



Understanding the Construction Code Rules, Part 8¹

Based on the 2014 *NEC*[®] and the 2015 *MRC*

The State of Michigan is operating under the 2014 edition of the *National Electrical Code*[®] as amended by the *Construction Code Act, Part 8* of P.A. 230 of 1972. A copy can be obtained from the Bureau of Construction Codes and Fire Safety, P.O. Box 30254, Lansing, MI 48909. The purpose of this document is to explain how the *Michigan Electrical Code (MEC)* differs from the 2014 *National Electrical Code (NEC)*[®], and when the *Michigan Residential Code (MRC)* is to be used in place of the *MEC* for wiring installations. To access official information on the internet, go to the web site <http://www.michigan.gov/lara> (517.241.9320). The electrical portion of the *Construction Code Act* is *Part 8 of Public Act 230 of 1972*. This Tech Note is not an official document.

Rule 801: This rule adopts the 2014 *NEC*[®] with some sections omitted and some rewritten. Also omitted are *Article 547* dealing with agricultural wiring, and *Informational Annex H* which contains suggested administrative rules. This amended version of the *NEC*[®] is called the *Michigan Electrical Code* or *MEC*.

Deleted from the *MEC* are sections 110.24, 501.30(B), 502.30(B), 503.30(B), 505.25(B), and 506.25(B). Section 110.24 is a requirement that all services except dwelling services be marked with the available fault current at the time of installation or modification. This rule does not apply in Michigan, however, a similar rule has been in effect in Michigan for many years and that is 110.9 and 110.10. Administrative Rule 80.21(g) now requires available fault current calculations to be included when plans are submitted for approval. The other Code sections were deleted because they permitted a practice not permitted in Michigan. Michigan Rules 867, 868, and 869 do not permit the use of flexible metal conduit (FMC) or liquidtight flexible metal conduit (LFMC) as an equipment grounding conductor.

Additions and revisions resulting in new administrative rules that apply in Michigan. Rules that remain in effect from the previous enactment of the *Construction Code Act* are not covered.

80.1 Exception: This exception exempts certain types of buildings from the *Michigan Electrical Code (MEC)* and instead requires them to have wiring installed in accordance with the *Michigan Residential Code (MRC)*. One-family dwellings and two-family dwellings are to have wiring installed according to the *MRC*. There are two changes to this exception when the 2011 *Part 8 Rules* were enacted and remain in effect. Change one is that townhouses which are multiple single-family dwellings now come under the *MRC* if they are not over three floors in height and if they each have separate means of egress from the dwelling unit. The second change is that accessory structures for one-family and two-family dwellings are also permitted to be wired using the *MRC*.

80.14 Duties and powers of the code official: This rule was revised with the 2011 *Part 8 Rules* and made much more specific with respect to duties of the code official. The code official has the authority to render code interpretations. Interpretations, policies, and procedures of the code official are required to be in compliance with the Code. Subsection 80.14.1 specifies the records that are required to be kept by the enforcing agency. Subsection 80.14.2 requires the code official to carry proper identification when performing an inspection. Subsection 80.14.3 gives the code official right of entry and spells out actions that can be taken if entry is refused.

¹ Developed by the Electrical Technology staff of the Biosystems & Agricultural Engineering Department of Michigan State University, East Lansing, MI 48824-1323. For a copy of this Tech Note and other educational papers, visit the Electrical Technology web site at <http://www.egr.msu.edu/bae/et/>.

80.14.4 Verification of the installation of the concrete encased electrode. This is a new rule that permits the “building inspector”, when qualified and authorized, to inspect the required concrete encased electrode for the service rather than the “electrical inspector.” The “inspector” upon approval is required to either note on the “field copy” of the permit that the concrete encased electrode has been approved. The “inspector” signature must also be provided with this notation. The alternative is to attach an “inspection tag” to the accessible portion of the reinforcing bar where connection to the grounding electrode conductor is to occur. The actual connection of the service grounding electrode conductor to the reinforcing bar is required to be inspected by the “electrical inspector.”

80.15 Means of appeal: The appeal process was clarified with the 2011 Part 8 Rules. An appeal of a code official ruling is to be directed to a local board of appeals. The local board of appeals ruling can be appealed to the Construction Code Commission. This process was not made clear in the past. Subsection 80.15.2 requires members of a board of appeals to be qualified.

80.19.3.1 Posting of permit: This was a new requirement with the 2011 *Part 8 Rules*. It is required to keep a copy of the permit at the job site.

