Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 12** **December 2016**

Electrical Inspector Positions Available

Do you enjoy a challenge? Have you ever thought about becoming an Electrical Inspector for L&I? The time may be right if you enjoy serving customers and interacting with electrical contractors, electricians, and the public. If you want to help ensure electrical safety in Washington and help licensed electrical contractors and certified electricians by enforcing laws related to the underground electrical economy, this could be just what you are looking for. It is a great job with a great benefit package. Inspectors have a challenging workload inspecting a wide variety of interesting and complex electrical installations. You can get more information and apply for these positions by visiting the ***Find a Job at L&I*** page of our website. Get your resume together and keep watching, as openings will be posted for upcoming positions.

Safety Tip of the Month

In the coming months, be prepared for deteriorating driving conditions. Rain, fog, ice, and snow are on the way. Slow down and increase your following distance to help compensate for decreased traction and visibility. Make sure your windshield wipers work well and wiper fluid is full. To help prepare for winter driving, see the ***Winter Travel*** page on the Washington Department of Transportation website.

2016 Emergency Rule – Temporary Electrician Permits, Canadian Red Seal Electricians

Due to the sharp increase in construction projects in Washington, and shortage of journey level electricians to do the work, the department, acting on advice of the Electrical Board, has filed emergency rule revisions (effective November 21, 2016) which will allow the issuance of temporary permits in lieu of certificates of competency for qualified electricians coming from another state. The law does not allow temporary certificates to be issued for specialty electricians or to those from another country. Under the emergency rule, electricians from other states who have completed an equivalent state regulated four-year journey level electrical apprenticeship program or possess an equivalent journey level electrician certificate obtained by examination in another state and can meet the requirements under ***RCW 19.28.181*** are eligible for a 90 day non-renewable temporary permit allowing them to work in Washington before passing the open-book electrician certification examination. (01) General Electrical contractors wishing to employ temporary electricians must receive permission from the Chief Electrical Inspector using the ***Contractor Application to Employ Temporary Electricians*** form.

All applicants for a temporary electrician permit must complete the ***Combined Application for a Temporary Electrician Permit and Journey Level Electrician Examination*** form and submit documentation of qualifications. The application fee is $124.00, of which $62.00 is nonrefundable after the application is submitted. Along with the completed form, applicants must provide proof of either:

- Completion of an equivalent state regulated four-year journey level electrical apprenticeship program. Submit a notarized letter from the apprenticeship training director or state apprenticeship authority stating that they have completed such a program; or
- Proof of issuance of an equivalent journey level electrician certificate obtained by examination in another state. Submit a notarized letter from a state licensing authority verifying certification and indicating the number of hours of supervised work experience in the electrical construction trade under direct supervision of a licensed electrician. In addition, provide evidence of completion of at least 96 hours of in-class training on the National Electrical Code, basic electrical theory, or the use of Washington's electrical laws and rules.

The emergency rule also allows Canadian Red Seal endorsed journeyperson construction electricians to qualify for the Washington journey level (01) electrician competency examination if they have possessed a Red Seal endorsement for one year. Canadian Red Seal electricians do not qualify for a temporary electrician permit.

The emergency rules will be in effect for 120 days. In the meantime, the department will begin the process to adopt permanent rules for these issues with input from stakeholders and the Electrical Board. See the ***Rule Development*** page of our website for information about this and other proposed rule revisions.

Electrical Fee Increase to be Effective January 1, 2017

The Electrical Program is increasing fees by the fiscal-growth factor of 4.32%, the Office of Financial Management's (OFM) maximum allowable fiscal growth rate for fiscal year 2017. The ***fiscal growth factor*** is based upon OFM's estimated projections for 2017. At the current fee levels, revenues fell short of allotted operating expenses in the Electrical Program in fiscal years 2015 and 2016 and are projected to fall short in fiscal year 2017 if fees are not adjusted to cover costs. A fee increase will help to ensure the program's revenues match expenditures; otherwise, service levels may have to be reduced. The last fiscal-growth increase took effect on June 30, 2012. The ***revised fees*** are posted on the Rule Development page of our website. These fees will take effect for all fee items purchased after 12:00 a.m. January 1, 2017.

WAC 296-46B Rule Revision Proposals – 2017 NEC Adoption

During the month of October, the department accepted proposals for revision of ***WAC 296-46B*** from all electrical stakeholders. In the coming months, the department will be considering these proposals based on advice from the Technical Advisory Committee and the Electrical Board. You can view or download a copy of all proposals and keep up-to-date on this and other rule revisions by visiting the ***Rule Development*** page of our website.

Invitation to a Stakeholder Meeting Near You

I am holding 18 electrical stakeholder meetings in various locations across the state between January 24 and April 5, 2017. These meetings are an opportunity to talk in an informal setting. Check the schedule below and attend a meeting near you. I want to hear how we can better serve you, our customers and help you stay informed of any changes that might affect you and/or your business. Meetings are scheduled from 6 to 8 p.m. at the locations listed below. Meeting dates and addresses will also be posted on our ***Electrical Calendar*** webpage and distributed on the program email list. If you are not on the email list, you may join at our ***Electrical Email List*** webpage.

Spring 2017 Stakeholder Meetings 6 – 8 p.m.	
January 24 – Aberdeen – ***L&I Building*** 415 West Wishkah Street, Suite B	**March 8 – Everett** – ***Snohomish County PUD*** Commission Meeting Room 2320 California Street
January 25 – Tumwater – ***L&I Auditorium*** 7273 Linderson Way Southwest	**March 9 – Tukwila** – ***L&I Building*** 12806 Gateway Drive South
February 7 – Longview – ***Cowlitz PUD*** meeting room, 961 12th Avenue	**March 21 – Pullman** – ***Gladish Community and Cultural Center,*** Oscars Room, 115 NW State St.
February 8 – White Salmon – ***White Salmon Valley Community Library*** – 77 NE Wauna Avenue	**March 22 – Spokane** – ***Spokane Falls Community College*** 3410 W. Fort George Wright Drive, Bldg 17, Sub Lounges A & B
February 9 – Vancouver – ***L&I Building*** 312 Southeast Stonemill Drive	**March 23 – Moses Lake** – ***L&I Building*** 3001 West Broadway Avenue
February 21– Bremerton – ***L&I Building***, basement 500 Pacific Avenue	**March 29 – Wenatchee** – ***Chelan County PUD*** Auditorium, 327 North Wenatchee Avenue – Parking in back (east) side of building
Februrary 22 – Port Angeles – ***Elwha Klallam Heritage Center***, 401 East First Street	**March 30 – Okanogan** – ***Okanogan PUD*** Auditorium 1331 2nd Ave North
February 23 – Tacoma – ***L&I Building*** 950 Broadway, Orcas Room, 5th floor	**April 4 – Kennewick** – ***Benton PUD*** Auditorium 2721 West 10th Avenue
March 7 – Mount Vernon – ***Northwestern Washington Research and Extension Center*** , 16650 State Route 536	**April 5 – Yakima** – Pacific Power Auditorium 500 Keys Road

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 11** **November 2016**

Exam Question Confidentiality and Cheating

Recently, two separate incidents of cheating on electrical certification examinations have been discovered. In both cases, the exam proctor caught the individuals copying questions. In the latest incident, the individual was taking an 03 pump and irrigation specialty electrician exam for the fourth time. During the investigation, we discovered the contractor who certified his experience has been over-reporting hours, and now his approval for examination is under review. The department takes cheating on an exam very seriously. ***WAC 296-46B-960***(12) and (13) discuss cheating on an examination and question confidentiality. Anyone found cheating on an examination, attempting to bribe a proctor or other agent involved in administering an examination, or using inappropriate materials/equipment during an examination will be required to wait at least eleven months before being allowed to reexamine. All such reexaminations will be administered by the department in Tumwater, and the candidate will be required to apply and schedule for the examination with the chief electrical inspector.

Safety Tip of the Month

A fall from a ladder could kill you or disable you permanently.

- Always use the right ladder for the job. A chair is not a ladder!
- Get help with heavy or long ladders.
- Make certain your footing is solid. If outdoors, check for concealed holes left by moles and gophers. Avoid ice, mud, and other slippery conditions.
- Review the OSHA ladder bulletin at: ***https://www.osha.gov/Publications/OSHA3625.pdf***

Examination candidates and persons who have taken an examination are not allowed to copy or otherwise make note of or share examination content, in any manner. Examination candidates must agree, prior to beginning an examination, to keep all examination content confidential. The department may also file a civil penalty action under chapter 19.28 RCW. The civil penalty for cheating on an examination is $250 for a first time violator.

Information about the open book, multiple choice examinations including materials and equipment that may be taken into the examination can be found in ***WAC 296-46B-960***, and in the ***Exam Information Bulletin*** provided by PSI, the department's exam contractor.

Question of the Month –

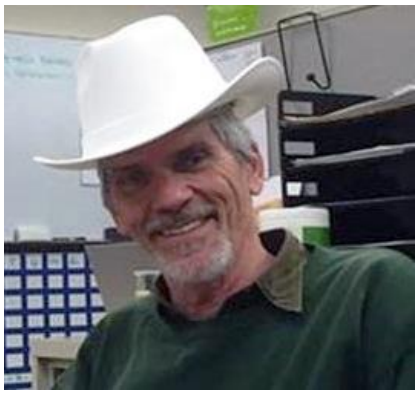
See correct answer on page 2. The picture at right (Click on it to enlarge) was taken by an electrical inspector performing an inspection after a generator load bank test was performed. This is the disconnect and overcurrent protection for the permanently installed generator. Notice the wire in the lower left (red arrow) that is not connected. It runs out the back of the enclosure and connects to the generator frame. How would you determine if this wire should or should not be connected to the grounded conductor terminal bar above it?

Revised Policy For Weatherproof Receptacle Covers on Temporary Construction Services

Effective January 1, 2017, the department will begin enforcing the requirements of 2014 NEC® 590.4(D)(2) for temporary construction services. All 15- and 20-ampere, 125- and 250-volt receptacles installed in a wet location must comply with NEC® 406.9(B)(1), which requires these receptacles to have an enclosure that is weatherproof whether or not the attachment plug cap is inserted. An outlet box hood installed for this purpose shall be listed and shall be identified as "extra duty." All 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles shall be listed weather-resistant type.

This requirement supersedes a department policy established in an Electrical Currents newsletter article from ***July 2004***. When "bubble covers" were first introduced in the 2002 NEC®, the quality of some covers was not good and many temporary power receptacles ended up with no protection from the weather due to broken bubble covers. Substantial improvements have been made, and the requirement for these covers to be identified as "extra duty" will prevent the problem the previous policy sought to correct. When temporary power equipment is relocated, it must be updated to comply with the new requirements.

Electrical Inspector Chuck Paul Passes Away



Sadly, we have lost another friend and co-worker. Chuck Paul, a recently retired Lead Inspector from the Tacoma office, tragically lost his life in a kayak accident in early October. Chuck had just retired in July after 28 years with the department. His passion for the outdoors and his boys shaped an adventurous and exciting life. He was always comfortable and friendly with everyone he met. Chuck was well versed in so many areas because of his avid love of reading and his unquenchable thirst for knowledge. His love and selflessness was felt by all around him. His genuineness in his faith built his Godly character that touched everyone's life. His life was a great example for all of us. Chuck was loved and respected by all who knew him and will be greatly missed. You can leave a comment for Chuck's family and friends at ***http://chuckpaul.com/***.

Manufacturers of Electrical/Telecommunications Products – Limited Exemption

In general, all installation or maintenance of electrical wiring and equipment must be done by licensed electrical contractors and certified electricians. Several exemptions are listed in ***RCW 19.28.091***, ***RCW 19.28.261***, and ***WAC 296-46B-925***. Recently, many questions have been asked about the exemption for manufacturers of electrical or telecommunications products in ***WAC 296-46B-925***(22). This is a very limited exemption allowing manufacturers to utilize the manufacturer's authorized factory-trained technicians to perform initial calibration, testing, adjustment, modification incidental to the startup and checkout of the equipment, or replacement of components within the confines of the specific product, without permit or required licensing provided the product: 1) Has not been previously energized; or 2) Has been recalled by the Consumer Product Safety Commission; or 3) Is within the manufacturer's written warranty period; or 4) The manufacturer is working under the written request and supervision of an appropriately licensed electrical contractor.

Except for the replacement of individual components, as allowed above, this exemption does not include the initial installation, removal, or replacement of the electrical product. Modifications to the equipment, as designated above, must not include any changes to the original intended configuration nor changes or contact with external or field-connected components or wiring.

The intent of this exemption is to allow manufacturers to perform limited startup and checkout of a product, or to replace defective components within the confines of the product under the conditions described above. No installation work may be performed. For example, if a product is assembled in a factory, then dismantled and shipped to the jobsite in pieces, all electrical work associated with putting the pieces together and making the wiring connections between them (even if custom wire harnesses or cable assemblies with connectors are used) is considered installation and must be done by properly licensed electrical contractors and certified electricians. Installation and connection of accessories in or on the product is also an installation and not allowed under this exemption.

Answer to Question of the Month: You would need to look at the transfer switch to determine if the generator is a separately derived system (See Informational Note 1, NEC® 250.30). If the neutral is switched with the phase conductors in the transfer switch, the generator is a separately derived system. It must be grounded in accordance with NEC® 250.30 in the same way a typical transformer is grounded. The wire that is disconnected in the picture would be the system bonding jumper and must be connected to the generator neutral bar, along with a grounding electrode conductor connected to the building electrode system. If the transfer switch has a solidly connected neutral bar (connecting the normal, load, and generator neutrals together), the generator is a non-separately derived system. In this case, the wire in the picture must not be connected to the neutral bar. Doing so would create a parallel path for neutral current and violate NEC® 250.24(A)(5). More information about grounding permanently installed generators can be found in the ***June*** and ***July 2012*** Electrical Currents newsletters.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 10** **October 2016**

Question of the Month – What is the allowable ampacity of four 12-2 with ground nonmetallic-sheathed (Type NM) cables run through a single hole in wood framing that is to be sealed with foam insulation? All cables serve single-phase loads supplied by a 120/240-volt single-phase system. *See correct answer on page 2.*

Submit Rule Revision Proposals and Technical Advisory Committee Applications During October

The Department will accept proposals for revisions to ***WAC 296-46B*** from all stakeholders during the month of October. All proposals must be submitted to the department electronically using the 2017 NEC WAC 296-46B Proposal Form which is available on the ***Rule Development*** page of our website. Follow the instructions on the form for submitting a proposal. All proposals must be received by 11:59 p.m. on October 31, 2016.

During the month of October, you can also apply to serve on the Technical Advisory Committee (TAC). The TAC will meet in December and will review and make recommendations to the department regarding adoption of each proposal. Read the details about how to apply and the various stakeholder groups represented in the ***August 2016 Special Edition*** newsletter.

Safety Tip of the Month

The work of an electrician is very challenging and rewarding. Current knowledge of safe work practices and electrical laws, codes, and rules are essential to maintaining worker safety and ensuring installations meet the minimum requirements for safety to life and property.

Those learning the trade do not have the experience and knowledge required to make safe installation choices and must be supervised throughout their training period. ***RCW 19.28.161***(3) and ***WAC 296-46B-100*** describes proper supervision. Proper supervision consists of the trainee being on the same job site and under the control of an appropriately certified supervising electrician. Lack of proper supervision not only creates potentially hazardous conditions, it is illegal and could result in civil penalties being assessed to the contractor, administrator, and trainee.

Ampacity Correction and Adjustment of Conductors

National Electrical Code® (NEC®) Table 310.15(B)(16) gives the allowable ampacities of insulated conductors based on a temperature rating of 60° C through 90° C, not more than three current-carrying conductors in raceway, cable, or earth (directly buried), and ambient temperature of 30° C (86° F). Many factors must be considered when determining the correct conductor size for a given installation, such as the calculated load, size of the overcurrent protective device protecting it, temperature rating of terminals, number of current-carrying conductors in the raceway or cable, ambient temperature the conductors are installed in, and if nonmetallic-sheathed cables are bundled together for more than 24 inches or installed through holes in wood framing that will be sealed with thermal insulation, caulk, or sealing foam, etc. Before selecting a conductor size, purchasing, and installing the conductors, make sure you have reviewed and applied all applicable NEC® requirements for determining the proper ampacity of the conductors. Apply ambient temperature correction and other adjustment factors in accordance with NEC 310.15(B)(2) and (3).

The rated ampacity of a conductor can be used for correction and adjustment as long as the final ampacity does not exceed the temperature rating of the termination in accordance with the provisions of 110.14(C). See the example in this edition's question of the month. The ampacity of NM cables must be derated because there are 8 current-carrying conductors installed in the same hole in wood framing that is to be sealed with foam insulation. The ampacity of the 12-2 NM cables is 30 amperes based on the 90° C column of table 310.15(B)(16). This ampacity may be used as the starting point, but the final adjusted ampacity cannot exceed that of the 60° column ampacity of 20 amperes. The overcurrent protective device must be sized in accordance with NEC 240.4. In the example, if one more cable were installed, the adjustment factor would be 50%, reducing the ampacity of all cables to 15 amperes and requiring them to be protected by 15A breakers.

Plug-in Household Appliances

RCW 19.28.006(9) exempts plug-in appliances from all the requirements of chapter 19.28 RCW (e.g., licensing, certification, permitting, inspection, etc.). For this exemption, appliances are limited, by the definition in WAC 296-46B-100 to household appliances. For any other appliance (e.g., hard wired household appliances, and all non-household appliances), all the requirements of chapter 19.28 RCW apply.

There is another exemption in WAC 296-46B-925(10) from licensing and certification requirements for the installation of plug and cord connected utilization equipment (other than plug-in household appliances which are completely exempt). This exemption allows the first-time, new installation of plug and cord connected utilization equipment. The plug and cord must be a single listed unit consisting of a molded plug and cord and not exceeding 250 volts 60 amperes single-phase. The plug and cord can be field installed per the manufacturer's instructions and the product listing requirements. The utilization equipment must be a single manufactured unit, including the plug and cord, that does not require any electrical field assembly except for the installation of the plug and cord and is allowed to be plug and cord connected by the NEC. Firms who perform field electrical servicing, maintenance, or repairing of plug-in equipment or appliances (except plug-in household appliances) are not included in this exemption. The last sentence of WAC 296-46B-925(10) contains an error by mentioning household appliances. This error will be corrected during the upcoming WAC 296-46B revision cycle.

For more information, see the ***Appliance Installation & Repair*** page of our website.

Lightning Protection Systems

To install Lightning Protection Systems without being a licensed electrical contractor, you must be a registered general contractor under chapter 18.27 RCW. If you are not a licensed (01) electrical contractor, the only electrical equipment or conductors you may install are the conductors detailed in ***NFPA 780*** – Standard for the Installation of Lightning Protection Systems. You may make the required (NEC® 250.106) inter-system bonding connections to building structural steel, reinforcing steel in concrete encased electrodes, metallic piping systems, and premises made electrodes of rods, pipes or plates.

You may not install any of the required components of the premises grounding electrode system or terminate the lightning protection system conductors on any electrical system equipment enclosures, boxes, or raceways. You may not terminate the lightning protection system conductors on the premises grounding electrode conductor. Any termination of lightning protection system conductors on a premises grounding electrode conductor must be done by an electrical contractor. The electrical contractor doing the termination work is responsible for permitting and inspection of this connection. Other than the connection to the premises grounding electrode system, electrical work permits and electrical inspection will not be required for the installation of NFPA 780 Lightning Protection Systems.

Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* The wiring terminations for this outdoor luminaire are exposed to the inside of the wall behind the mounting plate for the luminaire creating a potential fire hazard. This is a violation of NEC® 300.15 which says a box or conduit body shall be installed at each conductor splice point, outlet point, switch point, junction point, termination point, or pull point. Also, the luminaire appears to be grounded, but the mounting plate is not creating a potential shock hazard.

Answer to Question of the Month: 20 Amperes. When more than two NM cables containing two or more current-carrying conductors are installed in the same hole in wood framing that is to be sealed with insulation, NEC® 334.80 requires the ampacity of each conductor to be adjusted in accordance with Table 310.15(B)(3)(a). The ampacity of conductors of NM cable is based on the 90° C ampacity column of Table 310.15(B)(16). For #12 conductors rated at 90° C, the ampacity is 30 amperes. Table 310.15(B)(3)(a) requires the ampacity to be derated by 70 percent for this installation based on 8 current-carrying conductors, leaving a corrected ampacity of 21 amperes. This exceeds the 60° ampacity, so the final ampacity is 20 amperes.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 9** **September 2016**

Question of the Month – You are designing a solar photovoltaic (PV) system to be installed on the roof of a single-family home in Yakima. Each mono crystalline PV module is rated 250 watts and has an open-circuit voltage of 37.8 volts DC. The open-circuit voltage temperature coefficients are not supplied with the instructions for the modules. The lowest expected ambient temperature in Yakima is -18 degrees C. What is the maximum number of modules that may be connected in series to form a DC string of the solar array without exceeding the maximum system voltage? *See correct answer on page 2.*

Unity Electric pays $171,000 Fine for Improper Supervision of Electrical Trainees

A Shoreline firm recently paid a $171,000 fine for performing electrical work using inexperienced trainees without proper supervision.

L&I investigated Unity Electric from May to October 2015. Through onsite visits and reviews of project records, state investigators found more than 300 instances of Unity having inexperienced, improperly supervised employees performing electrical work.

The work took place on an eight-story multi-use structure in Seattle and an assisted living retirement community in Ballard, among other buildings. The company underbid other contractors in 2015 for about $5.4 million worth of electrical projects.

Improper electrical installations can lead to fires and other hazards. State law requires certified electricians to supervise trainees, usually on a one-to-one basis. With Unity, there were up to five trainees working under a single certified electrician. Unity paid the fine earlier this year using a credit card.

Investigators with L&I's Electrical Compliance, Outreach, Regulation and Education (ECORE) team handled the case, which was the largest the team has investigated in terms of number of citations and total fines. The state Legislature created the ECORE team 10 years ago to ensure those doing electrical work are adequately trained and licensed.

To report concerns about improper trainee supervision or other electrical law violations, visit our website at ***www.Lni.wa.gov/Electrical***, and click on "Violators". You can also contact an electrical inspector at your local ***L&I office***. To find out whether a contractor is licensed, has an up-to-date workers' comp account, or see if they have any safety violations pending, go to ***www.Lni.wa.gov/Verify***.

Safety Tip of the Month

Why we do what we do:

Faulty electrical wiring causes fires. When you make an electrical installation, your actions can either have great or grave consequences. Thank you to all of the highly skilled, certified professional electricians who install wiring in accordance with all applicable safety codes. Your installation of safe wiring literally saves lives. Unfortunately, not all wiring is installed and maintained safely by skilled craftsmen. Here are links to recent news stories about fires started by improperly installed or maintained electrical wiring:

Moses Lake residence fire
Wenatchee house fire
Aberdeen electrical panel fire
Spokane Valley recessed lighting fire
2013 Colockum Tarps Fire – 126 square miles
Fire started by faulty hot tub wiring

Now is the Time for Code Update Classes Based on the 2017 National Electrical Code®

We are now accepting Code Update course applications for approval based on the 2017 edition of the National Electrical Code® (NEC®). The National Fire Protection Association has published the 2017 version, and copies will be available shortly. If you have completed an approved Code Update course based on the 2014 NEC®, it will count toward your current renewal. If you have not completed a Code Update course, or if you have and want to know more, you should take a course based on the 2017 NEC®. As we approve courses, we periodically update our website. You can find lists of approved Continuing Education and Basic Trainee Classroom Education through our ***Licensing, Exams & Education*** webpage at: ***http://www.lni.wa.gov/TradesLicensing/Electrical/***.

This document may contain hyperlinks to internet web pages. To access this PDF document online, go to:
http://www.ElectricalCurrents.lni.wa.gov

The tentative adoption date for the 2017 NEC® will be in late spring 2017. If you would like to review the 2017 NEC®, a ***free read-only version*** is available on NFPA's website.

Rulemaking to Adopt the 2017 National Electrical Code®

In August, a Special Edition Electrical Currents newsletter was published announcing the rule revision process for adopting the 2017 National Electrical Code®, as well as other changes to update and improve ***WAC 296-46B***. Information is also posted on the ***Electrical Rule Development*** page of our website. During the month of October, the department will accept proposals for revisions from all stakeholders as well as applications to serve on a Technical Advisory Committee. You can find full details in the ***August 2016 Special Edition*** newsletter.

Electrical Fee Increase Proposal and Public Hearing

The Electrical Program is considering amending fees for electrical permits, licenses, and administrative services in WAC 296-46B-***906***, ***909***, and ***911***. The Electrical Program's budget and projected revenue indicate a fee increase is necessary to cover the program's operating expenses and to maintain the current level of service to our customers. The proposal will seek to increase fees by 4.32%, the Office of Financial Management's maximum allowable ***fiscal growth rate factor*** for fiscal year 2017. The electrical fees were last increased July 2012. The proposed fees will be discussed with the Electrical Board and attending stakeholders at the ***Electrical Board meeting*** on October 27, 2016. A public hearing is scheduled for September 30, 2016 at 9 a.m., Room S119 at the ***Tumwater L&I Building***, 7273 Linderson Way SW, Tumwater, WA. For more information, visit the ***Rule Development*** page of our website.

Make Sure You Use the Most Current Version of Forms

Often, due to law or rule changes, or in an effort to continuously improve processes, electrical program forms are updated. Using outdated forms can cause delays because the information on the form may not be correct. The best source for up-to-date forms is our website. Locating a form on our ***Electrical Forms & Publications*** page is quick and easy, especially if you use the keyword search box. You may also obtain current forms from a ***local L&I service location***. If you have a stock of frequently used forms such as permit applications, or affidavits of experience, please verify that they are current before submitting them to the department.

Ugly Picture: Well, I guess they are not that ugly, just a little tired. Congratulations to L&I Electrical Technical Specialists Rod Mutch and Larry Vance on reaching new heights in electrical safety this year. Here, they are pictured in the summit crater of Mount Rainier at about 6 a.m. on June 28. To reach the summit, they used all appropriate industry standard personal protective equipment (PPE) including eye protection, traction enhancement, avalanche beacons, fall restraint, and fall arrest equipment. By the way, no Washington state resources were expended on this mission.

Answer to Question of the Month: 13: NEC® 690.7(C) Maximum system voltage for one- and two-family dwellings is 600 volts. Table 690.7 correction factor for ambient temperature of -18 degrees C is 1.18.

37.8 VDC X 1.18 = 44.6 VDC; 600 ÷ 44.6 = 13.5; Maximum of 13 modules allowed.

If this installation were in Aberdeen, a maximum of 14 modules would be allowed based on a lowest expected ambient temperature of -4 degrees C. You can find the lowest expected ambient temperature (Extreme Annual Mean Minimum Design Dry Bulb Temperature) for your area ***here*** on the ***solarabcs.org*** website.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 8 SE** **August 2016**

SPECIAL EDITION

New 2017 National Electrical Code® and Other Possible WAC Changes

The 2017 edition of the National Electrical Code® (NEC®) was adopted by the National Fire Protection Association in August 2016 and published editions will soon be available. The ***NFPA*** also provides free access on their website. The upcoming rule development process will allow Washington's electrical stakeholders to make recommendations to the department regarding adoption of specific sections of the 2017 NEC® as well as other sections of the Washington Administrative Code (WAC). The department will evaluate proposals and determine the extent of stakeholder support and economic impacts. This rule development process will include possible modification to all sections of ***WAC 296-46B***, excluding the fee schedules of WAC 296-46B-906, 909, and 911.

Keep Informed

There will not be a specific mailing list for this WAC revision process. Special WAC update postings will be maintained using the Electrical Program's ***Electrical Email List***, ***Rule Development*** page of our website, and ***Electrical Currents*** newsletter.

The best way to stay informed of the WAC process and other electrical issues is to join the *Electrical Email List* at: ***http://www.lni.wa.gov/Main/Listservs/Electrical.asp***

The Department Is Seeking Stakeholder Input for Proposed Rule Changes

Any stakeholder in the electrical industry may make proposals for additions and/or revisions to the Washington Administrative Code WAC 296-46B – Electrical Safety Standards, Administration, and Installation electrical rules. Proposals from stakeholders may be submitted from October 1, 2016 through October 31, 2016. Proposal submission guidelines are detailed below.

Rules are developed to aid both stakeholders and the department in clarification or enforcement of the intent of the electrical statute. Technical changes require evidence of a specific problem and substantiation that the proposal will provide a solution for that problem.

The department is responsible for development of all rules. The department will act as the correlating body during the rule development process and may at any time promote rule change as necessary to accommodate statutory change or department policies or procedures.

A sample **Proposal Form for 2017 WAC 296-46B Rule Changes** is shown on page four of this edition. All proposals must be submitted using an electronic MS Word version of this form which is available on our Rule Development page at: ***www.lni.wa.gov/TradesLicensing/Electrical/LawRulePol/RuleDev/default.asp***

Stakeholder proposals **must be received from 12:01 a.m. October 1, 2016 through 11:59 p.m. October 31, 2016**. **Any proposal received before or after these dates will be rejected**. **All proposals must be made electronically** using the form supplied by the department.

The submitter may submit a proposal(s) by:

- Sending the proposal(s) as an email attachment to ***ElectricalWAC@lni.wa.gov***. Please do not attempt to submit early, as this email address will not function until October 1, 2016; or
- Mailing a compact disc containing the proposal(s) to Chief Electrical Inspector, P.O. Box 44460, Olympia, WA, 98504-4460 – must be received by the closing date.

