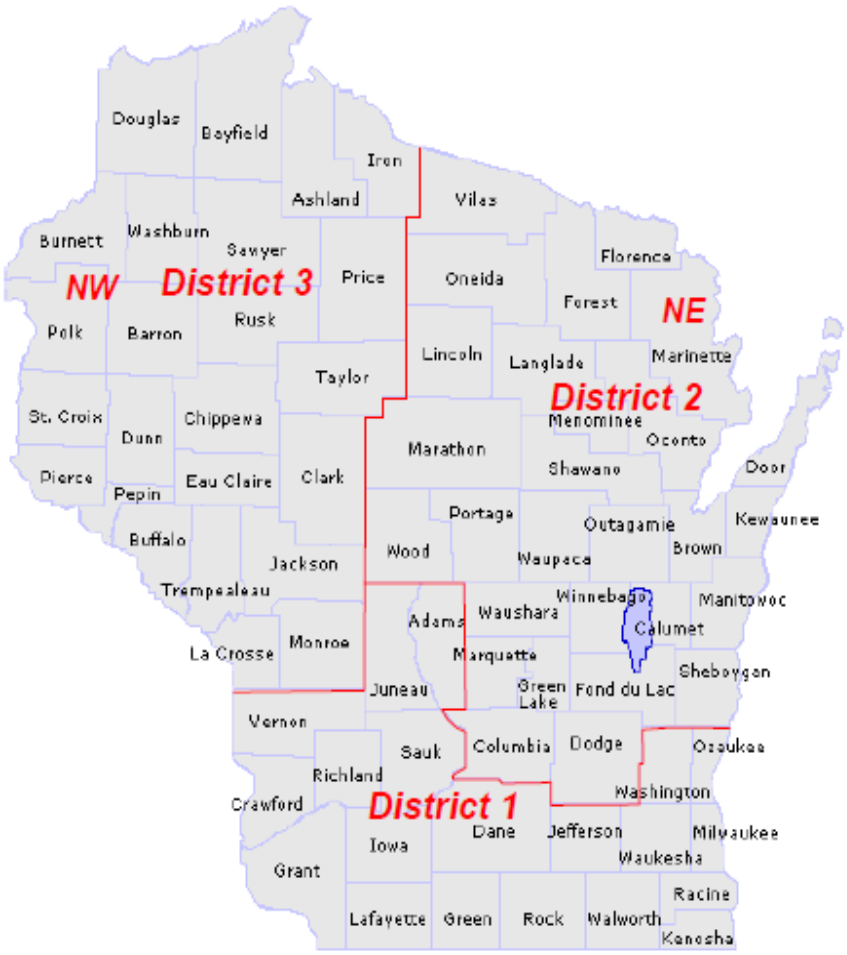
STATE OF WISCONSIN
Department of Safety and Professional Services
1400 E Washington Ave. Madison WI 53703
Web: dsps.wi.gov
Governor Scott Walker Laura Gutiérrez, Secretary

Electrical Program

Web: Electrical Program



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Rev 8/17

2018 UDC Electrical Program

Three short topics will be covered. The first covers Drilling, notching and boring wood for electrical installations. The second is Residential grounding and bonding. The third is Residential Box and Conductor Requirements. Our Code Panel will also answer questions submitted by our customers. Our panel consists of Inspectors from the Wisconsin Chapter of International Association of Electrical Inspectors.

Six continuing education credit hours for all electrical license categories will be given, including Registered (Beginning) Electrician.

Copies of both short programs and all answers to the Code questions will be made available. The link to these files is on our webpage. There is space in this handout for you to take notes.

Here is the link to the Electrical and Lighting Program Webpage:

http://dsps.wi.gov/Programs/Industry-Services/Industry-Services-Programs/Electrical-Lighting/

Please let us know what you think of this program. We welcome your suggestions for future programs. Use the following link to submit your comments:

https://www.surveymonkey.com/s/industryservicesspeakingevent

2018 Winter Electrical Code Update

UDC Electrical Program

Notes:

Question # 1

Is there a code issue with having an outside 100 amp meter on the house over a window well hole? Looking at a job and there isn't many options. The meter would only be on the corner of the hole.

Answer # 1 NEC 110.26(A) (1) & (2)

Yes, this may be a problem. Meter Sockets require the same working clearances as electrical distribution per NEC 110.26(A) (1) & (2). Most utility meter manuals throughout Wisconsin also require the same clearances specified in NEC 110.26 for meter sockets. As an option, NEC 110.26 permits a working platform to be installed. Could a permanent grate be installed over the window well hole? This is permitted in NEC 110.26 and may be permitted by the utility. Make sure the window is not designed as a means of egress.

Question # 2

Is it legal to install a 15 amp rated light switch on a 20 amp branch circuit. The load of the permanently wired luminaires (not cord and plug) is considerably less than 15 amps. I have looked under article 210 and 404 and cannot find where it would not be legal for this application.

Answer # 2 NEC 404.14

NEC 404.14 is helpful in understanding the requirement. It reads: 404.14 Rating and Use of Snap Switches. Snap switches shall be used within their ratings and as indicated in 404.14(A) through (F). The current code requires two current related things of the branch circuit conductors. 1) That they have sufficient ampacity for the load served. 2) That they be suitably protected by the OCPD feeding the circuit. But code only requires one current related thing of switches: 1) that they be rated for the load served. NEC 404.14. The switch only sees the current that will be passing through the load it serves. If that load is under 15 amps, you can use a 15 amp switch to control it. If a given switch serves a load that exceeds 15 amps, then that switch must be rated for more than 15 amps.

Question # 3

A home with knob-and-tube wiring had an electrical fire. Some of the walls and part of the floor system have been damaged and will be opened up and repairs made. How far does an electrician have to go with his repairs? Just the damaged areas? Back to the nearest tube? All of it?

Answer # 3 NEC 394.1

NEC 394.1 Covers the use, installation, and constructions specifications of concealed knob and tube wiring. Knob and tube wiring is still a legal means of wiring. 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 (or in your situation the fire damaged areas). 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. (If it has been insulated around the conductors, then they would have to be removed.) 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).
With regard how far we can go as an inspector in requiring the updating of existing electrical wiring, SPS 316.003 &316.010 are helpful. They read:
SPS 316.003(3) Existing installations. Existing electrical installations shall conform to the electrical code that applied when the installations were installed. An existing electrical installation may be required to be brought into compliance with the current code's requirements by the department and within the time period determined by the department when a hazard to life, health or property exists or is created by the installation.
SPS 316.010 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.

Question # 4
The last 2 pools I worked on, the inspectors made me run #8 solid to the pump motor, around the perimeter of the pool, and bond the water with a nipple and motor. What gives? I thought this is not required on above ground pools.

Answer # 4 NEC 680.26
If the pool is supplied with a pump listed as a permanent pool pump it shall be wired as a permanent pool (Parts 1 &2 of NEC 680 including the bonding requirements in NEC 680.26). We can't mix and match code requirements from parts 2&3 of NEC 680 to our liking. If the pool pump supplied is listed as a storable pool pump and the pool has an interior vinyl liner, it shall be allowed to be wired in accordance with part 1&3 of NEC article 680. We encourage you to check the listing of the pump supplied. Most Portable Pool Pumps come with a cord and integral GFCI on the cord. The listing of the pump dictates how the pool shall be wired and bonded. Portable pools require no additional bonding. This understanding has resolved the issues with 99% of the pools in question. If the pool pump is listed as a permanent pool pump, the bonding shall conform to NEC 680.26 (B) Bonded Parts. The parts specified in 680.26(B)(1) through (B)(7) shall be bonded together using solid copper conductors, insulated covered, or bare, not smaller than 8 AWG or with rigid metal conduit of brass or other identified corrosion-resistant metal. There are many different installation methods to ensure the parts are all bonded together.

Question # 5
I am having a contractor who might need convincing as to the NEC. The contractor has a problem believing me when I tell him not to install NM cable and the panel-board before the roof is on and in one case the rafters are not up. Would it be possible to receive a written statement from the Department stating its stance on the subject?

Answer # 5 NEC 110.28, 334.12(B)(4)

For the panelboard and enclosure: The bottom line is that it is up to you to judge. A NEMA 1 panel cannot be exposed to the weather during construction. If the interior gets saturated with water, it is scrap.

Just work something out with your contractors that satisfies this requirement and stay consistent. Our position is you cannot tell them to wait until the doors, windows etc. are in and the shingles are on the roof if the GC or EC are willing to install adequate temporary protective measures to protect the electrical equipment. What is "adequate" is left up to the inspector as each installation is unique based on the site conditions.

For the NM cable: NM cable cannot be installed in wet or damp locations in per 334.12(B)(4).

Question # 6

I am inspecting a duplex being built in a rural area. Each side of the duplex will be rented to a non-owner. Since it is in the Country only one well will be drilled and both units will share the well but the electricity from the well pump will be provided by one of the individual panels. I seem to recall when there is a situation where there is shared or common usage of electricity that a "house meter and panel" must be installed but can't seem to find that in the electrical code.