80.19.10 Permits and certificates: . This was new with the 2011 *Part 8 Rules* and creates what is known as an “annual permit.” For an existing facility an annual permit can be issued. This is particularly useful when a firm or corporation has on-site maintenance electricians. Subsection 80.19.11 requires the holder of an annual permit to keep records of work that is performed. The records are required to be filed with the enforcing agency, but no directions as to when this filing is to occur are stated.

80.20 Representative on jobsite: This is not a new requirement. The electrical inspector can require the permit holder to have a representative on the site when an inspection is conducted.

80.20.1 Licensed supervision required: This is not a new requirement. When electrical work is being performed a licensed electrician employed by the permit holder is required to be on the job site.

80.21 Plans and specifications: When the 2011 *Part 8 Rules* were enacted for those installations requiring plans and specifications to be submitted there was a new requirement under item (g) that available fault current calculations are required. Presumably this fault current calculation requirement is at the service equipment, however, it is not stated as to the extent of this requirement if any beyond the service equipment.

80.21.5 Information on construction documents: This is a new requirement that submitted construction documents are to be provided in a suitable form and clarity to indicate the scope and location of the work to be performed.

80.22.2 Concealing electrical installation: This is not a new requirement, but if work required to be inspected is made not accessible, the electrical inspector can require it to be made accessible at permit holder expense.

80.25 Connection to electricity supply: This issue was clarified with the 2011 *Part 8 Rules*. It is the enforcing agency that authorizes when an installation is permitted to be connected to an electrical supply.

80.26.1 Service equipment: This section was new with the 2011 *Part 8 Rules* and deals with the connection to power of a repaired electrical system under emergency circumstances such as may occur as a result of storm damage. A utility is permitted to restore power to a repaired installation prior to approval by the enforcing agency provided the repair is made by a licensed electrical contractor. The electrical contractor is then required to secure a permit for the repair the first business day following the completion of the work.

Michigan Amendments to the 2014 NEC: Refer to a copy of the *Michigan Electrical Code Rules, Part 8* for the actual text of the following code sections.

230.40: What was *Exception 3* of 230.40 in the 2014 NEC® was deleted from the *Michigan Electrical Code*, and the remaining exceptions were renumbered. This is not new. This exception has been deleted from every edition of the MEC since it was first introduced. The exception that was deleted applies in the case of a single-family dwelling and permitted an outbuilding as well as the dwelling to be supplied directly from a single service drop or lateral similar to the diagram in Figure 1. This is not permitted in Michigan. It is required to provide overcurrent protection on the feeder supplying the outbuilding.



Figure 1 Exception 3 of NEC® 230.40 was deleted from the MEC. It is not permitted to directly supply an outbuilding from a single-family dwelling service drop or lateral.

230.71(A): The change in this section is only editorial due to the change that was made in 230.40 by the deletion of Exception 3.

250.104(B): There have been concerns about possible lightning damage to corrugated stainless steel tubing (CSST) gas piping in buildings. The 2014 *National Electrical Code* does not have a rule with respect to bonding of CSST. The Michigan Electrical Code does have a rule that requires bonding CSST to the service grounding electrode system unless the CSST is specifically listed as not requiring such bonding. The Part 8 rules to the MEC revises 250.104(B) and adds this bonding requirement. The bonding conductor is required to be sized not smaller than the equipment grounding conductor of any circuit that potentially could energize the CSST as required by 250.122. In any case the bonding conductor size is not permitted to be smaller than 6 AWG copper. The points of connection to the service grounding electrode system are listed in 250.104(B)(a). Starting at the point where the gas piping enters the building, the bonding connection is to be made to either a metal gas pipe or the first CSST fitting.

Figure 2 illustrates an installation where the CSST begins at a gas meter. The bonding connection is required to be made at the first CSST fitting in this case. The CSST may begin at some point inside the building in which case the bonding connection is required to be made at the first CSST fitting or to a metal gas pipe prior to the origination of the CSST. There is an exception in the case where the CSST is listed by the “manufacturer” as not requiring this additional bonding.

This rule also applies to CSST installed in one-family and two-family dwellings as stated in E3609.7.1 which is printed out-of-place on page 652 of the MRC. It should have been printed on page 654 of the MRC. There are some differences for the installation of this CSST bonding in the case of a one-family and two-family dwelling as compared to other installations that come under the MEC. The CSST bonding conductor is not permitted to be longer than 75 feet. In the case of a one-family or two-family dwelling the bonding conductor is permitted to terminate at a lightning protection grounding electrode system which according to 250.106 is required to be bonded to the service grounding electrode system.

