



STATE OF WISCONSIN

Department of Safety and Professional Services

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Electrical Program

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2016 Winter Electrical Code Update UDC Electrical Program

- 1) Are we permitted to install a circuit breaker panel board in horizontal orientation?

NEC 404.7

Answer: No, 404.7 requires that when circuit breakers are operated vertically, the up position of the handle shall be in the on position. On a standard panel that was installed horizontally, this would mean that the breakers installed in the top half would not meet this requirement.

- 2) Is it permissible to allow the concrete encased electrode to be turned up and out of concrete and then attached to a #4 copper?

NEC 250.68 (A)

Answer: Yes, they do make a clamp for a number 4 bare conductor to connect to rebar.
Exception # 1 in NEC 250.68(A): An encased or buried connection to a concrete-encased, driven, or buried grounding electrode shall not be required to be accessible. This issue is clarified in the 2014 NEC; it permits an extension-stub up for a concrete encased electrode.

- 3) Is it permissible to use the poured wall section as a concrete encased electrode? One side of the poured wall foundation will be in contact with the earth. The other side would be covered with 2 inches of insulating foam.

NEC 250.52(A)(3) (1) & (2)

Answer: Yes. NEC 250.52 (A)(3) states that the concrete footing or concrete foundation shall be in direct contact with the earth.

- 4) A detached shed is supplied with a 15 A branch circuit. Is a grounding electrode required?

NEC 250.32 Exc.

Answer: No, NEC 250.32 Exception states a grounding electrode shall not be required where only a single branch circuit, including a multiwire branch circuit, supplies the building or

structure and the branch circuit includes an equipment grounding conductor for grounding the normally non-current-carrying metal parts of equipment.

- 5) I am buying a house. The overhead wires from the garage to the home are supported by trees. Does the code permit this?

NEC 225.26

Answer: No. Vegetation such as trees shall not be used for support of overhead conductor spans.

- 6) Is it permitted to use NEC chapter 3 wires/cables that are listed for dry locations in damp or wet locations if installed in conduit?

NEC 300.5(B), 334.12(B) (4)

Answer: No. This area is considered a wet location. NM cable would not be allowed.

- 7) Is a property owner allowed to replace an electric service on one of their rental property?

State Statute: 101.862 (2)

Answer: No. In order for a homeowner to do electric work on a residence it must be owner occupied. So if he does not live in the house himself he cannot do the electric wiring for the new service.

- 8) Can I use 1" schedule 40 PVC water pipe in the following application? The building is a non-occupied 12' x 12' shed used to house well pump controls & pressure tank. When running 12/3 UF wire from the well to the shed through the concrete slab we would like to use this pipe as a sleeve through the slab & as a conduit going to our control box.

NEC 340.12 (8)

Answer: No. The PVC water pipe is not listed as a raceway.

NEC 340.12 Uses not permitted. Type UF cable shall not be used as follows.(8) Embedded in poured cement, concrete or aggregate. Schedule 40 PVC water pipe could be used as a sleeve through the foundation wall. NEC 334.15 applies, the cable either has to closely follow the surface of the building finish or be secured through running boards. If the cable is exposed to physical damage it must be protected by means of RMC, IMC, EMT, schedule 80 PVC or other approved means.

- 9) I am installing a 200 amp service. Can we install a non-fused manual transfer switch ahead of the main disconnect? If we can install the non-fused switch ahead of the main, does that become the main bonding point?

NEC 230.91, 110.10

Answer: Yes. Several conditions must be met.

1) The manual transfer switch is service rated.

2) The manual transfer switch has a short-circuit current rating equal to or greater than the available short circuit current assigned by the utility. This is unlikely.

3) The manual transfer switch is grouped with the service overcurrent device as required by NEC 230.91. Either option is permitted as we interpret the Service Equipment” as consisting of two enclosures. Since manual transfer switches typically are only rated 10kA with no upstream OCP, it is unlikely that this arrangement is permissible for other than a residential dwelling.

10) I am a licensed electrician but in MN. If I become licensed in WI (master electrician license), can I pull my own permit and install the electrical? Or can I do both with my current MN license?

State Statue 101.862(1) & (2)

Answer: No. You would have to be a Wisconsin licensed master electrician and electrical contractor. Wisconsin and Minnesota do not have any reciprocal agreements regarding electrical licensing at this time. Once you have these two licenses you would be able to secure a permit and install electrical wiring.

11) I was in an older home and replaced an existing two wire receptacle with a new 3 prong outlet. I know that it says the outlet has to be replaced with either a two prong receptacle or a GFCI receptacle. Can I put in a GFCI breaker instead of the receptacle? Anything else I need to do?

NEC 402.4(D)(2)(b)&(c)

Answer: Yes A non-grounding type receptacle shall be permitted to be replaced with a grounding type receptacle where supplied through a Ground-fault circuit interrupter. You must mark the protected receptacles with the stickers provided by the manufacturer or similar marking.

12) I have had a numerous cases recently regarding Knob and Tube. There are a few “Home Inspectors” Telling people who are selling their homes that they will need to have all Knob and Tube removed from their home, and some state that only “exposed” Knob and Tube will need to be taken care of. Could you please give me some clarity on this issue?