Proposed revisions should include the relevant existing text and should use legislative format. Use underscore to denote wording to be inserted (e.g. inserted wording) and strike-through to denote wording to be deleted (e.g. ~~deleted wording~~).

Proposals not submitted according to these instructions will be rejected.

● Technical Advisory Committee (TAC)

The TAC process has proven to be very valuable in past years. The department will again appoint a General TAC made up of experts and interest group representatives to review and make recommendations on proposals from the electrical industry.

Persons interested in becoming TAC members must submit a letter of interest for specific positions to the Chief Electrical Inspector, by mail at P.O. Box 44460, Olympia, WA, 98504-4460 or by email to ***ElectricalWAC@lni.wa.gov*** **to be received from** October 1, 2016 through October 31, 2016. The letter should show constituency support for the prospective member. Include an email address and daytime phone number for the applicant. All applications will be evaluated to determine that the applicant meets the requirements for the position.

In order to keep the size of the TAC to an efficient and effective number, the committee will be limited to 33 voting members. The TAC makeup will be based on an equitable distribution relative to proportion of involvement within the electrical industry in Washington. TAC membership provides an opportunity for everyone interested in the Electrical Program's WAC development to participate in the process.

If necessary, each successful candidate may have an alternate attend the TAC meeting. There will be no formal alternate assigned by the department. Any TAC member that is absent must notify the Chief Electrical Inspector of the alternate's name one week prior to the TAC meeting. Failure to make the required notification will result in the position being vacant during the meeting.

● The TAC – Process

The TAC will make recommendations on industry proposals and identify proposals that may have an economic impact on other specialties, small businesses, construction costs, or the cost of enforcement. Members who know they will be absent from a TAC meeting should make every effort to send an alternate. The TAC must review and evaluate proposals based on the need:

- To address a critical life/safety need;
- To address a specific state policy/statute;
- To maintain a fair competitive environment;
- To address a unique character of the State; or
- To correct errors and omissions.

The TAC will operate on a majority basis. A majority vote in support of a motion, of members in attendance, will be considered as significant support for the motion made on a specific proposal. The TAC can propose amended language to a proposal. All voting members share an equal vote. The department will consider all TAC recommendations. Public testimony will not be received during the TAC meeting.

● 2017 WAC Revision Process – Proposed Sequence of Events

- **September 2016** – File CR 101 – pre-proposal statement of inquiry.
- **October 1 through October 31, 2016** – Accept proposals from stakeholders to amend or add to the existing WAC.
- **October 1 through October 31, 2016** – Accept applications for TAC.
- **Mid December (possible 2nd day)** –TAC meeting.
- **January 2017** – Electrical Board review and recommendation on proposals.
- **Spring 2017** – File CR 102 –rule filing (opens the official required public comment period).
- **Spring 2017** – Public hearing(s).
- **July 1, 2017** – Effective rule.

General TAC – Membership

Chairperson– Chief Electrical Inspector (non-voting)

2	Electrical Board Members (non-voting)	1	WA Manufacturing Business
1	Training School/Continuing Education Provider	1	Electrical Engineer
1	Electrical Apprenticeship Representative	1	Electrical Testing Laboratory
1	Electrical Manufacturer Representative	1	Utility
2	L&I Inspection (Supervisor & Inspector)	1	General Public Member
2	City Regulator (Supervisor & Inspector)	10	Electricians
1	Plumber (Contractor or Worker)	10	Electrical Contractors

Notes:

- Contractor positions must be filled by a licensed electrical/telecommunications contractor or representative of an electrical contractors' association in Washington representing that specialty.
- Electrician positions must be filled by a certified electrician who is not an owner in an electrical contracting business.
- The AD HOC contractor and electrician positions must be filled by a specialty not otherwise represented on the TAC.
- The plumbing position must be filled by a registered general or plumbing contractor or a representative of a plumber contractor's association in Washington or certified journeyman plumber.

Methodology for Determining the Number of Electrical Contractor and Electrician Members

Active Licenses & Certificates	# of Contractors	% of All Licenses	# of TAC Members	# of Electricians	% of All Certificates	# of TAC Members
01	2,697	53.5%	5	14,480	59.7%	6
02	289	5.7%		1,826	7.5%	
03	119	2.4%		334	1.4%	
03A	50	1.0%		123	0.5%	
04	82	1.6%		195	0.8%	
06	557	11.0%	1	2,474	10.2%	1
06A	662	13.1%	1	2,992	12.3%	1
06B	10	0.2%		122	0.5%	
07	103	2.0%		1,069	4.4%	
07A	15	0.3%		61	0.3%	
07B	57	1.1%		230	0.9%	
07C	0	0.0%		19	0.1%	
07D	44	0.9%		189	0.8%	
07E	7	0.1%		81	0.3%	
09	321	6.4%		N/A	N/A	
10	28	0.6%		57	0.2%	
Ad Hoc Group	1,125	22.3%	3	4,306	17.8%	2
Total	**5,041**		**10**	**24,252**		**10**
Notes:	<10% of Licenses/Certificates joins the Ad Hoc group					
	The Ad Hoc group will be filled on an equitable basis with an emphasis on representation closely following the % of licenses, with an effort to fairly represent the different specialties.					
	Unfilled positions will remain vacant.					

PROPOSAL FORM for 2017 WAC 296-46B Rule Changes

Email to: *mailto:ElectricalWAC@lni.wa.gov*
as an attachment

Mail CD to: Chief Electrical Inspector
Department of Labor & Industries
Electrical Section
PO Box 44460

Olympia, WA 98504-4460

FOR L&I USE ONLY

Specific Rule #:

Date Received:

NOTES:

1. All proposals must be **received from 12:01 a.m. October 1 through 11:59 p.m. October 31, 2016**.
2. Limit each proposal to a single rule section. Use a separate copy for each proposal.
3. **ENTER TEXT ONLY IN THE UN-SHADED SPACES ON THIS DOCUMENT – SAVE AS A NEW FILENAME BEFORE RETURNING**

Date submitted: _____ **Name:** _____

Representing: _____ **Telephone:** _____

Mailing Address: _____

Email Address: _____

1. Proposal: *Include new or revised wording, or identification of wording to be deleted. Proposed text should be in legislative format. Use underscore to denote wording to be inserted (e.g. inserted wording) and strike-through to denote wording to be deleted (e.g. ~~deleted wording~~).*

2. Statement of Problem & Substantiation for Proposal: *Note: State the problem that will be resolved by your proposal and substantiation for your proposal.*

3. Check one: ☐ This proposal is original material ☐ This proposal is not original material

(END OF PROPOSAL)

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 8** **August 2016**

Question of the Month – How many 12-2 with ground nonmetallic-sheathed cables can be installed in an 18 cubic-inch plastic nail-on device box, which will contain a flush-mounted duplex receptacle? *See correct answer on page 2.*

Electrical Board Appointments

In July, Governor Inslee made four appointments to the ***Electrical Board***. Two were existing board members who have agreed to serve for another four-year term. Thank you to John Brickey, who represents city electrical inspection jurisdictions and David Ward, who represents electric utilities, for their previous service and agreeing to serve another term.

Two of the appointments are new to the Electrical Board. Jason Jenkins replaces Rod Belisle in one of three electrician seats on the board. Jason comes to the board with 25 years' experience in the electrical industry. He holds electrician certifications from both Washington and Oregon. Jason is from Kelso, WA and is currently an electrical instructor for the NECA/IBEW Electrical Training Center.

Another new member is Ryan LaMar, representing telecommunications utilities. Ryan replaces Dennis Townsend, and is from Federal Way, WA. Ryan has worked for CenturyLink since 2007 as a Plant Facilities Supervisor, Construction Project Administrator, and Field Support Administrator. He is a graduate of Washington State University (go Cougs), and has served our country in the United States Army since 1999, with a recent tour in Afghanistan.

Special thanks to Rod Belisle and Dennis Townsend for their excellent service to the Electrical Board and Washington's electrical industry.

Safety Tip of the Month

Providing a safe work environment used to focus more on slippery floors and air quality than safe zones and evacuation routes. Unfortunately, today's world forces everyone to prepare for a much more dangerous and increasingly possible event – an active shooter entering our workplaces. The FBI released a report in 2014 revealing that the number of active shooter incidents in the United States increased over 250 percent from 2006 to 2013. Tragically, these events have occurred at an even greater rate over the last two years. With almost 70 percent of these incidents occurring at a business, school or healthcare facility, employers are now realizing that they need to have a plan for how to prepare and respond for these types of events.

The Department of Homeland Security and the city of Houston have created a very powerful, free, six-minute ***video*** on the Run, Hide, Fight approach that is available for training your employees.

Electrical Fee Increase Proposal and Public Hearing

The Electrical Program is considering amending fees for electrical permits, licenses, and administrative services in WAC 296-46B-***906***, ***909***, and ***911***. The Electrical Program's budget and projected revenue indicate a fee increase is necessary to cover the program's operating expenses and to maintain an acceptable level of service to our customers. The proposal will seek to increase fees by 4.32%, the Office of Financial Management's maximum allowable ***fiscal growth rate factor*** for fiscal year 2017. The electrical fees were last increased July 2012.

The ***CR-101*** was filed on July 5, 2016. The next step will be notifying all affected stakeholders of the public hearing and comment process. The proposed fees will be discussed with the Electrical Board and attending stakeholders at the ***Electrical Board meetings*** on July 28, 2016, and October 27, 2016. A public hearing is scheduled for September 30, 2016 at 9 a.m. at the ***Tumwater L&I building***, 7273 Linderson Way SW, Tumwater, WA.

As discussed in last month's newsletter, the department will be announcing a separate rulemaking to adopt the 2017 National Electrical Code. Watch for a special edition newsletter giving details. Information will also be posted on the ***Electrical Rule Development*** page of our website.

Port Angeles Electrical Inspector Mike Anderson Passes Away

The electrical program was saddened with the loss of inspector Mike Anderson. Mike passed away July 8, 2016 at the age of 63. Mike began working for the Department of Labor & Industries in 2001 as an electrical inspector, and proudly served the people of Jefferson and Clallam counties for over fifteen years. Mike was a Navy veteran and wonderful person who demonstrated the perfect balance between being a friend and a co-worker. For those that worked with him he was encouraging and inspiring. Mike was a meticulous craftsman who had a passion for refurbishing classic motorcycles and could often be seen cruising in his vintage Harley Davidson with a huge smile on his face, and his dog in the sidecar. Mike will be greatly missed and everyone here is saddened by his passing. Our thoughts and condolences are with his friends and family during this time.

Electrical Program Accomplishments for Fiscal Year 2016

The electrical program saw an increase in workload for Fiscal Year 2016, which ended June 30, 2016. All areas (permits, inspections, compliance, and licensing) showed increase, which is a reflection of Washington's increasing economic recovery. Here is some data from the last year that demonstrates the amount of work performed by our dedicated staff:

- 144,205 electrical permits were sold (92% online), which is an increase of 14% over last fiscal year.
- 236,422 electrical inspections were made (a 10% increase). 82% of inspections were requested online.
- 2.4 million miles were driven, slightly more (60,000) than last year.
- 43,975 corrections were issued for serious code violations. These represent about half of total corrections and are violations that would result in compliance action and eventual disconnection of power. By far, property owner permits are the most likely to receive serious corrections. At least one serious correction was issued for 50% of property owner inspections, compared to 15% for electrical contractor inspections.
- The economy is improving and our inspection response time went down slightly. For FY16, we responded to approximately 90% of inspections within 48 hours of the date requested. Unfortunately, this means that 23,595 times, customers had to wait more than 48 hours for inspection. Number of inspectors and workload affects response times. Before the economy crashed, we had 144 inspection staff; now we have 124. Restoring positions as the economy recovers will be key to improving our response time.
- The correction reduction initiative realized a 21.8% improvement in the number of corrections written to the group of contractors identified as having the most corrections per inspection the previous fiscal year. These contractors receive a list of their corrections each month and are encouraged to use the information to help their electricians improve the quality of their installations. Typically, 20% of contractors receive 80% of corrections.
- 4,172 citations were issued for the focused underground economy. These violations include failing to obtain electrical permits, unlicensed electrical contractors, or uncertified electricians. This represents a slight decrease from the previous fiscal year's 4,253 citations and may be due to the increased inspection workload.
- The licensing section processed 27,231 licenses (contractor, electrician, and trainee applications and renewals). Almost 100% of these were processed the same day they were received. In addition, 12,957 renewals and trainee certificate applications were processed by customers online.
- Our auditors reviewed affidavits of experience for 1,270,612 electrical trainee and out-of-state experience hours to qualify for electrical certification examinations. Of those, 850,621 were denied. Reasons for denial include inability to verify out-of-state experience, lack of or inactive training certificates, lack of proper supervision (sometimes no certified electricians on staff), inability to verify employment (no legal employment records), lack of electrical permits to verify work performed, and lack of valid contractor licensing.

Answer to Question of the Month: Two 12-2 with ground cables. NEC 314.16: #12 volume allowance per conductor = 2.25 in^3. One duplex receptacle = 4.5 in^3 (double volume allowance). Equipment grounds = 2.25 in^3 (single volume allowance). Two cables = four conductors X 2.25 = 9 in^3. Total volume of conductors, grounds, and receptacle = 15.75 in^3. This leaves 2.25 in^3 which would allow one 12-2 and one 12-3 cable in this box which would bring the total to 18 in^3.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 7** **July 2016**

Question of the Month – You are installing a new feeder to supply eight nonmotor generator arc welders. Each welder is rated 240 volts, single phase, 32 amperes primary, and operated at 50% duty cycle. What is the load in volt-amperes, the minimum size feeder conductors using copper type THWN conductors and the maximum size overcurrent protective device for the feeder? – *See correct answer on page 2.*

Safety Tip of the Month

School's out for summer. Pay attention! Put the phone down and be alert for children, pedestrians, skateboarders, and cyclists. Summer brings many new safety concerns for drivers and pedestrians.

Department to Seek Public Input for Revision of Electrical Rules

In the coming months, the department will be seeking public input regarding proposed changes to ***WAC 296-46B*** Electrical Safety Standards, Administration and Installation. The process of updating the National Electrical Code® is nearly complete. The revisions are posted in a second draft on the National Fire Protection Association's website. If you would like to search the second draft for revisions to specific articles, you may do so on the ***NFPA 70 Revision cycle information*** page of their website. Select "Second Draft Report" and you will be taken to a page where you may log in or create an account. It is free and available to the public. The final version of the 2017 NEC® will be published shortly.

Watch for an announcement in an upcoming edition of the Electrical Currents newsletter with instructions for submitting a proposal, applying to serve on a Technical Advisory Committee (TAC), and a proposed timeline for the rule revision process. Please be thinking about any proposals that you feel would have support of stakeholder groups and improve the electrical rules, remembering the goal of ensuring safe electrical installations for the citizens of Washington. Proposals will not be accepted until the time specified in an upcoming special edition of the newsletter.

Electrical Inspectors Teaching Continuing Education and Basic Trainee Classes

As some may know, the department has had a policy prohibiting L&I electrical inspectors from having outside employment teaching electrical continuing education and basic trainee classes. This policy was put in place to remove any real or perceived conflict of interest. A revision to this policy has been reviewed and approved by the Executive Ethics Board allowing department electrical inspectors to have outside employment as instructors or teachers under certain conditions.

Here are the specific conditions of employment that must be met:

- A third-party training vendor must employ the electrical inspector. Training is provided (advertised, scheduled, etc.) by an entity that exists independently of the instructor. The entity must be a nationally recognized contractor, labor, or electrical industry association; Washington State registered apprenticeship program; or accredited trade school as defined in ***WAC 296-46B-971***.
- Compensation to the inspector for providing instruction must be a flat or hourly rate, not a per-student rate, and must be considered reasonable by industry standards.
- Training materials, sign-in sheets, etc. must include a statement that the instructor is not representing the Department of Labor & Industries.
- Inspectors are prohibited from performing any outside teaching activities using any state-owned or provided transportation, equipment, supplies, or other resources, including printed or electronic resources.
- Inspectors are responsible for notifying their supervisors if a real or potential conflict of interest exists because of their teaching activities.

This is good news for many electrical program stakeholders as well as our inspectors, who will now be able to share their knowledge and provide the training the electrical industry and stakeholders are asking for while continuing to deliver the quality electrical services our customers deserve.

Electric Sign and Luminaire Retrofit Certification Requirements

An article published in the ***May 2016*** Electrical Currents newsletter described the importance of using lighting retrofit kits that have been certified as meeting appropriate electrical product safety standards. The same requirements apply to retrofitting electric signs. Any modification of a listed luminaire or sign must be made using certified (listed or classified) retrofit kits. NEC® 410.6 and 600.3 require all luminaire and sign retrofit kits to be "listed". The NEC® definition of "listed" says, the product must be included on a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

According to Underwriters Laboratories, retrofit kits bearing the "Classified" mark meet the NEC® definition of "Listed". The ***UL White Book*** indicates that classified products do receive follow-up service as an audit of the manufacturing process to ensure the continued compliance of the product and suitability for a specified purpose under conditions described in the classification. The UL "Recognized Component" mark is not acceptable. The White Book specifically states that the Recognized Component mark does not provide evidence of listing or labeling.

As stated in the May 2016 article, all certified (listed or classified) retrofit kits contain manufacturers' installation instructions, which must be followed. Certified kits will include required labeling of the sign or luminaire to alert those working on it in the future of the modifications. Inspectors are finding many retrofits requested for inspection where the manufacturer's instructions are not available for the inspector and the labeling required by those instructions has not been affixed. Help your inspector quickly approve your installation by leaving a copy of the installation instructions behind for them to consult if they have any questions.

Electrical Product Testing Laboratories

RCW 19.28.010 requires all materials, devices, appliances, and equipment under the jurisdiction of the electrical law to be "of a type that conforms to applicable standards or be indicated as acceptable by the established standards of any electrical product testing laboratory which is accredited by the department." The requirement that electrical equipment be manufactured to appropriate safety standards has been in Washington law for over forty years. OSHA and most states have similar requirements. There is a common misconception that products must be "UL listed". This is not quite correct. Underwriters Laboratories, Inc. (UL) is one of twenty-four product-testing laboratories accredited by the department. The ***Product Testing Laboratory*** page of our website lists all of the accredited laboratories. Laboratories are accredited for product listing, field evaluation, or both. Each laboratory has its own mark that they affix to products indicating whether the product has met appropriate electrical safety standards. For those laboratories that OSHA has designated as Nationally Recognized Testing Laboratories (NRTL), marks can be found on OSHA's website ***here***.

Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* Have you ever done this? This electrician was routing a nonmetallic-sheathed cable in a kitchen island cabinet. The energized end of the cable contacted his ring. The circuit breaker tripped immediately. This is a good reminder to make sure the circuit you are working on is in an electrically safe condition and as a precaution remove metal jewelry and watches, and wear protective gloves while doing electrical work.

Answer to Question of the Month: 32,444 volt-amperes, 1/0 copper THWN, 300-ampere overcurrent device. NEC® 630.11(B) and 630.12(B).

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 6** **June 2016**

Question of the Month – You are installing (or inspecting) a 480 volt three-phase service rated at 1600 amperes. The ungrounded supply conductors consist of seven parallel 300 kcmil aluminum XHHW conductors. What is the minimum size copper main bonding jumper required? – *See correct answer on page 2.*

Inspection Results via Email are on the Horizon

In preparation to report inspection results to you quicker, we started collecting email addresses for each online permit at the time of purchase. Providing a valid email address will make electronic notifications possible. We are working on this capability, but do not have a have an exact date when email notifications of inspection results will commence. Updates will be provided in future editions of this newsletter.

Safety Tip of the Month

When installing or using listed electrical equipment, always read and follow the manufacturer's installation instructions. Also, leave a copy of the instructions for the inspector and the owner.

When is Existing Wiring Required to Comply With Current Codes?

Remodeled and repaired structures often involve changing only a portion of the wiring. All previously inspected wiring left untouched and in good condition will be considered acceptable when installed in accordance with the code in force at the time of its initial installation subject to the following considerations:

- The original use and occupancy class of the building or structure remains unchanged.
- Structures damaged by fire may require closer examination to determine suitability of the existing wiring. Testing may be required to judge the fitness of the wiring.
    - Over-heated insulation will be brittle and will flake off when slightly bent.
    - A megger test will indicate a lower than acceptable megohm level of resistance.
    - Close examination may reveal physical damage by falling debris.
- Modifications to knob-and-tube wiring must be in accordance with ***WAC 296-46B-394***.
- Load centers will be inspected for overheating, grounding and bonding, and proper overcurrent protection.
- The grounding electrode system must be intact, and for altered services, must meet current requirements.
- There are some specific NEC® requirements for upgrading existing wiring (e.g., 210.12(B) AFCI protection, 406.4(D) receptacle replacements).

As always, inspectors and electricians must use their training and judgment when determining whether or not wiring must be updated.

Delayed 2014 NEC® Photovoltaic Requirements to be Effective July 1, 2016

The delay in implementing NEC® 690.11 Arc-Fault Circuit Protection (Direct Current) and NEC® 690.12 Rapid Shutdown of PV Systems on Buildings was put in place to allow manufacturers additional time to develop and produce listed equipment. As discussed in the ***February 2016*** newsletter, all solar photovoltaic (PV) installations made with electrical work permits obtained on or after July 1, 2016 must comply with NEC® 690.11 and NEC® 690.12.

Implementation of a third requirement for Wire Harness and Exposed Cable Arc-Fault Protection in NEC® 705.12(D)(6) is delayed until further notice. This requirement will likely be removed from the NEC® in the ***2017 edition***.

Rapid Shutdown Requirements for Additions to Existing PV Systems

Many solar photovoltaic (PV) systems have been installed before the rapid shutdown requirements of NEC® 690.12 became effective. The purpose of this article is to establish requirements that apply when part of building's PV system has rapid shutdown capability and part of it does not. The following requirements will be in effect until adoption of the 2017 NEC® as amended by ***WAC 296-46B***.

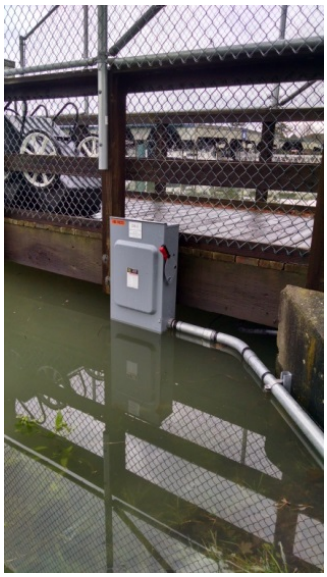
When new PV equipment with rapid shutdown capability is installed on a building that has PV equipment without rapid shutdown capability, the new portion must comply with the rapid shutdown requirements of 690.12. If a building has an existing PV system inspected and approved without rapid shutdown capability, the department will not require the existing portion of the system to be retrofitted with equipment to perform rapid shutdown function. Local building and fire officials may require by ordinance, all PV equipment and conductors on a building to be upgraded with rapid shutdown capability if new PV equipment is added to an existing system that does not have rapid shutdown. In this case, the department will enforce the local jurisdiction's requirements in accordance with WAC ***296-46B-902***(1).

To reduce confusion and provide greater safety for firefighters and property owners, the "PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN" ***identification plate*** required in 2014 NEC® 690.56(C) is only permitted when all PV equipment and conductors installed on a building comply with 690.12. Such an identification plate is not permitted to be installed if a building has one or more existing PV systems not capable of rapid shutdown. When required, this identification plate must be located on or within 3 ft. of the service disconnecting means and, where the service disconnect and meter are not grouped in the same location, an additional plate must be installed on or within 3 ft. of the utility metering equipment. Rapid shutdown can be initiated either by loss of utility power, or by installation of one or more initiation switches. The identification plate must also identify if loss of utility power initiates rapid shutdown, and the location of all rapid shutdown initiation switches if not at the same location. For one- and two-family dwellings, rapid shutdown initiation switches, when installed, must be in a readily accessible location outside the building. Identification plates for rapid shutdown initiation switches must be reflective, with all letters capitalized and having a minimum height of 3/8 inch, in white on red background. For switches on buildings in which all of the PV equipment has rapid shutdown capability, each switch must be labeled: "RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM. TURN SWITCH TO "OFF" POSITION TO SHUT DOWN CONDUCTORS LEAVING THE ARRAY". When all PV equipment and conductors on a building do not have rapid shutdown capability, all switches must have an identification plate within 3 ft. of the switch location stating: "RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM. DANGER: PARTIAL SHUTDOWN ONLY! SOME PV WIRING AND EQUIPMENT WILL REMAIN ENERGIZED WITH SWITCH IN "OFF" POSITION". The words "DANGER: PARTIAL SHUTDOWN ONLY!" must be on a separate line using letters having a minimum height of ½ inch.

Fees for After-Hours Inspections

Occasionally, a customer requires an inspection outside the normal business hours of 7:30 a.m. to 4:00 p.m., Monday through Friday. Such inspections must be pre-arranged with the local inspection field supervisor. For inspections outside of normal business hours, fees apply in addition to regular permit fees. If an after-hours inspection is pre-arranged 24 or more hours (before noon of the previous working day) in advance, the fee for the inspection will be the portal-to-portal hourly rate specified in ***WAC 296-46B-906***(11) in addition to the regular permit fee. For Inspections where the department has not been given at least 24 hours' notice, the fee will be the portal-to-portal fee plus the after-hours surcharge of WAC 296-46B-906(5)(f) (currently $113.70), plus the regular permit fee. These fees are not available online and must be paid at a service location, or as a fee due issued by an inspector.

The exception to this rule is for temporary stage or concert inspections only, which will be the greater of the permit fee from WAC 296-46B-906(3), or the portal-to-portal hourly fee; in addition to the short-notice surcharge if applicable.



Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* This disconnect switch is attached to a fixed pier. NEC 555.9 requires all electrical connections to be located at least 12 inches above the deck of a fixed pier but not below the electrical datum plane as defined in 555.2.

Answer to Question of the Month: 4/0 Copper. NEC® Table 250.102(C)(1) including Notes 1 and 2; Table 310.15(B)(16); Chapter 9, Table 8. 7 X 300 kcmil aluminum = 2100 kcmil total aluminum supply conductor area. Ampacity of 300 kcmil aluminum 75° supply conductors = ampacity of 4/0 copper 75° supply conductors (both are 230 amperes). 4/0 copper = 211.6 kcmil (Chapter 9, Table 8). 7 X 211.6 kcmil = 1481.2 kcmil total copper supply conductor area. Per notes 1 and 2, 1481.2 kcmil X 12.5% = 185.15 kcmil. Next higher conductor size = 4/0 copper main bonding jumper.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 5** **May 2016**

Question of the Month – What is the minimum size copper nonmetallic-sheathed cable required for the branch circuit, and the maximum overcurrent protection size to protect a single electric water heater rated 3800 watts at 240 volts? (Overcurrent protection rating is not marked on the appliance) *– See correct answer on page 2.*

Safety Tip of the Month

Prevent Heat Related Illness:

- Drink lots of water, about 1 cup every 15 minutes.
- Know the signs/symptoms of heat-related illness; monitor yourself and co-workers.
- Block out direct sun or other heat sources.
- Use cooling fans/air-conditioning; rest regularly.
- Wear lightweight, light colored, loose-fitting clothes.
- Avoid alcohol, caffeinated drinks, or heavy meals.

Administrator Suspended for Continuous Noncompliance

At the April 28 meeting of the ***Electrical Board***, the board upheld the department's decision to suspend the (01) General Electrical Administrator certificate of Vladislov Razumovich for two years for repeated, continuous non-compliance with the electrical laws and rules of Washington. Mr. Razumovich had been the assigned administrator for several different electrical contracting businesses. He was warned twice, and cited twelve times, for 104 separate incidents during a three-year period. Mr. Razumovich was also cited for being an absentee administrator. These violations occurred in multiple regions of the state and were issued by ten different electrical inspectors. While Mr. Razumovich was serving as the electrical administrator for these companies, he was a full-time employee for another contracting business.

The electrical administrator is the responsible person for an electrical contracting business to ensure all electrical work complies with the laws and rules of Washington. This is a very important position and requires a person to be a full-time supervisory employee or member of the firm and be available during business hours to carry out the duties described in ***RCW 19.28.061***.

UL Warns of Potential Hazards from Improper Installation of Lighting Retrofit Kits

Advances in lighting technology have resulted in many building owners seeking to realize significant savings by upgrading their existing incandescent or magnetic ballast-driven lighting systems to newer electronic and light-emitting diode (LED) lighting. Converting incandescent, fluorescent, or high-intensity discharge luminaires to LED technology typically involves re-wiring a listed luminaire and installing a new LED power supply or driver. Lighting retrofit work is not exempt from permit and inspection requirements. Many options exist for installers to perform this work and inspectors have been encountering upgrades to lighting systems that are performed using products that are not certified as meeting applicable product safety standards. Improperly installed lighting retrofits using un-certified products can cause significant risk of fire or shock hazard. 2014 National Electrical Code® article 410.6 requires all luminaires, lampholders, and retrofit kits to be listed. Listed retrofit kits will contain manufacturers installation instructions that must be followed, which will include required labeling of the luminaire to alert those working on it in the future of the modifications. Underwriters Laboratories urges those installing a lighting retrofit to use only retrofit kits that have been certified by a third-party ***testing laboratory*** and follow the accompanying installation instructions. You can verify UL Certified lighting retrofit kits on ul.com at ***http://iq.ul.com/ssl/*** and selecting LED Retrofit Kits from the product category pull-down. You can find more detailed information about retrofits and retrofit safety at ***http://industries.ul.com/lighting/retrofit-kits***.