Exception: Corrugated stainless steel tubing (CSST) tested and listed by the “manufacturer” for installation without additional bonding is permitted to be installed in Michigan without this additional bonding.

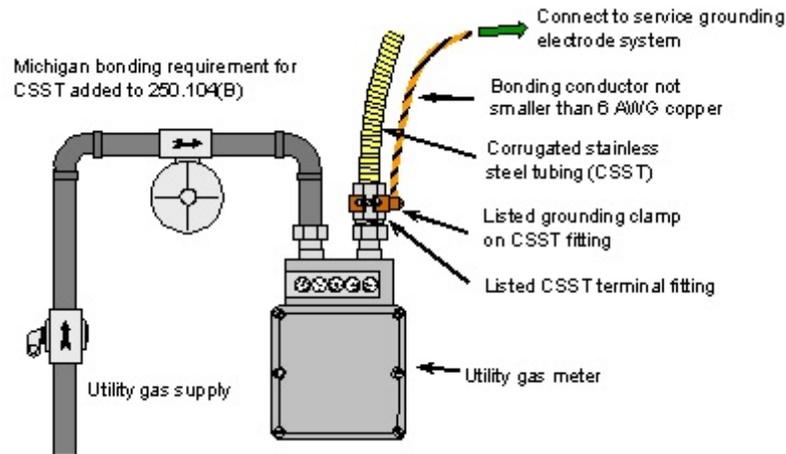


Figure 2 Both the MEC and the MRC require a bonding connection to a section of rigid gas piping or to a CSST terminal connector closest to the gas meter or point of entrance to a building when corrugated stainless steel tubing is installed as a part of the gas piping system in a building unless listed as not requiring bonding.

250.118: This section lists the acceptable means of providing equipment grounding. The corresponding section in the MRC is E3908.8. The NEC permits flexible metal conduit and liquidtight flexible metal conduit as an equipment grounding conductor under certain circumstances. In Michigan FMC and LFMC are never permitted as an equipment grounding conductor under any circumstances. This is not new. It has been the rule in Michigan for many years. What is different in 250.118 and E3908.8 is that FMC and LFMC have been deleted from the list of acceptable equipment grounding conductors. See Figure 5 and Figure 6.

334.10(2): The uses permitted for nonmetallic-sheathed cable has been modified for use in Michigan. The first modification deals with 334.10(2). In the NEC there is a reference to Type III, IV, and V construction of multifamily dwellings which in Michigan has been deleted. The significance of this revision is that in Michigan nonmetallic sheathed cable is permitted to be installed in any multifamily dwelling regardless of the type of construction of the building. This is illustrated in Figure 3.

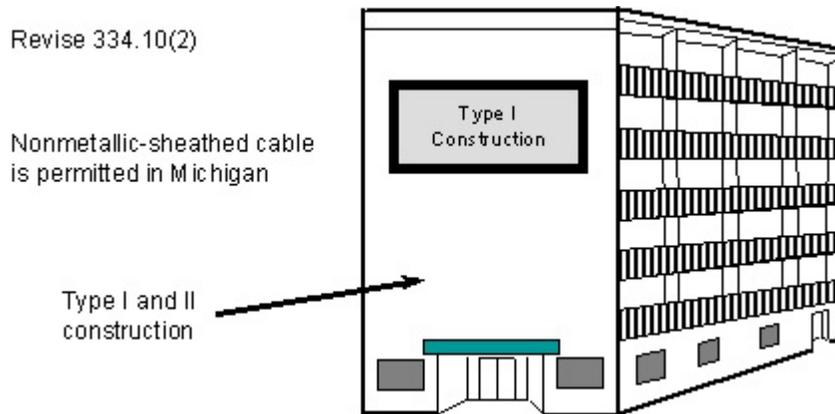


Figure 3 Nonmetallic-Sheathed Cable is permitted to be installed in multifamily dwellings of any type of construction in Michigan.

334.10(3): The NEC limits the installation of nonmetallic-sheathed cable in non-dwellings. It is required to be run concealed within walls, floors, or ceilings with a 15-minute finish fire rating. The wording of 334.10(3) has been changed for application in Michigan. Nonmetallic-sheathed cable is permitted to be installed as surface wiring or concealed within walls, floors, and ceilings that do not have a 15-minute finish fire rating provided the building is not more than one floor in height. This is illustrated in Figure 4. When the building exceeds one floor in height, nonmetallic sheathed cable is required to be concealed in walls, floors, or ceilings that provide a 15-minute finish fire rating.