NEC 394.1, 394.12, 394.23(A)&(B)

Answer: Not required to be replaced. NEC 394.1 covers the use, installation, and constructions specifications of concealed knob and tube wiring. Knob and tube wiring is still an acceptable wiring method. The question of removing the knob and tube would only be if it is no longer

installed the way it was intended to be used. Such as if someone had insulated the area where the knob and tube wiring existed. NEC 394.12 says (Uses not permitted) (5) Hollow spaces of walls, ceilings, and attics where such spaces are insulated by loose, rolled, or foamed-in-place insulating material that envelops the conductors. Knob and tube wiring is allowed in accessible attics. NEC 394.23 In Accessible Attics. Conductors in unfinished attics and roof spaces shall comply with NEC 394.(A) or (B).

- 13) The owner wants four pendants over the kitchen island. The boxes are about 15-inches apart. Do all of the boxes have to be "fan-rated"?

SPS 316.210(5)

Answer: No. It would be reasonable to require one of the boxes to be fan rated. I would also be reasonable that the box in the center to be the one that is rated for ceiling fan support. If the owner wanted to hang a fan, Most of the time it would be centered over the island or peninsula.

- 14) A single-phase service consists of a class 320 meter pedestal that supplies a panelboard with a 400-ampere breaker. The ungrounded service conductors are 500 kcmil copper with THWN-2 insulation. The conductor is only rated at 380 amps. Is this legal?

NEC 230.90 (A) Exc. No. 2, NEC240.4 (B)

Answer: Yes, if the calculated load is 380 amperes or less, the next higher standard overcurrent device can be used. Check with the Utility for their regulations. They might limit the sum of the OCP devices to 300-amperes based on the rating of the meter.

- 15) Are the branch circuits supplying lighting outlets in a finished basement required to be AFCI protected? What about the 20-ampere, 125 volt laundry outlet in the same finished basement?

NEC 210.12 (B)

Answer: Yes, the key words are "finished basement". A finished basement is called many different names for different uses and most are listed in 210.12(B) thus identifying where AFCI protection is required. When applying the electrical code, finished basement simply means that the area has been provided with the required receptacle outlets per 210.52(A) and the required lighting outlets per 210.70(A)(1). Wall, floor, and ceiling finishes are not used by the electrical code to determining finished area. With a finished basement, there are more outlets than just lighting outlets that will require AFCI protection. The 20-ampere, 125-volt laundry outlet is also required to be AFCI protected if located in a "finished" room or area.

- 16) Please help settle a discussion we are having in the shop. We agree when we have a concrete encased electrode installed in the footing we are required to use it as a grounding electrode. The disagreement is whether it is required to be supplemented by another grounding electrode such as ground rods.

NEC 250.52(A)(3), 250.53(D)(2)

Answer: A concrete encased electrode does not need to be supplemented with any additional electrodes. You are correct if a concrete encased electrode is present it is required to be used by 250.52(A)(3). The requirement for installing a supplemental electrode is found in 250.53(D)(2) and indicates only a metal underground water pipe is required to be supplemented by another electrode.

- 17) I extended the riser from an existing socket in order to meet the clearance requirements over swimming pools. Do I need to bring the entire service up to current code? Can I splice the conductors in order to relocate the mast?

SPS 316.003, SPS 316.010, NEC 230.40

Answer: No. Yes. As long as the electric service had been installed and inspected per the NEC and SPS 316.003(3) at the time of installation, replacement would not be required. Service entrance conductors shall be permitted to be spliced in accordance with NEC 110.14, 330.5(E), 300.13, and 300.15 (Notes). SPS 316.010, could be used to require replacement if the conductors have deteriorated.

- 18) Does a drop ceiling provide the required "protection" and allow NM cables to be run on the underside of the floor joist above?

NEC 334.15(A)

Answer: No. While we would not consider the area above a suspended ceiling an area that is subject to physical damage, we would still consider it exposed (See definition of exposed in Article 100) and as such would have to be installed to closely follow the building finish in accordance with 334.15(A). Running boards would be one option. Running the cables through bored holes in framing members is another.

- 19) A contractor proposed placing a 200 ampere single phase service in each unit of a side-by-side condo building. One transformer would supply both laterals. Is this arrangement permitted? I thought the rule is "one building=1 service"?

NEC 230.2

Answer: No. You are correct in your assessment of this installation. Assuming the service conductors are underground, the second sentence of 230.2 would prohibit this installation as the service equipment is not grouped at the same location. This section allows more than one set of underground conductors running to the same location to be considered one service. The conductors would have to be run to the same location.

- 20) Does the NEC have specific cover requirements for buried installations of communication cables?

NEC 90.3

Answer: No. Chapter 8 is a stand-alone article, and the requirements of chapters 1 through 4 do not apply to chapter 8. Telecommunications cable does not have to meet the minimum cover requirements listed in table 300.5.

- 21) I have an application where we are replacing old panelboards in separate tenant spaces of a building. The existing panels are main lug only. The main distribution panel is located in the basement electrical room. Do the new panels require a main breaker?

NEC 408.36

Answer: No. No overcurrent protection is required in the panelboard enclosure if the rating of the breaker protecting the feeder conductors does not exceed the ampacity rating of the panelboard. 408.36 allows the overcurrent protective device to be located within or at any point on the supply side of the panelboard.