Fees for Photovoltaic Systems

Photovoltaic (PV) systems are generators, but the terms the NEC® uses to describe PV system wiring can make applying the fee schedule in WAC ***296-46B-906*** somewhat confusing. The purpose of this article is to relate the fee schedule to the wiring of common PV systems so everyone can properly determine fees. For permanently installed generators (PV systems), refer to the appropriate residential or commercial new/altered service or feeder section.

- When outputs of micro-inverters are combined into a common output circuit, that circuit is counted as one feeder. When it is the largest feeder in the system being installed, this largest feeder is counted as a first feeder (full price column), even if less than 30 amps. If all are equal in size, one of them must be counted as a first feeder (full price column). In this scenario, additional combined micro-inverter output circuits count as additional feeders (reduced price column).
- When micro-inverters are not used, if the largest ampacity is the output of your inverter(s), the output rating of the largest inverter determines what the largest first feeder size is. This largest feeder is counted as a first feeder (full price column), even if less than 30 amps. If all inverters are equal in size, one of them must be counted as a first feeder (full price column). In this scenario, additional inverters count as additional feeders (reduced price column).

Examples:

- For single, two-family or multi-family dwellings with three inverters with an output rating from 0 to 200 amperes connected to an existing service: the current fee for the PV system will be $155.20 (i.e. $97.40 for the first inverter and $28.90 for each of the two remaining inverters).
- For a nonresidential PV system with three inverters with each having an output rating from 0 to 100 amperes connected to an existing service: the current fee for the PV system will be $216.40 (i.e. $97.40 for the first inverter and $59.50 for each of the two remaining inverters).

Other considerations: When another feeder, rated 30 amperes or larger, is created on the input or output side of an inverter because of a need to combine things for some reason (e.g., DC combiner panel or new panel to combine inverter outputs), it must be counted. Storage battery systems must be counted as a feeder fee based on the size of the overcurrent device protecting the battery conductors. There will be no additional charge for disconnect switches; including utility required AC disconnect switches regardless of overcurrent protection if present. The surcharge for over 600 volts does not apply to the DC side of PV systems. If such systems are present, low voltage or telecommunications fees (Class B eligible) may apply (rapid shutdown control wiring, etc.).

Class B Labels are not Valid for Work in Factory Assembled Structures

All electrical wiring performed within or attached to a factory assembled structure (FAS), such as a mobile or manufactured home, must be permitted and inspected by L&I's FAS division. Some electrical contractors, especially those installing low-voltage thermostat systems are validating and affixing Class B labels to new or replacement HVAC units in mobile and manufactured homes. This is not required, as the FAS alteration permit covers all wiring required in this situation. You can find information about FAS permits and inspection requirements on the ***Manufactured or Mobile Homes Permits & Inspections*** page of our website.

WAC 296-46B-550 describes permit requirements for various work associated with mobile or manufactured homes. Generally, if the circuit or feeder originates from the mobile/manufactured home's electrical panel and feeds an addition or equipment that is attached (e.g., garage, heat pump or air conditioning unit) it requires an FAS alteration permit and not an electrical permit from the electrical program.

All on-site electrical wiring associated with FAS structures must be performed by properly licensed electrical contractors and certified electricians.

Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* The renter of this property had an illegal marijuana growing operation located in a detached outbuilding. It is suspected, but not known if the unpermitted wiring contributed to the fire. The house used for drying and processing, including butane honey oil extraction, was not affected. The property owner purchased a permit and requested an inspection so power could be restored to the house. The renter will not be available for comment for many years.

Answer to Question of the Month: #10 AWG, and 25 amperes. WAC 296-46B-422, and NEC® 422.11(E)

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 4** **April 2016**

Question of the Month – What amount of electrical current flowing through a person's body will cause loss of muscle control? – *See correct answer on page 2.*

Legislative Update

The ***February 2016*** newsletter contained a list of bills the legislature has been considering that may affect the electrical program.

After various deadlines for passage, the only bill remaining is ***House Bill 2886.*** This bill allows the department to alter work scopes of three specialties that are partially or entirely defined in the law. It passed both the House and Senate and is currently awaiting the governor's signature.

Safety Tip of the Month

Do not allow yourself or anyone else to swim near a dock or marina where electrical power is present. Stray leakage current in the water can paralyze or kill.

If you must enter the water to work on a boat or dock, turn off and lock out all sources of electricity first.

Two Solar Photovoltaic Requirements to be Effective July 1, 2016

As discussed in the ***February 2016*** newsletter, two important National Electrical Code® (NEC®) safety requirements for solar photovoltaic (PV) systems will be implemented July 1, 2016. The two requirements are NEC® 690.11 Arc-Fault Circuit Protection (Direct Current) and NEC® 690.12 Rapid Shutdown of PV Systems on Buildings. Implementation of a third requirement for Wire Harness and Exposed Cable Arc-Fault Protection in NEC® 705.12(D)(6) is delayed until further notice. There is a proposal to remove this requirement from the NEC® in the 2017 edition.

All solar photovoltaic (PV) installations made with electrical work permits obtained on or after July 1, 2016 must comply with NEC® 690.11 and NEC® 690.12. If you would like to comment on the implementation of these requirements, you may email the Electrical Program at ***ElectricalProgram@lni.wa.gov***, attention: Rod Mutch.

Electric Shock Drowning - Ground-Fault Protection of Marinas and Floating Buildings

Damaged cables at a marina

Every year, people die while swimming or falling in the water around docks and boats which have electric shore power connected to them. Many of these deaths are attributed simply to drowning, but in some cases, Electric Shock Drowning (ESD) is the culprit. ESD is a phenomena caused by a fault in the wiring system supplying power to a marina, boat, or floating building being transmitted into the body of someone in the water. Energized metal parts of boats and voltage gradients in the water cause current to flow through the person's body and paralyze them resulting in the inability to swim. Sometimes, the tragedy is compounded due to a person trying to rescue the first victim becoming another victim. Many major boating publications such as ***Boating Magazine***, ***Boat U.S.***, and ***Yachting***, contain articles of recent tragedies involving ESD. The National Fire Protection Association (NFPA) journal contains a recent article entitled ***Troubled Waters*** which discusses this issue.

There is a difference in hazard between freshwater and saltwater. Saltwater is more conductive than freshwater. When a person is in saltwater, voltage gradients are much smaller, causing less current flow through a person's body. There are fewer cases of electric shock drowning in saltwater. However, if a person in saltwater contacts an energized boat or metal dock part, there is a high electrocution hazard. Because freshwater is less conductive, voltage gradients are much higher causing greater current flow through a person's body and electric shock drowning is the greater hazard.

To address this growing problem, in 2011, new requirements appeared in National Electrical Code® (NEC®) 555.3, Marinas and Boatyards, and 553.4, Floating Buildings, requiring ground-fault protection. The main overcurrent protective device that feeds the marina or floating structure shall have ground-fault protection not exceeding 100 mA. Ground-fault protection of each individual branch or feeder circuit shall be permitted as a suitable alternative. This requirement will probably be expanded when the 2017 NEC® is published this fall. A proposal contained in the First Draft for 555.3 reads: "The overcurrent protective devices that supply the marina, boat yards, and noncommercial docking facilities shall have ground-fault protection not exceeding 30 mA".

These requirements are currently in effect, but questions have been asked about application of the rules regarding alterations to a portion of the wiring system supplying marinas and floating buildings. Where a portion of the wiring system is extended or new feeders or branch circuits are added to an existing system, the ground-fault requirements of NEC® 553.4 and 555.3 will only be required for the new or extended feeders or circuits. The department will not require the main overcurrent protective device to have ground-fault protection in this case. Any alterations to the main overcurrent protective device will require it to have ground-fault protection not exceeding 100 mA.

Any changes to these requirements resulting from the adoption of the 2017 NEC® will be addressed during the rulemaking period next year prior to adoption of the new code.

Third-Party Evaluation Is Required For Unlisted Electrical Equipment

In order to meet the minimum electrical safety standards for installations, all materials, devices, appliances, and equipment, not exempted in chapter 19.28 RCW, must conform to applicable electrical product standards recognized by the department, be listed, field evaluated, or in specific cases, engineer reviewed. See ***WAC 296-46B-903***(5) and (6) for eligible industrial utilization equipment and details of the engineering review process.

Unless built with all listed components and wired in accordance with the National Electrical Code®, the electrical inspector can only approve equipment for use if it meets the one of the following third-party identification criteria:

- It arrives on the job site listed and identified with the certification mark of an L&I approved electrical products testing laboratory. The mark will identify the appropriate product category for the equipment. There may be listed individual components within the assembly but they are only a part of the product.
- Field evaluated with a field evaluation label applied by an L&I approved electrical testing lab.
- For industrial control panels and industrial utilization equipment only, Engineer Evaluated with the engineering evaluation label applied by an L&I approved engineer.

A third-party evaluator can have no organizational, managerial, financial, design, or promotional affiliation with manufacturers, suppliers, installers, or vendors of products covered under its certification or evaluation programs. Only laboratories or engineers approved by the department are allowed to perform field or engineering evaluations. "Approved" means the evaluator has met the requirements of WAC 296-46B-***997***, or ***999***, and is authorized by the department to evaluate electrical products that are installed in Washington.

You can find information about accredited electrical product testing laboratories and approved engineers at the following links to our website: ***Product Testing Laboratories,*** or ***Approved Engineers***.

Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* Electrical equipment and conductors must be protected from overcurrent in accordance with the rating of the equipment and ampacity of the conductor. This dangerous installation was made by someone without regard for the safety of those who may come in contact with this equipment in the future. They also have little regard for their electrical certificate of competency.

Answer to Question of the Month: Depending on the person, painful shock and loss of muscular control can happen at current levels of between 6 milliamperes and 30 milliamperes. For more information, see the ***Controlling Electrical Hazards*** page of OSHA's website.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 3** **March 2016**

Question of the Month – Calculation of loads in accordance with the National Electrical Code (NEC®) requires knowledge of the amount of power consumed by the circuits, feeders, and service. Power is expressed in volt-amperes or watts. How many volt-amperes are drawn by the following (assume 100 percent power factor). – *See correct answers on page 2.*

1) 4.5 kilowatt (kW), 240-volt single-phase water heater.
2) 10 ampere, 120-volt single-phase dishwasher.
3) 5 horsepower, 460-volt three-phase air compressor.

Safety Tip of the Month

- Keep power cords clear of tools during use.
- Suspend power cords over aisles and work areas to eliminate stumbling, or tripping hazards or damage to cords.
- Do not carry electrical tools by the power cord.
- Do not tie power cords in tight knots. Knots can cause short circuits and shocks.

Legislative Update

As discussed in the ***February 2016*** newsletter, the legislature has been considering several bills that may affect the electrical program. Only two of those bills passed the first ***cutoff date*** and continued on for further consideration. Of those, only one passed the second cutoff date and is still alive.

Engrossed House Bill 1590, which would require completion of an apprenticeship to be eligible for examination for an (01) general journey level or (02) residential certificate of competency passed the House on February 16 and was referred to the Senate Committee on Commerce and Labor. A hearing was conducted on February 26, and the Committee did not pass the bill on for further consideration. The only bill still available for consideration is ***House Bill 2886***, which deals with allowing the department to alter work scopes of three specialties, which are partially or entirely defined in the law. This bill passed the House on February 16. On February 26, the Senate Committee on Commerce and Labor sent the bill on to the Senate Rules Committee for further consideration.

Happy Tenth Anniversary to the E-CORE Team

Congratulations to Faith Jeffrey and the Electrical Compliance, Outreach, Regulation and Education (E-CORE) team for ten years of successful work in reducing the effects of the underground economy on legitimate electrical contractors and electricians. The team has focused their efforts on contractors' concerns with the underground economy (i.e., unlicensed electrical contractors, uncertified electricians, and those who fail to get electrical permits).

The E-CORE team was created in 2005 with legislative approval, in large part, due to a successful pilot program led by Jim Hinrichs. The SAFES (Strategic Action for Electrical Safety) team consisted of Jim and three inspectors focused on reducing the effects of the underground economy and increasing the public's awareness about the dangers of electricity and the importance of using qualified licensed electrical contractors to do electrical work. SAFES operated as a team across the state and coordinated with local inspectors and city jurisdictions to achieve the maximum effectiveness. After a successful six-month pilot of the SAFES team, the legislature approved funding for a three person E-CORE team which became operational in early 2006. In their ten years of hard work, the E-CORE team has issued almost 16,000 warnings and citations for focused underground economy violations. In addition, team members provide training to electrical inspectors, and outreach to various groups of electrical program stakeholders.

Thank you and congratulations to those who have been a part of this successful effort over the years: Jim Hinrichs, SAFES team Supervisor, and SAFES team members Michael Cerfus, Steve Freund, and David Myers; Faith Jeffrey, E-CORE and Audit Manager, and current and former E-CORE team members Tony Bierward, Charlie Brinkmeyer, Emilio Castro, Ken Copeland, Rand Jones, Phil Jordan (the only original member still on the team), Bob Judson, Mark Leon, Darin Lyon, Bob Matson, Chuck Murray, Jack Oxford, Clinton Quinn, Alexis Reed, and Jeff Robertson. Also, special thanks to Ron Fuller, former Chief Electrical Inspector who was instrumental in the establishment of the SAFES and E-CORE teams.

Because of their proven success, today's E-CORE team has expanded and now consists of six dedicated full-time members. Compliance efforts of our 113 electrical inspectors has been enhanced because of training provided by members of the E-CORE team. If you would like to help reduce the effects of the underground economy, you can report electrical law violations to your local electrical inspection office or the nearest E-CORE team member. For more information, visit the ***Report Electrical Law Violations*** page of our website.

2017 National Electrical Code® Update

The process of updating the National Electrical Code® is nearly complete. The National Fire Protection Association (NFPA) received 4,012 public inputs (proposals) recommending changes to the 2014 NEC®. Of those, the nineteen Code-Making panels recommended 1,235 revisions. These revisions were posted in a First Draft of the 2017 NEC®. A summary of some of the notable revisions was published in the International Association of Electrical Inspectors (IAEI) magazine. Here are links to ***Part 1*** and ***Part 2***. If you would like to search the first draft for revisions to specific articles, you may do so on the ***NFPA 70 Revision cycle information*** page of NFPA's website. Select "First Draft" and you will be taken to a page where you may log in or create an account. It is free and available to the public. Soon, a second draft will be posted which will include the final responses to public comments regarding changes in the first draft.

Sometime this fall, the 2017 NEC® will be published. We will provide updates through this newsletter about the rule revision process necessary to adopt it and any proposed revisions to the electrical rules. During the rule revision process, proposals will be solicited. This is an open process where anyone can participate. All proposals are considered. Before recommending adoption, we get advice from a technical advisory committee and the Electrical Board. Before adopting any proposals, a public hearing is held so everyone has an opportunity to provide input.

590.4(J) Support of Temporary Branch Circuit and Feeder Cords and Cables

The requirements for support of cable assemblies and flexible cords and cables used as branch circuits and feeders were amended in the 2014 NEC®. If flexible cords and cables are used as branch circuits or feeders, they shall not be installed on the floor or on the ground. Extension cords shall not be required to comply with 590.4(J). This change aligns the NEC® requirements for temporary wiring installations with the current OSHA requirements in ***29 CFR 1926.405(a)(2)(ii)(b)***.

The substantiation presented, which was accepted by the Code-Making Panel (CMP) for this proposal said: "*It is common to see temporary wiring run on the floor and on the ground in construction sites. This is a very dangerous practice. We have seen cable assemblies laying on the ground damaged by construction activity. This is a real shock hazard for construction workers and anyone else in the work area. Construction locations are almost always wet locations. Until a roof is installed and windows are finished the entire site becomes a wet location during and for days after a rainfall. The rules in 590.6 for GFCI provide excellent protection for workers utilizing cord and plug connected tools, but they only protect us on the load side of the outlet. There is no GFCI protection on the feeder or branch circuit. The OSHA standards for construction do not allow them to be run on the floor or ground in 1926.405(a) (2)(ii)(b). Temporary wiring is always looked upon as being a "class less than" and due to the brief length of time it is installed and the placement of cords and cable assemblies on the floor or ground is permitted. Extension cords on the ground or floor are "extensions" of the branch circuit and are permitted on the floor or ground because they are GFCI protected.*"

The department has not amended this requirement. Flexible cords and cables used as branch circuits or feeders are not permitted to be installed on the floor or on the ground.

Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* Notice the creative field-fabricated hold-down device. Its present location looks like the second attempt at installation. In addition, the circuit breakers are from three different manufacturers. You can find useful information about panelboard installation in UL's ***Panelboard Marking and Application Guide***. See section 15 on page 20, regarding circuit breaker compatibility.

Answer to Question of the Month: 1) 4500 volt-amperes (4.5 kW X 1000 W/kW X 1.0 p.f.); 2) 1200 volt-amperes (10 amperes X 120 volts); 3) 6,311 volt-amperes (7.6 amperes X 480V X √3) See NEC® Table 430.250 for 3-phase motor full-load current; √ (square root) of 3 = 1.73 (3Ø power formula).

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 2** **February 2016**

Question of the Month – What is the minimum size aluminum SE cable that may be used as a 100-ampere feeder in a single-family dwelling in Yakima, routed through the attic above the level of insulation, and down to a feeder panel in an uninsulated wall. The feeder does not carry the entire load associated with the dwelling. The expected high ambient temperature in the uninsulated attic is 120°F. The cable is marked with a temperature rating of 75°C. – *See correct answer on page 2.*

Safety Tip of the Month

When you are driving, nothing is more important than driving. Give your full attention to the road and do not let yourself be distracted by anything. A habit of allowing yourself to be distracted will end in tragedy.

Legislative Updates 2016

If you are a part of the electrical or telecommunications sectors regulated by L&I, lawmakers are considering several bills this legislative session that may affect you. The first four bills are new this session. The others were introduced last session and are still available for the legislature to consider. None of this legislation is sponsored by L&I.

Take this opportunity to review the bills and comment if you desire. A comment button is located to the right of the bill number on each webpage hyperlinked below. You may also contact your legislator to share your opinion about any legislation by visiting the legislative website at: ***http://www.leg.wa.gov/LIC/Pages/hotline.aspx***.

1. ***House Bill 2810*** – Requires the department of L&I to adopt the non-administrative portion of the electrical rules through a process in which the department, the Washington cities electrical committee, and the technical advisory committee have an equal vote in the adoption of the rules.
2. ***House Bill 2548*** – Provides a further reduction in the amount of appeal bond required to appeal a penalty issued by the department beyond the reduction implemented by the passage of ***2014 Substitute House Bill 2146***.
3. ***Senate Bill 6085*** – Creates an exemption from the electrical contracting, worker certification, and permit & inspection laws for work in connection with the installation, reconfiguration, or maintenance of modular electrical systems that are UL-listed for use in commercial furniture.
4. ***House Bill 2886*** – Provides authority to the department to determine by rule electrical scopes-of-work currently defined in electrical law (i.e., (07E) equipment repair, (07C) restricted nonresidential maintenance, and (09) telecommunications specialties).
5. ***House Bill 1315*** – Requires L&I to grant a variance from the allowed scope of work, upon application, to a specialty electrician, a master specialty electrician, or a specialty plumber under certain circumstances.
6. ***House Bill 1375*** – Eliminates special immunities from prosecution for criminal trespass, whether those immunities have been legislatively granted to the government or to private persons or entities. This bill would compromise an inspector's ability to gain access to ensure electrical work complies with state laws and rules, and requires property owners to be present for an electrical inspection, which would significantly reduce the number of inspections that could be performed with current inspection staff.
7. ***House Bill 1590***, ***Senate Bill 6581*** – Requiring completion of an apprenticeship program to receive a journey level or residential specialty electrician certificate of competency. See previous 2014 ***HB 2500***.
8. ***House Bill 1608***, ***Senate Bill 5845*** – Addresses certified HVAC/refrigeration specialty electricians and certified appliance repair specialty electricians concerning replacement of household appliances. See previous 2013 ***SB 5682 - 2013-14*** and ***HB 1760 - 2013-14***.
9. ***House Bill 1609***, ***Senate Bill 5846*** – Exempts from the plumbing and electrical statutes, minor or incidental work that does not require regulation for the protection of public health or safety.

10. ***Senate Bill 5686***, ***House Bill 2081*** – Removes the ability of the Electrical Board to hear appeals of decisions by the Office of Administrative Hearings. Decisions made by an administrative law judge would be a final order.
11. ***Senate Bill 5281*** – Requires L&I to establish a 2000 hour nonresidential security system specialty electrician certificate allowing a trainee to take the examination after 720 hours (or 90 days) of work experience and if successful, work alone installing these systems.
12. ***Senate Bill 5282***, ***House Bill 1876*** – Exempts from licensing requirements, and permit and inspection requirements under chapter 19.28 RCW, persons, firms, partnerships, corporations, and other entities for work limited to certain installations of security system wiring in one- and two-family dwellings.

Two Solar Photovoltaic Requirements to be Effective July 1, 2016

Three important National Electrical Code® (NEC®) safety requirements for solar photovoltaic (PV) systems were previously delayed because of a lack of listed products to meet these requirements in accordance with NEC® 90.4. The delay allowed manufacturers an additional two years to develop and produce listed equipment for implementation of these requirements.

Requirements in NEC® 690.11 Arc-Fault Circuit Protection (Direct Current) and NEC® 690.12 Rapid Shutdown of PV Systems on Buildings are scheduled for implementation in on July 1, 2016. Implementation of the third requirement for Wire Harness and Exposed Cable Arc-Fault Protection in NEC® 705.12(D)(6) is delayed until further notice. This requirement is likely to be removed from the NEC® in the 2017 edition.

All solar photovoltaic (PV) installations made in conjunction with electrical work permits obtained on or after July 1, 2016 must comply with NEC® 690.11 and NEC® 690.12.

If you would like to comment on the implementation of these requirements, you may email the Electrical Program at ***ElectricalProgram@lni.wa.gov***, attention: Rod Mutch.

This Month in History: 2009 and 2010 Electrical Program Staff Reductions

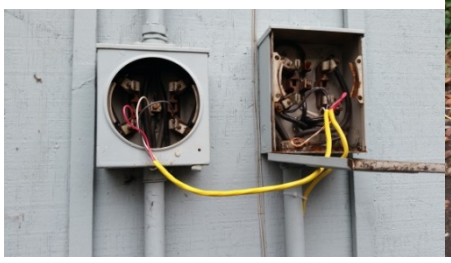
Here is an excerpt from an article from ***February 2010*** that details the effects of the electrical program staff reductions in which 59 positions were cut. In recent years, the program has been able to restore approximately 33 positions that were eliminated, but we know our stakeholders are still feeling the effects of this devastating program reduction.

The nationwide downturn in construction continues to adversely affect the electrical industry in Washington State. Electrical permit sales remain sluggish. As a result, reductions in staffing are again necessary to assure that the electrical program expenditures do not deplete the dedicated electrical fund. Just like our stake holders, the electrical program has to live within their means.

The electrical program continues to seek out and implement every process improvement possible to help us continue to provide high quality service. Just like our stakeholders, our remaining inspectors will have more area to cover after March 31st. You will likely see some changes in our inspection practices and in some instances our ability to quickly respond to inspection requests. Please help us to serve you better by making certain you have:

- *Entered the correct address and posted it plainly at the jobsite.*
- *Entered complete directions on the permit application so we can easily find the jobsite.*
- *Provided a detailed description of the work that was done*
- *Given us any information we might need to gain access on every trip to do your inspection.*
- *Talked directly with your inspector in advance of needing an urgent or scheduled inspection.*
- *Committed to inspection timelines with your customer that we are aware of and able to meet.*

Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* This is a quick, creative, and dangerous way to provide temporary power to a structure using an "other than code-compliant" method. If you choose to make an installation such as this, you are putting everyone on the jobsite, as well as your electrical certificate of competency in jeopardy.



Answer to Question of the Month: 2/0 - Table 310.15(B)(16) gives ampacities based on ambient temperature of 30°C (86°F). Ampacity must be adjusted for the high ambient temperature in the attic per 310.15(B)(2). An ambient temperature of 120°F requires a correction factor of .75 for the 75°C rated cable. 2/0 aluminum, 75°C conductors have an ampacity of 135 amperes. 135 X .75 = 101.25 amperes.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 19 No. 1** **January 2016**

Electrical Board Opportunity

There is an opening on the Electrical Board for the Telecommunications Utility representative. I would like to thank Dennis Townsend for his service to the citizens of Washington in his position on the board. Anyone interested in applying for this position must be an employee or officer of a facilities-based telecommunications service provider regulated by the Washington state utilities and transportation commission. The electrical board meets four times per year and plays a vital role in advising the department on all matters concerning Washington's electrical laws, rules, and policies. You can submit an application using the form on the Governor's ***Boards & Commissions website***. Application must be made using the Governor's form. Send your resume and any additional information you would like considered, such as letters of recommendation in a separate email to the Boards and Commissions mailbox at: ***GovernorBoardsandCommissions@gov.wa.gov***. If you have questions about the position or the Electrical Board, contact Bethany Rivera at 360-902-5249.

Safety Tip of the Month

As an electrical professional, be alert for electrical hazards on the jobsite that may injure or kill unsuspecting co-workers. Never leave an energized electrical panel without a cover. Make sure receptacles used for temporary power are GFCI protected, and be on the lookout for improper temporary wiring splices and damaged cords or tools.

Classification of a Building or Area

Who determines the classification of a building or space (e.g. place of assembly, occupancy, hazardous location)?

The phrase "Authority Having Jurisdiction" (AHJ) is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. The 2014 NEC says the AHJ is the organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.

Where public safety is concerned, the AHJ may be a federal, state, local, or other regional department or individual such as a fire chief, fire marshal, health department, building official, electrical inspector, or others having the authority and responsibility in statute or ordinance.

Department electrical inspectors will not define a building's classification. If the design and construction methods of the project raise doubts about classification (e.g., assisted living, nursing home, patient care areas, child care, institutional occupancy, educational occupancy, assembly occupancy for 100 or more persons, any hazardous location, etc.), the electrical inspector may require documentation from the AHJ regulating the occupancy. Likewise, the electrical inspector may require documentation from the owner verifying that a building will not be used in a specific manner before the building electrical construction and wiring methods can be approved.

NEC® 210.63 Heating, Air-Conditioning, and Refrigeration Equipment Receptacle Outlet

Since the 2002 edition, NEC® 210.63 has required a 125-volt, single-phase, 15- or 20-ampere rated receptacle outlet to be installed at an accessible location for the servicing of heating, air-conditioning, and refrigeration equipment. The receptacle shall be located on the same level and within 25 feet of the heating, air-conditioning, and refrigeration equipment. The receptacle shall not be connected to the load side of the equipment disconnecting means. An exception states that a receptacle shall not be required at one- and two-family dwellings for the service of evaporative (swamp) coolers.

This requirement must be met on installations were the branch circuit or feeder supplying heating, air-conditioning, and refrigeration equipment is a new installation or where a unit is relocated further than 25 feet from a service outlet meeting the requirements of 210.63. When the work is limited to replacement of a heating, air-conditioning, or refrigeration unit using the existing branch circuit, the service outlet in 210.63 is not required.

Nonmetallic-Sheathed Cables in Contact with Spray-Foam Insulation

Use of polyurethane spray-foam insulation in residential construction is very prevalent today. The question arises frequently about whether nonmetallic-sheathed cable is allowed to be in contact with, or encased in spray-foam insulation.

The first issue is one of access to the cables to perform a visual inspection. ***WAC 296-46B-010***(4) states *"Electrical wiring or equipment subject to this chapter must be sufficiently accessible, at the time of inspection, to allow the inspector to visually inspect the installation to verify conformance with the NEC and any other electrical requirements of this chapter… ".* Until all of the wiring in the areas that will be covered with spray-foam insulation has been inspected and approved for cover by the electrical inspector, the wiring must not be covered with spray-foam insulation or anything else that would conceal the conductors.

There are two other concerns with encasing nonmetallic-sheathed cables with spray-foam insulation. They are:

1) Potential reduction in heat dissipation properties of the conductors causing them to reach an operating temperature above that for which they are designed. Research has been conducted by the University of Toronto and published in ***Bulletin Number 95*** by the National Electrical Manufacturer's Association (NEMA) which states:
    - The National Electrical Code® (NEC®) does not prohibit installing Type NM-B cable in spray-foam insulation.
    - The NEC® contains requirements for derating conductors when bundled together. These, and all other Code requirements, must be followed.
    - The University of Toronto study indicates that the conductors will not be subjected to objectionable temperatures even under very severe conditions.
    - Type NM-B cable is routinely installed within heavily insulated walls, ceilings, and floors with no reported detrimental effects.
2) Potential deteriorating effects of the polyurethane spray-foam insulation on the nonmetallic-sheathed cables. NEC® 110.11 states: "Unless identified for use in the operating environment, no conductors or equipment shall be located in damp or wet locations; where exposed to gases, fumes, vapors, liquids, or other agents that have a deteriorating effect on the conductors or equipment; or where exposed to excessive temperatures."
    - The NEMA bulletin states, "The manufacturers of Type NM-B cable allow encasing the cable in foam insulation".
    - Research has been conducted by Southwire, (a manufacturer of nonmetallic-sheathed cable) which states, "Based on product information sheets and field information regarding typical residential and industrial spray-foam insulation products and contact with Type NM-B cable, there does not appear to be a reason to suspect that any adverse reactions would take place between these insulation products and Type NM-B cable as long as the insulation products are installed according to the manufacturer's directions. Neither the UL listing nor the operational integrity of the cable will be compromised by the contact."