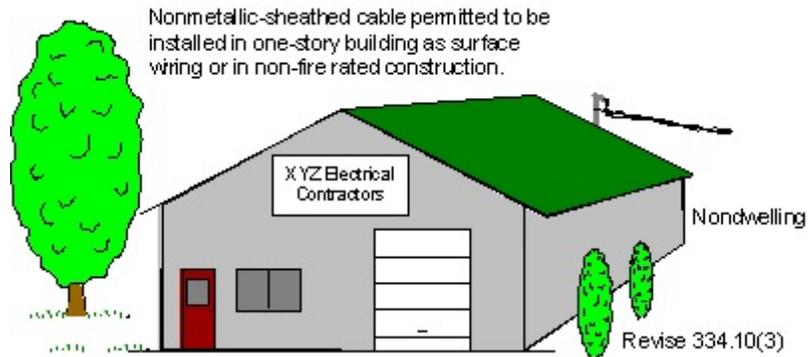


Figure 4 Nonmetallic-Sheathed Cable is permitted to be installed as surface wiring or concealed except for buildings of two or more floors and then it must be installed concealed within walls, floors, or ceilings with a 15-minute finish fire rating.

348.60: Flexible metal conduit (FMC) is not permitted to serve as an equipment grounding conductor in Michigan. This has been the rule for many years. When installed and equipment grounding is required, either an equipment grounding conductor or bonding jumper must be installed. This same rule is in the MRC as E3908.8.1. In the Michigan Electrical Code in 250.118 as well as in E3908.8 of the MRC, FMC has been deleted from the list of acceptable equipment grounding conductors. An example of this rule is shown in Figure 5.

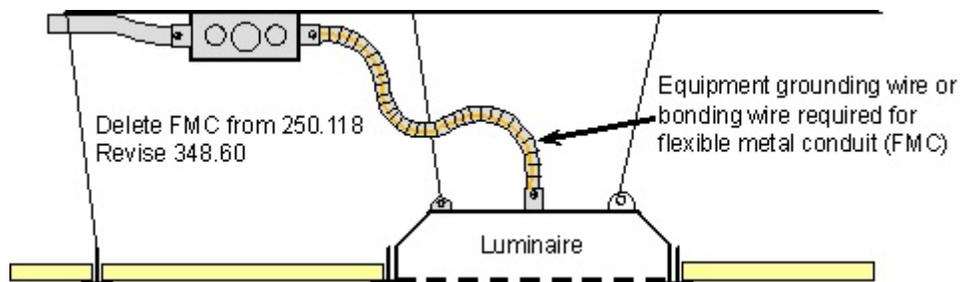


Figure 5 Flexible Metal Conduit (FMC) is not permitted to be used as an equipment grounding or bonding conductor in Michigan. A bonding jumper is required to be installed in all cases to provide a satisfactory fault current path from one end to the other of Flexible Metal Conduit.

350.60: Liquidtight flexible metal conduit (LFMC) is not permitted to serve as an equipment grounding conductor in Michigan. This has been the rule for many years. When installed and equipment grounding is required, either an equipment grounding conductor or bonding jumper must be installed. This same rule is in the MRC as E3908.8.2. In the Michigan Electrical Code in 250.118 as well as in E3908.8 of the MRC, LFMC has been deleted from the list of acceptable equipment grounding conductors. An example of this rule is shown in Figure 6.

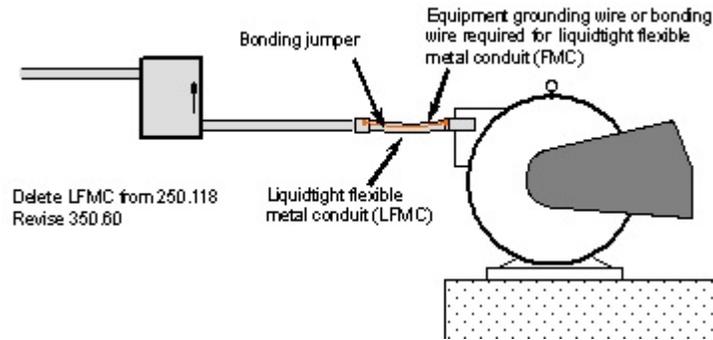


Figure 6 Liquidtight Flexible Metal Conduit is not permitted to be used as equipment grounding or bonding conductor in Michigan. A bonding jumper is required to be installed in all cases to provide a satisfactory fault current path from one end to the other of Liquidtight Flexible Metal Conduit.