- 22) The clay soils in my area are prone to frost heaving. Can I require direct-buried cables to have a "s-loop" at the point where it enters the conduit used to protect the cables at point of emergence?

NEC 300.5(J)

Answer: Yes. You are interpreting 300.5(J) correctly. If you believe that conductors or cables will be subject to movement due to settlement or frost, you can require the conductors or cables to be arranged or installed to prevent damage to them.

- 23) The electrician has installed a 3 wire branch-circuit, (2 hots/ 1 neutral/ 1 equipment ground) to a residential detached garage. Can I require service rated disconnect at the garage?

NEC 225.30, 225.36, 225.39(B)

Answer: No. The last sentence in 225.30 states "For the purposes of this section, a multiwire branch circuit shall be considered a single circuit." A snap switch is allowed as the disconnecting means per the exception to 225.36, and does not have to be SUSE rated.

- 24) Is an electrician's license required to perform pool bonding and installing potting compound in underwater lights and pool deck boxes?

ss 101.862(4)(d)

Answer: Yes. Pool installers are not allowed to install the conductors to meet the bonding requirements of 680.26(B). 101.862(4)(d) does not apply to bonding requirements for pools.

25) I am wiring a new home with a room above the garage. The stairway to the room is in the garage. The room will be drywalled but is not supplied with heat. Are the branch circuit for the lights and receptacles required to be AFCI protected? It was labeled on the plans as "bonus room".

NEC 210.52(A), 210.12(A), 210.70(A)

Answer: Yes. This Bonus Room is similar to a Rec. room. When the bonus room is finished then provisions such as NEC 210.52(A) 210.12(A) & 210.70(A) become applicable.

26) A 60-ampere feeder from the house supplies a 100 amp panel installed in the garage. Is it OK that the main in the garage panels is rated higher? The electrical contractor ran the required 4 wires to the panel but isn't there still the requirement of having a grounding electrode conductor?

NEC 250.32(A), 225.39(D)

Answer: Yes, the minimum rating of the panel in the garage is 60-amperes per NEC 225.39(D). No issues with a rating higher than the 50-ampere rating of the feeder. This is assuming the feeder conductors are allowed to be protected at 50-amperes and adequate for the calculated load. Two ground rods or similar electrode are required at the garage. The requirement for an electrode system at the separate building is NEC 250.32(A). The exception only applies to supply consisting of a single branch circuit.

27) A contractor installed a snap switch as the required disconnect for the dishwasher. The switch is located above the counter top. They then run NM cable through framing and extend a length through a hole in the drywall to the dishwasher. The excess NM cable is coiled up under the dishwasher. I have been rejecting this practice. Am I being too critical?

NEC 334.30 & 334.15

Answer: No. This installation method is not permitted by the NEC. The securing and supporting rules in NEC 334.30 & 334.15 for exposed work are not being followed. In many areas of the State contractors are typically using a flexible cord installed to meet NEC 422.16(B)(2).

28) A radon mitigation fan is located on the exterior of a home. Does the disconnecting means have to be located on the outside of the home as well?

NEC 430.102(B), & Article 100 Definition

ANSWER: Yes. A properly rated snap switch in a weather-tight enclosure is one option. NEC 430.109(C) permits a general use switch as the disconnect for motors 2 HP or less. The ampere-rating of the switch must be at least twice the full-load current rating of the motor.

An AC-only switch must have an ampere rating of at least 125% of the motor full load current.

The branch-circuit circuit-breaker is allowed to serve as the required disconnect, but only where the motor is rated 1/8 HP or less.

- 29) I have a home built in '03 and they want to finish the basement. The current ceiling boxes are not fan rated. The lighting outlets will not change. They plan to add receptacle outlets. I am debating about having them change the ceiling boxes. Are fan rated ceiling boxes required for this alteration? What about AFCI-Protection for the branch circuits?

SPS 316.314(2) & SPS 320.04(2), SPS 316.210(4)

Answer: Yes. Fan Boxes are required. What is now SPS 316.314 (2) required listed fan boxes in "habitable" rooms since 9-1-1996.

SPS 320.04 (2) shall also be used to determine compliance and indicates: (2) ADDITIONS AND ALTERATIONS. Additions and alterations to dwellings covered by this code shall comply with all provisions of this code at the time of permit application or the beginning of the project, if no permit is required." This section would require the installation to comply with the code requirements in effect at the time they turn unfinished space into habitable space.

Any new branch circuits would have to be AFCI protected. Existing branch circuit(s) supplying the lighting outlets are being extended and would not need AFCI protection per SPS 316.210(4).

- 30) I am inspecting a residential panel replacement whose existing service entrance conduit is EMT below grade and encased in concrete. Does the panel replacement trigger the removal of the EMT as it is part of the service? What about if new conductors were installed in the EMT??