Answer # 6 PSC 113.0802, PSC 113.0802(3), NEC 210.25(B)

PSC 113.0802 Measuring customer service.

PSC 113.0802(3) (3),The metering and wiring in non-transient, multi-dwelling-unit residential buildings, mobile home parks and commercial establishments where individual unit metering is provided, or required under the provisions of s. PSC 113.0803, shall be so installed or arranged so that each customer or tenant is metered for his or her own consumption only. Energy used by common area loads, for example, hallway lighting and heating, shall be separately metered and billed as appropriate under the utility's filed tariff.

NEC 210.25(B) Common Area Branch Circuits.

Branch Circuits installed for the purpose of lighting, central alarm, signal, communications, or other purposes for public or common areas of a two-family dwelling, a multifamily dwelling, or a multi-occupancy building shall not be supplied from equipment that supplies and individual dwelling unit or tenant space.

Question # 7

Can a licensed electrician file the required utility service certificate prior to energizing on a new 1 & 2 Family dwelling? I contend the inspector is the only person permitted to sign the compliance statement with the utility.

Answer # 7 SPS 316.950(1) & (2)

Answer: All new 1 & 2 family residences in the State of Wisconsin require electrical inspections prior to occupancy. This includes the service installation. The inspector is required to complete & file the certificate with the utility prior to the service being energized. The electrician is not permitted to file the certificate on a new (1) & (2) family dwelling. The requirement is found in SPS 316.950(1) and reads: (1)CERTIFICATE REQUIRED. The electrical wiring required to be inspected under s. SPS 316.940 (2) (a) may not be connected for use until a certificate is filed with the company or utility furnishing electric

current. **The certified inspector authorized to perform the inspection shall complete and file the certificate with the company or utility.**
For commercial installations & existing residential dwellings the requirement may change if no municipal inspector exists in the area. Existing homes & existing/new commercial buildings do not require electrical inspections unless the municipality exercises jurisdiction. SPS 316.950(2) reads: **(2)** STATEMENT REQUIRED. Electrical wiring not requiring a certificate under sub. (1) may not be connected for use until a written statement is filed with the company or utility furnishing electric current indicating that the electrical wiring complies with this chapter. The electrical contractor or other person doing the wiring shall complete and file the written statement with the company or utility.
If a municipal inspector exercises jurisdiction of the area, he/she is the only person allowed to file the certificate with the utility.

Question # 8
I recently inspected a service upgrade where the electrician came from the panel and clamped to the water pipe near the panel. I was under the impression that NEC Art 250.68 (c) still applies in all cases as the first 5 and 1/2 feet into the building. Water line ran thru the basement open. Water feed was PVC. The water meter was 30 feet from the panel.
Answer # 8 NEC 250.50, 250.52(A)(1), 250.104(A)
If the water pipe to the building is non-metallic, it is not a grounding electrode and 250.68 would not apply. The bonding of the metallic water piping inside the building would have to comply with 250.104(A)

Question # 9
I have an attic access in the second bedroom of my home and the inspector tells me I have to install running boards for my wires within 6 feet of the attic access. Is he correct?
Answer # 9 NEC 334.23, NEC 320.23(A)
The inspector is correct NEC 334.23 says the installation of cable in accessible attics shall comply with NEC 320.23. 320.23 In Accessible Attics. Type AC cables in accessible attics or roof spaces shall be installed as specified in 320.23(A) Cables Run Across the Top of Floor Joists. Where run across the top of floor joists, or within 2.1 m (7 ft) of the floor or floor joists across the face of rafters or studding, the cable shall be protected by substantial guard strips that are at least as high as the cable. Where this space is not accessible by permanent stairs or ladders, protection shall only be required within 1.8 m (6 ft) of the nearest edge of the scuttle hole or attic entrance.

Question # 10
Got a call from a woman in a manufactured home community this morning with a question concerning heat tape on a water pipe. Installing heat tape on a manufactured home water service. Will need to use an extension cord to run from home outlet to heat tape. Local inspector requested that another run of heat tape be run instead of the extension cord. Would the use of the extension cord (typical orange one w/ ground) be acceptable, or is that not permissible in this case?

Answer # 10 NEC 550.13 (E), NEC 400.8

The inspector is correct in prohibiting an extension cord to provide power to the heat tape. The NEC prohibits extension cords being used as a substitute for the permanent wiring of the structure. NEC 400.8 Uses Not Permitted Reads: flexible cords and cables shall not be used for the following:

(1) As a substitute for the fixed wiring of a structure. NEC 550.13(E) has specific requirements on the Pipe Heating Cable(s) Outlet. It reads: For the connection of pipe heating cable(s), a receptacle outlet shall be located on the underside of the unit as follows:

(1) Within 600 mm (2 ft.) of the cold water inlet.

(2) Connected to an interior branch circuit, other than a small-appliance branch circuit. It shall be permitted to use a bathroom receptacle circuit for this purpose.

(3) On a circuit where all of the outlets are on the load side of the ground-fault circuit-interrupter.

Question # 11

The electrician is adding yellow CSST to the hard gas pipe in a residence. Where is the required location for the bonding point in the residence? Is it specified in the code or a manufacturer requirement.

Answer # 11 Code reference: None, Manufactures Instructions.

Your question pertaining to bonding CSST tubing does not apply to the National Electrical Code. 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.

The installer of the product is responsible to properly install & bond the tubing. The installer may choose to have an electrician install the additional bonding. Ultimately, it is the installers responsibility, not the electricians. I have not heard of an electrician installing CSST.

I would encourage you or the installer to verify what CSST manufacture you are working with and then examine the installation instructions for proper bonding requirements.

Question # 12

I am wiring a PV system and the inspector says I have to cover the back of the PV array where the wires run so unauthorized people cannot touch the conductors, Is the inspector correct? This is on a residential home and this is a ground mounted array.

Answer # 12 NEC 690.7(D)

Circuits over 150 Volts to Ground. In one- and two family dwellings, live parts in photovoltaic source circuits and photovoltaic output circuits over 150 volts to ground shall not be accessible to other than qualified persons while energized.

Question # 13

What are the requirements for installing PVC conduit in exposed locations with possible physical damage considerations?

Answer # 13 NEC 352.10(F)

NEC 352.10(F) requires PVC exposed to be permitted as follows: PVC conduit shall be permitted for exposed work. PVC conduit used exposed in areas of physical damage shall be identified for the use.
Informational Note: PVC Conduit, Type Schedule 80, is identified for areas of physical damage.
With regards PVC and physical damage no article 100 definition is defined.
There is not a one size fits all official State of Wisconsin interpretation.
Our department respects the decision of the AHJ based on on-site conditions to determine if Schedule 80 PVC should be used for protection of physical damage.
In order to eliminate the confusion, many contractors choose to install Schedule 80 PVC where exposed.

Question # 14

I have a dwelling with two water systems which both have more than 10 feet of metallic piping in contact with the ground. I believe I have two separate Grounding electrodes per 250.52(A)(1) I have them bonded together at the MDP. An inspector is asking for another supplemental grounding electrode per D(2). When reading the exact language it states " a metal water pipe shall be supplemented...."
I contend I have two metal water pipes and the second supplements the first.

Answer # 14 NEC 250.53(D)(2)

The inspector is correct. Both water pipes shall be connected via wiring to form the water pipe electrode system. The water pipe electrode must be supplemented by something other than water piping. The following is required by 2011 NEC 250.52(D)(2):
(2) Supplemental Electrode Required. A metal underground water pipe shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8).
Please note: the supplemental electrode must be of an additional electrode outlined in (A)(2)-(A)(8). NEC 250.52(A)(1) (WATER PIPING) is not permitted/included in the list to be the supplemental electrode. Only electrodes listed in (A)(2) through(A)(8) are permitted.

Question # 15

We are installing a transfer switch for a back-up generator on a residential service.
Standard 100A meter socket with no disconnect or overcurrent, feeds a 100A panel inside the home. The auto transfer switch will be installed on the outside of the home. The standard meter socket will feed the transfer switch, as will the generator. From the load side lugs of this transfer switch, we will feed the existing panel inside the home. With no overcurrent or disconnect between the meter socket enclosure and the transfer switch, should the transfer switch be Service Entrance Rated?

Answer # 15 YES, SPS 316.110, NEC 702.4, NEC 702.5

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.
702.4 Capacity and Rating. (A) Available Short-Circuit Current. Optional standby system equipment shall be suitable for the maximum available short-circuit current at its terminals.

(B) System Capacity. The calculations of load on the standby source shall be made in accordance with Article 220 or by another approved method.
702.5 Transfer Equipment. Transfer equipment shall be suitable for the intended use and designed and installed so as to prevent the inadvertent interconnection of normal and alternate sources of supply in any operation of the transfer equipment. Transfer equipment shall be required for all standby systems subject to the provisions of this article and for which an electric utility supply is either the normal or standby source.

Question # 16
I wired a garage and the building inspector red-tagged me. I drilled the wires through the 2 x 4s so I wouldn't have to protect the wires on top of the rafters. Can he tag me for that?