404.2(C) Exception 2 Deleted: Since the 2011 *NEC* it has been required to provide a grounded circuit conductor (neutral) at lighting switch locations. The reasoning was that replacement room occupancy sensor switches and similar control devices require a neutral for operation. There was an exception that did not require the neutral at the switch if raceway was used to supply the location and the additional neutral could be added later. That same exception provided an exemption where cable was used and it was considered practical to replace the existing cable in the future. What Exception 2 addressed for the previous Code was the case where there were multiple switch locations for lighting in a room. The exception only required a neutral to be provided at one switch location. Revision of 404.2(C) basically resolves most concerns and this provision in the *Part 8 Rules* was not considered necessary. The 2015 *MRC* language in E4001.15 is identical to 404.2(C). According to 404.2(C)(2), when cable is used as the wiring method, if it is practical to replace the cable with the required conductors without removing a portion of the structure then it is not required to provide a neutral at the switch location. According to 404.2(C)(5) if all switch locations for a room are visible from the entire room then it is not required to provide a neutral at all switch locations.

Nonmetallic-sheathed cables in the past have been commonly stocked at supply locations that consisted of two circuit conductors and an equipment ground and with three circuit conductors and an equipment ground. A nonmetallic-sheathed cable with four circuit conductors and an equipment ground is now commonly available which can be useful when wiring lighting circuits. Figure 7 is an example of a lighting circuit wired with cable where a neutral is provided at both switch locations.

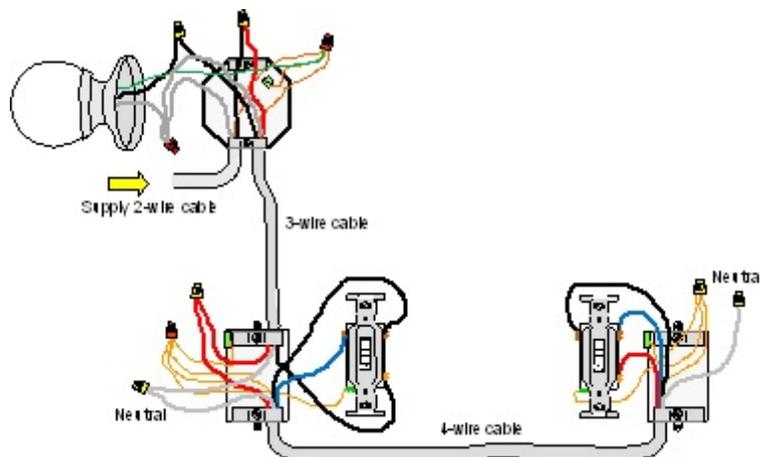


Figure 7 For this room lighting the supply is at the ceiling outlet and two 3-way switches control the luminaire where the neutral is provided at both switch locations.

625.40: There is a rule in the *NEC* that specifies how to determine the rating of the circuit that supplies electric vehicle charging equipment. This *Part 8 Rule* makes it clear that the branch circuit that supplies an electric vehicle charging station is required to be an individual branch circuit with overcurrent protection not less than 125% of the maximum load of the electric vehicle equipment. This is illustrated in Figure 8.

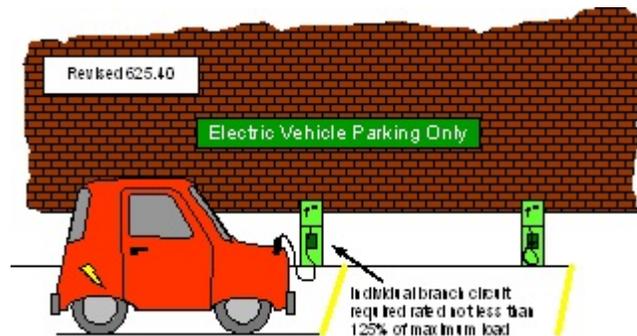


Figure 8 The Michigan Electrical Code requires an individual branch circuit to supply an electric vehicle charging station with a rating not less than 125% of the maximum charging load.

Michigan Residential Code: One-family dwelling, two-family dwellings, and townhouses consisting of multiple single-family dwellings not more than three floors in height and having means of egress from each dwelling unit are permitted to have wiring installed according to the 2015 *Michigan Residential Code*. Multi-family dwellings consisting of individual living units are to have wiring installed according to the *Michigan Electrical Code* which consists of the 2014 *National Electrical Code* as amended by *Part 8* of the *Construction Code Act*. Those amendments were discussed earlier in this Tech Note. The following discussion compares differences that exist for dwellings between the 2015 *Michigan Residential Code* and the 2014 *Michigan Electrical Code*.