SPS 316.358, 316.010, 316.003(3)

Answer: Yes. The EMT shall be relocated or replaced. SPS 316.358 Requires that Electrical metallic tubing may not be used in direct contact with earth, in concrete slabs or floors poured on earth, or in exterior concrete walls below grade. The installer would have to verify when the installation was installed to defend his decision to use the Grandfather clause SPS 316.003. SPS 316.010 Should also be used to determine the condition of the existing EMT. SPS 316.010 Reads: Inspection and maintenance. All electrical installations and equipment shall be cleaned and inspected at intervals as experience has shown to be necessary. Any equipment or electrical installation known to be defective so as to endanger life or property shall be promptly repaired, permanently disconnected, or isolated until repairs can be made. Construction, repairs, additions, and changes to electrical equipment and conductors shall be made by qualified persons only. EMT conduit has been known to rust and deteriorate over time when encased in concrete or installed in direct contact with earth. NEC 358.10(B) also requires the EMT below grade to be coated with corrosion protection when installed in concrete. (The installer shall defend his decision with this code and the grandfather clause prior to re-use) Is the existing EMT corrosion resistant? The existing EMT shall be inspected as to its integrity prior to being re-used and at intervals as you deem necessary before allowing SPS 316.003 to be used for the

installation. NEC 358.10(B) shall also be used to determine compliance. For these reasons, it is reasonable to require the EMT be re-located to an acceptable location when performing service alterations.

- 31) We are installing the electrical for a swimming pool. The general contractor is installing an epoxy coated chain link fence around the perimeter of the pool no closer than 12 feet from the edge of the pool. Am I required to bond this fence?

NEC 680.26(B)(7)

Answer: No. NEC article 680 covers the requirements for pools. NEC 680.26(B)(7)(Page 584)
Reads: (7) Fixed Metal Parts. All fixed metal parts shall be bonded including, but not limited to, metal-sheathed cables and raceways, metal piping, metal awnings, metal fences, and metal door and window frames. The general rule is that all metal fences be bonded. NEC 680.26(B)(7) Exception #2 covers the location of the fence. It reads: Exception No. 2: Those greater than 1.5 m (5 ft) horizontally of the inside walls of the pool shall not be required to be bonded. The fence in your application is no closer than 12' from the edge of the pool. Since the fence is greater 5' horizontally from the edge of the pool, bonding is not required.

- 32) I believe that the equipment ground on a hot tub has a different requirement that prevents me from using 8/3 NM as the branch circuit supply conductors. The nameplate calls for a 40 ampere fuse or circuit breaker. The 8/3 NM has a #10 ground. Has my memory failed me or is there a code somewhere about the larger ground required for Hot Tubs/Spas?

NEC 250.122, SPS 316.110

Answer: No. NEC 250.122 is used to size the equipment ground. Table 250.122 specifies that a 30, 40, 50 & 60 amp load requires a #10awg copper conductor for equipment grounding. This is why we see a #10 AWG ground conductor in a 8/3 AWG Romex cable.

With regards Hot Tubs and Spas, reading the installation instructions is critical. If the Spas/Hot Tubs installation instructions are more restrictive than NEC Table 250.122 they must be followed.

SPS 316.110 should be reviewed especially when wiring a hot tub or spa.

SPS 316.110 Requirements for electrical installation. Substitute the following wording for the requirements in NEC 110.3 (B): Listed or labeled equipment shall be installed or used, or both, in accordance with any instructions included in the listing or labeling, provided the instructions, listing or labeling do not conflict with this chapter.

- 33) I am in the process of adding some LED light fixtures to my home. I purchased them online and they were sold as UL rated fixtures. The fixtures came without a physical sticker on them but rather a certificate from the manufacturer. Is this acceptable? Question 2: Also, do the low voltage drivers need to have a sticker and/or certification as well?

NEC 410.6 & 411.3

Answer: Question 1: No. NEC 410.6 requires all light fixtures to be listed. The listing shall come from a nationally recognized testing laboratory like UL. The Listing mark is required on the product. If the listing mark is not on the product the fixtures shall not be installed. The only application of a UL Mark in the Field can take place under a UL Field Evaluation in the presence of UL. A certificate from the manufacture is not acceptable. • Answer Question 2: Yes. NEC 411.3 has two options. One is a lighting system listed as a complete system. This includes the luminaires, power supply, fittings, and exposed bare conductors if included. All of these parts shall be listed as part of the same identified lighting system. The other option is a assembly of listed parts. Example would be a listed power supply by one manufacturer, listed wiring method by another, and the listed luminaires by a third.

- 34) EMT is used as the wiring method for an overhead service. The contractor bonded the ground rods to the EMT with a 4 AWG copper. I usually see it connected to the service panel. The conductor is connected to the two ground rods. A listed clamp was used. Was the code changed to allow this?

NEC 250.53(A)(2)

Answer: Yes. Wisconsin Electrical Code no longer limits the service equipment enclosure as the sole permitted location for bonding to a supplemental electrode. NEC 250.53(A)(2)(4) allows the supplemental electrode to be bonded to a nonflexible metallic service raceway. "EMT" qualifies as long as the EMT is properly bonded.

The other permitted locations are; (read the 5 permitted locations from NEC 230.53(A)(2) on page 112.) A suitable clamp that is also listed for bonding and grounding is required to be used to make the connection.

- 35) I am requesting information on Mobile Homes. In many cases permits are being taken for replacement electrical equipment. In each case the lots are provided with a Mobile Home type meter pedestal with necessary main disconnects with proper 4-wire receptacles to accept the properly rated and listed cord connection to each lot. Do I have inspection jurisdiction inside the unit? Are such modifications inside the Mobile Home allowed?

SPS 316.002

Answer: Yes, in certain circumstances. Yes. Our State requirements deal only with scope and inspection, not permit requirements.