Summary: Based on the above findings, the department will not prohibit the encasement of nonmetallic-sheathed cables (i.e., Type NM-B, communication cables, community antenna TV, fiber, power limited circuit cable, power limited fire alarm cable, network powered broadband, USE and SE-R, tray cable and other non-metallic cables used in wiring structures), with polyurethane spray-foam insulation provided the spray-foam insulation is applied in accordance with the manufacturer's instructions after the nonmetallic-sheathed cables have been visually inspected and approved for cover.

Ugly Picture: *If viewing this document online, click on the picture to open a larger image.* This fire appeared to have started in the junction box for this light fixture. Improper connections or possibly oversized lamps may have started the heating that eventually caused the fire.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 12** **December 2015**

Inspector Training – No Inspections on December 8th and 9th

There will be no inspections scheduled in L&I's jurisdiction on December 8th and 9th. The department will be holding a two day training for all L&I inspectors. We regret the inconvenience this may cause to our customers who rely on timely inspections. We have found that a statewide approach to training improves consistency and is the most efficient use of our limited training budget. Please let your customers know and plan for your inspections accordingly.

Safety Tip of the Month

Running propane or other fuel-powered equipment indoors can cause deadly amounts of carbon monoxide to build up quickly inside rooms and other enclosed work areas. Exposure symptoms may not be detected until it's too late.

Ampacity of Service Entrance Cable as Branch Circuits, Feeders, and as the Main Power Feeder to a Dwelling

National Electrical Code® (NEC®) changes in 2011 and 2014 affect the ampacity of service entrance (SE) cable used as feeders and branch circuits, and as a feeder that supplies the entire load associated with a dwelling. This article supersedes an article that appeared in the ***January 2009*** newsletter that was written due to a change in ampacity of SE cable in the 2008 NEC®.

NEC® 338.10(B)(4) gives the installation methods for SE cables used as branch circuits and feeders. In 2011, this section changed to require that when SE cables are installed in thermal insulation, the ampacity shall be in accordance with the 60° conductor temperature rating. This was a change from the 2008 requirement that the ampacity of all SE cables installed as branch circuits or feeders must be in accordance with the 60° temperature rating.

At that time, 2011 NEC® 310.15(B)(7) specified conductor sizes for types SE, USE, and USE-2 (among others) when installed as the main power feeder to a dwelling. This table allowed the specified sizes of these cables to be used regardless of whether they were installed in thermal insulation, and the 2009 newsletter article stated that the department would not restrict the table ratings of type SE cable any further. In 2014, this section changed again and removed the table and specification of conductor types. The 2014 language stated that when used as service or feeder conductors supplying the entire load of a dwelling, the ampacity of the conductors shall be permitted to have an ampacity not less than 83 % of the service or feeder rating. This meant that instead of specifying a size for the types of cables listed, the ampacity must be determined in accordance with the type of conductor or cable used. The result of this change for SE cable was that now, the ampacity of the cable must be determined in accordance with NEC 338.10(B)(4) using 83 % of the service or feeder rating. If SE cable is used, and not installed in insulation, its ampacity may be determined in accordance with the cable's listed temperature rating (typically 75°C) and the temperature rating of the termination device. If the cable is installed in thermal insulation, the ampacity must be determined in accordance with the 60° temperature rating.

A cable is considered to be installed in thermal insulation when the cable is enclosed in a wall cavity that is insulated or in an insulated ceiling space where the cable is within the insulation. Air circulation is restricted and the cable is unable to dissipate the heat generated if the cable is operated at its allowable load. It should also be noted that if the cable is installed in an attic space above the level of insulation, it may be subject to extremely high levels of ambient temperature that may warrant an even greater ambient temperature adjustment.

If the length of cable in thermal insulation is limited, there is a provision to allow a higher ampacity to be used in accordance with NEC® 310.15(A)(2) Exception. Where two different ampacities apply to adjacent portions of a circuit, the higher ampacity shall be permitted to be used beyond the point of transition, a distance equal to 10 ft. or 10 % of the circuit length figured at the higher ampacity, whichever is less. This exception allows a limited portion of the circuit to be installed in thermal insulation and still be allowed to operate at the higher ampacity.

Installing Satellite and Conventional Antenna Systems

We continue to receive questions about telecommunications installations that involve customer satellite dish and conventional antenna systems receiving a telecommunications service provider's signal. All satellite receiving equipment is on the customer side of the telecommunications network demarcation point and under the jurisdiction of RCW ***19.28.400*** and ***.420***. Because of federal law, satellite system installations are exempt from permitting and inspection, but are not exempt from licensing requirements. The telecommunications laws were passed by the legislature in 2001, to address increasing instances where the safety of buildings and the people occupying them was being degraded by poor telecommunications work. The department and city jurisdictions were finding serious problems, especially with firewall penetrations and cable support. The legislation established a minimum level of regulation to address these types of problems.

A telecommunications contractor license is required for firms that do any work on satellite systems, including all or part of the dish (antenna) installation, cabling from the dish to the structure, and installation of the necessary conductors and interface equipment in or on the building.

Any individual or firm found working on a satellite system without a telecommunications contractor or appropriate electrical contractor license is in violation of the electrical contracting laws and may be issued a civil penalty of up to $10,000 per day per violation.

Wear Your Certificate With Pride

One of the greatest keys to ensuring safe electrical installations in Washington is the requirement for electrical work to be performed by properly certified electricians and properly supervised trainees. The requirement in ***WAC 296-46B-940(3)*** and ***WAC 296-46B-942(1)*** for wearing and visibly displaying a valid certificate while engaged in the electrical construction trade went into effect on March 1, 2013. You must display your original certificate, not a copy. Visibly displaying certification allows the public, customers, and other workers to know that properly certified persons are performing electrical work. The requirement provides a deterrent for contractors who knowingly work trainees unsupervised and will help fight the underground economy and level the playing field for those who comply with the law.

The certificate may be worn inside the outer layer of clothing when outer protective clothing (e.g. rain gear when outside in the rain, arc flash, welding gear, etc.), is required. The certificate must be worn inside the protective clothing so that when the protective clothing is removed, the certificate is visible. A cold weather jacket or similar apparel is not protective clothing. The certificate may be worn inside the outer layer of clothing when working in an attic or crawl space or when operating equipment (e.g. drill motor, conduit threading machine, etc.) where wearing the certificate may pose an unsafe condition for the individual.

Certified electricians should display their certificates proudly. Protect your livelihood and help ensure safe electrical installations by ***reporting electrical workers*** who are not properly certified. You earned your certificate, wear it with pride and make sure others do too.

Ugly Picture: *If viewing this document online, you may click on the picture to open a larger image in another window.* This picture is a good example of a serious non-compliance problem that was discussed in a ***September 2015*** newsletter article. The unprotected energized service conductors present a life safety hazard to everyone approaching this jobsite. The contractor and administrator who purchase a permit and request inspection of such a temporary service but do not ensure the ditch is backfilled and the energized service conductors are protected from damage are subject to a compliance process that will probably end with suspension of their electrical contracting license and administrator's certificate. The law also provides for civil penalties of up to $10,000 per day for a violation of this type.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 11** **November 2015**

Question of the Month – What is the maximum length of single-circuit lighting track (rated at 20 amperes, 120 volts) that may be connected to a 20 ampere, 120-volt circuit in a store? – *See correct answer on page 2*

Safety Tip of the Month

In the coming months, be prepared for deteriorating driving conditions. Rain, fog, ice, and snow are on the way. Slow down and increase your following distance to help compensate for decreased traction and visibility. Make sure your windshield wipers work well and wiper fluid is full. To help prepare for winter driving, see the ***Winter Driving*** page on the WA State Department of Transportation website.

Inspector Training – No inspections on December 8th and 9th

There will be no inspections scheduled in L&I's jurisdiction on December 8th and 9th. The department will be holding a two day training for all L&I inspectors. We regret the inconvenience this may cause to our customers who rely on timely inspections. We have found that a statewide approach to training improves consistency and is the most efficient use of our limited training budget. Please let your customers know and plan for your inspections accordingly.

2-Step Verification Provides Stronger Security for Our Customers' Online Information

Attention SecureAccess Washington (SAW) users of the ***Electronic Permit and Inspection System***: L&I is enhancing its systems to better protect your personal information. The update requires your participation. In the near future, you will be prompted to update your online security profile to enable a new feature called 2-Step Verification. Learn more about 2-Step Verification and how it works by visiting ***http://lni.wa.gov/News/files/TwoStepVerificationFAQ.asp***.

Communications Cables Installed in Indoor Wet Locations

Communications wires, cables, raceways, and cable routing assemblies installed in buildings must be listed in accordance with National Electrical Code® (NEC®) 800.113(A). The listing requirement also applies to installations described in NEC® Articles 820, 830, and 840. There is a provision for limited installation of unlisted communications cables in buildings as specified in NEC® 800.48. This allows unlisted outside-plant communications cables to be installed in building spaces other than risers, ducts, plenums, and other spaces used for environmental air, under specific conditions. The cable must enter the building from the outside, the length of the cable within the building, measured from its point of entrance must not exceed 50 ft., and the cable must be terminated in an enclosure or on a listed primary protector.

There is confusion about what it means for the cable to "enter the building from the outside". The cable must originate from (or extend to) a location outside the exterior building walls. This does not apply to a cable that runs from one point inside a building (e.g., a communications closet), down under a slab-on-grade, and emerges in another interior location or a floor box located inside the building. Installation of unlisted cables inside a building creates a hazard in that the cables are not evaluated for flame propagation and smoke characteristics.

A conduit below an interior building floor slab in contact with the earth is a wet location (see NEC® 100 definition – "Location, Wet"). The department is revising a position stated in an article that appeared in the ***April 2013*** newsletter. Further research has shown that currently, there is only one manufacturer of listed communications cable that will approve their cable for installation in underground conduits that are subject to prolonged exposure to water. As an alternative, installers have turned to installing unlisted outside-plant cable in buildings to floor boxes and other interior locations in violation of NEC® 800.113(A). NEC® Article 800 does not require cables installed in interior underground

conduits to be suitable for use in wet locations, but it does require all cables installed in buildings to be listed. Until listed communications cables that are suitable for use in wet location underground conduits become more widely available, or the NEC® changes, L&I will view this as a performance issue and not regulate the suitability of the cable for use in wet locations.

For installation of cables that are installed in wet locations inside a building, such as to interior floor boxes, the department will make an allowance for use of unlisted outside-plant cable under the following conditions only. The unlisted cable must be installed in rigid metal conduit (RMC), intermediate metal conduit (IMC), or below a concrete floor slab. PVC conduit is permitted under the slab, but must transition to RMC or IMC before emerging from the slab. Unlisted cables must be terminated in a metal enclosure or floor box, and transition to a listed cable before emerging from the enclosure. The provision in NEC® 800.48 for up to 50 feet of unlisted cable to be installed within a building does not apply to this situation because the cable does not enter the building "from the outside". This allowance is based on the definition in 800.2 for "Point of Entrance" – *The point within a building at which the communications wire or cable emerges from an external wall, from a concrete floor slab, from rigid metal conduit (RMC), or from intermediate metal conduit (IMC)*.

When Is A Building Weatherproof Enough To Install Dry Location Wiring and Equipment?

Neither the National Electrical Code® nor the electrical rules (WAC ***296-46B***) require a specific level of construction completion before wiring and equipment installation may begin. The Code does recognize that a normally dry location may be subject to dampness or wetness while a building is under construction. However, this does not allow Type NM and other cables and equipment not rated for wet locations to be subjected to water damage during the construction process. The minimum requirements for a building to be considered dry are when the wall and roof sheathing are installed and the roof is completely covered by a waterproof membrane such as roofing felt. Flat roofs must be watertight. If wind driven rain is likely, contractors would be wise to cover the rough openings or have windows in place before wiring or installing equipment. If dry location wiring or equipment gets wet by any method, the inspector may require wiring or equipment to be replaced prior to approval as described in WAC ***296-46B-110***(2) and the National Electrical Manufacturer's Association's (NEMA's) *Evaluating Water-Damaged Electrical* publication.

NEMA's *Evaluating Water-Damaged Electrical Equipment* is available for download at no charge at ***www.nema.org/stds/water-damaged.cfm***. It provides advice on the safe handling of electrical equipment and wiring that has been exposed to water. These guidelines must be treated as manufacturer's installation instructions. (See the ***August 2005*** edition of this newsletter for details regarding Type NM cable.)

Ugly Picture: *Click on the picture to open a larger image.* Look closely into the dirt. This conduit riser for an outbuilding feeder transitions to black plumbing drain pipe and elbow once it goes underground. An electrical contractor unsuccessfully tried to pull out the feeder conductors because an equipment-grounding conductor was not installed creating objectionable current flow on the TV coax shield. Luckily, this was discovered before the "plumbing pipe" was dug up and someone tried to cut into it to repair it. The grounding electrode and grounding electrode conductor connection are also not code compliant. Code violations: NEC® 300.3(A), 250.6, 250.32(B)(1), 250.53(G), and 250.70. If such an installation were to be made by a licensed electrical contractor or certified electrician, they could expect to receive a notice of intent to suspend their license/certificate from the department shortly after it was discovered.

Answer to Question of the Month: There is no limit to the length of track that may be installed. A sentence was added to 2014 NEC 410.151(B) which states: The load calculation in 220.43(B) shall not be required to limit the length of track on a single branch circuit, and it shall not be required to limit the number of luminaires on a single track.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 10** **October 2015**

Question of the Month – You are designing a project for installation near the ocean and need to select an electrical enclosure that will provide a degree of protection against corrosion as well as being in a location that may be subject to prolonged submersion. What is the enclosure-type number required to be marked on an enclosure suitable for this application? – *See correct answer on page 2*

Safety Tip of the Month

Working in an attic space can be difficult and dangerous. It exposes you to fall hazards if you slip and step between the trusses. Employers must evaluate the hazards and take steps to reduce the risk of falls. Using appropriate fall protection measures reduces risks and saves lives. For more information, OSHA® has a helpful ***Fact Sheet*** about reducing falls while working in attics.

October Electrical Board Meeting to be Held in Spokane

This month's meeting of the Electrical Board will be held in Spokane. The board meets four times per year on the last Thursday of January, April, July, and October. The meetings are open to the public and meeting times and locations as well as minutes of previous meetings are posted on the ***Electrical Board*** page of our website. This month's meeting will be held October 29 at 9 a.m. at the Ramada at Spokane Airport, Inland Empire Room, 8909 West Airport Drive, Spokane.

Public Hearing on Proposed Rule Changes for Factory Assembled Structures (FAS)

Many electrical contractors and electricians perform work on Factory Assembled Structures (FAS). The Department of Labor & Industries will hold a public hearing to receive information and provide the opportunity for public comment regarding the proposed changes to the FAS rules. The hearing will be held Friday, October 30, 2015 at 9 a.m. in room S119 in the ***Tumwater L&I building***, 7273 Linderson Way SW, Tumwater. The purpose of this rulemaking is to propose amendments to sections of Chapter ***296-150M*** WAC for Manufactured Homes. For more information, you may visit the ***FAS Rule Development*** page of the ***FAS*** website.

Corrections Issued to Electrical Contractors Cause Costly Delays

Return trips to jobsites to complete corrections and verify completion are costly to you and to the department. When electrical inspectors encounter violations of the adopted installation standards, they issue a correction notice and may not be able to approve the installation for cover. This creates costly return trips for the contractor and the inspector, as well as unhappy owners and general contractors because of job delays. Electrical contractors and assigned electrical administrators should make your electrical workers aware of the following most common electrical corrections written to licensed electrical contractors last year to avoid having to deal with costly return trips.

- NEC® 110.3(B) Didn't follow the manufacturer's instructions. (Look for statements like "minimum supply circuit conductor temperature rating – 150°C" or "If fan is installed over a shower, GFCI protection is required".
- NEC® 210.8 Missing or inoperable GFCI protection or the GFCI is located in a non-readily accessible location.
- NEC® 408.4(A) Didn't fill out the panel schedule or update the existing one with new circuit information.
- NEC® 210.12 Didn't provide AFCI protection in required areas.
- NEC® 110.24(A) Didn't label the service equipment in other than dwelling units with the maximum available fault current including the date the fault-current calculation was performed.
- NEC® 110.12(A) Failing to seal unused openings in enclosures. (Really? This happened 662 times last year!)
- WAC 296-46B-250(2) Failing to install a concrete-encased electrode as required for new buildings or structures built on a permanent concrete foundation.

RCW 19.28.361 makes the installer – contractor and electrician – personally responsible and liable for any injury or damage to a person or property for any defect in the electrical installation. The RCW goes on to say that, the inspector is

not responsible for the safety of the installation. Inspectors cannot and will not inspect each termination, piece of wire, wire connector, or other device or equipment. The inspector is not on the job to create a "punch list" of items that need repairing. The inspector's job is to do a quick visual inspection to assure that the contractor and assigned administrator/master electrician has done the quality control work for their installations. The inspector is not expected to and will not be able to find every correction in an electrical installation. Inspectors and your customers expect to be able to inspect each installation without encountering significant safety problems – no corrections.

Of the 185,878 inspections made for electrical contractors last year, only 32,563 – 18% – had corrections written. Remarkably, only 20% of all electrical contractors caused 80% of all re-inspections. Because the contractor failed to be responsible for the quality of their electricians' work, corrections were issued which resulted in the need for a re-inspection. All contractors, administrators, and electricians should do their part in reducing the number of corrections the inspector encounters. Your reduction of corrections will save everyone time and money.

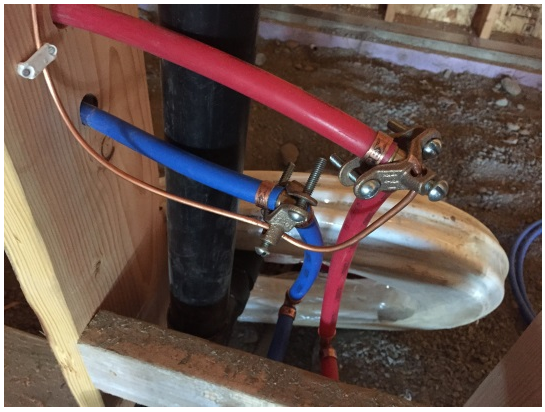
Marijuana Processing and Extraction Facilities

Effective July 1, 2015, the ***State Building Code Council*** (SBCC) adopted an emergency rule, ***WAC 51-54A-3800*** to specify requirements amending the International Fire Code dealing with marijuana processing and extraction facilities. Due to these facilities' use of flammable and combustible liquids for the liquid extraction process, building officials will require these facilities to provide an emergency power system, dedicated hazardous exhaust system and a continuous gas detection system. In addition, specified electrical equipment must be interlocked with the gas detection system and disabled when the gas detection system is activated. The department of L&I cannot require these systems to be installed, but similar to a fire alarm system, when the building official requires it, L&I will inspect to make sure it meets NEC® and RCW 19.28 requirements. These rules, along with other rulemaking proposals are open for public comment on the ***SBCC rulemaking page*** of their website. Comments must be received by close of business on October 23, 2015. Summary of the requirements of WAC 51-54A-3800:

- 3802.4.3 Ventilation. Each marijuana extraction room shall be provided with a dedicated hazardous exhaust system.
- 3802.4.6 Interlocks. All electrical components within the extraction room shall be interlocked with the hazardous exhaust system and when provided, the gas detection system.
- 3802.4.7 Emergency power for extraction process. An automatic emergency power source (meeting the requirements of NEC Article 700) shall be provided with sufficient capacity to allow safe shutdown of the process plus an additional 2 hours. The emergency power system shall supply the extraction room lighting, ventilation system, gas detection system, emergency alarm system, and automatic fire extinguishing systems.
- 3802.6.2 The process using a flammable or combustible liquid shall be located within a hazardous exhaust fume hood, rated for exhausting flammable vapors.

WAC 296-46B-500 states: *Classification of locations may only be done by the authority having jurisdiction or a professional engineer registered in Washington who uses appropriate National Fire Protection Standards as a basis for classification. The authority having jurisdiction is allowed to make the final determination in cases of conflict.* In this case, the authority having jurisdiction is the local building official.

Ugly Picture: An inspector discovered this installation, made by a property owner while inspecting a commercial repair garage. It is not actually a code violation to bond nonmetallic water tubing. There were other NEC® violations discovered, but this was the most interesting thing the inspector found. *Click on the picture to open a larger image.*



Answer to Question of the Month: Type 6P – NEC® 110.28 and Table 110.28 must be used for selecting enclosures for use in specific locations other than hazardous (classified) locations. For more information, refer to this helpful ***enclosure types*** publication from the National Electrical Manufacturers Association (NEMA).

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 9** **September 2015**

Question of the Month – What is the best method to communicate inspection request details to your electrical inspector? A) Call the inspector the morning of the inspection. B) Email the inspector. C) Leave a voicemail message at the inspector's desk phone. D) Leave details in the comment field of an online inspection request. – *See correct answer on page 2*

Safety Tip of the Month

Test equipment allows you to know the energized status of electrical systems. Keep yours in good repair and check it often with a known source of power. Your life may depend on it.

Electrical Board Appointments

Governor Inslee recently made three appointments to the Electrical Board. They are:

- Don Baker – Electrical Contractor Seat (Western Washington)
- David Cornwall – Electrical Manufacturer Seat
- Bobby Gray – Electrical Contractor Seat (Eastern Washington)

The electrical board advises the department on all matters pertaining to the enforcement of Washington's electrical laws and rules. The board consists of fifteen members representing a wide range of Washington's electrical stakeholders. Meetings are held four times per year, on the last Thursday of January, April, July, and October. You can view minutes of past meetings and get information about upcoming meetings on the ***Electrical Board*** page of our website.

I would like to congratulate Don, Dave, and Bobby as well as the entire electrical board for their willingness to serve the citizens of Washington in this capacity.

Marinas and Boatyards – All Enclosures Must Be Corrosion Resistant

To ensure that electrical installations do not become a hazard due to corrosion, corrosion resistant enclosures are required in all commercial and residential facilities covered by 2014 NEC® Article 555, as amended by WAC ***296-46B-555***. The requirement for corrosion resistant enclosures is found in WAC 296-46B-555(5). You must use NEC® Table 110.28 when determining what enclosure types meet this requirement. Only those enclosure types described in the table, which provide a degree of protection from corrosive agents, are considered corrosion resistant enclosures. More information on enclosure ratings is available at ***http://www.nema.org/Products/Documents/nema-enclosure-types.pdf***

Fighting the Underground Economy

Operating outside the requirements for licensing, certification, and permitting is very tempting to some individuals and contractors working in today's economy. The underground economy and companies attempting to operate with an unfair competitive advantage take work away from legitimate contractors and individual electricians who take pride in their work and the electrical industry.

L&I is actively working to reduce these impacts. Our electrical inspectors, E-CORE (Electrical Compliance, Outreach, Regulation, and Education), and audit teams work in conjunction with the industry by combating companies and individuals not playing by the rules. For the fiscal year which ended on June 30, 2015, the electrical program issued over 4,000 citations for unlicensed contracting, uncertified electricians, doing electrical work with no permit, or a related issue. The department and the electrical board considers all these violations a part of the underground economy.

No matter what you do, inspector, contractor, electrician, regulator, or citizen, we encourage you to do your part in reducing the negative effects of the people who choose to violate the electrical laws and compete unfairly and in many cases unsafely with the legitimate electrical industry. We welcome your referrals about this type of unfair and illegal activity. If you know of, or suspect such activity, please notify us. Visit the ***Office Locator*** page of our website for contact information for a local L&I electrical inspection office. You can also visit the ***Report Electrical Law Violations*** page of our website for contact information for the E-CORE team.

Join us by helping provide a level competitive environment for legitimate contractors so they can provide safe electrical installations for their customers.

Proper Installation of Plate Electrodes

If you use a plate electrode, you must follow the installation requirements of the National Electrical Code®. NEC® 250.52 requires that each plate electrode have not less than 2 square feet of surface exposed to exterior soil. Most ground plates are 12" by 12" - exactly 2 square feet of surface area. If you are using a ground plate, all surfaces must be in contact with the soil. Plate electrodes shall be installed not less than 30 inches below the surface of the earth as required by NEC® 250.53. Plate electrodes must be visible during inspection. After approval, you are responsible for properly covering them. This means you must bury all of the plate at least 30 inches deep. Be sure to backfill all plate electrodes and direct buried service conductors before the service or feeder they are connected to is energized. In a case where the power company uses direct burial splices for the service conductors, you are responsible for properly covering the electrode(s) and service conductors immediately upon completion of the power company's work. When you install a service and leave exposed, energized service conductors or improperly covered plate electrodes, the installation presents a hazard of fire and/or a danger to life safety, a serious violation of the electrical laws, which could result in suspension of your license or certificate.

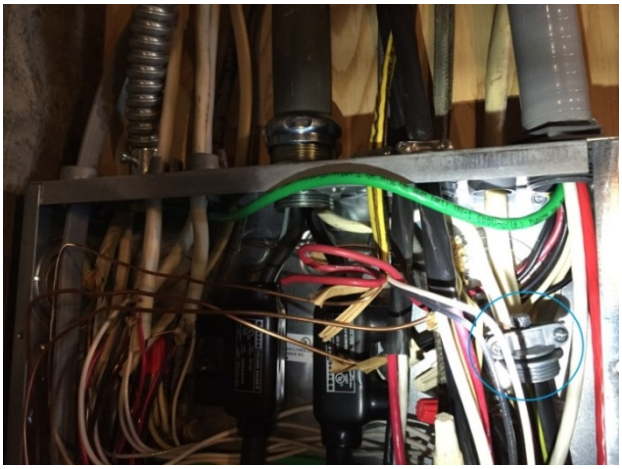
Dedicated Electrical Equipment Space

NEC® 110.26(E) requires all switchboards, switchgear, panelboards, and motor control centers to be located in dedicated spaces and protected from damage. The dedicated space for indoor electrical equipment is described in 110.26(E)(1)(a) and requires a space equal to the width and depth of the equipment and extending from the floor to a height of 6 ft. above the equipment or to the structural ceiling, whichever is lower and shall be dedicated to the electrical installation. No piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation shall be located in this zone. Two questions have recently come up about this requirement.

The first question is what about a panel that is mounted flush with the wall (inside the wall cavity). Is foreign piping, etc. permitted (above or below the panel) within the wall space? Nothing in the requirement exempts electrical panels inside a wall from the requirement to maintain dedicated electrical space. The dedicated electrical space for a panel within a wall extends from the floor to a height of 6 feet above the panel, or the structural ceiling, whichever is lower.

The second question: If a suspended ceiling is constructed above the electrical equipment, is foreign piping, etc. allowed to be installed above the suspended ceiling within the 6-foot space above the electrical equipment? 110.26(E)(1)(d) answers this question. A dropped, suspended, or similar ceiling that does not add strength to the building structure shall not be considered a structural ceiling. A suspended ceiling constructed above electrical equipment does not allow for installation of foreign systems in the dedicated electrical space.

Ugly Picture: *Click on the picture to open a larger image.* Code violation: (among others) NEC® 110.14 – You have to look carefully, as the inspector who found this did, but a nonmetallic-sheathed cable connector is being used as a method to splice the copper grounded service conductor to an aluminum conductor to extend it to the neutral bar in a service panel. The inspector found this installation (made by a previous homeowner) while inspecting a homeowner's installation of a new HVAC unit. Eventual failure of this neutral conductor connection would result in serious damage in the home and possible fire hazard or shock to someone working in the panel.



Answer to Question of the Month: D) Leave details in the (255-character) comment field of an ***online inspection request***. The inspector that takes the inspection job will read the comment and have the information to get the inspection done. Many times, inspectors start their day from the field and download inspection requests remotely. Phone calls require valuable time that reduces their ability to complete more inspections. Help us help you by making inspection arrangements in a way that avoids asking inspectors to make unnecessary phone calls.

Washington State Department of Labor & Industries

Electrical Currents

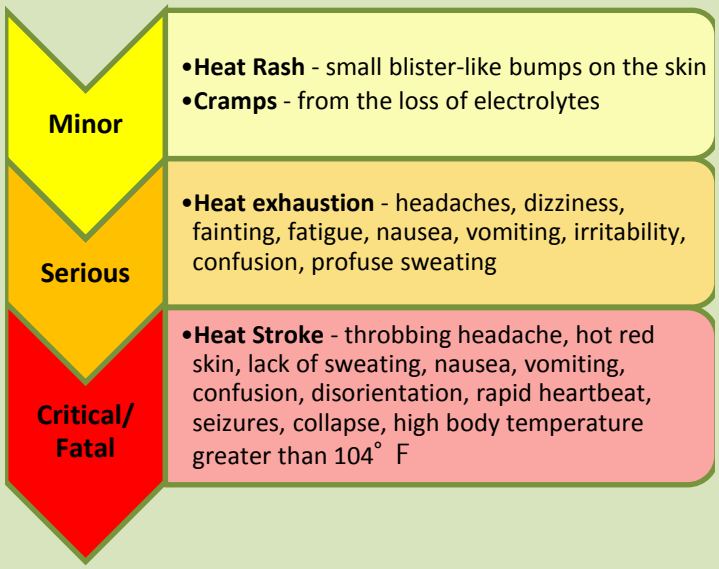
Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 8** **August 2015**

Question of the Month – Which systems are required to be disconnected simultaneously from all sources of supply by the emergency disconnecting means for a motor fuel dispenser? 1) Power, 2) Communications, 3) Data, 4) Video, 5) Equipment for remote pumping systems, 6) All of the above. – *See correct answer on page 2*

Safety Tip of the Month

Summer heat is here! Stay hydrated and avoid extreme heat conditions. Heat related illness ranges from mild to potentially fatal. Find great tips and resources for protecting yourself, co-workers, and employees on the ***Outdoor Heat Exposure*** page of L&I's website.