E3401.5 to E3401.8 Dwelling Photovoltaic Installations

Installation of photovoltaic modules and arrays at a single-family dwelling or a two-family dwelling location are permitted to be roof mounted or ground-level mounted. In either case there are several references in the *Michigan Residential Code (MRC)* where installation requirements are found. In addition to this reference in the electrical section of the *MRC* there are other requirements found in R324 dealing with general installation rules, R902 for fire rating requirements, and R907 roof mounted photovoltaic systems. With respect to the installation of electrical wiring and components of the system those rules are found in Article 690 of the 2014 edition of the *National Electrical Code*.

Figure 9 shows a roof installation of a photovoltaic array on a dwelling roof. For locations in Southern Michigan it is recommended the photovoltaic array face South and tilted at an angle of about 50 degrees from horizontal. This should provide maximum power production during winter months and the high angle will help prevent snow build-up on the modules. Roof structure must be capable of supporting the weight and if a supporting structure is used, it is required to be constructed of non-combustible materials or if of wood it is required to be fire-retardant treated wood. Other mounting instructions are found in the listed “R” and “E” sections of the *MRC*.

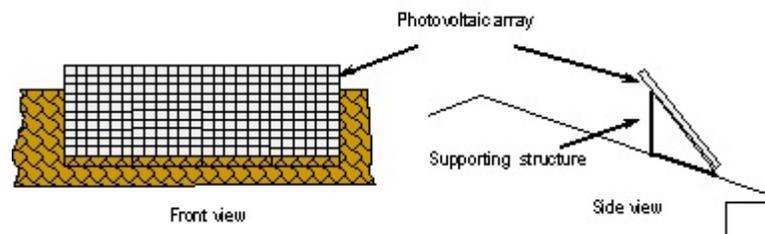


Figure 9 A dwelling roof mounted photovoltaic array if with a supporting structure shall be constructed of non-combustible or fire-retardant materials on a roof rated for the weight to be supported.

E3406.7 Conductors of the same circuit.

The corresponding section in the *NEC* is 300.3(B) which permits exceptions. This is the requirement that all of the wires of a circuit be run together in the same raceway, trench, cable, or cord including the neutral and equipment grounding conductor. When conductors are run in parallel the *NEC* permits sets of conductors to be run in separate raceways or separate cables. The rule in the *MRC* does not permit separate raceways or separate cables. The other difference deals with equipment grounding conductors and bonding jumpers. This rule requires all equipment grounding conductors and bonding jumpers to be run inside raceway or cable. It would then be a violation to run a bonding jumper on the outside of a section of flexible metal conduit or liquidtight flexible metal conduit.

E3601.6.3 Separate outdoor electric space conditioning equipment.

This is a service equipment rule that is in the *MRC* but not in the *NEC*. This rule permits the service disconnecting means for space conditioning equipment to be separated from the service disconnecting means for the remainder of the dwelling when the space conditioning equipment is separately metered by the utility. Figure 10 shows a dwelling with separately metered space conditioning equipment located outside the dwelling. Since the space conditioning equipment is separately metered it requires a separate service disconnect. The issue is that the Code requires separate service disconnects to be grouped thus requiring the space conditioning disconnect to be located adjacent to the dwelling service disconnect. Since the space conditioning equipment is located outside the dwelling it is desirable to also locate the space conditioning service disconnect outside. This arrangement requires a provision in the Code.

The space conditioning service disconnect is required to be located adjacent to the meter. A plaque is required at the disconnect indicating the location of the dwelling service disconnect. At the dwelling service disconnect a plaque is required indicating the location of the space conditioning service disconnect. A main bonding jumper is required at the space conditioning service disconnect. It is also required to provide a grounding electrode system for the space conditioning service disconnect. A grounding electrode conductor can be run to the dwelling service grounding electrode system, or a separate grounding electrode system can be provided. If a separate grounding electrode system is provided, it is required to be bonded to the dwelling service grounding electrode system. See the example in Figure 10.