Regarding Mobile homes in Wisconsin, we only have authority to inspect the wiring that supplies the mobile home unless the factory wiring is altered after site installation based on SPS 316.002 Scope.

SPS 316.002 does give us the authority to inspect an alteration of the factory wiring after site installation. Electrical alterations are permitted for mobile homes.

We do not have the authority to inspect the interior of a new mobile home. This inspection has already been conducted and approved by an insignia seal permanently located on the mobile home.

ss101.91 of the statutes refers to a mobile home as a structure to be used as a dwelling with or without a permanent foundation and is certified by the federal dept. of housing and urban development.

The mobile home will have a label attached typically somewhere on the outside that indicates it was built to HUD standards. The interior wiring is installed per the NEC; however it may not be the current NEC.

- 36) A resident had a toilet overflow on the first floor and water overflowed into the basement. I suspect water damage to concealed wiring and the electrical panel. Can I order all fixtures, and the electrical panel in the water damaged area to be replaced? The insurance company had a restoration company come in and "dry" everything out. They told the owner "We don't need to replace any of the electrical wiring" even though it was clearly drenched in the flood.

SPS 316.009&010, NEC 110.3(B), 110.12(B) & 300.6

Answer: Yes, the panel components & fixtures can and should be ordered to be replaced if subjected to water. Code references that can be used are: SPS 316.009, 316.010, NEC 110.3 (B), 110.12 (B), 300.6. NEMA has a guide that is valuable in assisting with compliance. Its titled: Evaluating water damaged electrical equipment. NEMA's guide includes electrical equipment & wiring that requires replacement and equipment & wiring that may be re-conditioned when subjected to water. UL has links to guidelines for evaluation flood as well as fire damaged equipment on their website. Check the UL website under the AHJ info category.

- 37) I have a small family room addition going onto an existing home. The existing home has a fuse panel. What is the State's position in this type of circumstance where arc-fault breakers won't fit into an older fuse panel?

NEC 210.12(A)

Answer: For new branch circuits installed in existing dwelling or additions to existing dwellings, current NEC requirements apply. NEC 210.12(A) requires AFCI protection in the areas listed per the article. Having a fuse panel does not exempt the AFCI protection rules for new branch circuits/additions to a dwelling. The owner may have the option to install a sub panel that would accommodate AFCI breakers, replace the panel, or use NEC 210.12 exception #1. NEC 210.12 Exception #1 permits RMC, IMC, EMT, or type MC cable in conjunction with a metal box for the homerun circuit. An AFCI receptacle could then be used at the metal box to provide protection for the remaining portion of the branch circuit.

38) I Installed a #6 conductor from the appliance side of the CSST to the supply side of the CSST fitting. The gas main is bonded to the water line that is used for the service ground system. I cannot find a code article requiring this additional bonding. Please help.

NEC 250.104(B)

Answer: Your question pertaining to bonding CSST tubing does not apply to the NEC. CSST bonding goes above minimum NEC requirements and shall be bonded in accordance with the manufactures installation requirements that come with the product. Several CSST tubing manufactures exist, each with unique required method's for properly grounding the tubing. Some CSST products do not even require bonding. Verify what CSST manufacture you are working with and then examine the installation instructions for proper bonding requirements.

39) I had an electrician tell me about a 45 degree angle rule that applied to bubble covers installed on porches with large overhangs. I could not find this in the NEC and he's says it's not in the NEC but it's a Ray Weber rule. What is correct?

NEC 406.9(B)

Answer: The relevant requirements are NEC 406.9(B) & the definition of a Wet Location in NEC Article 100.

NEC 406.9(B) requires receptacles installed in wet locations have an enclosure that is weatherproof whether or not the attachment plug is inserted.

Article 100 defines a wet location as a location subject to saturation with water such as in unprotected locations exposed to weather.

With regards porches with large overhangs, this becomes a judgment call based on on-site conditions. If the receptacle is installed in a protected area such as a porch with large overhangs, you may determine the location not be considered wet based on Article 100. As State of Wisconsin electrical staff, we would respect your decision either way.

Many inspectors use a 45 degree angle rule from the porch overhang to the receptacle to make a reasonable call in determining a location is wet or not.

The choice is yours based on what you see on a case by case basis.

40) I have a contractor who has installed a NEMA 1 loadcenter directly to a poured concrete wall that is below grade without maintaining a ¼" spacing. He has used the mushroom head fasteners and removing these are difficult but can be done. New home has 1st floor on and no windows in and I already denied the power connection until it gets windows and shingles installed; problem is the panel is going to sit on wall thru this whole time, and then he will call to be energized. Is a below grade concrete wall considered a damp location?

NEC 312.2, 300.6

Answer: Normally these loadcenters have “bumps” on the back that are present to meet the ¼” air space requirement found in NEC 312.2. However, as you indicated, the loadcenter is not suitable for a wet location such as a house under construction. If the electrician can cover the loadcenter in a manner that you feel would prevent moisture from entering, it could be acceptable. That would be up to your judgement. I would use caution in allowing a loadcenter to be covered to prevent moisture, as it is often impossible to prevent moisture from entering the enclosure in conditions such as a house under construction.

41) Are Meter Mounted transfer switches approved for installation in the State of Wisconsin?