Answer # 16 YES, SPS 321.27(7)(b)
Code Reference: SPS 321.27(7)(b); The term "rafter" is not defined in the State of Wisconsin Uniform Dwelling Unit Code SPS 320 – 324. However, the dictionary states that a rafter is "one of the usually sloping timbers that support a roof". It appears that what was drilled was a truss which is defined as "a strong frame of beams, bars, or rods that supports a roof". SPS 321.27(7)(b) states that truss member shall not be cut, bored or notched, except as allowed under sub. (8)(d). SPS 321.27(8)(d) says notching or boring of engineered wood products shall be done in accordance with the manufacturer's instructions provided those instructions were developed through structural analysis or product testing. An engineering analysis of the truss may be acceptable to the building inspector.

Question # 17
I have decided to make my single family home into a two family. If I decide to install two meters, so each unit has its own meter, do I also need to put in another meter for common areas? I don't really want to do that and only will if it is absolutely necessary, or I'd rather just have the one meter for everything. To put it simply:
Choice one: Single meter
Choice two: Two meters, one for each of the units & one of the meters providing for the common usage.
Choice three: Three meters, one for each unit and one for the common areas.
What choice is required?

Answer # 17 Choice 3 is required. PSC 113.0802, NEC 210.25 (B)
Before moving forward with your options, we encourage you to contact your village/municipality to inquire about zoning requirements. You will need to comply with any/all zoning requirements in the area which you live. If your zoning allows for a (2) family conversion "Choice (3)" is the required option. Each tenant is required to have a separate metered electrical service as required in State of Wisconsin PSC 113 requirements. It reads in part: PSC 113.0802 PSC 113.0802 Measuring customer service. PSC 113.0802(1)(1) Except as provided in sub. (2), all energy sold to customers shall be measured by commercially acceptable measuring devices owned and maintained by the utility. All other electrical quantities which the rates or utility's rules indicate are to be metered shall be metered by commercially acceptable instruments owned and maintained by the utility. PSC 113.0802(2) (2) For temporary or special installations where it is impractical to meter loads, such as certain highway or area lighting which may be billed at a flat rate based on lamp rating and use, the consumption may be calculated.

PSC 113.0802(3) (3) The metering and wiring in non-transient, multi-dwelling-unit residential buildings, mobile home parks and commercial establishments where individual unit metering is provided, or required under the provisions of s. PSC 113.0803, shall be so installed or arranged so that each customer or tenant is metered for his or her own consumption only. Energy used by common area loads, for example, hallway lighting and heating, shall be separately metered and billed as appropriate under the utility's filed tariff. Our State of Wisconsin Electrical code SPS 316.230 (4)a) Requires a minimum of 150-amp supply to a (2) Family service. If the conversion is permitted the service will have to be reworked. It reads:
Two- or multi-family dwellings. Except as provided in par. (a), for 2-family or multi-family dwellings, the service equipment shall have a rating of not less than 150 amperes, 3-wire or 4-wire. Where the combined rating of all service disconnecting means is 150 amperes or larger, the service or feeder equipment rating for each dwelling unit shall have a rating of not less than 60 amperes.
2011 NEC 210.25 Has specific requirements on common area branch circuit loads in a (2) or multifamily dwelling and follows similar requirements to the PSC 113. It reads:
210.25 Branch Circuits in Buildings with More Than One Occupancy. (A) Dwelling Unit Branch Circuits. Branch circuits in each dwelling unit shall supply only loads within that dwelling unit or loads associated only with that dwelling unit.(B) Common Are Branch Circuits. Branch circuits installed for the purpose of lighting, central alarm, signal, communications, or other purposes for public or common areas of a two-family dwelling, a multifamily dwelling, or a multi-occupancy building shall not be supplied from equipment that supplies an individual dwelling unit or tenant space.

Question # 18
Can I install my own UL listed, sunlight resistant cord onto a radon mitigation motor? I would install a GFCI with an in use cover and use the cord as the disconnect. Or am I required to install a toggle switch and approved raceway to the motor? The motor is installed with a knockout opening in the junction box on the unit.

Answer # 18 NEC 430.109(F)
The cord and plug is allowed to be used as the disconnect if it meets the conditions in 430.109(F). I would also verify that the manufacturer's instructions allow for the motor to be cord and plug connected.

Question # 19
A homeowner is requesting a new electric meter service for an accessory building on his parcel of land in which he owns and occupies the dwelling at the same address. SPS 305.43 and state stat's 101.862(4) have language in regards to the owner’s residence but looks to be silent on owner performed electric on an accessory building. Can you please clarify for me if the owner can or cannot install wiring in this situation?

Answer # 19 Wis. Stat. 101.862(4)(a) (a)
Yes, it is permitted. You are correct that Wis. Stat. 101.862(4)(a) (a) permits a residential property owner to do wiring on premises that the property owner owns and occupies as a residence. This exemption applies to an owner occupied single family dwelling only. This exemption would also apply to accessory

structures such as a detached garage or other similar outbuildings that are directly associated with the dwelling.

Question # 20

I have wired numerous pool heaters and always have wired them for GFCI protection. Ran into an issue with one this year tripping the GFCI breaker (never had an issue with the other heat pumps on a GFCI breaker). Anyway, the company that sold the homeowner this unit is insisting that I go swap out the breaker to a regular (non GFCI) breaker, they will not even send a service guy out to service the unit until the breaker is swapped.

Now obviously for liability issues I'm not going to do this until I get the right direction in doing so. I was always under the impression that GFCI protection is always needed in all equipment that is supplying a pool? Could you give me some clarification on this?

Answer # 20 NEC 680.22(A), 680.27

Receptacles would need GFCI protection in accordance with 680.22(A). Pool heaters are also not mentioned in 680.27 Specialized Pool Equipment. A hard wired pool heater would not need GFCI protection.

Question # 21

Is AFCI protection required in newly constructed Dwelling Units in Wisconsin?

Answer # 21 NEC 210.12 (A)

NEC 210.12 Arc-Fault Circuit-Interrupter Protection. (A) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

NEC 210.12(A) contains a non-exclusive list of rooms and similar areas. Branch-Circuits supplying such rooms or similar areas require AFCI protection. A laundry room that is “finished” is similar to a hallway or closet and requires AFCI protection. AFCI protection is required for all 120-volt, single phase, 15-and 20 Ampere branch circuits supplying outlets. (See definition of outlets in Article 100). NEC 210.12(A) does not apply to unfinished portions of basements.

Question # 22

Is it legal to use 2 wire NM-B for 3 and 4 way switch travelers if a neutral from the same circuit is present at each switch location?

Answer # 22 NEC 300.3(B)(3), 300.20(B) Maybe;

The general rule in 300.3(B) states that all conductors of a circuit must be within the same cable or other wiring method. But 300.3(B)(3) allows the conductors to be in different nonferrous wiring methods, such as NM cables, if they comply with 300.20(B).

Question # 23

On existing services that may or may not have a meter installed where a mobile home is moving onto the site, would we consider that as 'new' service due to it serving a different trailer? Or is this service considered existing and "Grandfathered"?

Answer #23 SPS 316.003 (3)

If the service exists it is not considered "New" if another trailer arrives on site. The existing service is considered "Grandfathered" if installed to code at the initial time of installation. This allowance is located in State of Wisconsin Electrical Code SPS 316.003. It reads: (3) Existing installations. Existing electrical installations shall conform to the electrical code that applied when the installations were installed. An existing electrical installation may be required to be brought into compliance with the current code's requirements by the department and within the time period determined by the department when a hazard to life, health or property exists or is created by the installation. (If the existing service has a 50 or 60 amp rating and a new trailer house is brought in with a 100 amp rating the service would now have to be updated to 100 amps.)

Question # 24

Increasingly insulating contractors are trying to seal receptacle and switch device boxes with the expandable spray foam vs. silicone caulk. It raises a question as to whether this material is acceptable for sealing the device boxes when applied to the wire openings from the inside of the box. The foam typically results in excess foam projecting into the box and perhaps making contact with the receptacles and switches

Answer # 24 NEC 314.16, SPS 316.110

NEC 314.16 Requires Boxes to be of sufficient size to provide free space for all enclosed conductors. This clear space is compromised when foam is installed inside the electrical box. SPS 316.110 could also be used to prohibit such a practice.

It reads: 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

Question # 25

Thanks for the information on the low voltage wiring for my undercabinet lights. The lettering on the low voltage wire cover is "SUN RES CL2 OR MP OR CM OR FPL 18 (E111005) (UL)". I am guessing that it is an 18 gauge, UL rated wire that would be acceptable for my reuse for my new under cabinet lighting. I talked to Tech Support (the low voltage, 24 volt, under cabinet lighting system that I am looking at using) and they had no problem with reusing the low voltage wiring, the distance between the transformer/driver and the fixtures and the layout for my kitchen. Are you in agreement with reusing the existing low voltage wiring (used upon the above information)? Thanks for your help.

