective, June 18, 2015, we the undersigned agree to the following:

The inspection of concrete encased grounding electrodes shall be permitted to be inspected and verified for code compliant installation by the Building Inspector. Inspection of the concrete encase electrode shall be made to verify code compliance with 2014 NEC NFPA 70 Sections 250.50 and 250.52(A)(3), with the following conditions:
Decide together what should be included in the agreement.

The inspection of concrete encased grounding electrodes shall be permitted to be inspected and verified for code compliant installation by the Building Inspector. Inspection of the concrete encase electrode shall be made to verify code compliance with 2014 NEC NFPA 70 Sections 250.50 and 250.52(A)(3), with the following conditions:

- This agreement pertains to residential installations only.
- This written agreement shall be signed by all Electrical and Building Inspectors for the Emmet County Planning, Zoning and Construction Resources Department; and remain on file with the Emmet County Planning, Zoning and Construction Resources Department.
- An Electrical Permit shall be issued prior to approval of the concrete encased electrode.
- Upon inspection and verification by the Building Inspector of the concrete encased electrode, the Building Inspector shall provide written documentation to the Electrical Inspector that the installation of the concrete encased electrode meets the requirements of set forth in 2014 NEC NFPA 70 Sections 250.52(A)(3) and 250.68(C)(3). Written verification shall be in the form of a copy of the building inspection approval report and photos indicating the location of the concrete encased electrode prior to the placement of the concrete. Photos shall be of sufficient quality to provide up close evidence of the installation as well as verification of the approximate location on the foundation (close up as well as panoramic view).
- The grounding electrode conductor connection to the concrete encased electrode shall be inspected and approved only by the Electrical Inspector. The Building Inspector is authorized to only inspect reinforcing bar intended to be used as a grounding electrode connector. Wire connections within the concrete shall be inspected and approved only by the Electrical Inspector. Grounding of metal frame buildings shall be inspected and approved only by the Electrical Inspector.
- Verification of approval of the concrete encased electrode shall be made at the construction site by signature of either the Electrical Inspector or the Building Inspector, noting that the inspection is approved, by attachment of an approval tag attached to the accessible portion of the concrete encased electrode reinforcing bar.
- The Electrical Inspector shall notify the Electrical Permit holder of the approval in the form of a written inspection report. The report shall contain the name of the inspector that verified the installation.
- This agreement shall expire, and be re-evaluated for approval when the Part 8 Rules and/or the Michigan Residential Code are updated with any changes to the Rules or Codes that may affect the terms of this agreement.
Include a signature line for each of the Building and Electrical Inspectors working for the enforcing agency, so all are aware of this agreement.
The grounding electrode shall be ½ inch diameter or greater.

The grounding electrode shall be at least 20 feet in length.

The grounding electrode shall be encased in a minimum of 2 inches of concrete.

The grounding electrode connection shall be in an accessible location, interior of the structure or extended up above grade.

Grounding electrodes shall be galvanized or equivalent if located on the exterior of the building.

The footing with the grounding electrode shall be in direct contact with the earth.

Grounding electrodes with connections made within the concrete shall only be approved by the Electrical Inspector.
Determine how the Inspector will provide field notification of approval or denial of the inspection.
Develop a plan on how the Building Inspector will provide the inspection results to the Electrical Inspector.

- Inform the Electrical Inspector of the inspection results by phone, text or email. In addition:
  - Email a copy of the footing inspection report to the Electrical Inspector.
  - If no email, mail or fax a copy of the inspection report to the Electrical Inspector.
- Provide copies of pictures for future reference to the Electrical Inspector.
What should the Electrical Inspector do with the inspection results...

- Verify the installation as code compliant by way of any pictures provided by the Building Inspector.
- Complete the Electrical Inspection Report to document the inspection outcome.
- Include a reference to the Building Inspector verifying the grounding electrode installation.
- Notify the Electrical Permit Holder of the inspection results.
- File a copy of the Building Inspection Report and any photos provided in the permit file so that those documents can be accessed if necessary in the future.
Rebar in footings shall be used as a grounding electrode if ½ inch or larger in diameter and at least 20 feet in length. Grounding electrodes shall be encased in at least 2 inches of concrete with the concrete in direct contact with the earth. Grounding electrodes stubbed out future wire connections shall be accessible. Grounding electrodes on the exterior of the structure shall be galvanized. Building Inspectors can now verify this installation for the Electrical Inspector with the following conditions:

- A written agreement is created and signed by the Electrical and Building Inspectors of the Enforcing Agency and said agreement has been filed with the Enforcing Agency.
- A plan for communication of the inspection results between the Electrical and Building Inspectors is in place.
- A method of field approval is determined.

Saves Enforcing Agencies time and money by sending just one inspector to verify the rebar installation.
Questions?

The End

Thanks for your attention today

Feel free to contact me with any questions, comments or to obtain a copy of this presentation.

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Failure to plan is planning to fail!