Electrical Permit Requirements for HVAC Replacements and Retrofits

In the most recent revision to ***WAC 296-46B-908***, the scope of work for Class B labels was revised to include *"and associated Class 2 low voltage wiring"* for single like-in-kind replacement of an electric/gas/oil furnace not exceeding 240 volts and 100 amps, or an individually controlled electric room heater, air conditioning unit, heat pump, or refrigeration unit not exceeding 240 volts, 40 minimum circuit amps (see paragraphs (10)(b)(iii) and (10)(b)(iv)). There is confusion about when the term *"associated"* applies to the low voltage cable, especially when a new unit such as an air conditioner or heat pump is installed while replacing the furnace. The term *"associated"* means only the cable originally connected to the unit listed on the Class B label may be extended or replaced to accommodate the replacement unit. It does not include new cable installed to a new unit. Below are two scenarios with options for permit requirements and explanations for each.

Scenario 1 – Like-in-kind replacement of a single furnace, heating unit, air conditioner, or heat pump meeting the voltage and current limitations above:

- Option 1 – One Class B label includes disconnecting and reconnecting both the line and low voltage conductors for the new unit. If the low voltage conductors must be extended or replaced, they are considered *"associated"* and may be done on the same Class B label as long as they are conductors originally connected to the unit listed on the Class B label to accommodate the replacement. No modification to the line voltage branch circuit conductors or raceway is allowed with a Class B label.
- Option 2 – A regular permit may be used for this task. Fees must be included for both the altered branch circuit and the low voltage thermostat cable.
- Thermostat permit fees are required for the new or altered low voltage cable(s). Replacement of a thermostat in the same location is, in most cases, a Class A permit-exempt task (***WAC 296-46B-901***(7)(b)(i)).
- "Like-in-kind" means having the same overcurrent protection requirements and similar characteristics such as voltage requirement, current draw, short circuit characteristics, and function within the system and being in the

same location (***WAC 296-46B-100***). If the replacement unit requires a different overcurrent protection size (smaller or larger), it is not like-in-kind, not Class B eligible, and reconnecting the line voltage supply conductors is not within the work scope of (06A) or (06B) specialty electrical contractors and electricians. A regular permit is required with a fee for the altered circuit as well as a permit fee/Class B label for the low voltage cable.

Scenario 2 – Like-in-kind replacement of a single furnace, along with installation of a new air conditioner or heat pump:

- A regular permit is required for the line voltage branch circuit to the new unit. The branch circuit fee is good for up to four circuits, which includes the altered circuit for the replacement furnace if done by the same contractor. All low voltage wiring including the cable to the new unit can be performed on one Class B label or a regular permit fee for the low voltage thermostat cable.
- The installation of new line voltage branch circuit wiring to the new unit is not within the work scope of the HVAC specialty (06A) or (06B) contractors or electricians. This is also true for installation of the line voltage cable interconnecting the outdoor and indoor units of a ductless split system air conditioner or heat pump (see the ***November 2013*** Electrical Currents newsletter article). This work must be done by (02) residential or (01) general electrical contractors and electricians. If more than one contractor does this work, each contractor must have a permit(s) for their own work scope. The HVAC contractor would be able to replace the furnace on a Class B label. They could also install the new low voltage cable to the new outdoor unit on another Class B label (new low voltage cable to the new unit is not *"associated"* with the furnace replacement). The new branch circuit wiring installed by the (02) or (01) contractor requires a regular permit with a fee for line voltage circuits.

Good Job Descriptions and Driving Directions Equal Quicker and Better Inspections

Imagine trying to find a jobsite and figure out what you need to inspect with little or no information to go on. Inspectors rely on driving directions and permit and inspection descriptions to get the job done. It slows them down when they do not have good information. Help your inspector find your jobsite and the exact work you want inspected quickly. A few details are all it takes. The following are actual job descriptions received on permits:

Bad	Good
• Extend circuit • Lights • Run a circuit • Homeowner request	• Circuit to new heat pump in back yard • Add an outlet at vanity in master bathroom • 100 amp underground feeder from panel in garage to wiring in new barn

Can you tell the difference? The first four are virtually useless to the inspector. The last three are clear and will enable the inspector to find the work you need inspected quickly. The permit job description field will take 255 characters.

Like the job description, it is equally important to provide good directions to your jobsite. Within the next five years, seventy-five percent of our staff will be relatively new. Newer inspectors may not be as familiar with your area as you are. Provide directions from the nearest main street, highway, or intersection that an inspector from another area would be able to find. Please do not cut and paste directions from mapping software. Here are some examples of bad and good directions:

Bad	Good
• Just past the green shop on Brown Rd. • Hwy 20 • See map	• North on Hwy 821 from Selah, 1.2 miles past Pomona, right on Selah Creek Dr. • I-82 East to Exit 75, right on McCreadie, right on Wine Country Rd.

As with job descriptions, it is easy to tell the difference between good and bad driving directions. Help yourself by helping your inspector. Together we can improve and everyone will benefit.

Answer to Question of the Month: 6) All of the above. A change in 2011 NEC® 514.11(A) and 514.13 clarified that all associated power, communications, data, and video circuits must be disconnected simultaneously to remove all external sources. This requirement also applies to replacement dispensers.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 7** **July 2015**

Question of the Month – If an electrical certification examination candidate fails the open-book examination, what is the maximum number of times the candidate may retake the exam or portion of the exam within their one-year examination period? – *See correct answer on page 2*.

Safety Tip of the Month

Proper fall protection can save your life. In the first three months of 2015, three construction workers in Washington died from falls. Read a story at this ***link*** about a worker whose fall protection system saved him from a potential 30-foot fall.

Receptacles in Cabinets Under Sinks

Questions have arisen regarding receptacles installed in cabinets under sinks, specifically in the kitchen, in accordance with revised requirements in NEC® 210.8. Ground-Fault Circuit-Interrupters (GFCIs) must be installed in a readily accessible location. 210.8(A)(7) requires GFCI protection for all 125-volt, single-phase, 15- and 20- ampere receptacles installed within six feet of the outside edge of a sink. 210.8(D) requires GFCI protection for outlets that supply dishwashers installed in dwelling units.

Question 1: Is a GFCI installed in a cabinet under a sink considered to be in a readily accessible location? Answer: Probably. As long as the receptacle is visible and can be accessed without using tools to remove an obstruction, it will be considered in a readily accessible location. Care must be taken during rough-in installation to prevent the GFCI from being located behind plumbing or equipment such as a waste disposal. The presence of easily removable items such as cleaning supplies to access the GFCI for testing will not rule out the location as not being readily accessible.

Question 2: Is a 125-volt, 15- or 20-ampere receptacle installed in a cabinet under a sink required to be GFCI protected. Answer: Yes, if it is within six feet of the outside edge of the sink. There was much discussion by Code Making Panel 2 in the Report on Proposals and the Report on Comments for the 2014 NEC® regarding how the six foot measurement should be taken. The panel rejected proposals to exempt receptacles installed in cabinets under sinks, and in the end, the requirement was published to require GFCI protection where receptacles are installed within 6 feet of the outside edge of the sink. This means that receptacles installed in a cabinet under the sink, for equipment such as a dishwasher, waste disposal, or hot water tap must be GFCI protected as well as being Arc-Fault Circuit-Interrupter (AFCI) protected in accordance with 210.12. This may be a great use for a dual-function GFCI/AFCI circuit breaker.

New Identity Verification of Permit Purchasers Provides Protection for Electrical Contractors

Beginning July 1, 2015, to prevent issuing fraudulent electrical work permits, Electrical Contractors purchasing L&I electrical permits using the paper application form must print their name and mark their affiliation with the company on the permit application. The customer service representative will check the electrical contractor's license information to verify the person purchasing the permit is authorized under ***WAC 296-46B-901***(3) to do so.

If a permit purchaser is someone other than the assigned administrator, master electrician, owner, principal of the corporation, or a documented authorized signer, the customer service representative will not sell the permit.

WAC 296-46B-901(3) states:

"…Each electrical work permit application must be signed by the electrical contractor's administrator (or designee) or the person, or authorized representative of the firm, partnership, corporation, or other entity that is performing the electrical installation or alteration. Permits purchased electronically do not require a handwritten signature. An entity designated to sign electrical permits must provide written authorization of the purchaser's designation when requested by the department or city that is authorized to do electrical inspections."

Do you need to update principals or authorized signers? If the members of the firm shown on your electrical contractor license are not current, you can update this information using the Electrical – Telecommunication Principal/Member/Owner Update Request form ***F500-124-000***.

Note: Before updating your license, we will verify that the members of the firm match what is on file with the Master Business License service and/or Secretary of State.

To add someone as an authorized signer for your company, the owner or principal must submit a signed request in writing to us on company letterhead.

In addition, changes have been made to the permit fee worksheets to make them more user-friendly. These changes are the result of suggestions for improvement by a group of customer service representatives from across the state. The fee prices will not change.

Notice of Proposed Changes to the Factory Assembled Structures (FAS) Rules:

The Factory Assembled Structures (FAS) program is planning amendments to sections of Chapter ***296-150M*** WAC for manufactured homes. For more information, visit the ***2015 FAS rule development*** page on the L&I website.

If you have any preliminary input on the proposed rules, please send to Alicia Curry at ***Alicia.Curry@Lni.wa.gov***. We would appreciate your comments by Monday, August 3, 2015. You will have the opportunity to provide your comments during the public comment period.

The FAS Advisory committee members will meet to review the proposed rule changes and provide advice to the department on August 20, 2015 at 1 p.m., ***L&I Tumwater***, Room S129.

Insulating Over Concealed Knob-and-Tube Wiring

NEC® 394.12(5) prohibits concealed knob-and-tube wiring in hollow spaces of walls, ceiling, and attics where such spaces are insulated by loose, rolled, or foamed-in-place insulating material that envelops the conductors. Washington has a rule in place to allow insulation to be installed in contact with concealed knob-and-tube wiring under very limited circumstances. ***WAC 296-46B-394*** allows the installation of **loose or rolled** thermal insulating material in spaces containing existing knob-and-tube wiring, under specified conditions. It is important to note that the WAC rule does not allow dense-pack insulation. This is a method of insulating within existing walls using a pressurized application method that would create displacement of the concealed knob-and-tube wiring and could cause overheating and damage to the wiring in those spaces. **Dense-pack insulation is not permitted in spaces containing existing concealed knob-and-tube wiring.**

The conditions whereby insulation may be installed in spaces containing existing knob-and-tube wiring are:

(1) The wiring must be surveyed by an appropriately licensed electrical contractor who must certify in writing to the department that the wiring is in good condition with no evidence of improper overcurrent protection, conductor insulation failure or deterioration, and with no improper connections or splices. The electrical inspector must inspect all repairs, alterations, or extensions to the electrical system.

(2) The insulation must meet Class I specifications as identified in the Uniform Building Code, with a flame spread factor of twenty-five or less as tested using ASTM E84-81a. Foam insulation may not be used with knob-and tube wiring.

(3) All knob-and-tube circuits must have overcurrent protection in compliance with NEC® Table 310.15(B)(16), 60 degree centigrade column. Overcurrent protection must be either circuit breakers or Type S fuses.

Ugly Picture: This is an online ad placed by an aspiring entrepreneur looking to drum up some business. Unfortunately for him, he did not possess an electrical contracting license. ***RCW 19.28.041*** requires those who advertise to perform electrical work to be licensed electrical contractors, and when the ***E-CORE*** inspector finished with him, placing the ad cost him $500.00.

Need Electric work done?! Look no further!

I am an apprentice electrician (about to get my residential card) offering up my skills for hire. I can do most things needed but if I cannot do it myself, I have multiple journeyman electricians who would help. Send me an email (or call [redacted]) with a detailed description of the work you need done, as well as any pictures you can provide and I will get back to you as swiftly as possible.

- do NOT contact me with unsolicited services or offers

Answer to Question of the Month – ***WAC 296-46B-960 (9)-(10)*** Five – If the individual makes a failing score, the individual must wait two weeks before being eligible to retest. If the individual fails an exam three times within a one-year period, the individual must wait three months to retake the failed portion of the examination. For more information, see the exam article in the ***April 2015*** newsletter.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 6** **June 2015**

Note From the Chief

I would like to introduce Tony Bierward as our new Plan Review supervisor. Tony has been with the Department since 1995, and has been a Lead Electrical Inspector in Tumwater since 2004. Prior to coming to L&I, Tony worked for 17 years as an electrician, foreman, and project supervisor on a wide variety of Commercial, Industrial, Manufacturing, and Residential jobs in Washington. Tony is a great asset to the electrical program and will do a great job of leading the Plan Review section as they transition to an electronic plan review process. I would also like to thank Bill Eckroth for his years of excellent of service to the electrical program. Bill is retiring after almost 26 years with L&I, with 12 years as the Plan Review supervisor. Please join me in wishing Bill all the best for a well-deserved retirement, and congratulating Tony as he enters this exciting new phase in his career.

Safety Tip of the Month

School will soon be out for summer. Please use extra caution while driving and watch for children who may not be watching for you.

Reminder – Changes Coming Soon For Electrical Permit Fee Due Notices

As discussed in last month's ***May 2015*** newsletter, the electrical program is implementing changes to our electrical permit fee due notice and collection process beginning July 1, 2015. The program is making these changes to reduce the fee due processing time, collect fees in a timely manner, and be consistent throughout the state. Permit fees are due upon receipt of the notice. Please review last month's article for explanation of these important changes.

Arc Energy Reduction – 2014 NEC® 240.87

In 2011, a new requirement was introduced in NEC® 240.87 titled "Noninstantaneous Trip". This requirement was located in Section VII of Article 240 applying to circuit breakers. The intent was to provide a measure of protection for workers while working within an arc-flash boundary. It applied to circuit breakers not equipped with an instantaneous trip feature. These circuit breakers, commonly installed in systems requiring selective coordination, are equipped with an intentional delay, allowing additional time for a downstream circuit breaker to trip before the upstream breaker trips. This intentional delay creates greater incident energy at the upstream circuit breaker, and a greater arc-flash hazard for workers within the arc-flash boundary. The 2011 requirement allowed three methods to reduce arc-flash hazard for circuit breakers without an instantaneous trip feature.

For 2014, the title of 240.87 was changed to "Arc Energy Reduction", and now applies to circuit breakers where the highest continuous current trip setting for which the actual overcurrent device installed is rated or can be adjusted to 1200 A or higher. Two methods were added to the list of ways to accomplish the requirement. Here is a brief description of the five methods allowed:

(1) Zone-selective interlocking – The upstream and downstream circuit breakers have circuitry to communicate with each other to determine the location of the fault. The location of the fault is sensed by the system, and the circuit breaker immediately upstream of the fault trips instantaneously. The circuitry overrides the intentional delay feature of the upstream device if the fault occurs in the feeder between the upstream and downstream devices, which lowers the incident energy at the upstream device.

(2) Differential relaying – This method would usually be found in medium-voltage systems. Current transformers sense the amount of current flowing into the upstream device and compare it to the amount flowing out of the downstream device(s). If the two values are different, a fault is occurring ahead of the downstream device and the upstream device trips immediately.

(3) Energy-reducing maintenance switching with local status indicator – A maintenance switch allows a worker to set the circuit breaker to "maintenance mode" while working within the arc-flash boundary. The switch alters the breaker's trip settings and allows the breaker to trip faster in the event of a fault, reducing incident energy.

The status indicator, usually a light, alerts the worker to place the switch back in normal mode when the work is complete.

(4) Energy-reducing active arc flash mitigation system – A system requiring specialized equipment that will sense an arc-flash event and create an alternate path for arc fault current, reducing incident energy.

(5) An approved equivalent means – This method allows for future technology or a method acceptable to the authority having jurisdiction. A circuit breaker equipped with an instantaneous trip feature which is set to trip below the level of arcing current, is an equivalent means acceptable in L&I's jurisdiction. An arc flash study must be performed to determine the level of arcing current and the circuit breaker must be set to open instantaneously at a current level less than the minimum expected arcing current. Methods for determining expected arcing current can be found in Informative Annex D, 2015 ***NFPA 70E®***. If this method is used, you must provide documentation to the inspector showing the minimum expected arcing current and how it was calculated.

Enhanced worker safety is the goal of this requirement. Always follow guidelines found in NFPA 70E, Standard for Electrical Safety in the Workplace®.

Examinations Will be Based on 2014 NEC Beginning July 1, 2015

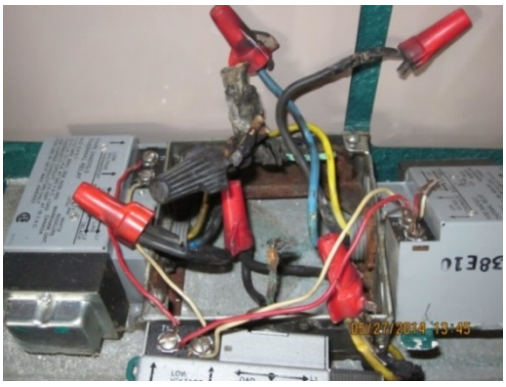
Over the past year, the department and our examination contractor, PSI, have been updating the electrical certification exam questions to the 2014 National Electrical Code (NEC®). Beginning July 1, 2015, all administrator candidates who take the exam for the first time, and all electrician candidates who are approved on or after July 1 will be given the updated exam. For more information, see the article in the ***February 2015*** Electrical Currents newsletter.

Last Chance to Grandfather Telecommunications Experience Toward (06) Certification

The opportunity to receive credit for previous unsupervised telecommunications work while working for a licensed (01) general or (06) limited energy electrical contractor will end on July 1, 2015. For more information, see the ***May 2014*** Electrical Currents newsletter. This opportunity began on June 12, 2014. All applications must be received before July 1, 2015. After that date, our legal authority to consider unsupervised telecommunications experience expires. If you have questions, call us at 360-902-5269. Do not miss out!

Pre-manufactured Floor Heating Mats

The placement of pre-manufactured heat mats in tile grout was added to Class A basic electrical work (i.e. work that does not require a permit) in a rule change that became effective November 25, 2005. ***WAC 296-46B-901(7)(b)(iv)*** says: "*Embedding pre-manufactured heat mats in tile grout where the mat is listed by an approved testing laboratory and comes from the manufacturer with pre-connected lead-in conductors. All listing marks and lead-in conductor labels must be left intact and visible for evaluation and inspection by the installing electrician and the electrical inspector*." The placement of pre-manufactured heat mats is considered a Class A electrical installation. The setting of these "pre-manufactured" listed mats does not require an electrical permit or inspection, and the mat can be covered with grout by the tile setter. Laying these mats on the floor and covering them with grout is not an electrical installation. The installation of any wiring, including sensor installation, and routing the lead-in conductors to the thermostat or controller location, is an electrical installation and must be performed by appropriately certified electricians employed by licensed electrical contractors. We are beginning to see a type of floor heat mat, which has webbing between the heating cables that may be cut, allowing the heating cables to be repositioned to fit room contours. Any such alteration of the heating mat, or installation of a sensor, is an electrical installation requiring electrical permits, inspections, and proper licensing and certification for installers. To be eligible for the Class A permit exemption, the mat must be installed in its original factory pre-manufactured condition.



Ugly Picture: *Click on the picture to open a larger image.* This picture shows the results of splicing copper and aluminum conductors using standard wire nuts. NEC® 110.14 prohibits conductors of dissimilar metals to be intermixed in a terminal or splicing connector unless the device is identified for the purpose and conditions of use.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 5** **May 2015**

Question of the Month

According to the National Electrical Code®, what is an effective ground-fault current path intended to accomplish? – *See correct answer on page 2*.

Note From the Chief – Solar Photovoltaic Rules Delayed

After extensive research into product availability, and feedback from stakeholders, in accordance with National Electrical Code® (NEC®) 90.4, I have made the decision to extend the delay in implementation of three requirements for Solar Photovoltaic (PV) systems until July 1, 2016. The three requirements are 690.11 Arc-Fault Circuit Protection (Direct Current), 690.12 Rapid Shutdown of PV Systems on Buildings, and 705.12(D)(6) Wire Harness and Exposed Cable Arc-Fault Protection. Oregon has a similar delay in implementation of these rules. This approach will ensure that the products currently under development to meet these requirements will be certified by an accredited product testing laboratory as meeting appropriate electrical product safety standards. Enforcement of these requirements will begin July 1, 2016. Due to the delay in implementation of 690.12 Rapid Shutdown requirements, the 2011 NEC® 690.31(E)(1) requirement to route Direct-Current PV source and output circuits at least 10 inches below roof decking or sheathing when installed inside a building will be enforced until the Rapid Shutdown requirement takes effect on July 1, 2016.

Safety Tip of the Month

(Click on image to enlarge)

This explosion and fire occurred when a worker operated a circuit breaker. It is likely that the equipment was not rated for the available fault current. Protect yourself, always stand clear and use proper personal protective equipment when operating a circuit breaker, even when no live parts are exposed.

Changes Coming Soon For Electrical Permit Fee Due Notices

The department has implemented Lean process improvement as explained in the April 2013 *Electrical Currents* newsletter to identify and eliminate waste. As part of this process, we have reviewed and modified the electrical permit Fee Due Notice process. We want our customers to be aware of the changes ahead of time so they can prepare and understand the new time line for the fee due notices that will affect them. Our goal is to reduce the fee due processing time, collect fees in a timely manner, and be consistent throughout the state. Fees are due upon receipt of the notice. For fees that are not paid upon receipt, we will be standardizing the collection of fees due along a 30 day time line. Our new procedures will include modifications to the fee due notice letters. A telephone call will be made within the 30 days serving as the second notice or where applicable a second fee due notice will be sent as a reminder of the outstanding balance that is required to be paid before it is sent to collections. The start date for this new process is July 1, 2015. Please remember, if your job requires additional inspections, a request for inspection cannot be made until all outstanding fees have been paid.

Licensing and Certification is Required for Class A Basic Electrical Work

RCW 19.28.006 defines the terms “Class A basic electrical work” and “Class B basic electrical work”. These terms are used to identify types of work for determining permit and inspection requirements. Requirements for electrical work permits and inspections vary depending on the type of work performed and you can find further clarification in WAC ***296-46B-901***(7). Class A basic electrical work is exempt from permits and inspections. Class B basic electrical work may be inspected on a random basis using the Class B label process described in ***WAC 296-46B-908***.

Sometimes we hear of confusion about the licensing and certification requirements associated with contractors and individuals performing electrical work that is exempt from permit and inspection requirements. Nothing in RCW

19.28.041 or ***.161*** provides an exemption from licensing and certification requirements for performing Class A basic electrical work. Even though the work does not require permits and inspections, properly licensed electrical contractors and certified electricians or properly supervised trainees must perform Class A basic electrical work. The specialty scopes of work defined in WAC 296-46B-920 also apply to who may perform Class A basic electrical work.

Telecommunications Workers Grandfathering Opportunity Ending in Less Than 2 Months

Do you or someone you know have unsupervised telecommunications experience gained while working for a licensed (01) general or (06) limited energy electrical contractor in Washington? For a very limited time, the legislature is allowing an opportunity to apply that valuable work experience towards eligibility for the (06) limited energy systems specialty certification examination.

Want more information?

- Please review the ***May 2014*** *Electrical Currents* newsletter for eligibility requirements and the two methods that can be used to document your past work experience.

What do I do next?

- Be sure hours claimed were worked for an (01) general or (06) limited energy electrical contractor who continuously maintained a valid electrical contractor license during the period claimed.
- If you are eligible, complete the ***special affidavit form***; it must be received before July 1, 2015 by mail as instructed on the top right of the form. Please do not turn in the form at an L&I service location, as it may cause a delay in processing.
- The July 1, 2015 deadline only applies to submitting hours of unsupervised telecommunication experience for consideration. Once hours are credited toward qualifying for examination, you never lose those hours. This deadline does not apply to applying for or passing the (06) limited energy specialty examination. To be eligible to take the (06) limited energy specialty examination, applicants must have a minimum of 4000 hours of qualified work experience.

So far, the department has received 246 special affidavit forms. This opportunity began on June 12, 2014. All applications must be received before July 1, 2015. After that date, our legal authority to consider unsupervised telecommunications experience expires.

This one-time opportunity ends in less than 2 months. Questions? Call us at 360-902-5269. Do not miss out!

Ugly Picture: Click on the picture to open a larger image. Faulty wiring to a submersible pump in the lake electrocuted the two deer in the picture, and another one located nearby. Here is an excerpt of a message from a power company representative to an L&I electrical inspector: “All grounds from the service to the pump are broken. Someone tried to ground the electrical conduit going into the lake. When I spoke with Ron, he told me of dogs & kids that were getting shocked a few years back. They had hired an electrician who “fixed” the problem. Ron also noted that the monthly utility bill had increased recently, for no apparent reason. I believe the entire feeder from the service to the pump has failed, the current is passing through the ground energizing all in its path”. The electrical inspector ordered the power disconnected from this installation immediately.

Answer to Question of the Month

NEC® 250.4(A)(5) – Electrical equipment and wiring and other electrically conductive material likely to become energized shall be installed in a manner that creates a low-impedance circuit facilitating the operation of the overcurrent device or ground detector for high-impedance grounded systems. It shall be capable of safely carrying the maximum ground-fault current likely to be imposed on it from any point on the wiring system where a ground fault may occur to the electrical supply source. The earth shall not be considered as an effective ground-fault current path. Consequences of using the earth as a ground-fault current path are shown in this month’s ugly picture.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 4** **April 2015**

Note From the Chief – Want to be an Electrical Inspector?

Do you enjoy a challenge? Have you ever thought about becoming an Electrical Inspector for L&I? The time may be right if you enjoy serving customers and interacting with electrical contractors, electricians, and the public. If you want to help ensure electrical safety in Washington and help licensed electrical contractors and certified electricians by enforcing laws related to the underground electrical economy, this could be just what you are looking for. It is a great job with a great benefit package. Inspectors have a challenging workload inspecting a wide variety of interesting and complex electrical installations. You can get more information and apply for these positions by visiting ***www.careers.wa.gov***. Select "Look for Jobs", then under Department, check "Dept. of Labor & Industries" and use the keyword search for "inspector". Get your resume together and keep watching, as openings will be posted for upcoming positions.

New Look for Credit Card Payment Screen

Later this month, the department will be changing the credit card vendor they have been using for many online services. What does this mean for you the customer? It means when you purchase a permit or renew your license online the credit card payment information screen will look differently. When selecting credit card as your method of payment, you will see a message that will say click "Pay Now" to process your credit card payment with our third party vendor, First Data Payeezy Gateway. After selecting "Pay Now", the page will be displayed for you to enter your credit card information.

Safety Tip of the Month
DO NOT WORK ON AN ENERGIZED CIRCUIT!!!

Sorry for shouting, but as highly skilled electricians who know how to mitigate the hazards of working around dangerous electricity, we sometimes make foolish decisions. An ***OSHA report*** from 2013 indicates 71 construction workers died that year from electrocution. Even seemingly minor work such as replacing light switches or changing luminaire ballasts, if done while the circuit is energized, could result in an accident and cause serious injury or even death! Take the time to de-energize every circuit you are working on.

Don't ruin your life and the lives of your loved ones by taking shortcuts and risks with electricity.

Legislative Update

Lawmakers have been considering several bills that may affect the electrical program as discussed in the ***February 2015*** edition of the newsletter. Various cutoffs and deadlines have left only two of those bills still active. They are ***ESSB 5282***, which would exempt certain low-voltage security system installations from permit and inspection requirements, and ***HB 1590***, which would require completion of an apprenticeship to become a certified (01) or (02) electrician. None of this legislation is sponsored by L&I. Take this opportunity to review the bills and comment if you desire. A comment button is located to the right of the bill number on the webpage for each bill.

You may also contact your legislator to share your opinion about any legislation by visiting the legislative website at: ***http://www.leg.wa.gov/LIC/Pages/hotline.aspx***.

Electrical Board Opportunity

There will be an opening on the Electrical Board in July to fill one of the certified electrician seats. The electrical board meets four times per year and plays a vital role in advising the department on all matters concerning Washington's electrical laws, rules, and policies. Anyone interested in applying for this position must hold a current Washington electrical certificate of competency. You can submit an application using the ***form*** on the Governor's website. Application must be made using the Governor's form. Your application must be received by April 30 to be considered. Send your resume and

any additional information you would like considered, such as letters of recommendation in a separate email to the Boards and Commissions mailbox at: ***GovernorBoardsandCommissions@gov.wa.gov***. If you have questions about the positions or the Electrical Board, contact Bethany Rivera at 360-902-5249.