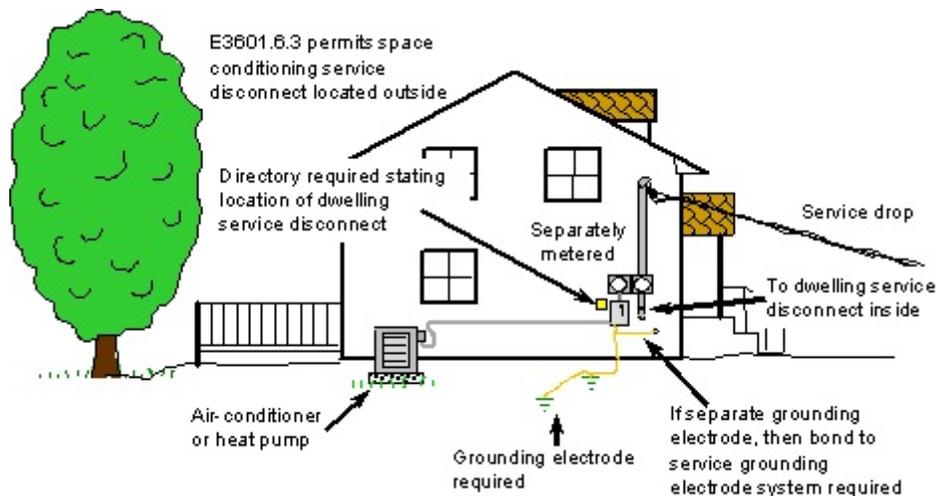


Figure 10 In the case of a one-family or two-family dwelling, it is permitted to provide a separate disconnecting means on the outside of the dwelling for separately metered space conditioning equipment service disconnect, but a grounding electrode system is also required.

E3601.6.4 Electric vehicle charging system service disconnect.

This is a service equipment rule that is in the *MRC* but not in the *NEC*. This rule permits the service disconnecting means for the electric vehicle charging station to be separated from the service disconnecting means for the remainder of the dwelling when the space conditioning equipment is separately metered by the utility. Figure 11 shows a dwelling with a separately metered electric vehicle charging station located outside the dwelling. Since the electric vehicle charging station is separately metered it requires a separate service disconnect. The issue is that the Code requires

separate service disconnects to be grouped thus requiring the electric vehicle charging station disconnect to be located adjacent to the dwelling service disconnect. Since the electric vehicle charging station is located outside the dwelling it is desirable to also locate the electric vehicle charging station service disconnect outside. This arrangement requires a provision in the Code.

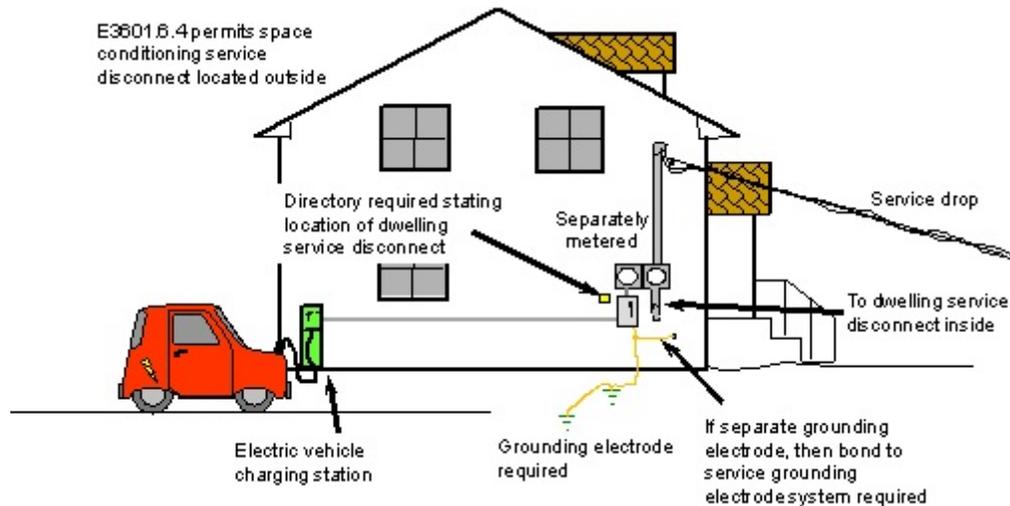


Figure 11 In the case of a one-family or two-family dwelling, it is permitted to provide a separate disconnecting means on the outside of the dwelling for a separately metered electric vehicle charging station service disconnect, but a grounding electrode system is also required.

The electric vehicle charging station service disconnect is required to be located adjacent to the meter. A plaque is required at the disconnect indicating the location of the dwelling service disconnect. At the dwelling service disconnect a plaque is required indicating the location of the electric vehicle charging station service disconnect. A main bonding jumper is required at the space conditioning service disconnect. It is also required to provide a grounding electrode system for the electric vehicle charging station service disconnect. A grounding electrode conductor can be run to the dwelling service grounding electrode system, or a separate grounding electrode system can be provided. If a separate grounding electrode system is provided, it is required to be bonded to the dwelling service grounding electrode system. See the example in Figure 11.