Answer # 25 YES, NEC 411.3(B)(6)

NEC 411.3(B) allows low voltage lighting to be an assembly of listed parts. The concern you expressed was for the wiring buried within the walls since you are using a listed driver and luminaires. NEC

411.3(B)(6) permits the use of cable, conductors in conduit, or other fixed wiring method. The wiring is UL listed and approved for concealment. As long as the 18 gauge wire is sufficient for the load being imposed on it, you are good to go.

Question # 26

I have been called on an inspection item regarding SPS 322.49 for the single family residence not having 50% of the lighting fixtures to have high efficiency lamps. Does this rule apply to one and two family dwellings in the state of Wisconsin?

Answer # 26 YES, SPS 322.49

SPS 322.49 applies in the State of Wisconsin. The code is written to say that at least 50% of the permanently installed light fixtures in a home need to have high efficacy bulbs. This does not mean 50% of the individual fixture. Below is a link to the DOE website addressing this topic.https://www.energycodes.gov/sites/default/files/documents/cn_high-efficacy_lighting_in_new_homes.pdf

Question # 27

Can an unlicensed person install electrical wiring in an owner occupied single family dwelling? What if they own more than one dwelling in the State and occupy both at any given time?

Answer # 27 Yes. Wis. Stat. 101.862(4)(a)

Wis. Stat. 101.862(4)(a) allows a homeowner to install, repair, or maintain electrical wiring without a license on premises that the property owner owns and occupies unless a license is required by a local ordinance. (For example: a homeowner may have to take out a permit but would not need a license to add new lights or receptacles to either new or existing circuits.)Note: No mention is made that the home be the primary residence. Just that the owner occupies the home. For example, an individual may own (2) homes in Wisconsin and occupy both homes at different times of the year. The person in question could perform their own wiring for the addition to their 2nd home/hunting shack & accessory buildings at the dwelling without a license.

Question # 28

Can a person attach to a piece of rebar sticking out of the bottom of a footing that is in direct contact with earth?? At a code seminar it was brought to our attention that this was not allowed because the theory was that the rebar would eventually rust and deteriorate over time resulting in the loss of that electrode. This was at a Wisconsin seminar and it might have been Neitzl but not for sure**.**

Answer # 28 NO, 2017 NEC 250.68(C)(3)

You are correct with the theory of the rebar rusting if not provided with corrosion protection. Many AHJ's in Wisconsin & throughout the country have been requiring the rebar to be located where not subject to corrosion and are using various language in Article 110 to assist. Thankfully this been clarified in the 2017 NEC to assist us. 2017 NEC 250.68(C)(3) reads: A rebar-type concrete-encased electrode installed in accordance with 250.52(A)(3) with an additional rebar section extended from its location within the concrete to an accessible location that is not subject to corrosion shall be permitted for connection of grounding electrode conductors and bonding jumpers. The rebar extension shall not be exposed to contact with the earth without corrosion protection. Our group would support compliance

now with installation clarification in the 2017 NEC. This is a life safety code, and when given the opportunity to interpret the NEC it's good to have clarification in codes not yet adopted to assist.

Question # 29

I have an existing 3 wire feeder that is now feeding a house by the lake. The owner wants to tear down the existing house and build a new one. Can I reuse the existing feeder to refeed the new home?

Answer # 29 YES, SPS 316.003, NEC 250.32 (B)(1) Exception

SPS 316.003(3) EXISTING INSTALLATIONS. Existing electrical installations shall conform to the electrical code that applied when the installations were installed. An existing electrical installation may be required to be brought into compliance with the current code's requirements by the department and within the time period determined by the department when a hazard to life, health or property exists or is created by the installation.

NEC 250.32 (B)(1) Exception: For installations made in compliance with previous editions of this Code that permitted such connection, the grounded conductor run with the supply to the building or structure shall be permitted to serve as the ground-fault return path if all of the following requirements continue to be met:

(1) An equipment grounding conductor is not run with the supply to the building or structure.

(2) There are no continuous metallic paths bonded to the grounding system in each building or structure involved.

(3) Ground-fault protection of equipment has not been installed on the supply side of the feeder.

Question # 30

At what point does a "foyer/mud room" become a habitable room for receptacle placement? Yesterday I had one that was >100 sq. ft, and asked the electrician to add a second receptacle on a wall. He argued a little, but complied. The wall was "L" shaped, 15' of total length with one duplex near one end. The other end had 4' of wall between the garage egress door and the corner. I felt like the room was large enough that it was highly likely for a table to be in that corner.

Answer # 30 NEC 210.52(I)

Use the room designation that is stated on the plans; Code Reference: NEC 210.52(I); If this is indeed a foyer and greater than 60 square feet you would look for one receptacle on any wall space over 3' wide per NEC 210.52(I). There are some pretty big foyers where you could have several tables along a wall, but the code only requires one receptacle for every wall 3 feet or more in length.

Question # 31

There are screen porches being constructed with screen type windows, and the screens also have a vinyl sheet material which can be pulled down over the screen to make it more of a living area when colder or raining, then making it similar to a 3 season room. With the typical screen porches, we have in past not required receptacles to be placed to meet the spacing requirements of the 6' - 12', we have treated these rooms as open porches. With 3 season rooms with storm type glass windows we have always required the receptacles to be installed to meet the 6' – 12' requirements. Is this correct?

Answer # 31 YES, NEC 210.52(A)

210.52(A) applies to 3 season rooms that are similar in use to living rooms, recreational rooms, or sun rooms. Some typical characteristics of such spaces are that:

1) The room is judged to be a dry location. So it will have a weathertight exterior shell and windows.
2) The room or space is judged large enough to permit placement of furniture such as tables, chairs, etc.
3) The room is likely to contain electrical equipment such as cord-and-plug-connected lighting and appliances such as televisions or radios.
It is not necessary for the room to be heated in order for its use to be similar to a recreational room or sun room.
The typical three season room you refer to is that it qualifies on both counts. Plan to supply receptacle outlets per 210.52(A) and a lighting outlet(s) per 210.70

Question # 32
I have a two gang PVC box that is 36 cu inches, how many # 14 wires can I have in this box with 2 switches.

Answer # 32 NEC 314.16 (B)(1)
NEC 314.16 (B)(1) Conductor Fill. Each conductor that originates outside the box and terminates or is spliced within the box shall be counted once, and each conductor that passes through the box without splice or termination shall be counted once. Each loop or coil of unbroken conductor not less than twice the minimum length required for free conductors in 300.14 shall be counted twice. The conductor fill shall be calculated using Table 314.16(B). A conductor, no part of which leaves the box, shall not be counted.
You may have 18 # 14 conductors minus 4 for the switches and 1 for the grounds, so that leaves 13 black, red or white conductors to be installed in this 2 gang device box. 3#14-3 =9 + 2# 14-2=4 which gives you a total of 13 conductors +1 for the grounds + 4 for the devices=18 X 2 cu.In = 36 cu. In.

Question # 33
NM stapling. We had an electrician complain about being red tagged because his staple was 8” from the Carlon box, but there was 2’ of cable from the box to the staple. We only found one exception regarding measuring along the length and we were told that the exception does not pertain to this installation. If that is the case, then the entire conduit and cabling measurement rules would be useless with people having sloppy installations.

Answer # 33 NEC 314.17(C), 334.15(A)
Check with AHJ; NEC 314.17(C) Exceptions states: Where nonmetallic-sheathed cable or multi-conductor Type UF cable is used with single gang boxes not larger than a nominal size 2-1⁄4 in. × 4 in. mounted in walls or ceilings, and where the cable is fastened within (8 in.) of the box measured along the sheath and where the sheath extends through a cable knockout not less than 1⁄4 in., securing the cable to the box shall not be required. If this is a multi-gang or round plastic box which is required to have clamps that are not broken and indeed fastening the conductor to the box, the cable would need to be fastened within 12" of the box and no more than every 4 1/2 feet thereafter per NEC 334.30. I have always looked at the measurement along the sheath when looking at that code. A person could go from one staple, install 10 feet of cable and as long as the next staple is within 4 1/2 feet of the first staple the installation would be compliant. NEC 334.15(A) requires NM that is exposed, must closely follow the surface of the building finish or of running boards. Check with the AHJ. Some inspectors will allow a loop of extra cable from the last strap to the box in some areas where there is concern that the

person(s) installing the drywall may damage the conductors within the box. By using this method, the electrician is able to pull more cable into the box and discard the damaged conductors.

Question # 34
I have a basement bar area that will have a sink, refrigerator, dishwasher and a built in microwave. Is this considered a kitchen?

Answer # 34 NO Definitions
A cord-and-plug microwave oven is typically listed as a portable appliance and is not considered "permanent provisions" for cooking. As such, the basement bar in your e-mail does not meet the Article 100 definition of a kitchen.

Question # 35
I wired an air conditioners and I got a call from an inspector asking why I used NM-B cable in the carflex to feed the AC from the disconnect. We do it all the time. The inspector says I have to change the wire to a type THWN conductor, is he correct?