GFCI Protection Required for Fixed Electrical Equipment in Showers and Near Bathtubs

In July 2014, the department adopted a new requirement in ***WAC 296-46B-210***(2) that requires all fixed electrical equipment with exposed grounded metal parts within an enclosed shower area or within five feet of the top inside edge of a bathtub to have ground-fault circuit-interrupter (GFCI) protection. This was done because the NEC® did not specify GFCI protection for installations such an exhaust fan in an enclosed shower or an electric fireplace installed on the ledge of a bathtub within easy reach of someone in the tub. For equipment located near bathtubs, the measurement is taken in all directions (vertically and horizontally) from the top inside edge of the tub.

What Happens if I Fail My Open-Book Electrical Examination?

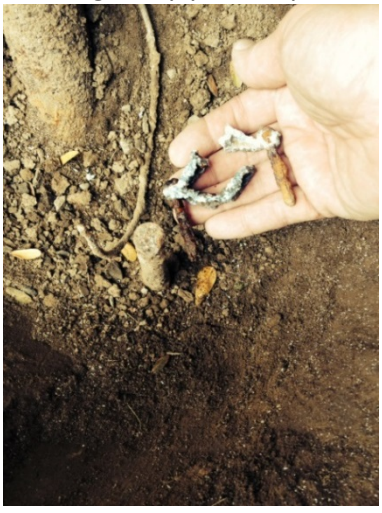
Electricians who are very familiar with the National Electrical Code® (NEC®) and other electrical reference materials are more apt to make safer installations for consumers and save their employer time and money by doing better work that does not require callbacks for repairs. They are also more likely to pass their open-book electrical examination on their first attempt. Each exam is unique and made up of questions selected randomly from a question pool covering basic electrical theory, NEC®, and Washington laws and rules.

Electrician examination candidates have one year to pass all sections of their examination beginning on the date they are approved for the examination. Administrator examination candidates have a year to pass their exam starting from the date of their first attempt. If you fail to pass your examination, the conditional allowance to retest is found in ***WAC 296-46B-960(8)-(10)***. If a candidate makes a failing score, they must wait two weeks before being eligible to retest. Within the one year examination period, candidates have to retake only the sections they failed to pass. If a candidate fails three times within a one-year period, they must wait three months to retake any failed sections of the examination. This three-month waiting period will apply to all subsequent attempts. The waiting period is a great opportunity to prepare for another attempt by taking advantage of additional classroom training. If all sections are not successfully completed within the one-year period, the candidate must begin a new examination period and retake all sections.

Exam pass rates show candidates need to be better prepared before attempting an examination. At ***Electrical Board*** meetings, the department reports information about exam pass and failure rates. The report relates the number of applicants who attempted to take an exam, which type of exam, how many attempts an applicant has made, and whether the applicants passed or failed. Last year for example, there were almost 1200 candidates for the (01) general electrician certification exam. 124 applicants attempted the exam four or more times. One applicant failed to pass the exam on the twentieth attempt.

The legislature sets minimum hours of ***basic classroom instruction*** required to ***qualify for examination*** in RCW ***19.28.205***. Washington's requirements are much less than those in our neighboring states (Oregon and Idaho). Those states require those learning the electrical trade to complete 144 - 180 hours of in-class training every year they are in training. For example, (01) general journey level examination candidates in Washington must complete 96 hours of in-class training. Candidates in Oregon and Idaho are required complete a minimum of 576 hours of in-class education.

Beginning July 1, 2015 exams will be based on the 2014 NEC® as described in the ***February 2015*** edition of this newsletter.



Ugly Picture: Click on the picture to open a larger image. An inspector discovered this badly corroded and broken ground clamp at a house built in 1979. Connections to the grounding electrodes are very important. You must expose all connection points at the time of inspection so inspectors are able to visually verify the integrity of the connections and electrodes. NEC® 250.70 requires ground clamps to be listed for use with the materials of the grounding electrode and the grounding electrode conductor and, where used on buried electrodes, be listed for direct burial or concrete encasement.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 3** **March 2015**

Question of the Month – How many voting members comprise the Washington State ***Electrical Board***? *– See the correct answer on Page 2.*

Note From the Chief

I am happy to announce that the Electrical Program has recently restored three more electrical inspector positions. We are closely monitoring electrical program revenue to determine whether the program can support restoration of additional inspectors, which were allotted by the legislature last session to deliver better service to our customers. This brings the total number of positions restored in the last eighteen months to twenty-one (nineteen electrical inspectors, one E-CORE inspector, and one technical specialist/trainer). All of these new positions as well as the Electrical Succession Planning Inspectors attend and complete our new inspector training before going to the field to do inspections on their own. This training program consists of an eight-week process, which includes a rotating schedule of one week of training followed by one week in the field to use the tools and information that they were given during the training. During the program, they receive training on basic safety practices, inspection techniques, mobile computing, permitting, and permit fees along with ECORE training and the opportunity to ride along with experienced inspectors. We are finding that this training program gets our new inspectors up to speed and productive quickly, and with better knowledge of the inspection process. By hiring and training inspectors in the winter months, we hope to have a better-prepared work force ready for the upcoming summer and fall months to provide better service to our customers.

Safety Tip of the Month

Protect Extension Cords from Damage.

- Do not run extension cords under carpets, through doorways or under furniture.
- Only use an extension cord outdoors if it is marked for outdoor use.
- Never alter a cord to change its length or perform inadequate repairs such as taping up damaged insulation. Do not trim, cut or alter the plug blades in any way.
- Unplug an extension cord when it is not in use. The cord is energized when it is plugged in and can overheat if shorted.

Legislative Update

If you are a part of the electrical or telecommunications sectors regulated by L&I, lawmakers are considering several bills this legislative session that may affect you. Last month's edition (***February 2015***) of the newsletter contained a list of the bills that may affect the electrical program. None of this legislation is sponsored by L&I. Take this opportunity to review the bills and comment if you desire. A comment button is located to the right of the bill number on the webpage for each bill.

You may also contact your legislator to share your opinion about any legislation by visiting the legislative website at: ***http://www.leg.wa.gov/LIC/Pages/hotline.aspx***.

Electrical Board Opportunity

There will be an opening on the Electrical Board in July to fill one of the certified electrician seats. The electrical board meets four times per year and plays a vital role in advising the department on all matters concerning Washington's electrical laws, rules, and policies. Anyone interested in applying for this position must hold a current Washington electrical certificate of competency. You can submit an application using the ***form*** on the Governor's website. Application must be made using the Governor's form. Send your resume and any additional information you would like considered, such as letters of recommendation in a separate email to the Boards and Commissions mailbox at: ***GovernorBoardsandCommissions@gov.wa.gov***. If you have questions about the positions or the Electrical Board, contact Bethany Rivera at 360-902-5249.

Tamper-Resistant Receptacle Requirements for Child Care Facilities

A new requirement in the 2011 NEC® requires all nonlocking-type 125-volt, 15- and 20-ampere receptacles installed in child care facilities to be listed tamper-resistant receptacles. The section was re-arranged in 2014 NEC® 406.12(C), and four exceptions were added, but the basic rule is the same. The term "Child Care Facility" is defined in 406.2. According to this definition, a child care facility is a building or structure, or portion thereof, for educational, supervisory, or personal care service for more than four children 7 years old or less. This definition includes such facilities as day-care centers, pre-schools and elementary schools, church Sunday school classrooms, etc.

For the purpose of this requirement, all areas within these facilities that are accessible to children 7 years old or less will require tamper-resistant receptacles when receptacles are replaced, or when new receptacle outlets are installed.

When Do I Need to Request an Inspection?

Recently, questions have been asked about when a permit holder is required to request an inspection. Specifically, when is an installation considered "complete"? ***WAC 296-46B-901***(9)(a) requires a request for inspection to be made no later than three business days after completion of the installation or one business day after any part of the installation has been energized, whichever occurs first. As required by WAC 296-46B-901(3) each entity performing electrical work must obtain a permit and request inspections for the portion of electrical work performed by that entity. Some jobs may have multiple permit holders. If your permit is taken out for a portion of the job, you must request inspections based upon the portion of the installation covered by your permit even though there may be other electrical work performed by others that is not complete. For example, your portion of a job may be only to install raceway for a future system to be installed by others. You must request an inspection within three days of completing the installation of the raceway as described on your permit, even though nothing has been energized yet, and there will be more work performed by others on the job. On jobs with multiple permits, please notify the inspector that there will be other work at that location. This is best done by entering this information in the comment field of your inspection request. The inspector may choose to combine inspections for multiple permits on the same inspection trip, but permit holders are responsible for requesting inspections in a timely manner as described above.

You may call any L&I office to request an inspection, but this may delay your inspection request. Requests made online before midnight will be available to the inspector the next morning. To request an electrical inspection online, go to ***http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermInsp/PermitInspect/Inspection.asp***

Because of fluctuating workloads, the response time for an inspection may vary. Inspectors perform most inspections within one or two working days after they receive the request. In some areas, longer delays are possible because of the large geographical area covered by the inspector or short staffing.

Answer to Question of the Month: 14 – The electrical board is appointed by the governor. Membership and duties are described in ***RCW 19.28.311***. The board is made up of a diverse group of stakeholders representing all phases of Washington's electrical industry. Membership consists of one representative of a private or public power company, one telecommunications service provider, three licensed electrical contractors, one licensed telecommunications contractor, one electrical manufacturer/distributor representative, one general public representative, three certified electricians, one telecommunications worker, one licensed professional engineer, one outside line worker, and one non-voting member to represent city electrical inspection jurisdictions. The chief electrical inspector serves as the secretary to the board, but like the city AHJ, is not a voting member.

Ugly Picture: Click on the picture to open a larger image. A worker who said his battery drill was dead and "This was the fastest way to get power" installed this temporary receptacle. The worker was kneeling on wet concrete with his feet in the snow as he drilled holes. When asked if he knew if the GFCI even worked, he said, "I don't know." Don't be like this guy.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 2** **February 2015**

Question of the Month – The electrical program operates with funding from a dedicated account called the electrical license fund. ***RCW 19.28.351*** states the electrical license fund can only be used to accomplish the intent of ***RCW 19.28***, which is the law regulating Electricians and Electrical Installations. What is the intent of RCW 19.28? *–See the correct answer on Page 2.*

Legislative Updates 2015

If you are a part of the electrical or telecommunications sectors regulated by L&I, lawmakers are considering several bills this legislative session that may affect you. None of this legislation is sponsored by L&I. Take this opportunity to review the bills and comment if you desire. A comment button is located to the right of the bill number on each webpage hyperlinked below.

House Bill 1315 - Requires L&I to grant a variance from the allowed scope of work, upon application, to a specialty electrician, a master specialty electrician, or a specialty plumber under certain circumstances.

House Bill 1375 - Eliminates special immunities from prosecution for criminal trespass, whether those immunities have been legislatively granted to the government or to private persons or entities. This bill would compromise an inspector's ability to gain access to ensure electrical work complies with state laws and rules, and require property owners to be present for an electrical inspection, which would significantly reduce the number of inspections that could be performed with current inspection staff.

House Bill 1590 - Requiring completion of an apprenticeship program to receive a journey level or residential specialty electrician certificate of competency. See previous 2014 ***HB 2500***.

House Bill 1608 - Addresses certified HVAC/refrigeration specialty electricians and certified appliance repair specialty electricians concerning replacement of household appliances. See previous 2013 ***SB 5682 - 2013-14*** and ***HB 1760 - 2013-14***.

House Bill 1609 - Exempts from the plumbing and electrical codes, minor or incidental work that does not require regulation for the protection of public health or safety.

Senate Bill 5686 – Removes the ability of the Electrical Board to hear appeals of decisions by the Office of Administrative Hearings. Decisions made by an administrative law judge would be a final order.

Senate Bill 5281 – Requires L&I to establish a 2,000 hour nonresidential security system specialty electrician certificate allowing a trainee to take the examination after 720 hours (or 90 days) of work experience and if successful, work alone installing these systems.

Safety Tip of the Month

The work of an electrician is very challenging and rewarding. Current knowledge of safe work practices and electrical laws, codes, and rules are essential to maintaining worker safety and ensuring installations meet the minimum requirements for safety to life and property.

Those learning the trade do not have the experience and knowledge required to make safe installation choices and must be supervised throughout their training period. ***RCW 19.28.161***(3) and ***WAC 296-46B-100*** describe proper supervision. Proper supervision consists of the trainee being on the same job site and under the control of an appropriately certified supervising electrician.

Lack of proper supervision not only creates potentially hazardous conditions, it is illegal and could result in civil penalties being assessed to the contractor, administrator, and trainee.

Senate Bill 5282 - Exempts from licensing requirements, and permit and inspection requirements under chapter 19.28 RCW, persons, firms, partnerships, corporations, and other entities for work limited to certain installations of security system wiring in one and two family dwellings.

You may also contact your legislator to share your opinion about any legislation by visiting the legislative website at: ***http://www.leg.wa.gov/LIC/Pages/hotline.aspx***.

Electrical Certification Examinations – 2014 Update Scheduled for July 1, 2015

We are in the process of updating all electrical examinations to the ***2014 National Electrical Code®*** (NEC®) and current versions of Washington electrical laws and rules – ***RCW 19.28*** and ***WAC 296-46B***. Unless this process is delayed, the newly revised exams will be in place on July 1, 2015. If you make your first attempt to pass an electrical administrator exam or are approved to take an electrician exam on or after July 1, 2015, your examination will be based on the 2014 NEC® and current Washington electrical laws and rules. If you re-take an exam on or after July 1, 2015 that you failed before July 1, 2015, you will be able to re-test using the 2008 version until your one year test cycle ends. Those who have not successfully passed the exam by June 30, 2016 will start a new testing session with the 2014 version.

The examinations are open-book and applicants may bring any unaltered original copyrighted material and copies of Washington electrical laws and rules (RCW 19.28 and WAC 296-46B) into the examination area.

Most exam questions are based on general code and electrical theory principles and tend to not change with revisions to the code. Many of the changes are editorial or reference changes. All of the questions are taken verbatim from the text in the reference material. Exam candidates must be familiar with the construction of the reference materials to be able to locate the correct answers quickly.

At times, the department receives comments that some of the questions for specialty exams do not apply to the work that the applicant performs in their specialty. All questions for specialty examinations are based on work that is allowed to be performed by the holder of the specialty certificate as described in ***WAC 296-46B-920***. Questions for each specialty were selected by industry representatives from each specialty to ensure they are related to the allowed scope of work.

Delayed Solar Photovoltaic (PV) Rules to be Effective July 1, 2015

In the ***May 2014*** Electrical Currents newsletter, the Chief Electrical Inspector issued a policy delaying the implementation of three new requirements for PV systems. These delays were made due to concerns from manufacturers about their inability to provide equipment to comply with the new requirements. The rules scheduled to go into effect on July 1, 2015 are:

- NEC® 690.11, Arc-Fault Circuit Protection (Direct Current)
- NEC® 690.12, Rapid Shutdown of PV Systems on Buildings
- NEC® 705.12(6), Wire Harness and Exposed Cable Arc-Fault Protection

If you would like to comment on the implementation of these rules, you may email the Electrical Program at ***ElectricalProgram@lni.wa.gov***, attention: Rod Mutch.

Ugly Picture: Click on the picture to open a larger image. This "water-cooled" electrical conduit and load center was discovered by one of our licensed electrical contractors who was called out to a residential jobsite. It is not clear whether the water pipe or the electrical conduit was installed first, but these violations of NEC® 300.8, 110.12(B), 110.26(E), 312.5(C), and 110.3(B) were corrected.

Answer to Question of the Month: RCW ***19.28.010***(1); ***.031***(1); ***.051***; ***.201***(1)(a); ***.410***(1); ***.440***. To ensure that all electrical wires and equipment, and installations thereof are in strict conformity with approved methods of construction for **safety to life and property**, and to ensure that those engaged in the business of electrical installations are competent to engage in and supervise the work to **ensure proper safety and protection for the general public**.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 18 No. 1** **January 2015**

Question of the Month – What is the maximum rating of an inverse time circuit breaker used to provide branch-circuit short-circuit and ground-fault protection for a residential 240 VAC, single-phase, 1 ½ horsepower well pump motor, controller, and branch circuit? *–See the correct answer on Page 2.*

Note from the Chief

With the start of the winter season comes a downturn in the weather, and ugly driving and working conditions. I would like to take this opportunity to remind everyone to allow some extra time to compensate for the weather and stay safe in everything that we do, both at work and at home. I hope that everyone enjoyed a safe and joyous Holiday Season with their family and loved ones.

Last month, we completed our annual inspector training. I want to thank our customers for their patience while our inspectors were out of the field for the training. We have found it very valuable to get all of our inspectors together for training to promote statewide consistency, especially with all of the newer inspectors. Our inspectors received 8 hours of solar photovoltaic (PV) training from two nationally recognized trainers. In addition, we had a presentation by Underwriters Laboratories about determining the certification status of electrical products and the use of the new ***Product Spec*** application. I would like to thank Phil Lou, Solar Energy Specialist with ***Washington State University*** extension energy program; Bill Hoffer and Brian Mehalic with ***Solar Energy International***; and Jeff Fitzloff with ***Underwriters Laboratories*** for providing great training for our inspectors.

We continue to pursue the Underground Economy in our efforts to maintain a level playing field for properly licensed electrical contractors and certified electricians. Our inspectors continue to find unlicensed electrical contractors using uncertified workers making substandard installations without permits and inspections. You can join our effort by reporting violators. Information about how to make a referral is found on the ***Violators*** page of our website.

Safety Tip of the Month

Portable generators are useful during power outages and on construction sites. Be aware of the dangers of improper use of portable generators. One of the most common dangers associated with portable generators is carbon monoxide poisoning.

Make sure your generator is in a well-ventilated outdoor area. Never use a generator in an attached garage, even with the door open.

Place generators so that exhaust fumes will not enter the building through windows, doors, or other openings.

You can download a helpful generator safety publication from the National Fire Protection Association ***here***.

Telecommunications Workers Grandfathering Opportunity Ending in Less Than 6 Months

Technology is bringing many changes, installation materials and methods for some limited energy systems are now much like those used by the telecommunications industry. Do you or someone you know have unsupervised telecommunications experience gained while working for a licensed (01) general or (06) limited energy electrical contractor in Washington? For a very limited time, the legislature is allowing an opportunity to apply that valuable work experience towards eligibility for the (06) limited energy systems specialty certification examination.

Want more information?

- Please review the ***May 2014*** *Electrical Currents* newsletter for eligibility requirements and the two methods that can be used to document your past work experience.

What do I do next?

- If eligible, complete the ***special affidavit form***; it must be received before July 1, 2015 by mail as instructed on the top right of the form. Please do not attempt to return the form to an L&I service location as it may cause a delay in processing.

- The July 1, 2015 deadline only applies to submitting hours of unsupervised telecommunication experience for consideration. Once hours are credited toward qualifying for examination, you never lose those hours. This deadline does not apply to applying for or passing the (06) limited energy specialty examination. To be eligible to take the (06) limited energy specialty examination, applicants must have a minimum of 4000 hours of qualified work experience.

So far, the department has received 125 special affidavit forms. This opportunity began on June 12, 2014; all applications must be received before July 1, 2015. After that date, our legal authority to consider unsupervised telecommunications experience expires.

This one-time opportunity ends in less than 6 months. Do not miss out!

Grounded Circuit Conductor at Switch Locations Controlling Lighting Loads

With the adoption of the 2014 NEC® came a requirement in 404.2(C) to install a grounded circuit conductor (neutral) at all switch locations that control lighting loads unless the wiring is installed in a raceway or the construction of the building allows for the ready installation of a grounded circuit conductor in the future.

Often, lighting systems in new buildings are controlled by occupancy sensors connected to proper wiring. In other buildings undergoing a lighting control upgrade, occupancy sensors are being added in existing switch boxes where no grounded conductor exists. When this happens, the installer typically utilizes the equipment-grounding conductor as the standby current return path, which creates a potentially unsafe circulating current on it and any non-current-carrying metal parts in contact with it. The new requirement for grounded circuit conductors at switch locations applies to all installations regardless of occupancy type (residential, commercial, industrial, etc.)

There are seven situations listed in 2014 NEC® 404.2(C) where the grounded conductor may be omitted:

1) Where the lighting circuit enters the box through a raceway system with sufficient capacity to install a future grounded circuit conductor with the lighting circuit conductors.
2) Where the switch box and a box containing the branch circuit including the grounded conductor of the controlled lighting circuit is accessible for the installation of an additional or replacement cable without removing building finish materials.
3) Snap switches with integral enclosures supplied by non-metallic sheathed cable.
4) Where a switch does not serve a habitable room or bathroom, (some examples of non-habitable rooms include hallways, stairways, garages, and storage or equipment spaces).
5) Where multiple switches control the same lighting load, a grounded conductor of the controlled lighting circuit must be installed at one or more switch location(s) such that the entire floor area covered by that lighting load is visible from the single or combined switch locations.
6) Where the lighting is controlled by automatic means.
7) Where a switch controls a receptacle load.

Some of the wording in these exceptions differs from the text of the NEC®. The above represents Washington's interpretation of the intent of the article.

Ugly Picture: Click on the picture to open a larger image. One of our inspectors took this photo while inspecting a service change performed by a homeowner. If you look closely, you will see some very creative and dangerous wiring. The correction notice issued by the inspector resulted in the replacement of this installation with a new code-compliant service panel with proper overcurrent protection.

Answer to Question of the Month: NEC® 430.52(C) – 25 amperes. The full-load current of the motor is 10 amperes (Table 430.248) multiplied by the percentage of motor full load current for an inverse time circuit breaker (250% from NEC Table 430.52) which equals 25 amperes. Since 25 amperes is a standard size, no increase in size is permitted.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 17 No. 12** **December 2014**

Question of the Month

Why do transformers hum? See the correct answer on Page 2.

Safety Tip of the Month

Your job as an electrical professional is very important to the safety of Washington's citizens. According to the U.S. Fire Administration, for the most recent year's data, ***residential building electrical malfunctions*** caused 26,800 fires, 280 deaths, 1200 injuries, and caused an estimated $1,021,300,000 in losses.

Never cut corners when it comes to safe wiring practices. Make sure your electrical installations are permitted and inspected, and meet all minimum code requirements.

Note From the Chief

It is my pleasure to announce that Dennis Straley has been appointed to the new Technical Specialist position and will be taking on the duties of the statewide electrical training coordinator. His appointment began October 1. Dennis is a certified ME01 master electrician and has been with the department for nine years. He has held positions as an electrical inspection supervisor in Tukwila and Bellevue, electrical inspector, and safety and health specialist for the division of occupational safety and health. He has been a valuable contributor to the current new inspector training and has been involved since the inception of the program. I look forward to working with Dennis to help further promote the growth and training of both our existing and new inspection staff. In the last 2 years, due to restoration of positions that were lost in the recent recession, and the replacement of those leaving the department, we have added 35 new staff. In addition, we are looking forward to adding more in the future to help provide better service to our customers as inspection and compliance workloads continue to increase with the recovering economy.

As Chief, I see the Electrical Program growing and becoming more efficient through use of our ***LEAN*** process, which helps us identify and eliminate waste, and increase efficiency. We will also be looking to continue to put pressure on the true underground economy as we do our daily inspections and conduct our ongoing ***E-CORE*** sweeps. Our focus as we go forward will be on working closely with the construction industry, stakeholders and neighboring inspection AHJs. I will be looking to create an environment of cooperation and trust between the Department and our stakeholders in a joint effort to combat the true underground economy while keeping the construction industry safe and jobs moving forward.

Inspector Training – No inspections on December 9th and 10th

There will be no inspections scheduled in L&I's jurisdiction on December 9th and 10th. The department will be holding a two day training for all L&I inspectors. We regret the inconvenience this may cause to our customers who rely on timely inspections. We have found that a statewide approach to training improves consistency and is the most efficient use of our limited training budget. Please let your customers know and plan for your inspections accordingly.

Engineering Evaluations

The department is pleased to announce that there are now six engineers approved to perform engineering evaluations of industrial utilization equipment and industrial control panels, as defined in ***WAC 296-46B-903***. The engineering evaluation is used to determine that equipment conforms to applicable electrical standards. Engineering evaluations were created to allow customers an alternative method to get their industrial equipment approved for use. If the evaluating engineer determines that the equipment meets the applicable standard(s), the engineer will place an approval label on the equipment. The electrical inspector will accept the approving engineer's label as verification that the equipment is appropriate for use.

The contact information for all ***approved engineers*** is located on the electrical program website and updated regularly as individual engineers are approved. Following is the contact information for the currently approved engineers.

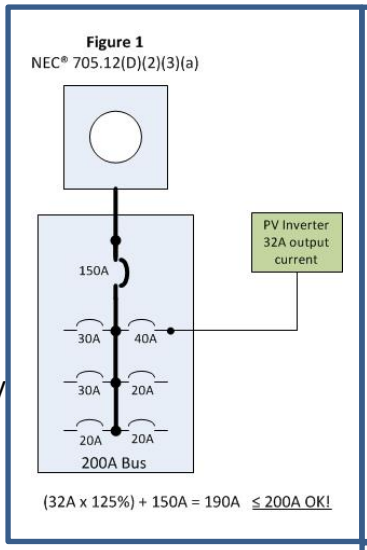
- LDW Engineering, Leonard D. Whalen, P.E. 425-891-9926 ***leonard.whalen@gmail.com***
- Parker Messana & Associates, Jacob V. Rovinsky, P.E. 253-926-0884 ***www.pma-eng.com***
- Picatti Bros. Inc., David J. Picatti, P.E. 509-248-2540 ***davidp@picatti.com***
- Picatti Bros. Inc., James M. Smith, P.E. 509-248-2540 ***jsmith@picatti.com***
- Power Science Engineering, C. (Sank) Sankaran, P.E. 206-306-6745 ***www.power-sci.com***
- Talos Engineering Inc., Jason Merrick, P.E. 509-893-5799 ext. 1001 ***jmerrick@talosengineering.com***

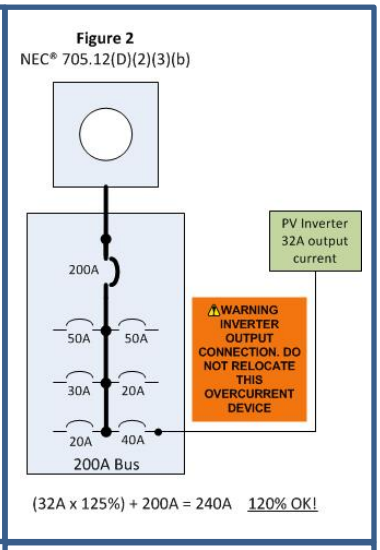
Interconnected Electric Power Production Sources – Point of Connection Part 3, Busbar Connections – NEC® 705.12(D)(2)(3)

This is the third article in a series about point of connection requirements for interconnected electric power production sources. ***October's article*** discussed supply side connections. ***November's article*** discussed connections to feeders. In this edition, we will discuss methods for making interconnections to busbars.

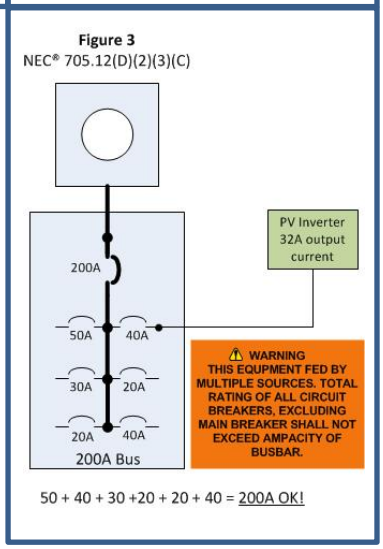
When the output of a utility interactive inverter is connected to a load center or panelboard, the possibility of overloading exists because two sources of power are supplying the same busbar. To avoid overloading busbars, one of the following four methods in NEC® 705.12(D)(2)(3) must be used to determine the ratings of busbars in panelboards that have both utility and alternate sources connected to them:

- 705.12(D)(2)(3)(a) – 100 percent rule: The sum of 125 percent of the inverter(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed the ampacity of the busbar (See Figure 1).
- 705.12(D)(2)(3)(b) – 120 percent rule: Where the inverter output is connected on the opposite end of the busbar from the utility supply, the sum of 125% of the inverter(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed 120 percent of the ampacity of the busbar. A permanent warning label in accordance with NEC® 110.21(B) shall be installed adjacent to the backfed breaker from the inverter that states: WARNING: INVERTER OUTPUT CONNECTION; DO NOT RELOCATE THIS OVERCURRENT DEVICE (See Figure 2).





- 705.12(D)(2)(3)(c) – The sum of all overcurrent devices in the panelboard, both load and supply devices, except for the overcurrent device protecting the busbar shall not exceed the rating of the busbar. A permanent warning label in accordance with 110.21(B) shall be installed that states: WARNING: THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR. (See Figure 3)
- 705.12(D)(2)(3)(d) Connections shall be permitted on multiple-ampacity busbars or center-fed panelboards where designed under engineering supervision that includes fault studies and busbar load calculations.



Answer to Question of the Month:

Because they can't remember the words.

Best wishes to all for a safe and happy holiday season!