UL Whitebook WPXW page 530

Answer: No. Such transfer switches are not permitted to be installed in installations where SPS 316 and the NEC apply. They may be installed where under the exclusive control of the Utility. The following is from the UL Whitebook: “Meter-mounted Transfer Switches (WPXW) USE This category covers transfer switches rated 600 V or less, intended for mounting in a meter base, on the line side of the service disconnect switch. These transfer switches are intended to transfer the loads connected to the load side of the meter from the normal utility supply to an alternate supply, consisting of a portable generator that is temporarily cord connected to the meter-mounted transfer switch. These devices are not intended for use in emergency systems or in legally required standby systems. The installation of these devices is intended to be under the exclusive control of the serving utility, and is not considered under the purview of ANSI/NFPA 70, National Electrical Code.” As such, these devices are not considered service equipment.

42) Service panel in existing dwelling was located on first floor. Contractor upgraded service and at that time moved the panel into a basement with a floor to ceiling height of 5-1/2 feet. Panel located such that bottom breaker is 30-inches above floor. Acceptable?

NEC 110.26(A)(3) Exception

Answer: Yes, if readily accessible. NEC 110.26(A)(3) Exception. This exception does not set a minimum height for existing dwellings where the equipment is rated 200-Amperes or less. The exception applies to basements with safe and ready access to the equipment. Panels located in crawl spaces are not permitted. The NEC does not set a lower limit for the height of an overcurrent device above the floor.

43) I would like to get your opinion on siding over a service raceway similar to the attached photo. I have always taken this to be a violation, but I now find myself in a little war of sorts on this and I would like to run this past you to see if you would agree. Any comments or advice on how you handle this situation would be appreciated.

NEC 230.70(A)(1)

Answer. We agree. NEC 230.70(A)(1) requires a service disconnecting means with overcurrent protection at the point nearest to where service conductors enter the building. That point is where the conductors are first covered by the siding in this example. Siding over the raceway or cable is a clear violation and can be a significant safety hazard. Wisconsin Utilities have reported numerous safety related incidents with concealed service conductors.

- 44) Our company is about to undertake an electrical service change at a two family dwelling. In the past under comm16 and NEC art 210.25 there were provisions for splitting public circuits from the individual dwellings, and if I recall correctly the requirement for a public meter space. I was unable to locate wording in the 2011 NEC and the DSPS rules that specifically state if public circuits still need to be separated, or if a public meter and/or panel is required at the time of a service upgrade/change. Was the wording relocated or has the rule changed?

SPS 316.003(3)

Answer: If the duplex was wired in accordance with the Code in effect at the time of the original installation, no public panel needs to be added. NEC 210.25 is relatively new. The language first appeared in the 1996 NEC. As long as you are not altering the branch circuit wiring such as adding to the "public load" or adding a "public load", the existing branch circuits are grandfathered in.

- 45) An electrical service is mounted on a detached garage. The service supplies a residential dwelling. Voltage is 120/240, single-phase, three wire. Can NEC 310.15(B)(7) be used to size the conductors to the service equipment? Can the same Table use to supply the feeder conductors to the house? Are the requirements different if the service is the same rating as the feeder?

NEC 310.15(B)(7), Table 310.15(B)(7) & 215.2(A)(4)

Answer: No. Yes. Yes. NEC 310.15(B)(7), Table 310.15 (B)(7), 215.2(A)(4) The garage is not a dwelling unit. If the service was larger than the feeder, the service conductors are sized based upon Table 310.15(B)(16 and protected per 240.4. A feeder that only supplies the dwelling could utilize a smaller conductor per Table 310.15(B)(7). If the service and feeder to the house have the same rating, then NEC 215.2(A)(4) permits the Table to be used to size both sets of conductors.

- 46) Using the 2011 ampacity tables 310.15((B)(16), the allowable ampacity of #12 NM cable is now 20amperes at 60deg C. When a residential a\c nameplate require a branch circuit ampacity of 25 amperes or less can we still use the existing 12 AWG cable?

NEC 310.15(B)(16) & SPS 316.003(3)

Yes. One of the downsides of "harmonizing" with the Canadian Electrical Code is that a wire that this time last year had an allowable of 25 amperes is now limited to 20. SPS 316.003 (3) would allow you to accept the existing wiring back to the panel for a replacement unit that does not increase the load on the branch circuit above the ampacity of the existing wire. But if they change the location, increase the load, install a new whip, etc., the current code would have to apply to those types of alterations.

- 47) 210.52(G) requires a receptacle outlet in "each separate unfinished portion" of a basement. There is a room that divides the basement into two parts. The room is designated on the house plans as a closet. Do we need a receptacle in each part of the basement?

NEC 210.52(G)

Yes. 210.52(G) Each unfinished portion of the basement requires a receptacle outlet.

- 48) A swimming pool is to be constructed above the ground. The pool is over 42" high and has an interior non-metallic vinyl liner and a metallic exterior frame. Does this type of pool meet the definition of a storable pool per NEC 680.2?

NEC 680.2

Answer: Yes. This type of pool is considered "Storable". NEC 680.2 defines a Storable Pool as those that are constructed on or above the ground and are capable of holding water to a maximum depth of 42" or a pool with nonmetallic, molded polymeric walls or inflatable fabric walls regardless of dimension. Vinyl liners and fiberglass composite shells are considered nonconductive materials. The electrical installation for this type of pool shall comply with Parts I and III of NEC Article 680.