Answer # 35 YES, NEC 334.12(B)(4), NEC 310.104(A) & (B) NEC 300.9
NEC 334 Nonmetallic Sheathed Cable: Type NM,
NEC 334.12(B)(4) Uses Not Permitted. (4) *In w*et or damp locations
NEC 310.104(A) & (B) for explanation of type letters used in tables and for recognized sizes of conductors for the various conductor insulations.
310.104 Conductor Constructions and Applications. Insulated conductors shall comply with the applicable provisions of Table 310.104(A) through Table 310.104(E).
NEC 300.9 Where raceways are installed in wet locations above grade, the interior of these raceways shall be considered to be a wet location.

Question # 36
Can Bryant, ITE , or Home-line breakers be used in a Crouse-hinds panel if they fit?

Answer # 36 NO, SPS 316.110
Just because the breakers fit does not mean that the installation complies with code or is safe. The breakers need to be listed for use in the perspective electrical panel. The electrical panel & breakers have instructions per the listing indicating what components can be used and where they can be used. The instructions for the electrical panel are typically located on the electrical cover. We would encourage you to verify prior to installation. If instructions are not found/missing, we would encourage you to contact the manufacture for assistance.
The State of Wisconsin Electrical code SPS 316.110 reads:
SPS 316.110 Requirements for electrical installation. Listed or labeled equipment shall be installed or used, or both, in accordance with any instructions included in the listing or labeling.

Question # 37

I put a single receptacle in for the sump pump on its own 15 amp circuit, I was told by the inspector that I am required to install a GFCI outlet within 3' of the sump pump outlet to meet the code. I looked in the NEC but did not see this requirement, where is the inspector getting his information?

Answer # 37 SPS 316.210 (2)

The inspector is getting his information from SPS 316.210 (2) GROUND−FAULT CIRCUIT−INTERRUPTER PROTECTION FOR PERSONNEL. This is a department exception to the requirements in NEC 210.8 (A).Exception: Ground−fault circuit−interrupter protection shall not be required for a single receptacle providing power for sump or sewage pumps where an accessible ground−fault circuit−interrupter protected receptacle is located within 900 mm (3 ft) of then on−GFCI protected receptacle.

Question # 38

What is the code section that requires licensed electrician in single family homes not technically occupied by the owner?

Answer # 38 SS 101.862(1), SS 101.862(2)

An electrical license is required if you engage in the business of installing, repairing, or maintaining electrical wiring in Wisconsin. The requirement is located in Wisconsin State statute 101.862(1). It reads: 101.862 License or registration required. 101.862(1) (1) No person may engage in the business of installing, repairing, or maintaining electrical wiring unless the person is licensed as an electrical contractor by the department. 101.862(2) (2) No person may install, repair, or maintain electrical wiring unless the person is licensed as an electrician by the department or unless the person is enrolled as a registered electrician by the department. 101.862(3) Reads: No person who is not a master electrician may install, repair, or maintain electrical wiring unless a master electrician is at all times responsible for the person's work.Exemptions exist for owner occupied homes. 101.862(4) reads:
(4) Subsections (1) to (3) do not apply to any of the following:
(a) A residential property owner who installs, repairs, or maintains electrical wiring on premises that the property owner owns and occupies as a residence, unless a license or registration issued by the department is required by local ordinance.

Question # 39

I am an electrical contractor that wires several homes a year, Now with all the cell phones home buyers do not want to pay for a land line to be installed in the house. Do I need to run a phone jack in a new home?

Answer # 39 YES, NEC 800.156

NEC 800.156 Dwelling Unit Communications Outlet. For new construction, a minimum of one communications outlet shall be installed within the dwelling in a readily accessible area and cabled to the service provider demarcation point.

Question # 40

I am wiring a hot tub that is sitting on a concrete slab that is located 4 feet from a metal fence. I am running a # 10 green ground in my PVC raceway to ground the metal enclosure of the hot tub components, What is the difference between a ground wire and a bond wire.

Answer # 40 Definitions

Definitions: Ground wire or EGC is a conductor that is installed to connect normally non-current – carrying metal parts of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.

Bond wire is a wire connected to establish electrical continuity and conductivity between metal parts. For a hot tub it is to ensure that all metal within a 5' radius of the hot tub be bonded, this will reduce the voltage gradients in the area of the hot tub.

Question # 41

I did a 100 amp service in PVC conduit. Does the PVC require a plastic bushing for the service conductors, and if so why?

Answer # 41 NO

Bushings are not generally required to be used with RNC terminal adaptors. 300.4(F) requires the 4 AWG or larger conductors be protected by "a substantial fitting providing a smoothly rounded insulating surface". A listed RNC box fitting or terminal adaptor is tested to meet this requirement without a separate bushing. We have attended many inspector meetings where this question has been answered by the UL representative in this fashion. As long as the fitting has not been damaged, no bushing is required.

Question # 42

I inspected a second floor loft in new construction measuring 18' x 11'. One of the 11' long "walls" is actually a railing overlooking the first floor. Because this is a railing and not a wall, does 210.52(A) apply and is a floor receptacle required along the railing? The owner does not want a receptacle in this location nor does he want any furniture or electrical equipment placed against the railing.

Answer # 42 YES, YES NEC 210.52 (A)(2)(1) &(3)

Receptacles are required. NEC 210.52(A)(2)(1) &(3) applies: Any space (2ft) or more in width (Including space around corners) & The space afforded by fixed room dividers, such as freestanding bar-type counter or railings.

Receptacles shall be installed as required in NEC 210.52(A)(1) &(2) at the railing location.

Question # 43

The city municipal electric supplier is going to replace all the overhead service drops with underground service laterals. They asked this contractor to change out the old meter sockets from overhead to underground ones. The question he has is how far would he have to go on each installation? Would he

have to replace all the existing service entrance cable? Does that mean he has to bring all the service up to today's code (replace panels etc.)? Thanks, for your help with this matter.

Answer # 43 No & No SPS 316.003, SPS316.010

At a minimum, the electrician shall inspect each existing service entrance cable to verify it is not defective. We would generally not require the existing service to be updated as it is considered existing. Only the replacement parts need to be wired and installed to current code. Here are some electrical codes to consider:

SPS 316 316.003 (3) Existing installations. Existing electrical installations shall conform to the electrical code that applied when the installations were installed. An existing electrical installation may be required to be brought into compliance with the current code's requirements by the department and within the time period determined by the department when a hazard to life, health or property exists or is created by the installation.

SPS 316.010 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.

Question # 44

Today I was rejected on a small bathroom in a basement for not installing/wiring an exhaust fan. The bathroom has an openable window to exhaust unwanted air. Isn't the openable window allowed in lieu of a fan? The UDC inspector referencing sps-323.02 (3) (d).

Answer # 44 The inspector is correct. SPS 323.02(3)(d)1.1

The code referenced requires an exhaust fan capable of exhausting 50cfm be installed. The fan is considered intermittent basis. SPS 323.02(3)(d)1.1. Requires the following: Except as provided under subd. 2., any room with a toilet, tub or shower shall be provided with exhaust ventilation capable of exhausting 50 cubic feet per minute on an intermittent basis or 20 cubic feet on a continuous basis. SPS 323.02(3)(d)2. 2. For dwellings with no electrical service, any room with a toilet, tub or shower shall be provided with an openable window.

Question # 45

I want to install ridged metal conduit 90's with short ridged nipples to extend out of the concrete. The underground conduit is PVC, and from the ridged nipples to the trough will be PVC also. There will be an equipment ground conductor in the raceway. The ridged nipples will only extend out of the concrete 6". Do I need to bond the nipples to the equipment ground conductor?

Answer # 45 YES NEC 250.86

Except as permitted by 250.112(I), metal enclosures and raceways for other than service conductors shall be connected to the equipment grounding conductor. Exception No. 3: A metal elbow shall not be required to be connected to the equipment grounding conductor where it is installed in a run of

nonmetallic raceway and is isolated from possible contact by a minimum cover of 450 mm (18 in.) to any part of the elbow or is encased in not less than 50 mm (2 in.) of concrete.

Question # 46
Would the garage subpanel require a main disconnect if there are not more than six circuit breakers installed in the subpanel?

Answer # 46 NO NEC 225.33
NEC 225.33 permits up to (6) overcurrent devices grouped in the same location to qualify as the garage disconnect. The reason why most contractors put a main disconnect is the (6) disconnect rule limits the panel to only (6) overcurrent devices. Most homeowners want the option to fully utilize all the openings in the electrical panel.

Question # 47
Can NM Cable Romex be installed through a drilled hole in a brick wall in a residential building? Or does the Romex need to be installed in a conduit sleeve through the brick wall. The Romex will be concealed on each end of the hole by additional concrete.

Answer # 47 NO NEC 334.12(A)(9)
NEC 334.12(A)(9) Prohibits NM cable in the following location:(9) Embedded in poured cement, concrete, or aggregate. We view the NM Romex Cable as considered installed in/through concrete. The installation does not meet the requirement of the NEC without being sleeved per NEC 334.15(B).

Question # 48
A general contractor is asking me to start bidding on some bathroom remodels and I'm wondering about older bathrooms with an existing receptacle on a 15-amp circuit. How do I determine when a new 20-amp circuit is required to be brought in? Not sure if this is a one answer question or if I should ask each local municipality as I run into this problem?