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Stephen Thornton, Chief Electrical Inspector **Vol. 17 No. 11** **November 2014**

Question of the Month

A 1200 ampere feeder is tapped to supply a 100 ampere main breaker panelboard having a total calculated load of 80 amperes. The panelboard is listed for use with 75°C supply conductors and located adjacent to the enclosure in which the tap is made. The 8 ft. tap conductors are installed in electrical metallic tubing. What is the minimum size required for the copper THHN feeder tap conductors? See the correct answer on Page 2.

Safety Tip of the Month

What do cleaning out your rain gutters and replacing your smoke detector batteries have in common? They are both important tasks and may involve the use of a ladder. A fall from a ladder could kill you or disable you permanently.

- Always use the right ladder for the job. A chair is not a ladder!
- Get help with heavy or long ladders.
- Make certain your footing is good. Check for concealed holes left by moles and gophers. Avoid ice, mud, and other slippery conditions.
- Review the OSHA ladder bulletin at: https://www.osha.gov/Publications/OSHA3625.pdf

Note From José Rodríguez, Assistant Director for Field Services and Public Safety

It is my pleasure to announce that I have appointed Stephen Thornton as Chief Electrical Inspector, effective October 16, 2014.

Steve has over 35 years of experience in business management, supervision, electrical inspection and compliance, general contracting, along with journey level industrial, commercial and residential electrical installations and maintenance. He holds a valid ME01 master electrician certificate and prior to that, he held an AD01 administrators and EL01 general journey level certificate. He began his electrical career as a small business owner of a construction company and worked as a journey level electrician, administrator, general foreman and supervisor in the private sector. Steve has worked for L&I for 20 years, working as an Electrical Inspector, with the last 17 years serving as an Electrical Inspection Supervisor, a position he has held since July 1996.

Steve has the well-earned respect of supervisors, peers and stakeholders as a dedicated, technically proficient and well-rounded leader capable of providing leadership for the electrical program and for enforcing electrical laws. I am confident that he will be able to transition quickly into the job and lead the Electrical Program to even greater success.

I want to express my sincere thanks to Larry Vance for his willingness to assume the duties of Chief Inspector during the recruitment process and to Megan Eriksen for her administrative support.

Interconnected Electric Power Production Sources – Point of Connection Part 2, Feeder Connections – NEC® 705.12(D)(2)(1) & (2)

Point of connection requirements for interconnected electric power production sources have changed significantly in the two recent National Electrical Code® (NEC) revision cycles. Last month's newsletter discussed supply side connections. In this edition, we will discuss conductor ampacity when connecting a utility-interactive inverter to a feeder. Next month, we will discuss requirements for connecting inverter load to busbars in panelboards.

Bus or Conductor Ampere Rating 705.12(D)(2) – A utility interactive inverter connected to the load side of a service disconnecting means must be done in such a way that does not overload the feeder, tap conductors, or busbar, connected to two sources of supply. The previous method of using the overcurrent protective device (OCPD) ampere rating as the basis of calculations for determining rating of a conductor or busbar is no longer used. Instead, the calculation must be made using 125% of the inverter output circuit current. In most cases, this provides system designers greater flexibility in connecting utility interactive inverters to premises wiring systems. NEC® 705.12(D)(2) provides methods for determining bus or conductor rating when connecting to feeders, taps, and busbars.

Feeders – 705.12(D)(2)(1) – When the connection is made to a feeder at a location other than the opposite end of the feeder from the primary source OCPD, that portion of the feeder supplied by two sources may become overloaded if it is not sized appropriately. The rating of the feeder must not be less than the sum of the primary source OCPD and 125 percent of the inverter output circuit current (See Figure 1), unless an OCPD on the load side of the inverter connection is rated not greater than the ampacity of the feeder (See Figure 2).

Figure 1
NEC® 705.12(D)(2)(1)(a)

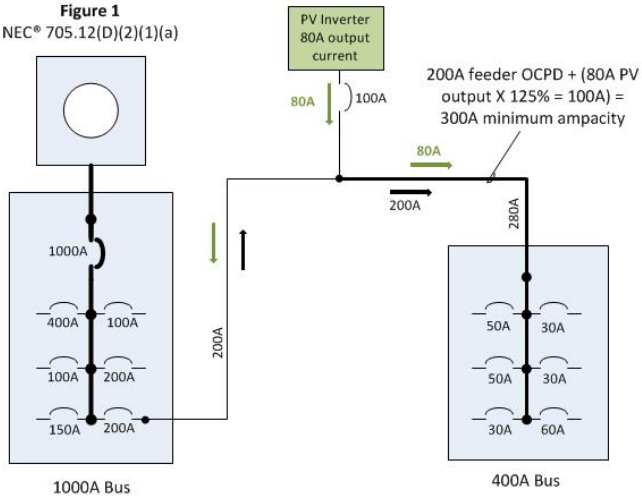
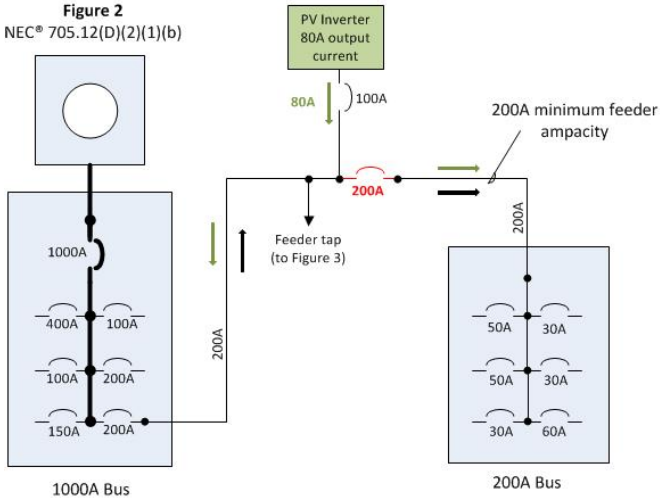
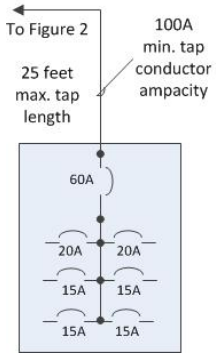


Figure 2
NEC® 705.12(D)(2)(1)(b)



Taps – 705.12(D)(2)(2) – When a feeder tap is made to a feeder with an interconnected power production source connected to it, things really get complicated. The general requirements for sizing feeder taps are found in NEC® 240.21(B) and are based upon the rating of the overcurrent device protecting the feeder conductors. For example, tap conductors over 10 feet long but not over 25 feet long must have an ampacity not less than one-third the rating of the OCPD protecting the feeder conductors. The possibility to overload the tap conductors exists if an additional source such as an inverter is connected to the same feeder supplying the tap conductors. In accordance with 705.12(D)(2)(2), tap conductors connected to a feeder with an inverter output connection must be sized based on the sum of 125 percent of the inverter(s) output circuit current and the rating of the OCPD protecting the feeder conductors as calculated in 240.21(B).

Figure 3
705.12(D)(2)(2)



Example (See Figure 3): 25 ft. tap conductors connected to a feeder protected by a 200A OCPD and having an 80A inverter output connected must have an ampacity not less than 100 amperes (25 ft. tap rule; one-third of the sum of 200A and 125% of inverter output current). 1/3 X (200 + (125% X 80)) = 100A.

Ugly picture: Click on the picture to open a larger image. NM cable splices concealed in wall without enclosure. Violations include NEC® 300.15, Box required at each splice point; WAC 296-46B-990 Serious non-compliant installation, improper splice concealed within wall. Serious non-compliance may result in suspension or revocation of installer's license/certificate.

Answer to Question of the Month: 1 AWG – NEC® 240.21(B)(1) – minimum tap conductor ampacity for taps not over 10 ft. long is one-tenth of the rating of the overcurrent device protecting the feeder conductors: 1200 X .1 = 120 amperes. Per Table 310.15(B)(16), 1 AWG Copper 75° conductor ampacity = 130 amperes.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Interim Chief Electrical Inspector **Vol. 17 No. 10** **October 2014**

Question of the Month

WAC 296-46B-940 and *942* requires all electricians and trainees to possess, wear, and visibly display their certificates while working in the electrical construction trade. What are the specific exceptions to visibly displaying the certificate? See the correct answer on Page 2.

Safety Tip of the Month

Fire Prevention Week is October 5 – 11, 2014.

Working smoke alarms save lives.

Many people do not test their smoke alarms as often as they should. When there is a fire, smoke spreads fast. You need working smoke alarms to give you time and to get out.

Test yours every month!

Visit *www.FPW.org*.

AFCI Protection Requirements for Residential Smoke Detectors

Many questions have arisen about Arc-Fault Circuit-Interrupter (AFCI) protection requirements for branch circuits supplying residential smoke detectors. There is no exception in NEC® 210.12 allowing a 120-volt branch circuit supplying residential smoke detectors to be installed without AFCI protection. There are two informational notes in 210.12 that deal with power-supply requirements for smoke alarms installed in dwelling units, and fire alarm systems.

NFPA 72, chapter 29 deals with single- and multiple-station alarms and household fire alarm systems. The requirements for the AC primary power source is found in chapter 29.6.3, and does not prohibit branch circuits supplying residential smoke detectors from being AFCI protected. Sub paragraph (5) states that smoke alarms powered by branch circuits protected by AFCIs or GFCIs shall have a secondary power source. The secondary power source is typically a battery backup, which is required by the local building inspection jurisdiction. Department of L&I electrical inspectors do not have jurisdiction to enforce requirements of NFPA 72 for battery backup. For other than residential single- and multiple-station alarms, power supply requirements for fire alarm systems are found in NEC® 760.41(B) and 760.121(B). Branch circuits supplying Non-Power-Limited and Power-Limited fire alarm equipment shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters. See NEC® 210.12(A), Exception for requirements for installing a non-AFCI protected fire alarm branch circuit.

Interconnected Electric Power Production Sources – Point of Connection – Part 1, Supply Side NEC® 705.12(A)

The rules for connecting inverter outputs from solar photovoltaic, fuel cell, or wind electric systems can be confusing and seem to change with each revision of the NEC®. The connection to a premises wiring system must be made in such a way that it does not overload the service conductors, feeders, tap conductors, or busbars, which are connected to multiple sources of supply. The point of connection rules were consolidated and relocated to NEC® 705.12 in 2011. These requirements were expanded in 2014 to include revised methods to determine busbar or conductor ampere ratings for feeders, taps, or busbars. Over the next few editions of the newsletter, we will discuss the various methods of connecting the output of an interconnected electric power production source in accordance with 705.12.

In this issue we will discuss basic requirements of the supply side connection. The advantage of a supply side connection is increased capacity limited only by the ampacity of the service. An electric power production source may be connected to the supply side of the service disconnecting means as permitted in 230.82(6). This may be difficult to achieve in an existing installation because a code compliant method of connecting ahead of the service disconnecting means must be installed. Some meter base manufacturers offer accessory lug kits for this purpose (See Figure 1). Utility requirements for this equipment may vary. Always consult the serving utility for their requirements before ordering or installing this equipment.

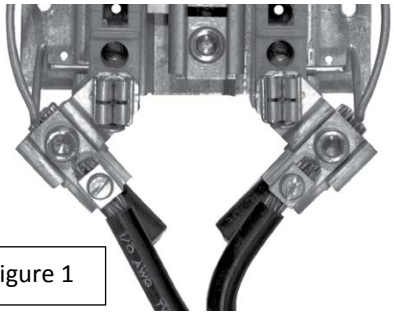


Figure 1

A separate enclosure, such as a splice or tap box may be installed to provide a point at which to connect the power production source conductors to the service conductors (See Figure 2).

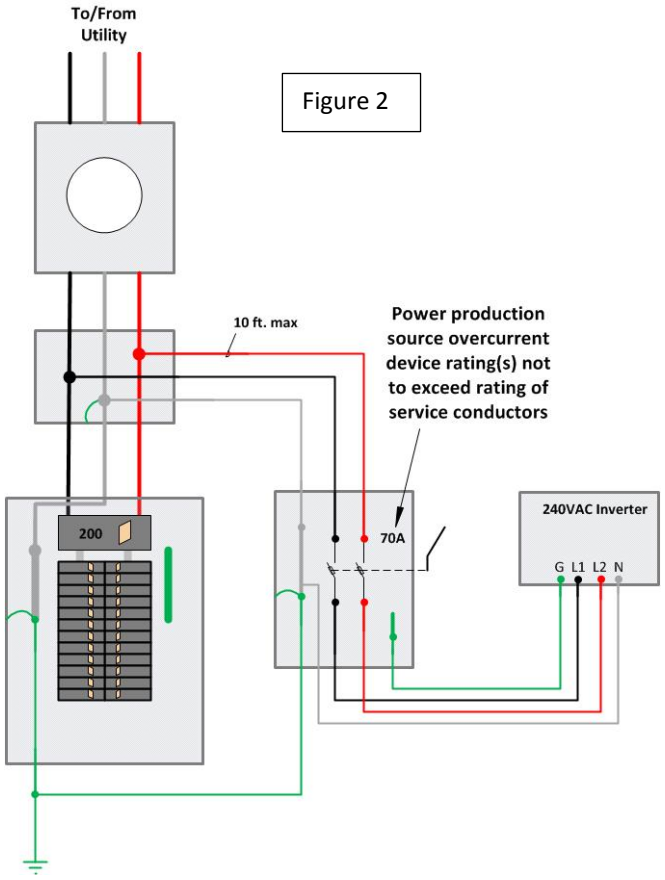


Figure 2

The sum of the ratings of all overcurrent devices of power production sources connected to a service cannot exceed the rating of the service. The disconnecting means for the interconnected power production source should be treated as an additional service in accordance with 230.2(A)(5). It does not count as one of the (up to six) disconnects of the main building service as allowed by 230.71, neither is it required to be grouped with the main service disconnect(s). The wiring methods, grounding, and bonding must be in accordance with Articles 230 and 250 as an additional service.

Overcurrent protection for power production source conductors connected in this manner must be located within 10 feet of the point where the conductors connect to the service in accordance with 705.31.

In installations where a supply side connection is made by connecting the power production source overcurrent device to a main lug service panelboard or switchboard, the sum of the ratings of all interconnected power source overcurrent devices must not be greater than the rating of the service equipment or service conductors. The power production source overcurrent device does not count as one of the main service disconnects. Click here for example of main lug service.

Answer to Question of the Month: WAC 296-46B-940(3): The certificate may be worn inside the outer layer of clothing when outer protective clothing (e.g. rain gear when working outside in the rain, arc flash, welding gear, etc.) is required. The certificate must be worn inside the protective clothing so that when the protective clothing is removed, the certificate is visible. A cold weather jacket or similar apparel is not protective clothing.

The certificate may be worn inside the outer layer of clothing when working in an attic or crawl space or when operating equipment (e.g. drill motor, conduit threading machine, etc.) where wearing the certificate may pose an unsafe condition for the individual. The certificate must be immediately available for examination at all times. When working as a certified electrician, the electrician must not display a training certificate. When supervising a trainee(s), the supervising electrician's certificate must be appropriate for the work being performed by the trainee(s).

Any person working as an electrician or trainee must also possess government issued photo identification and immediately present that identification when requested by the inspector. Visibly displaying your certificate while performing an electrical installation allows the public, customers, and other workers to have the knowledge that properly certified persons are the ones doing the work.

Wear your certificate with pride – you earned it!

Ugly picture: Click on the picture to open a larger image. Even while off duty, electrical inspectors remain vigilant, and observant for electrical safety violations. Technical Specialist Rod Mutch noticed this little gem while out of state on vacation. Code violations include: NEC® 334.12(A)(1), 334.10(3), 300.15. If you know where this is located, email Rod at ElectricalProgram@lni.wa.gov. The first person to identify the town wins. The prize? A congratulatory call and a fishing tale or two from Rod!

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Interim Chief Electrical Inspector **Vol. 17 No. 9** **September 2014**

Question of the Month

2014 NEC® 110.24 requires that service equipment in other than dwelling units be legibly marked in the field with the maximum available fault current at the time of installation and when modifications are made to the electrical installation that affect the available fault current. What are the factors that affect available fault current in an electrical system?

Safety Tip of the Month!

As summer ends, back-to-school season is in full effect. It is important for motorists to be on the lookout for children not only in school zones, but also in residential areas, playgrounds, and parks.

Children are unpredictable pedestrians and often take risks, ignore hazards, and fail to look both ways before crossing the street.

Give them a brake.

Electrical Board Appointments

Governor Inslee has made five appointments to the ***electrical board***. Janet Lewis was re-appointed to a four-year term in one of the three electrician seats. David Ward was appointed to fill the remaining two years of the vacant electrical utility representative seat. Bobby Gray was appointed to fill the remaining one year of the vacant electrical contractor's seat. Randy Scott was appointed to a four-year term in the general public seat, and Kevin Schmidt was appointed to a four-year term in the telecommunications contractor seat. The electrical board plays a vital role in advising the department in all matters concerning Washington's electrical laws, rules, and policies. Congratulations to all who were appointed to these important positions.

Reminder – Telecommunications Workers Grandfathering Opportunity

Until July 1, 2015, in accordance with ***House Bill 2253***, eligible persons who have gained unsupervised telecommunications experience while working for a licensed (01) general or (06) limited energy electrical contractor can apply that work experience towards eligibility for examination for an (06) limited energy systems certification. The opportunity began on June 12, 2014 and since then the department has received and processed 49 applications. Please review the ***May 2014*** *Electrical Currents* newsletter for eligibility requirements and the two methods that can be used to document your past work experience. If this applies to you, complete the ***special affidavit form***, only available until July 1, 2015, and submit it by mail as instructed on the form. Do not return the form to the local L&I service location. Note: ***WAC 296-46B-942***(8)(d) requires employers to provide the necessary documentation and the signed affidavit of experience to a worker within twenty days upon request. This one-time opportunity ends on July 1, 2015. Do not miss out!

Continuing Education and Basic Trainee Classes are not Completed Until the Roster is Submitted by the Course Provider

When taking an electrical training class, you should make certain that the class provider promptly submits the roster for your class. The provider has seven calendar days in which to submit the electronic roster to L&I. You have not completed the class until the roster is submitted to L&I. You can verify the status of your certificate and check to see that your course provider has properly applied your course credit by reviewing your education information at: ***www.Verify.lni.wa.gov***.

Completed courses are not displayed once they have been applied to renew a certificate. Contact the course provider if you are missing credit for a completed course. Completion certificates or receipts will not be accepted as evidence that your education requirements have been fulfilled. If you do not complete the class, or the roster for your class is not submitted by the course provider in a timely manner, you may be late in completing your education requirements, which may affect your ability to renew resulting in a lapse in certification. Do not wait until the last minute to take your class.

Visit ***www.ElectricalRenew.lni.wa.gov*** for information about required electrical education.

NEC® 406.4(D) Receptacle Replacements – Permit Requirements

New in 2011 was a requirement in NEC® 406.4(D)(4), (5), and (6), that where receptacles are replaced in areas requiring Arc-Fault Circuit-Interrupter (AFCI) protection, or tamper-resistant or weather-resistant receptacles, the replacement receptacles

must be provided with such protection. This is similar to a requirement that has been in place since the 1993 NEC® regarding replacement of receptacles in areas where GFCI protection is required.

Providing AFCI protection when a receptacle is replaced in an area requiring AFCI protection may be accomplished by one of three methods specified in 2014 NEC® 406.4(D)(4):

- The replacement receptacle may be a listed outlet branch-circuit type AFCI receptacle.
- The replacement may be a receptacle protected by a listed outlet branch-circuit type AFCI receptacle located ahead of the replacement receptacle.
- The entire circuit may be protected by a listed combination type AFCI circuit breaker.

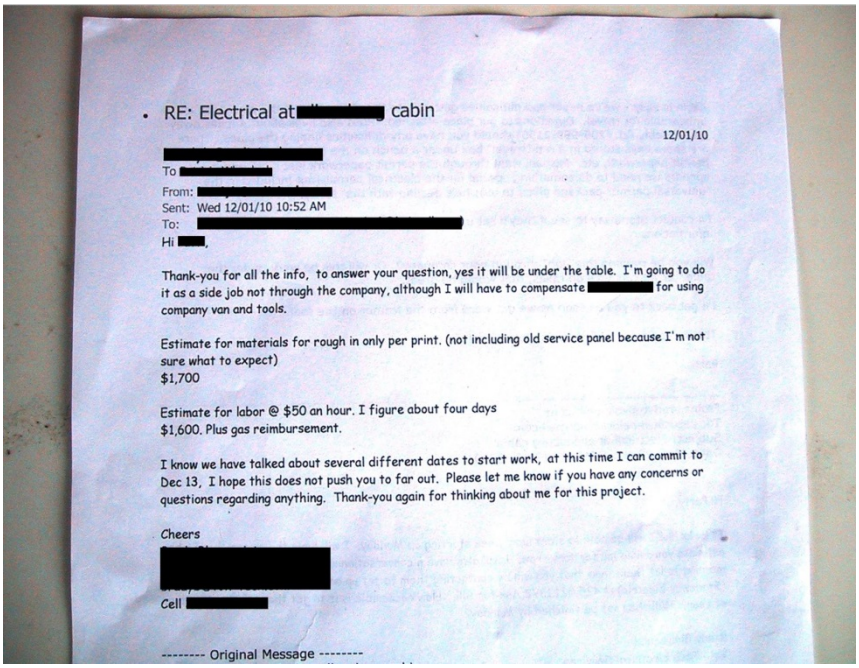
Whether circuit breakers or receptacles are used, AFCIs and GFCIs must be installed in a readily accessible location.

Electrical permits and inspections may be required for these replacements. Replacing a standard grounding-type receptacle with a tamper-resistant, or weather-resistant receptacle is a like-in-kind replacement. The like-in-kind replacement of a maximum of five receptacle outlets is on the Class A list of permit-exempt work in ***WAC 296-46B-901***(7)(b)(i). If replacing more than five receptacle outlets, a ***Class B random inspection label*** may be used to replace a maximum of twenty like-in-kind receptacle outlets. Property owners, or other entities not eligible for Class B permits must purchase a regular permit for this work.

The conversion of standard receptacles to GFCI or AFCI receptacles is not a like-in-kind replacement (See definition of "like-in-kind" in ***WAC 296-46B-100***). This work may be eligible for Class B random inspection labels. ***WAC 296-46B-908***(10)(d) says the replacement of not more than ten standard receptacles with GFCI receptacles is within the Class B work scope. For the purpose of permit requirements, the department will consider replacement of standard receptacles with AFCI receptacles the same as GFCI receptacles, allowing up to ten to be replaced with a Class B label. A maximum of two Class B labels may be used per week on a job site.

Replacement Type	Permit Requirements
GFCI or AFCI receptacles	Regular permit (altered circuit), or a maximum of 10 replacements per Class B label. 2 labels per week per job site.
Tamper-Resistant or Weather-Resistant receptacles	Maximum of 5 replacements – Class A exempt from permits Over 5 – Regular permit (altered circuit), or a maximum of twenty replacements per Class B label. 2 labels per week per job site.
AFCI circuit breaker replacing standard circuit breaker	Not like-in-kind. Regular permit required for altered circuit.

Ugly picture: Click on the picture to open a larger image. This is an email message discovered during an investigation of a job performed by an unlicensed electrical contractor. In a previous message, the property owner asked, "Will you be running this "job" through your company? Or will this be work under the table? If we can save on taxes that would be great." The investigation resulted in citations issued to the unlicensed contractor as well as the property owner who purchased a permit for the work stating on the affidavit that they would be personally performing the electrical work.



RE: Electrical at [redacted] cabin

12/01/10

[redacted]
To [redacted]
From: [redacted]
Sent: Wed 12/01/10 10:52 AM
To: [redacted]
Hi [redacted],

Thank-you for all the info, to answer your question, yes it will be under the table. I'm going to do it as a side job not through the company, although I will have to compensate [redacted] for using company van and tools.

Estimate for materials for rough in only per print. (not including old service panel because I'm not sure what to expect)
$1,700

Estimate for labor @ $50 an hour. I figure about four days
$1,600. Plus gas reimbursement.

I know we have talked about several different dates to start work, at this time I can commit to Dec 13, I hope this does not push you to far out. Please let me know if you have any concerns or questions regarding anything. Thank-you again for thinking about me for this project.

Cheers
[redacted]
Cell [redacted]

-------- Original Message --------

Answer to Question of the Month:

System voltage and phase, transformer kVA, transformer impedance percentage, conductor material (copper or aluminum), conductor size, conductor length, conduit material (metallic or nonmetallic), motor contribution.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Interim Chief Electrical Inspector **Vol. 17 No. 8** **August 2014**

Question of the Month

Is Arc-Fault Circuit-Interrupter (AFCI) protection required for existing branch circuits when replacing dwelling unit circuit breakers or changing a panel?

Arc-Fault Circuit-Interrupter Requirements

A proposal to align AFCI requirements with the 2014 NEC by removing amended AFCI requirements in WAC 296-46B-210 was adopted during the last rulemaking. Installations made on any electrical work permit purchased after July 1, 2014 are subject to the 2014 NEC AFCI requirements.

One of the most significant changes between the 2008 and 2014 versions of the National Electrical Code installers encounter is the expansion of Arc-Fault Circuit-Interrupter (AFCI) protection in NEC 210.12.

- Dwelling unit AFCI protection has expanded and now includes all 120-volt, single phase, 15- and 20-amp branch circuits supplying outlets or devices installed in dwelling unit kitchens, family rooms, dining rooms, living room, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas. This includes hard-wired equipment and appliances.
- Dormitory units now fall under similar requirements.
- Devices providing AFCI protection must be installed in a readily accessible location.

Safety Tip of the Month!

When working on or about energized or potentially energized electrical equipment, be aware that an arc flash/blast event can seriously injure or kill you and anyone nearby.

NFPA 70E-2012, Standard for Electrical Safety in the Workplace, provides assistance in determining the severity of potential exposure, planning safe work practices, and selecting personal protective equipment.

Here is a good ***Arc Flash Awareness*** video from the National Institute for Occupational Safety and Health (NIOSH) that shows what can happen when things go wrong.

Class B Labels – Validating and Posting

Recently, questions have been asked about when Class B random inspection labels must be validated using the department's online system. The Class B labels and the process for their use and validation were updated in March 2013. ***WAC 296-46B-908***(2)(a) describes the process for validating and posting Class B labels purchased after February 28, 2013. The entity doing the electrical work must use the department's online Class B system to enter the jobsite information for an unused label and post the label or label number before beginning the work. If the work occurs on a weekend or a federal/state holiday, the purchaser must still post the label/number before beginning the work, but may enter the jobsite information into the online system no later than the next business day. For additional information about Class B labels, the department has prepared a publication that details ***what you should know about Class B labels.***

Luminaire Ballast Disconnecting Means – Now Required When a Ballast is Replaced

NEC 410.130(G)(1) gives the requirements for installing a disconnecting means for fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place. This requirement first appeared in the 2005 NEC and did not specify whether a disconnecting means was required when replacing an existing ballast in an existing luminaire. To provide consistency, in ***May 2008*** an *Electrical Currents* newsletter article was published which stated a disconnecting means was not required if the luminaire was installed prior to January 1, 2008.

A change in the 2011 NEC, added a sentence to NEC 410.130(G)(1) stating "*For existing installed luminaires without disconnecting means, at the time a ballast is replaced, a disconnecting means shall be installed.*" Effective August 1,

2014, the department will enforce the current NEC requirement and require ballast disconnecting means as specified in 2014 NEC 410.130(G)(1). This article supersedes the previous *May 2008* article.

NEC 690.47(D) – Additional Electrodes for Photovoltaic Array Grounding

One of the controversial changes in the 2014 NEC is the modified requirement for additional electrodes for photovoltaic array grounding. This requirement first appeared in the 2008 NEC and was deleted from the 2011 edition. For 2014, the requirement was re-instated, but was modified to require additional "auxiliary" electrodes to be installed in accordance with NEC 250.52 and 250.54. Because 250.54 does not require an auxiliary electrode to be bonded to the other electrodes present at a building or structure as part of the grounding electrode system, there could be a difference of potential between the auxiliary electrode, a building electrode system, and grounded metal parts of the building or structure, especially during a lightning event. This difference of potential could cause objectionable current flow on the equipment grounding conductor connected to the frames of the modules as required by 690.43. Equipment in the equipment grounding conductor path would be subject to risk of damage, and create a possible shock hazard for anyone contacting the equipment during a lightning event.

NEC 690.47(D) Exception No. 2 states an additional array grounding electrode(s) shall not be required if located within 6 feet of the premises wiring electrode. Until this problem is addressed in the NEC, Washington State will not require additional electrodes for photovoltaic array grounding if the array is mounted on a building or structure that has a grounding electrode system in accordance with Parts II and III of Article 250.

Grounding of Receptacles and Fixed Electrical Equipment in Patient Care Areas

A change in 2014 NEC 517.2 definitions may have added some confusion to the requirements for grounding of receptacles and fixed electrical equipment in patient care areas required by 517.13. The definition of "*patient care area*" was changed to "*patient care space*". This change was made to align with the definitions in NFPA 99 *Health Care Facilities Code.* The confusion arises because the requirement in NEC 517.13 still refers to "*patient care areas*". The general description of the area or space did not change and refers to "*Space within a health care facility wherein patients are intended to be examined or treated"*. NEC 517.13 requires specific wiring methods for patient care areas (i.e. insulated copper conductor, metal raceway, hospital grade MC, or AC cables, etc.). Patients in these areas may come in contact with ordinary electrical appliances, be connected to electromedical devices, or be subjected to invasive procedures. Not all areas where patients are treated or examined are patient care spaces. The governing body of a facility must designate areas as patient care spaces or not patient care spaces in accordance with the type of patient care anticipated to be provided in the facility.