- 49) Is there any circumstance a person can use their master electrician license in lieu of the state electrical contractor license?

SS 101.862(1)&(3)

Answer: No. The contractor's license is required for the business by ss 101.862(4)(1) Stats. It is required for businesses engaged in installing maintaining or repairing electrical wiring. A electrician's license is required for the person doing the electrical work.

- 50) My electrical Inspector is not allowing the use of a breaker lock for the disconnecting means for a built-in dishwasher which is on its own circuit. The inspector is saying it needs to be a switch above the counter or the cord and plug style. The issue is we don't want to take apart the cabinet and wreck the nice floor. What are the requirements?

NEC 422.31(C)

Answer: The inspector is correct with the requirement. Your question pertained to using a breaker lock in lieu of a disconnect in sight of the dishwasher. You quoted NEC 422.31. A breaker lock would be permitted if the appliance was not a motor operated appliance. A dishwasher is a motor operated appliance and needs a disconnect in sight of the appliance. NEC 422.31(C) would apply to your installation.

- 51) In a residential occupancy, does the peninsula bar on the wall opposite of the kitchen need to meet the "wall space" requirements the Code?

NEC 210.52

Answer: Not necessarily. What is the intent of the space? Our consensus is that if the area is used for seating with bar chairs or seating in general, it does not meet the intent of the wall space receptacle requirements of NEC 210.52(A)(1). View the space as a table extension if it will be used as such. A receptacle in accordance with 210.52(C)(3) would be required.

- 52) I have a contactor attempting to use a "RU" labeled power supply for a low voltage lighting system. The power supply has not been evaluated to be used with the other lighting components. I guess I want to know what this backwards RU mark means. Would this label comply with the NEC requirements?

NEC 411.3(A)&(B)

Answer: No. The system shall be listed as a whole, or be assembled of listed parts. UL Recognized Components (backwards UR) are incomplete in construction or have been evaluated on a limited basis and are intended for factory installation into an overall Listed product. They are not stand alone products intended for field installation. Recognized component does not comply with the definition of Listed and labeled in the NEC. From the information that you have provided, it does not seem that the recognized component driver is part of an overall Listed LV lighting system.

- 53) I have a quick question regarding an accessory building with a 100 amp sub panel recently installed in it. The electrical contractor ran the required 4 wires to the panel. But my question is in addition to the isolated ground wire, isn't there still the requirement of having a grounding electrode at that separate building?

NEC 250.32 & SPS 316.250

Answer: Yes. Grounding Electrode is required. NEC 250.32 reads: Buildings or Structures supplied by feeders or branch circuits shall have a grounding electrode or grounding electrode system installed in accordance with part III of Article 250. Typically the only grounding electrode in these accessory buildings would be (2) Ground rods, per SPS 316.250. If other available electrodes exist at the accessory building (Concrete Encased Electrode, Water Piping, Structural Steel) these would also be required to be installed and connected to form the grounding electrode system for the accessory building.

54) Does the 2011 NEC allow a #6 AWG grounding electrode conductor to be run stapled to the face of the basement unfinished ceiling joists? Or is it required to be run in drilled holes in the joists at the proper distance from the joist face? Please provide code section.

NEC 250.64(B)

Answer: No. A #6 or smaller grounding electrode conductor stapled to the bottom of the ceiling joists is considered likely to be damaged. NEC 250.64(B) reads: Where exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. Grounding electrode conductors shall be permitted to be installed on or through framing members. A 4AWG or larger grounding electrode conductor shall be protected if exposed to physical damage. A 6 AWG grounding electrode conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection if it is securely fastened to the construction.

55) I looked at the definition of a Kitchen in the 2011 NEC. I have a "Kitchenette" that we are doing in a basement and the guys only pulled the 2 Small Appliance Branch Circuits for the countertop. They are feeding the Garbage Disposal off one of them. This Kitchenette is really small and just has a sink, counter space and a refrigerator. It has no cook top or oven. Is this a "kitchen"?

NEC 100 Definitions

Answer: No. The kitchenette does not have "permanent provisions for cooking" therefore it does not meet the NEC definition of kitchen and 2 SABC are not required.

56) What is the maximum number of duplex receptacles allowed on a two-wire 20 ampere dwelling unit circuit?

NEC 210.19(A)

Answer: The NEC does not have a specific rule that says 10 receptacles on a 15 ampere circuit or 13 receptacles on a 20 ampere circuit. Many people think that when calculating the number of receptacles the load should be reduced by 80%, but this is not the case. The NEC limits the load on receptacle circuits to 80% for portable appliances and, the maximum continuous load on a branch circuit shall not exceed 80% of the circuit rating (protection device) , but these rules don't apply to the number of receptacles per circuit.

57) Does the NEC regulate "drip loops" or is this covered by Utility regulations?

NEC 230.24(B)(1), 230.54(F), 230.54(G)

Answer: Drip loops are covered by the NEC. Drip loop conductors must maintain a minimum of 10 feet clearance to finish grade, drip loop conductors shall be below the service head or below

the end of the service cable sheath, and must be arranged to prevent water from entering the service equipment .

58) Can IMC be used as a service mast?