Answer # 48 SPS 316.003(3)
We would encourage you to use State of Wisconsin electrical code SPS 316.003(3) for assistance. It reads :*(3) Existing installations. Existing electrical installations shall conform to the electrical code that applied when the installations were installed. An existing electrical installation may be required to be brought into compliance with the current code's requirements by the department and within the time period determined by the department when a hazard to life, health or property exists or is created by the installation.*
The removal of drywall does not trigger a requirement to bring the existing wiring up to current codes if it was code compliant at the time it was first installed. Any new wiring would need to meet current codes. GFCI protection would have to be provided for any receptacles that are replaced per 406.4(D)(3).

Question # 49

I was looking at a service that is pulling off the side of a house. Above the meter socket is pvc with a pvc weather head. Is this acceptable in Wisconsin? It is not a mast, it is mounted on the side of the house.

Answer # 49 YES NEC 352.30, NEC 230.43

The PVC raceway would be acceptable; it must be secured per Article 352.30 of the NEC. And Article 230.43(11) Wiring Methods for 600 volts or less, Service Entrance conductors shall be installed in accordance with the applicable requirements of this code covering the type of wiring method used And shall be limited to the following methods: There are 19 methods and PVC is one of the 19.

Question # 50

I am wiring a detached garage on a residential property, I used 20 amp GFCI receptacles mounted 48" above the floor. When the inspector came to inspect my work he told me I had to use Tamper resistant receptacles in this building, is he correct?

Answer # 50 YES NEC 406.12

406.12 Tamper-Resistant Receptacles for Dwelling Units.
In all areas specified in 210.52, all non-locking-type 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles

Question # 51

What are the strapping (securing) requirements for a raceway for mechanical protection sleeving Romex coming out of the top of a residential panel?

Answer # 51 NEC 312.5(C), SPS 315.312

The requirement is located in 2011 NEC 312.5(C) as well as SPS 316 .312. With regards the securing of NM cable coming out the top of a residential panel sleeve it reads: Each cable is fastened within 300 mm (12 in.), measured along the sheath, of the outer end of the raceway.
NEC 312.5 (C) Exception (f) The raceway is fastened at its outer end and at other points in accordance with applicable article.

Question # 52

On a service upgrade is the re-use of the metal clad type conductor allowed to the water pipe or is a new conductor required? I am not able to find a reference either way. It is difficult to determine the size of this ancient conductor but looks sufficient. Thoughts?

Answer # 52 SPS 316.003(1)

Per SPS 316.003(1) all required grounding electrodes & conductors on a service upgrade must meet new code requirements. This includes the existing metal clad type conductor to the water pipe. The existing metal clad type conductor must be sized per Table 250.66, protected from physical damage & meet all other applicable NEC Article 250 & SPS 316 requirements. There is no grandfather clause for grounding

electrodes or conductors on a service upgrade in the state of Wisconsin. If the existing metal clad type conductor meets all code requirements it can it be re-used.

Question # 53

Does an electrical contractor need an additional DSPS HVAC license to install electric baseboard heating units in Wisconsin?

Answer # 53 NO SPS 305.70(1)(b)3

An electrician installing electric baseboard heat would fall under the Wis. Admin. Code § SPS 305.70(1)(b)3. The electrician in this case would not need an HVAC license. SPS 305.70(1)(b)3. 3. A person, entity, or business is not required to hold a registration as a registered HVAC contractor for electrical or plumbing work associated with the installation or servicing of the HVAC equipment or systems.

Question # 54

If a home has a house fire (contained to the unfinished basement) but the exposed electrical and plumbing was damaged making the house uninhabitable (no working plumbing or electrical) can the home owner make the electrical repairs? I told the homeowner that since the home was not currently occupied they could not do the electrical repairs. No homeowners insurance. Is this a correct interpretation of the State Statues?

Answer # 54 NO, YES ss 101.862(4)

Our group electrical consensus is that you are correct in your understanding of ss101.862.

(4) *Subsections (1) to (3) do not apply to any of the following:**(a)** A residential property owner who installs, repairs, or maintains electrical wiring on premises that the property owner owns **and occupies** as a residence, unless a license or registration issued by the department is required by local ordinance.*

If the fire deemed the home uninhabitable, the owner owns but no longer occupies the home.

Most municipalities will not grant occupancy to a home fire until needed repairs are made and re-inspections conducted.

With no working electrical or plumbing, the home should not be occupied and repairs shall be conducted by a licensed electrician.

Question # 55

Can a detached garage or outbuilding have two separate feeds coming to it?

Details. I have an owner of a duplex that has a 3 car garage. He would like two of the garage units to be feed from the lower unit and one from the upper unit. Two master electricians have said no and one inspector has said yes as long as there are two disconnects that are grouped together.

Answer # 55 YES SPS 316.225 2(B), SPS 316.230(3)(b) NEC 250.32

SPS 316.225 2(B) permits a single branch circuit to be run from the tenant's panel to each tenants' respective space. The disconnect for each branch circuit may be a snap switch per NEC 225.36

Exception. The disconnect for the branch circuit may be in the space and shall be located per 225.32. The identification requirement of 225.37 applies.
SPS 316.230(3)(b) would apply, Service entrance cable may not extend longer than 8 feet into the building.
NEC. 250.32 requires an electrode, two rods minimum, since there are multiple branch circuits supplying the building. The ground rods may be connected to the equipment grounding conductor(s) at a common location such as a junction box at the point where the branch circuits enter the garage.

Question # 56
Does a garage door opener in a one family residence require GFCI protection?
Does the GFCI have to be Readily Accessible?

Answer # 56 Yes, NEC 210.8 (A)(2) Yes, NEC 100
The NEC requires all 15 & 20 amp 120-volt receptacles installed in the garage to be GFCI protected. No exemptions exist in the code for 120-volt cord & plug connected door openers. The code article is NEC 210.8(A)(2). If the garage door opener is cord and plug connected, 120-volt, and located in the garage, it is required to be protected by a GFCI device even if on a dedicated circuit. The height of the receptacle makes no difference with the GFCI requirement. GFCI protection is still required. Beware, new to the NEC is a requirement that GFCI's be installed in readily accessible locations NEC 210.8. All 120-volt receptacles in the garage require GFCI protection and the GFCI shall be installed in readily accessible locations. So while GFCI protection is required, it would not be permitted to install a GFCI 9' above the floor. The GFCI device protecting the garage door opener must be readily accessible. Readily accessible is defined in NEC article 100.

Question # 57
We know that the clearance around an electrical panel should be 36". Does the same rule apply for disconnect switches?

Answer # 57 NEC 110.26
The question would be is this equipment likely to require examination, adjustment, servicing, or maintenance while energized? If it does Sec. 110.26 and Table 110.26(A)(1) would require the proper working clearances be provided. If the disconnect has no fuses or does not need to be energized for examination or servicing NEC 110.26 would not apply.

Question # 58
In a residential duplex, can the owner, if he/ she live in ½ of the duplex, do any electrical work? This would include work on his/ her half and the half that they are renting out.

Answer # 58 NO ss 101.862(4)(a)(a)
101.862(4)(a)(a) permits a residential property owner to do wiring on premises that the property owner owns and occupies as a residence. This exemption does not apply to a duplex or multifamily dwelling. This exemption applies to an owner occupied single family dwelling only.

Question # 59

2011 NEC 690.47(c) says that the existing ac grounding electrode system (for the house service, when tying on to it), shall meet the applicable requirements of 250 part III. Does this require connection within 5' of where the copper water pipe enters the house and driving of two ground rods? So when the PV system is AC and DC with no direct connection between the dc grounded conductor and ac grounded conductor are we correct in requiring that the grounding electrode system per NEC 250 part III requires updating of the existing grounding electrode system as well?

Answer # 59 YES NEC 690.47(C)(2) or (3)

You are correct in requiring the existing grounding electrode system to be updated when the PV system is AC and DC with no direct connection between the dc grounded conductor and ac grounded conductor and methods outlined in NEC 690.47(C)(2) or (C)(3) are used. Per NEC 690.47(C): When using the methods of (C)(2) or (C)(3), the existing ac grounding electrode system shall meet the applicable requirements of Article 250, Part III. If the existing grounding electrode system does not comply with 2011 NEC Article 250 part III than the system must be brought into current code when NEC 690.47(C)(2) or (C)(3) are used. The PV install is a new installation and shall meet all requirements of the NEC. This includes updating the grounding electrode system when required in the NEC. The Grandfathered rules in SPS 316.003 do not apply in this case.

Question # 60

I have a question about an old house with K & T wiring. The owner applied to the City to re-wire her house. However she does not have the equity to allow for that size budget, so I was trying to think of some cheaper alternatives. Would it help to replace the existing breakers with AFCI ones? Replace existing receptacles with AFCI and GFCI? So basically would these or other similar options be worthwhile instead of re-wiring the whole house?