E3607.9.1 Corrugated stainless steel tubing (CSST).

Whenever corrugated stainless steel tubing (CSST) gas piping is run inside a one-family or two-family dwelling, unless it is listed by the manufacturer as not requiring grounding, it is required to be grounded to the dwelling service grounding electrode system with a bonding conductor not smaller than 6 AWG copper. Starting at the gas meter or entrance to the building, the grounding connection is to be made to a metal gas pipe or CSST fitting at the closest point to the supply where the run of CSST begins. For more details, refer to the discussion of 250.104(B) on page 3 of this tech note, or the exact wording of 250.104(B) as printed in the *Michigan Part 8 Rules*. Also refer to Figure 2 in this tech note.

E3902.11 2009 MRC Deleted - Bedroom outlets arc-fault protection **NO LONGER REQUIRED**

In Michigan, arc-fault circuit-interrupter protection of 15- and 20-ampere circuits are no longer required in one-family and two-family dwellings. This also included one-family townhouses that have individual means of egress and are not more than three floors in height. Single-family units of multi-family dwellings come under the *Michigan Electrical Code* and the arc-fault circuit-interrupter rules of 210.12 do apply.

E3908.8 Types of equipment grounding conductors.

This section is similar to 250.118 in the *NEC* except in the *MRC* flexible metal conduit (FMC) and liquidtight flexible metal conduit (LFMC) are not contained in the list.

E3908.8.1 Grounding of flexible metal conduit.

Flexible metal conduit (FMC) is not permitted to be used as an equipment grounding conductor or as a bonding jumper in Michigan. The corresponding section in the *NEC* is 348.60. This is illustrated in Figure 5.

E3908.8.2 Grounding of liquid-tight flexible metal conduit.

Liquidtight flexible metal conduit (LFMC) is not permitted to be used as an equipment grounding conductor or as a bonding jumper in Michigan. The corresponding section in the *NEC* is 350.60. This is illustrated in Figure 6

E4002.16 Replacements (receptacles).

The corresponding section in the *NEC* is 406.4(D). When an outside receptacle is replaced whether a water resistant (WR) listed receptacle is required to be install depends upon interpretation of E4002.8. Does this requirement apply only to new construction and does it also apply the any work on the circuit including receptacle replacement. The same interpretation will also apply in the case of a tamper-resistant receptacle (TR) required by E4002.14. When a receptacle is replaced in the dwelling is it required to install a tamper-resistant (TR) receptacle? What confuses this issue is that in this section it specifically addresses how to proceed in cases where GFCI protection is required for a receptacle.

R302.11 Fireblocking.

In combustible construction, fireblocking shall be provided to cut off all concealed draft openings both vertical and horizontal and to form an effective fire barrier between stories, and between a top story and the roof space. This rule applies to electrical installations as well as other trade installations. More information about dwelling fireblocking, smoke alarm and carbon monoxide detection and alarm installations can be found in Tech Note 252. This publication can be accessed at the web site www.egr.msu.edu/bae/et.

R314 Smoke Alarms

Smoke alarms are required to be installed in each bedroom of a dwelling with an additional smoke alarm outside the bedrooms in the bedroom area. At least one smoke alarm is required to be installed on each habitable floor such as a basement used only for recreation and/or storage and utility appliances and equipment. This also includes any floor that does not have sleeping spaces. Helpful information about dwelling smoke alarm placement can be found in *Tech Note 252*. When alterations to a dwelling are made that require a permit, smoke alarms are to be installed meeting the requirements of new construction. For exceptions review this reference in the *MRC* or contact the local building code enforcing agency.

R315 Carbon monoxide

Carbon monoxide alarms are required to be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms within dwellings where fuel-fired appliances are installed and in dwelling units that have attached garages. This information as to the actual location to install a carbon monoxide alarm is not found in the *MRC*. Instead it is found in the *Construction Code Act, Public Act 230 of 1972 in Section 125.1504f(1)*. Helpful information about dwelling carbon monoxide alarms and their placement can be found in *Tech Note 252*. When alterations to a dwelling are made that require a permit, carbon monoxide alarms are to be installed meeting the requirements of new construction. For exceptions review this reference in the *MRC* or contact the local building code enforcing agency.