NEC 230.28

Answer: Yes, according to Section 230.28 the only requirement is that the service mast "...shall be of adequate strength or be supported by braces or guys to withstand safely the strain imposed by the service drop." IMC meets this requirement. The local utility should be consulted for service mast requirements. They may require rigid or limit the unbraced height.

59) I was told that a microwave oven is required to be on a separate circuit by itself. Is this true?

SPS 316.110, NEC 210.23(A)(1), 210.23(A)(2)

Answer: It depends on the wattage of the microwave oven. A separate circuit is required for the microwave oven (or any appliance) if:

1. The installation instructions specify a separate circuit. 110.3(B), & SPS 316.110
2. The appliance is cord and plug connected and the rating exceeds 80 percent of the branch-circuit ampere rating. 210.23(A)(1)
3. The appliance is fastened in place and the rating exceeds 50 percent of the branch-circuit ampere rating. 210.23(A)(2)

60) I know I am required to have a disconnecting means within sight of a motor. What do I do for a submersible well pump? Obviously I can't put it at the bottom of the well casing. Where does the "lock off" go?

NEC 430.102(A) & (B)

Answer: The general rule is found in 430.102(A) & (B). (A) requires a disconnect within sight of the motor controller. The requirement for motors is found in (B). It requires a disconnect within sight of the motor in (1). (2) allows the controller disconnect to act as the motor disconnect when it is located within sight of the motor. The Exc. indicates that where it is impracticable to locate the motor disconnect within sight the disconnect for the controller can act as the motor disconnect where means are provided for locking off. The locking means must remain in place with or without the lock being installed.

61) When doing a service change on a single family home am I required to install AFCI breakers for the circuits that require protection by 210.12?

SPS 316.003(3), SPS 316.210(4)

Answer: No. We would consider this a branch circuit modification and SPS 316.210(4) deletes the requirements of NEC 210.12(B). Existing installations must comply with the code that applied when the installation was installed. They would not need to be AFCI protected.

- 62) The room at the top of the stairs has a railing. The railing is one "wall" of the room. The room is large enough to be used as a home office or play room for the kids. Are receptacle outlets required along the railing?

NEC 210.52(A)(2)(3)

Answer: Yes. The NEC considers railings as wall space. A receptacle would have to be placed so that no point along the railing is more than 6 feet from a receptacle.

- 63) Is a POWTS system installer required to be licensed as an electrician to install the associated electrical wiring and equipment? (Associated electrical equipment includes but is not limited to the effluent pump and the alarm system.)

Ss101.862 (4)(p)

Answer: No. Wis. Stat. 101.862 (4) (p) exempts persons that are installing, repairing, or maintaining a private on-site wastewater treatment system, as defined in s. 145.01 (12), from electrical licensing. The non-licensed person is limited to activities involving installing or modifying cables or conductors going from the system's junction, pull, or device box to the nearest disconnecting point. This includes all associated conductors and cables that are buried with the system and system piping.

- 64) Can a POWTS system installer place the wire in the open trench with the POWTS piping and bury the wire?

Ss101.862 (4)(p)

Answer: Yes, a POWTS system installer may place the wire in the trench and connect the wiring to the nearest disconnecting means on the building or supply side of the wiring and all associated equipment at the POWTS system.

- 65) Are water or well pump installers required to have an electrician's license to install water well pumps?

Ss101.862 (4)(q)

Answer: No. Wis. Stat. 101.062 (4) (q) exempts persons who install water well pumps from electrical licensing. The non-licensed person is limited to activities involving installing or modifying cables or conductors going from the well pump to the junction, pull, or device box at

the pump or well head and with the water piping to the nearest disconnecting point. This includes all associated conductors and cables that are buried with the water piping.

- 66) Can a well system installer place the wire in the open trench with the well piping and bury the wire?

Ss101.862 (4)(q)

Answer: Yes, a well system installer may place the wire in the trench and connect the wiring to the nearest disconnecting means on the building or supply side of the wiring. They may also connect the wiring to the well pump at the well.

- 67) I will be upgrading a service on one of our commercial buildings. My question is pertaining to article 110.24(B) available fault current. It is a 400amp service. Can we use the utility's maximum fault current chart or do you need to have study showing calculations?

NEC 110.24

Answer: Yes. The maximum fault current value provided by the utility provider can be used to meet the requirements found in 110.24(A)&(B).

- 68) Are 120 volt outlets located in a 1st floor mud/laundry room are required to be AFCI protected? I have conducted a final occupancy inspection on a dwelling and this finished room is located just as you enter the home from the attached garage. The electrician has indicated he does not believe this area is required to be protected by an AFCI circuit breaker.

NEC 210.12(A)

Answer: Yes. The laundry room is considered a "similar room or area" as described in 210.12 and would require AFCI protection for the outlets in the room. This is clarified in the 2014 NEC as "laundry areas" was added to the list of places that require AFCI protection.

- 69) In a single family dwelling, is the hard gas pipe required to be bonded to the electrical service? There is no CSST, all gas piping is the black hard pipe

NEC 250.104(B)

Answer: Yes. NEC 250.104(B) requires the piping be bonded. The equipment grounding conductor for the circuit that is likely to energize the piping (Example: the furnace equipment ground conductor) shall be permitted to serve as the bonding means. No additional bonding shall be required if no CSST exists. Any equipment grounding conductor for the circuits involved shall qualify.