Answer # 60 NEC 394

NEC 394 covers the use, installation, and constructions specifications of concealed knob and tube wiring. Knob and tube wiring is still a legal means of wiring. The State of Wisconsin DSPS does not require removal of code compliant knob & tube wiring in existing buildings. The question of requiring the removal the knob and tube would only be if it is no longer installed the way it was intended to be used. You may attempt to AFCI & GFCI the knob & tube branch circuits in lieu of removing compliant knob & tube wiring. This would ensure a greater degree of safety; however it may be problematic with many of the old systems sharing common neutrals**.**

Question # 61

Is there any way to have a non- GFI dedicated outlet in a residential mechanical room? It seems like I remember the code saying you could if a GFI outlet was located within 3 feet of the non- protected outlet. Customer is very paranoid about freezer quitting. Told her about alarm GFI's but not sold.

Answer # 61 NO NEC 210.8(A)

The NEC & State code generally do not permit non-GFCI protected receptacle in unfinished basement spaces. (See NEC 210.8(A) SPS 316 does permit the following for Sump & Sewage pumps: 2) Ground-fault circuit-interrupter protection for personnel. This is a department exception to the requirements in NEC 210.8 (A). Exception: Ground-fault circuit-interrupter protection shall not be required for a single receptacle providing power for sump or sewage pumps where an accessible ground-fault circuit-interrupter protected receptacle is located within 900 mm (3 ft) of the non-GFCI protected receptacle. The NEC has an additional exception in 210.8(a) for fire alarm receptacle feeds. All other receptacles in unfinished basement spaces must be GFCI protected. This includes 120-volt receptacles providing power for freezers in these spaces.

Question # 62

I am using at times on new homes the 4 wire 4/0/4/0/4/0/2/0 aluminum. How do I deal with the equipment ground? The inspector said I have to tie one end of the bare equipment grounding conductor to the enclosure or the neutral bar. This conductor doesn't do anything and we have cut the ends off for years. Do I have any other options?

Answer # 62 YES NEC 250.4(A)(4)

NEC 250.4(A)(4) The Code requires normally non-current carrying electrically conductive materials that are likely to become energized to be connected together and to the electrical supply source in a manner that establishes an effective ground fault current path. So it could be tied to ground on one end. It also could be cut back and/or taped such that it was not likely to become energized.

There are no special Code rules to address “spare” conductors within an electrical enclosure. However, the method of installation must ensure that spare conductors are unlikely to be come energized via contact with live parts in the same enclosure.

Question # 63

A resident would like to have a reading area in an upstairs area that is a cupula. It currently has no lights and was not used for an occupied area. They would like to use this area with a chair and table etc. It is in an older building. The cupula area has a narrow stairs that leads to it but not any current lighting. They wanted to know if they could use a battery type light for this area and not have to rip out walls etc. on the stairway to get a light to this previously unlit area.

Answer # 63 YES

Yes it is permitted. We consider the stairwell and cupula as existing. If the electrical code did not require a light in the stairwell and cupula when first installed, light/s would not be required. A battery type light in the area would be acceptable in this case. We would encourage you to use State of Wisconsin electrical code SPS 316.003(3). It reads: (3)Existing installations. Existing electrical installations shall conform to the electrical code that applied when the installations were installed. An existing electrical installation may be required to be brought into compliance with the current code's requirements by the department and within the time period determined by the department when a hazard to life, health or property exists or is created by the installation.

Question # 64

When replacing an old service panel , can I use the old panel as a j-box, run a raceway between the panels, run the branch circuit wires through the raceway, and use one common neutral, sized accordingly, from the new panel to the j-box, terminating in an approved neutral bar in the j-box?

Answer # 64 NO NEC 300.3(B)

Your proposed method is not permitted for the neutral conductors. All of the grounded neutral conductor branch circuits shall be spliced separately in the j-box and terminated in the new electrical service panel. The requirement is located in NEC 300.3(B): Conductors of the Same Circuit. All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, auxiliary gutter, cable tray, cablebus assembly, trench, cable, or cord. You may spice all of the grounding conductors together sized accordingly, from the new panel to the j box.

Question # 65

Has the code changed to eliminate the outlet on peninsula in a kitchen?

Answer # 65 NO NEC 210.52 (C)(3)

The State of Wisconsin is presently enforcing 2011 NEC & SPS 316 requirements. Current code in Wisconsin requires a peninsular receptacle per NEC 210.52(C)(3). It reads:(3) Peninsular Countertop Spaces. At least one receptacle outlet shall be installed at each peninsula countertop space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connecting edge. The 2017 NEC has changes to the requirement in NEC 210.52(C)(3). The State of Wisconsin has not yet adopted the 2017 NEC.

Question #66

I am inspecting and doing some work in a house for the owners who are selling. I have noticed that the mast is in good shape, but has a slight bend in it above the roof line. The pipe is bent, but not kinked. This is not a wooden mast, it is the standard rigid pipe mast. The buyer wants an electrician to inspect the pipe and sign off on it.

Our opinion at this point is that if the mast is secure and has no other issues except for being bent without kinks, then it is OK to sell as is. Aesthetically it is not pretty, but pretty is not in the code book, either. Could you supply some clarification on this for me?

Answer # 66 NEC 230.28, SPS 316.010

NEC 230.28 covers requirements for Service masts as supports. It reads:

230.28 Service Masts as Supports. Where a service mast is used for the support of service-drop conductors, it shall be of adequate strength or be supported by braces or guys to withstand safely the strain imposed by the service drop. Where raceway-type service masts are used, all raceway fittings shall be identified for use with service masts. Only power service-drop conductors shall be permitted to be attached to a service mast.

SPS 316.010 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.
If you feel the pipe is not damaged due to the bend I would say it is up to the seller or buyer to repair the mast if need be for cosmetic reasons. The Utility that supplies power may want the mast to be repaired if they feel it is unsafe.

Question # 67
I have a question about rental properties and the replacement of two wire receptacles. When doing inspections for the general conditions of the rental properties, I often find three prong outlets installed without a ground (in place of the old 2 wire outlet). I then have the owner contact an electrician to properly install the outlets. Since someone took out the old two wire and did not replace to code, I feel the installation should be brought up to todays replacement criteria (Gfci protected and TR recepts).

Answer # 67 NEC 406.4(D)
ARTICLE 406 Receptacles, Cord Connectors, and Attachment Plugs (Caps)
(D) Replacements. Replacement of receptacles shall comply with 406.4(D)(1) through (D)(6), as applicable.
(1) Grounding-Type Receptacles.
(2) Non–Grounding-Type Receptacles.
(5) Tamper-Resistant Receptacles. Listed tamper-resistant receptacles shall be provided where replacements are made at receptacle outlets that are required to be tamper-resistant elsewhere in this *Code*.
The National Electrical Code allows two prong receptacles to be replaced by three prong receptacles if no grounding means exists at the receptacle box and the receptacle is GFCI protected. The downstream three prong receptacles are required to be marked “GFCI Protected” and “NO Equipment Ground”. It is also allowed to replace two prong receptacles with new two prong receptacles.
In your case the receptacles may be GFCI protected, and if they are they would be required to be marked as indicated above. If they are not GFCI protected, GFCI protection could be installed, or they could be replaced with two prong receptacles.

Question # 68
I have a new home with the plumbing all done in plastic Water piping. The Hydro massage bathtub is not bonded to the water system because it Is plastic. The tub has a double insulated pump motor on it and the inspector is calling me on 680.74 and telling me I need to provide a #8 bonding jumper to the motor in case the motor Is changed to a non-double insulated motor & connect it to the branch circuit ground feeding the Motor because there is no metal water piping system –it is all plastic-
Answer # 68 NEC 680.74

The inspector is asking for you to bond the metal piping and metal parts in contact with the circulating water. The only thing is you have commented there is no metal piping or metal parts in contact with the circulating water. Therefore NEC 680.74 would not apply as there is no metal water pipes or metal parts in contact with the circulating water.
680.74 Bonding. All metal piping systems and all grounded metal parts in contact with the circulating water shall be bonded together using a solid copper bonding jumper, insulated, covered, or bare, not smaller than 8 AWG. The bonding jumper shall be connected to the terminal on the circulating pump motor that is intended for this purpose. The bonding jumper shall not be required to be connected to a double insulated circulating pump motor. The 8 AWG or larger solid copper bonding jumper shall be required for equipotential bonding in the area of the hydro-massage bathtub and shall not be required to be extended or attached to any remote panelboard, service equipment, or any electrode. The 8 AWG or larger solid copper bonding jumper shall be long enough to terminate on a replacement non-double-insulated pump motor and shall be terminated to the equipment grounding conductor of the branch circuit of the motor when a double-insulated circulating pump motor is used.

Question # 69
Instead of romex connectors at the panel, I have a contractor using a plastic grommet/sleeve. Is there a code reference that would prohibit the use of a grommet/sleeve?

Answer # 69 NEC 300.15, NEC 312.5, SPS 316.312(1)
A grommet would not secure the conductor to the enclosure.
NEC 300.15 Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed.
NEC 312.5 (C) Cables Where cable is used , each cable shall be secured to the cabinet. SPS 316.312(1) Does allow short lengths of pipe as a sleeve above panels, The length on this is minimum of 12" and maximum of 10'. Cables must be secured within 12" where they leave the top of the sleeve.

Question # 70
Does the NEC require GFCI protection for a replacement of a non-GFCI receptacle in an existing building?

Answer # 70 Yes NEC 406.4(D)(3
When existing receptacles are replaced in locations where GFCI protection is currently required, the replacement receptacles must be GFCI protected.

Question # 71
What kinds of items are considered grounding electrodes?

Answer # 71 Each of the following can serve as a grounding electrode [250.52]

- Metal underground water pipe in direct contact with the earth for 10 ft or more [250.52(A)(1)].
- Metal in-ground support structure(s) in direct contact with the earth vertically for 10 ft or more [250.52(A)(2)].

- Concrete-encased electrode that is either one or more electrically conductive steel reinforcing bars of at least ½ in. diameter, mechanically connected together by steel tie wires (or other effective means) to create a 20 ft or greater length [250.52(A)(3)(1)] or a bare copper conductor not smaller than 4 AWG and at least 20 ft long [250.52(A)(3)(2)].
- Ground ring consisting of at least 20 ft of bare copper conductor not smaller than 2 AWG buried in the earth encircling a building [250.52(A)(4)].
- Rod electrode with at least 8 ft in length in contact with the earth [250.53(G)] and diameter of at least 5⁄8 in., unless listed [250.52(A)(5)].
- Other listed grounding electrodes [250.52(A)(6)].
- Bare or electrically conductive coated iron or steel plate at least ¼ in. thick, or a solid uncoated copper metal plate at least 0.06 in. thick, with an exposed surface area of at least 2 sq ft [250.52(A)(7)].
- Metal underground systems, piping, and well casings [250.52(A)(8)].

Question # 72

I'm representing a buyer in the purchase of a single family home that has a Federal Pacific circuit breaker box. The inspector says it is defective and needs to be replaced. The Seller/homeowner says the box is "grandfathered". Can you confirm which it is and direct me to a link that states such if it is available? I've talked to a few licensed electricians that say it is no longer grandfathered. I need to confirm this.

Answer # 72

To the best of our group's knowledge, Federal Pacific Electrical products have not been recalled, and UL has not retracted the listing on their panels. There is no code language to require replacement of an existing code compliant panel in order to sell a home in the State of Wisconsin. We have heard that some insurance companies will not insure a home with the breakers. This is outside of our control. Homeowners should verify with potential insurance companies as to their policies. Unless there was evidence of a hazard or damage, they are allowed to be continued to be used. The US Consumer Product Safety Commission released a report back in 1983, and later revised it in 2011. Here is what the commission advises:

- Know your electrical circuit. Know which outlets and products are connected to each circuit.

Never overload any electrical circuit by connecting too many products to the circuit. Be particularly careful not to connect several products that demand high current (such as heating appliances) to a low amperage circuit. Comply with local building codes in wiring or adding electrical circuits. Make sure the wiring and devices used in the circuit are connected to a circuit breaker or fuse of the proper size. Immediately disconnect any electrical product if problems develop. Have the product examined by a competent repair person. Investigate to determine why a fuse blows or circuit breaker trips. Do not simply replace the fuse or reset the breaker. If a fuse blows or breaker trips, it is often a warning that the circuit is overloaded. Check the circuit for causes of overloading (for example, too many appliances plugged in, a malfunctioning product, a short circuit). When in doubt, consult a licensed electrician.

To view the full report, here is the link: https://www.cpsc.gov/Newsroom/News-Releases/1983/Commission-Closes-Investigation-Of-FPE-Circuit-Breakers-And-Provides-Safety-Information-For-Consumers/

Question # 73

In a residential setting a guy builds a house and attaches a garage that doubles for an aircraft hangar. He is a hobbyist and builds small planes which he will fly. Is this structure a hanger? Would it need to meet NEC 513(?) hanger requirements? There is no commercial element to this structure. Your thoughts?

Answer # 73 YES NEC 513

If the structure meets the NEC definition for an Aircraft hangar than "yes" NEC article 513 rules would apply. No exception is made in the NEC for residential aircraft hangers. The definition is as follows: 513.1 Scope. This article shall apply to buildings or structures in any part of which aircraft containing Class I (flammable) liquids or Class II (combustible) liquids whose temperatures are above their flash points are housed or stored and in which aircraft might undergo service, repairs, or alterations. It shall not apply to locations used exclusively for aircraft that have never contained fuel or unfueled aircraft.

Question # 74

How far below grade does the ground rod electrode conductor need to be installed? Can it be run on top of grass?

Answer # 74 No Distance

No distance required in the NEC. NEC 250.64(B) requires the following: A 4AWG or larger copper grounding electrode conductor shall be protected if exposed to physical damage. We would agree that a conductor exposed may be subject to physical damage. Burying the conductor under the earth would meet the NEC requirement. Specific site conditions may determine specific burial depths. As you are aware, the burial depth in Table 300.5 does not apply in this case and shall not be used for compliance.

Question # 75

I am a master electrician and building/wiring my new home. Do I need to also have an electrical contractor's license to do wiring on my new home being constructed? I do not believe I am contracting in this case. What if I work for a friend pro-bono (No Charge?)

Answer # 75 ss 101.862

If you are the owner of the home you plan on wiring and have a valid Master Electrician license from DSPS, you do not need an electrical contractor license to wire your home. Wiring your own home is not contracting. No exception exists in the State of Wisconsin Statues if the home is owned by a friend or others. You must have a valid Electrical Contractor License to proceed. An electrical contractors license is required if you engage in the business of installing, repairing, or maintaining electrical wiring in Wisconsin. The requirement is located in Wisconsin State statute 101.862(1). It reads: 101.862 License or registration required. 101.862(1) (1) No person may engage in the business of installing, repairing, or maintaining electrical wiring unless the person is licensed as an electrical contractor by the

department. 101.862(2) (2) No person may install, repair, or maintain electrical wiring unless the person is licensed as an electrician by the department or unless the person is enrolled as a registered electrician by the department. 101.862(3) Reads: No person who is not a master electrician may install, repair, or maintain electrical wiring unless a master electrician is at all times responsible for the person's work. An electrical contractor license allows the person or entity to engage in the business of installing, repairing, or maintaining electrical wiring. A person who holds an electrical contractor license is responsible to use licensed or registered individuals for the installation, repair or maintenance of electrical wiring. An electrical contractor's license is not the same as a master electrician; the two licenses are not interchangeable. One is necessary for construction bids and contracts, while the other is needed for the person to actually install the wiring.

Question # 76

In designing layout of furniture for cabins in our campground I need to know if electric outlet boxes can be installed in floor or if there is a height from floor requirement?

Answer # 76 YES NEC 210.52(A)(3), NEC 210.52(4)

NEC 210.52(A)(3) permits floor receptacles in lieu of receptacles on the wall. The floor boxes must be installed within 18" of the wall to be counted as a required receptacle. No outlet that is required by 210.52 shall be higher than 5 ½ feet above the floor**.**

Question # 77

I have a small pole barn that was just a storage area/Garage and the person changed it into a "dwelling". He is now staying overnight, living in the building. He did the electrical himself and is not a WI licensed Electrician. Does all the electrical need to be removed and reinstalled or is it allowed to have a licensed electrician sign off on what has been done?
This is a slab on grade building.

Answer # 77 Master shall be responsible

The wiring can remain as long as it meets NEC & SPS 316 minimum codes. You are correct that a Master electrician shall be responsible for the installation. Getting a State of Wisconsin Master electrician involved would meet the State of Wisconsin Statue requirements outlined in State of Wisconsin Statue 101.862.

Question # 78

My question is regarding placement of a receptacle under an open porch which has only a covered roof and no walls. A receptacle was installed about 18 inches in from the edge of the porch and is under cover of the roof, but also could be subject to a driving rain and thus be a wet location and not a damp location. Is it then a judgement call on the inspectors part to determine a wet or damp location on a porch since NEC 406.9 does not specify a particular distance under the roof which is considered protected ?

Answer # 78 Judgement call based on conditions, NEC 406.9(B), NEC 100

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

Question # 79

We have a large zero step (walk in) shower that has a sink and toilet installed inside the shower. We did not install a receptacle in this application citing 406.9C. The inspector is referencing 210.52(D). They contradict each other and we chose to err on the side of safety by not placing a receptacle in a shower. Even though the code also sees it as a bathroom.

Answer # 79

If the bathroom is in a dwelling occupancy, a receptacle must be installed within 3' of the sink per NEC 210.52(D). The following may also assist: deem the space areas wet/damp or dry based on what indeed is the shower stall space/threshold without a curtain. Try to obtain the area in the room that is considered the shower space/threshold. A test with the shower on may assist in compliance**.**

Question # 80

I met you at the seminar on Wednesday, which I enjoyed. Anyway, I was the one who showed you my wallet sized DSPS credential card (cheaply made), which basically had all the information erased off of it. How do I get a replacement card?

Answer: To receive a replacement card please complete the request form here: :http://165.189.64.111/Documents/Credentialing%20Forms/Trades%20Application%20Forms/fm3168.pdf