NEC 517.10(A) was changed to state that Part II of Article 517 (which contains 517.13) shall apply to patient care space of all health care facilities. All locations designated as "*patient care space"* by the governing body of a facility must comply with the requirements of 517.13.

Ugly Installation: Click on the picture to open a larger image. There are too many violations to list in this dangerous installation. The installers may have been sampling the product.

Answer to Question of the Month: Not always. An exception to 2014 NEC 210.12(B) states AFCI protection shall not be required where the extension of the existing conductors is not more than 6 ft. and does not include any additional outlets or devices. This would allow circuit breakers or a panel to be replaced without providing AFCI protection if the conditions in the exception are met. If a circuit is extended more than 6 ft, 2014 NEC 210.12(B) requires AFCI protection where branch-circuit wiring is modified, replaced, or extended in any of the areas specified in 210.12(A).

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Interim Chief Electrical Inspector **Vol. 17 No. 7** **July 2014**

The Question of the Month

When does the NEC require service equipment to be marked with the maximum available fault current?

Safety Tip of the Month!

Maintain a Safe Work Environment

WISHA (the Washington Industrial Safety and Health Act of 1973) obligates your employer to provide a safe place for you to work. Notify your employer immediately if you feel that a hazard exists.

Both workers and employers can find assistance with safety issues at: ***http://www.lni.wa.gov/Safety***

Note from the Interim Chief Electrical Inspector

The electrical industry has faced many challenges during the great recession. It has taken 69 months for the economy to recover the jobs lost during that time. Some jobs may never return. While things are better today than they were several years ago, growth in the residential construction sector remains quite flat. As the economy expands in other areas, your electrical inspectors are working very hard to respond to requests for inspection. In 2008, there were 141 electrical inspection staff members. After the layoffs in 2009 and 2010, there were 91. A supplemental budget allotment provided by the legislature, supported by a recovering economy, has allowed the program to restore 27 inspector positions lost during the recession. There is a direct relationship between the quantity and value of electrical permits and the number of electrical inspectors supported by those factors. Every time an inspector position is restored, inspection response times get better, only for the effect to be erased by a recovering economy. Some capacity to restore electrical inspector positions exists, but it is not yet supported by the economy. We are frequently recruiting to fill inspector vacancies caused by retirements or restoration of positions. If you or someone you know is interested in becoming an electrical inspector, there is no better time to pursue that opportunity. For details, please visit our webpage, ***Find a job at L&I*** and search using keyword “inspector”.

Recall Alert – Trane Air Conditioning Systems

The U.S. Consumer Product Safety Commission (CPSC), in cooperation with Trane U.S. Inc. has recalled 100,600 air conditioning systems due to shock hazard. The ground screws used in some units do not have the two threads required to provide sufficient grounding, posing a shock hazard to consumers. The recall involves 37 models of Trane XB300 and American Standard brand Silver SI split system outdoor cooling units. The units are gray and have a black grated front. The units were sold in two sizes: 25.5 inches deep by 23.5 inches wide by 28.83 inches tall and 28.83 inches deep by 28.48 inches wide by 29.28 inches tall. The Trane or American Standard logo is affixed to the front and model numbers are printed on the silver nameplate on the back of the unit. Models included in the recall are listed on the ***Recall Alert*** page of the CPSC website.

According to the U.S. Consumer Product Safety Commission (CPSC), consumers should immediately turn off the cooling unit via the main breaker switch and check the model information. Consumers with recalled air conditioning systems should contact Trane or their installer or service dealer for instructions on scheduling a free inspection and repair.

The 2014 NEC and Revised WAC 296-46B Are Effective July 1, 2014

The 2014 NEC and Revised WAC 296-46B are effective July 1, 2014. For projects that do not require electrical plan review, the purchase date of the electrical work permit will determine which version of the Code will be enforced. Permits purchased on or after July 1, 2014 must comply with the 2014 NEC and WAC 296-46B. For projects requiring plan review, the installation must comply with the 2014 NEC if the plans are received and accepted for review on or after July 1, 2014.

Eligible Telecommunications Workers – Steps to Obtaining a 06 Specialty Certificate

Until July 1, 2015, individuals who have unsupervised telecommunications experience while working for either a 01 general, or a 06 limited energy specialty electrical contractor can apply work experience towards eligibility for examination for a (06) limited energy systems certificate of competency. Please review the ***May 2014 newsletter*** for eligibility requirements and the two methods that can be used to document your past work experience. If this applies to you, complete the ***special affidavit form*** and submit it as instructed on the form. Note: ***WAC 296-46B-942***(8)(d) requires employers to provide the necessary documentation and the signed affidavit of experience to a worker within twenty days upon request.

In addition to documenting your hours of qualified work experience, the other requirements to obtain a 06 limited energy certificate are explained on the ***How to apply for an Electricians' certificate*** page of our website. You must complete 48 hours of ***Basic Classroom Instruction*** and apply for, and pass an ***examination***.

Arc Fault Circuit-Interrupter (AFCI) and Ground Fault Circuit-Interrupter (GFCI) Protection

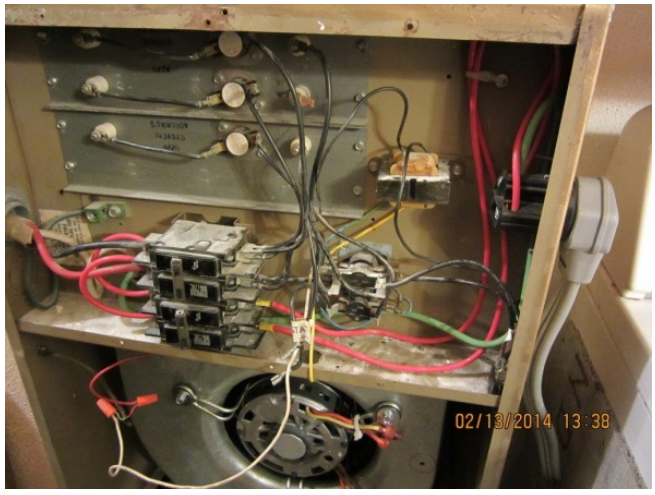
Effective July 1, 2014, Washington will require Arc Fault Circuit-Interrupter Protection (AFCI) as specified in the 2014 National Electrical Code (NEC). The provision in WAC 296-46B-210 that limited AFCI protection requirements to bedroom spaces only was eliminated in the recent WAC rule revisions. NEC 210.12(A) identifies the areas of a dwelling unit where all 120-volt, single-phase, 15- and 20-ampere branch circuits must be AFCI protected, and includes most areas in a home except garages and bathrooms. Options for providing AFCI protection were expanded in the 2014 NEC and are described in 210.12(A)(1) through (6).

There will be areas where a branch circuit must be AFCI protected, and the receptacle or outlet on that circuit must be Ground-Fault Circuit-Interrupter (GFCI) protected as specified in NEC 210.8. In this case, the same circuit may require both an AFCI and a GFCI circuit breaker or device. Both the AFCI and GFCI, whether a circuit breaker or device type must be readily accessible. Also new for 2014, NEC 210.8(A) was expanded to require GFCI protection for laundry areas, and NEC 210.8(D) requires GFCI protection for outlets that supply dishwashers installed in dwelling units.

NEC 210.12(B) requires AFCI protection where branch circuit wiring is modified, replaced, or extended by installing a listed combination-type AFCI at the origin of the branch circuit, or a listed outlet-type AFCI located at the first receptacle outlet of the existing branch circuit. An exception allows a circuit to be extended not more than 6 feet without AFCI protection if it does not include any additional outlets or devices. This would allow a panel to be replaced at or near the same location without requiring AFCI protection for the existing branch circuits.

NEC 406.4(D) now requires replacement receptacles to be AFCI, GFCI, or tamper resistant, where replacements are made at locations requiring such protection.

Ugly Installation: Click on the picture to open a larger image. Note the dryer receptacle mounted on the side of the furnace that is supplied from one of the furnace disconnect breakers. While creative, this is not only a violation of NEC 110.3, Examination, Identification, Installation, and Use of Equipment, it is a violation of RCW 19.28.101, electrical work completed without a permit or inspection. This installation voids the listing of the furnace. In the end, the issue was corrected.



Answer to Question of the Month: NEC 110.24 (A) & (B) Available Fault Current. Beginning July 1, 2014, maximum available fault current markings are required for new non-dwelling service installations and any time modifications to the electrical installation occur that affect the available fault current at the service.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Interim Chief Electrical Inspector **Vol. 17 No. 6 SE** **June 2014**

SPECIAL EDITION

Significant 2014 NEC & WAC 296-46B Changes

This issue is dedicated to a review of significant changes in the National Electrical Code (NEC) and the WAC 296-46B electrical rules. The 2014 NEC was adopted in March of 2013 with an effective date July 1, 2014. The electrical rules also become effective on that day. Installations made under any electrical permit purchased on or after July 1, 2014 are subject to the requirements of the 2014 NEC and July 2014 WAC 296-46B electrical rules.

The recent rulemaking process was necessary to align the March 2013 WAC 296-46B (based on the 2008 NEC) with the 2014 NEC. In a number of instances, the NEC had aligned with WAC 296-46B. As a result, it was necessary to remove sections from WAC 296-46B to avoid redundancy. Very few amendments to the NEC were adopted.

This document does not cover all changes. It is meant to assist you in becoming aware of significant changes in the 2014 NEC and changes to WAC 296-46B. The explanations vary from the actual code language; for clarification, refer to the 2014 NEC and/or WAC 296-46B. A complete version of the 2014 ***WAC 296-46B*** will soon be available at:
http://www.lni.wa.gov/TradesLicensing/Electrical/LawRulePol/LawsRules/default.asp.

Until that time, the adopted electrical rules (modified sections only) in tracked changes format are available at:
http://www.lni.wa.gov/rules/AO13/16/1316Adoption.pdf

- **NEC 100 – Definitions.**
  - *2014 NEC new definition - Retrofit kit* – A general term for a complete subassembly of parts and devices for field conversion of utilization equipment.

- **NEC 110.21 (B) - Marking/Field-Applied Hazard Markings.**
  - *2014 NEC new requirement 110.21(B)* - Requirements for caution, warning, or danger signs or labels required elsewhere in the code.

- **NEC 110.24 - Available Fault Current.**
  - *2011 NEC new requirement 110.24* - Non-dwelling unit service equipment required to be field marked with the amount of available fault current when installed or modified.

- **NEC 200.4(B) - Neutral Conductors/Multiple Circuits.**
  - *2014 NEC new requirement 200.4(B) – Similar to existing grouping requirements located in 210.4(D) Multiwire Branch Circuits* - In an enclosure, the common grounded conductor (neutral) shall be identified or grouped to correspond with the ungrounded conductors of the same circuit by wire markers, cable ties, or similar means in at least one location within the enclosure.

- **NEC 210.8 (A) - Ground-Fault Circuit-Interrupter Protection for Personnel/Dwelling Units.**
  - *2011 & 2014 NEC new requirements NEC 210.8(6), (7), (A)(9), & (10)* - GFCI protection required for receptacles installed within 6 ft. of the outside edge of any sink, bathtub or shower stall, in all laundry areas, indoor wet locations, locker rooms with associated showering facilities, and on the kitchen dishwasher branch circuit.

- *2014 new requirement WAC 296-46B-210 (2)* - All fixed electrical equipment with exposed grounded metal parts within an enclosed shower area or within five feet of the top inside edge of a bathtub must have ground fault circuit interrupter protection.
- Devices providing GFCI protection must be installed in a readily accessible location.

- **NEC 210.12 - Arc-Fault Circuit-Interrupter Protection.**
  - *2011 and 2014 NEC new requirements 210.12* - Dwelling unit AFCI protection has expanded and now includes all 120 volt, single phase, 15 and 20 amp branch circuits supplying outlets or devices installed in kitchens, family rooms, dining rooms, living room, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas. This includes hard-wired equipment and appliances.
  - Dormitory units now fall under similar requirements.
  - Devices providing AFCI protection must be in installed in a readily accessible location.
  - *WAC 296-46B-210 (4) - Arc-Fault Circuit-Interrupter Protection deleted, eliminating any differentiation from the 2014 NEC.*

- **NEC 210.13 - Ground-Fault Protection of Equipment.**
  - *2014 NEC new requirement 210.13* - Same as the existing GFPE requirements for services and feeders, GFPE is now required on branch-circuit disconnects rated at 1000 amps or more with more than 150 volts to ground (not exceeding 600 volts phase to phase).

- **NEC 210.52 - Dwelling Unit Receptacle Outlets.**
  - *2011 NEC new requirement 210.52(A)(4) - Countertop Receptacles* – Countertop receptacles shall not be considered as the wall space receptacles required by 210.52(A).
  - *2014 NEC revised 210.52(E)(1) & (E) (2) - Outdoor Outlets - One-Family and Two-Family Dwellings* - The requirements for outdoor receptacles have been revised to permit receptacle outlets to be readily accessible from grade but not more than 6 ½ feet above grade level. It is no longer necessary to be standing at grade to access the receptacle, allowing them to be accessible from porches and decks. The same requirements apply to multifamily dwelling units.
  - *2014 NEC revised 210.52(E)(3) - Balconies, Decks, and Porches* - All balconies, decks and porches that are attached to and accessible from inside a dwelling unit shall have a least one outdoor receptacle. The change eliminates the requirement for the receptacle to be installed "within the perimeter of the balcony deck or porch"; it must be accessible and not more than 6 ½ ft. above the balcony, deck or porch.
  - *WAC 296-46B-210 (7) - Balconies, Decks, and Porches deleted, eliminating any differentiation from the NEC.*
  - *2014 NEC revised 210.52(G) (1) - Basement, Garages, and Accessory Buildings* – The branch circuit feeding the garage receptacles shall not supply outlets outside of the garage. At least one receptacle outlet shall be installed for each car space.
  - *2011 NEC new requirement 2014 NEC revised 210.52(I) Foyers* – Foyers that are not part of a hallway and greater than 60 square feet shall have a receptacle located on each wall space 3 ft. or more in width.

- **NEC 210.64 - Electrical Service Area.**
  - *2014 NEC new requirement 210.64* - In other than one and two family dwellings, at least one 125-volt, 1Ø, 15 or 20 ampere rated receptacle outlet shall be installed within 50 ft. of the electrical service equipment.
  - *Modified by the chief electrical inspector* - If service equipment is located outdoors, the requirements of NEC 210.64 do not apply (See the ***June 2014 edition of the Electrical Currents Newsletter***).

- **NEC 250 - Grounding and Bonding.**
  - *2014 NEC new table 250.102(C)* - Rather than Table 250.66, new table 250.102(C) is to be used for sizing grounded conductors, main bonding jumpers, system-bonding jumpers, and supply-side bonding jumpers.

- o *WAC296-46B-250(2) Revised - Another option if the concrete encased grounding electrode is not available* - If the concrete encased grounding electrode is not available for connection, a ground ring must be installed per NEC 250 or other grounding electrode installed per NEC 250 verified to measure 25 ohms or less to ground. Resistance verification testing must be performed by an independent firm having qualified personnel and proper equipment. A copy of the testing procedures used and a written resistance test record signed by the person performing the test must be available at the time of inspection. The resistance test record must include test details including, but not limited to, the type of test equipment used, the last calibration date of the test equipment, and all measurements taken during the test.

- **NEC 406.12 - Receptacles, Cord Connectors, and Attachment Plugs - Tamper Resistant Receptacles in Dwelling Units.**
  - o *2011 & 2014 NEC revised 406.12* - With few exceptions tamper-resistant receptacles shall be installed in all areas specified in 210.52, guest rooms and guest suites of hotels and motels, and childcare facilities.
  - o *WAC 296-46B-406 deleted, eliminating any differentiation from the NEC.*

- **NEC 410.6 Luminaires, Lampholders, and Lamps.**
  - o *2014 NEC revised 410.6 – Listing required* - In addition to luminaires and lampholders, retrofit kits shall be listed. Luminaires and signs upgraded in the field will require a listed retrofit kit. A new definition for retrofit kit can be found in NEC Article 100.
  - o *2011 NEC new requirement 410.130(G)(1) – Disconnecting means s*hall be installed when replacing ballasts.

- **NEC 450 - Transformers and Transformer Vaults.**
  - o *2014 NEC new requirement 450.10(A) - Dry Type Transformers - Grounding* - With the exception of transformers with wire-type connections, a terminal bar shall be secured inside the transformer for connection of all equipment grounding conductors and supply side bonding jumpers. The terminal bar shall not be installed on or over any vented portion of the enclosure.
  - o *2011 NEC new requirement 450.14 – Disconnecting Means* - Transformers are required to have a disconnecting means. Where located in a remote location, the disconnecting means must be lockable and the location of the disconnect must be field marked on the transformer.

- **NEC 517 - Health Care Facilities** – *The 2012 edition of the NFPA 99, Health Care Facilities Code, underwent major changes resulting in major modifications for the 2014 NEC and WAC 296-46B-517.*
  - o *517.2 Definitions* - Two new: Support Space & Wet Procedure Location - Two deleted: Emergency System & Wet Procedure Locations (from the definition of Patient Care Space) - Six revised definitions: Critical Branch, Equipment ~~System~~ Branch, Life Safety Branch, Patient Care ~~Area~~ space, General Care ~~Area~~ Space, & Patient Care Vicinity.
  - o *2011 & 2014 NEC revised 517.18 - General Care Areas- Patient Bed Locations* – The electrical receptacles or the cover plates for receptacles supplied by the critical branch shall have a distinctive color or markings as to be readily identifiable and shall also indicate the panelboard and branch circuit number supply them.
  - o The minimum number of receptacles required for general care area patient bed location was increased from four to eight receptacles.
  - o *2011 & 2014 NEC revised 517.19 (A) - Critical Care Areas - Patient Bed Locations* - The minimum number of receptacles required for critical care area patient bed location was increased from six to fourteen receptacles.
  - o *2014 NEC revised 517.19 (C) - Critical Care Areas – Operating Room Receptacles* - The minimum number of receptacles required for an operating room was increased to thirty-six receptacles.
  - o *2014 NEC revised 517.30(B) - Essential Electrical System (Hospital)* – The term “emergency systems” has been removed from Article 517. The essential system is now comprised of three separate branches: the critical branch, the life safety branch, and the equipment branch.

- **NEC 600 - Electric Signs and Outline Lighting.**
  - *Changes and new requirements for 2011 NEC, 2014 NEC, and WAC296-46B-600.*
  - *NEC 600.3 - Listing* – Fixed, mobile, or portable electric signs, section signs, outline lighting, and retrofit kits shall be listed, provided with installation instructions, and installed in conformance with listing.
  - *NEC 600.4 (C) - Markings - Visibility* – The required markings and listing labels do not need to be visible after installation but shall be in a location visible during servicing.
  - *NEC 600.4(D) - Durability* – Markings shall be permanent, durable, and when in wet conditions, shall be waterproof.
  - *NEC 600.4(E) - Installation instructions – All signs, outline lighting, skeleton tubing systems, and retrofit kits shall be marked to indicate that field wiring and installation instructions are required.*
  - *NEC 600.9(A)(1) - Disconnects – Location – At Point of Entry to a Sign Enclosure – With the exception of conductors passing through a sign enclosed in a Chapter 3 wiring method, the required sign disconnect shall be located at the point of entry of the conductors into the sign.*
  - *WAC296-46B-600 - Electrical Signs – General*
    - *(1) Listing* - All electrical signs and outline lighting must be listed and will be inspected for compliance with instructions and the NEC.
    - *(5) Retrofit Kits*– Signs and outline lighting can be retrofitted in place if the retrofit components and kits are listed, installation instructions are available, and physical access is provided at the time of inspection.

- **NEC 690 - Solar Photovoltaic Systems.**
  - *The continual growth in the PV industry has resulted in many changes to Article 690 in both the 2011 and 2014 NEC. The changes are too many to list here. If you participate in the PV industry, becoming familiar with the changes is imperative.*
  - *Modified by the chief electrical inspector* – One-year delay, until July 1, 2015, of implementing 2014 NEC sections 690.11, Arc-Fault Circuit Protection (Direct Current), 690.12 Rapid Shutdown of PV Systems on Buildings (See the ***May 2014 edition of the Electrical Currents Newsletter***).

- **NEC 695 - Fire Pumps.**
  - *Many revisions in both the 2011 and 2014 NEC. If you participate in the fire pump industry, becoming familiar with the changes is imperative.*

- **NEC 700 - Emergency Systems.**
  - *Changes and new definitions for the 2011 NEC - new requirements and changes for the 2014 NEC, and minor changes to WAC 296-46B-700.*
  - *2014 NEC new requirement 700.8 Surge Protection* – A listed SPD shall be installed in or on all emergency systems switchboards or panelboards.
  - *2014 NEC revised 700.16 Emergency Illumination* – Emergency illumination required for emergency service or feeder building disconnecting means.
  - *2014 NEC new requirement 700.19 Multiwire Branch Circuits* – The branch circuit serving the emergency lighting and power circuits shall not be part of a multiwire branch circuit.
  - *2014 NEC new requirement 700.27* – A licensed professional engineer or other qualified persons must design and select the selective coordination of the overcurrent protection devices for emergency systems.

- **NEC 705 - Interconnected Electric Power Production Sources.**
  - *Point of Connection – Moved from PV Systems NEC 690.64 to 705.12 in 2011, revised for 2014, also applies to NEC 694 Wind Electric Systems* – Many of the point of connection requirements have changed.

- *Modified by the chief electrical inspector* – One-year delay, until July 1, 2015, of implementing 2014 NEC section 705.12(6), Wire Harness and Exposed Cable Arc-Fault Protection (See the ***May 2014 edition of the Electrical Currents Newsletter***).

WAC 296-46B-010(4) – Inspections – General.

- *New exception* - Not more than 2.44 m. (8 ft.) of electrical conduit used as service entrance raceway in a foundation of a one or two family dwelling or residence may be installed and the concrete poured without a cover inspection.

- **WAC 296-46B-100 – General definitions.**
  - *New definition* - "Journey level electrician" means a person who has been issued a journey level electrician certificate of competency by the department. “The terms “journey level” and “journeyperson” in RCW 19.28 are synonymous.”

- **WAC 296-46B-900(3)(a)(vi) – Plan review for educational, institutional or health care facilities/buildings.**
  - *New requirement* - For projects described in WAC 296-46B-900(3)(a)(ii)(iii) & (v), electrical plan review is not required. However, the following information must be available to the electrical inspector before the work is initiated: a clear and adequate description of the project’s scope; a load calculation(s); what the load changes are, providing both before and after panel schedules as needed; and provide information showing that the service and feeder(s) supplying the panel(s) where the work is taking place has adequate capacity for any increased load and has code compliant overcurrent protection for that supply.

- **WAC 296-46B-901(7)(v) – Permit – Requirements.**
  - *No permit required for* - The disconnection of electrical circuits from their overcurrent protection device for the specific purpose of removing the electrical wiring or equipment for disposal.

- **WAC 296-46B-908(10)(b)(iii), (iv), and (e) - Class B permits expanded**
  - *WAC 296-46B-908(10)(b)(iii) & (iv)* - Class B permits expanded to include associated Class 2 low voltage wiring when replacing an electric/gas/oil furnace not exceeding 240 volts and 100 amps when the furnace is connected to an existing branch circuit; or when replacing an individually controlled electric room heater (e.g., baseboard, wall, fan forced air, etc.), air conditioning unit, heat pump unit, or refrigeration unit not exceeding 240 volts, 40 minimum circuit amps when the unit is connected to an existing branch circuit.
  - *WAC 296-46B-908(10)(e)* - The conversion from snap switches to not more than ten occupancy sensors was added to the work that can be done using a Class B permit.

- **WAC 296-46B-925(17) - Electrical/telecommunications contractor exemptions**
  - *Clarification* - The licensing and certification requirements of Chapter 19.28 RCW do not apply to persons or firms who remove electrical wiring and/or equipment for the purpose of disposal when all conductors, raceways, and equipment to be disposed of have been physically separated from the source of power by a properly certified electrician employed by a licensed electrical contractor, or person(s) meeting the exemptions listed in RCW 19.28.261. Removal of a component or only a portion of an equipment unit is considered electrical maintenance and does not qualify for this exemption.

- **WAC 296-46B-935(1) - Administrator certificate. General.**
  - *New requirement* – The department will deny assigning an administrator or master electrician to a contractor if the individual owes money because of an outstanding final judgment(s) to the department.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Interim Chief Electrical Inspector **Vol. 17 No. 6** **June 2014**

The Question of the Month

When does 2014 National Electrical Code become effective?

Note from the Rod Mutch

After much careful consideration, I have made the decision to step down as chief electrical inspector effective June 1, 2014. This decision was made in consideration of personal and family reasons related to my living in Yakima and working in Tumwater. I will remain with the department and will be working in the Yakima L&I office. I have enjoyed my tenure as chief and am grateful for the support of the department, inspectors, supervisors, and electrical program stakeholders. The electrical program is in a strong position with many capable leaders. In the interim, until a permanent chief electrical inspector is appointed, Larry Vance has agreed to serve as interim chief. Larry has been working as an electrical technical specialist in the electrical program from November 2007 to the present with brief periods where he served as the electrical inspection field supervisor in Tacoma and interim electrical program manager and chief electrical inspector. Prior to becoming an electrical technical specialist, Larry was an electrical field inspector from 2004 through 2007. He has eighteen years of electrical experience in the private sector electrical construction industry. Based on Larry's knowledge and experience, I believe he is the best choice for this interim appointment. Please join me in welcoming Larry to his new position.

Safety Tip of the Month!

Protect yourself, your family, and your investment – Make certain you hire a legitimate licensed electrical contractor who:

- Uses certified electricians and;
- Gets the work inspected.

Check your contractor's and electrician's status at:

https://secure.lni.wa.gov/verify/

Who Can Place Building Integrated Photovoltaic Systems?

WAC ***296-46B-690***(5) states: The entity placing a building integrated cell, module, panel, or array is not subject to the requirements for electrical inspection, licensing, or certification so long as the work is limited to the placement and securing of the device and an electrical work permit has been previously obtained for the electrical work related to the equipment by an entity authorized to do that electrical work.

This rule became necessary because of the proliferation of materials that serve a dual function as photovoltaic components and building exterior finish materials such as roofing, siding, and windows. It does not allow non-electrical contractors and uncertified individuals to install PV system materials unless they meet the definition of building integrated and the requirements stated in WAC 296-46B-690. The definition of "building integrated" PV panels is from the National Electrical Code, and is defined in rule as follows: WAC 296-46B-690(1) Building integrated: means photovoltaic cells, modules, panels, or arrays that are integrated into the outer surface or structure of a building and serve as the outer protective surface of that building, such as the roof, skylights, windows, or facades.

In general, ***RCW 19.28.041***, ***RCW 19.28.161***, and RCW ***19.28.006*** definitions of "Equipment" and "Electrical construction trade" require that all parts and components of solar photovoltaic (PV) systems be installed and maintained by properly licensed electrical contractors and certified electricians. Construction contractors who are not electrical contractors are not properly licensed to install solar photovoltaic (PV) panels except in very specific applications as described in WAC 296-46B-690. The allowance in WAC 296-46B-690(5) permits construction contractors and uncertified individuals to place only "building integrated" PV panels but all electrical work, including wiring installation, terminations, etc., necessary to complete the electrical installations must be completed by the entity that obtained the electrical work permit.

WAC Rule Revision Update – Effective Date July 1, 2014

The proposed rule changes to ***WAC 296-46B*** were adopted on May 20, 2014 and will become effective on July 1, 2014. In addition to the changes to WAC 296-46B, the 2014 edition of the National Electrical Code (NFPA 70-2014) will also become effective July 1, 2014. Permits purchased prior to July 1, 2014 may conform to either the 2008 NEC or 2014 NEC. Permits purchased July 1 or after must comply with the 2014 NEC.

The 2014 rule making would not have been possible without the time and expertise of the many stakeholders who participated. Thank you to everyone that submitted rule proposals, the members of the technical advisory committee who reviewed all of the proposals and made recommendations, the Electrical Board, everyone who attended one of the 17 stakeholder meetings where proposed changes were discussed and those who submitted comments on the proposed rules.

NEC 210.64 New Requirement – Receptacles for Electrical Service Areas

2014 NEC 210.64, Electrical Service Areas, states "At least one 125-volt, single phase, 15- or 20-ampere rated receptacle outlet shall be installed within 15 m (50 ft) of the electrical service equipment". The substantiation for this new requirement raised concern about cords used to power equipment used for testing and monitoring service equipment being routed down hallways, across rooms, and through doorways creating slip, trip and fall hazards. The electrical program understands the intent and therefore will only enforce the requirements of NEC 210.64 for indoor electrical service areas. If service equipment is located outdoors, the requirements of NEC 210.64 do not apply.

When Will Electrical Examinations be Based on the 2014 NEC?

Adopting a new version of the NEC usually causes a number of queries from training providers and exam candidates anxious about the timeline for updated examinations. Historically, basic code requirements and theory fundamentals do not change much with a new version of the NEC. We are planning to roll out updated examinations in the summer or fall of 2015. Until then, the examinations are based on the 2008 NEC. When the exam revision date is known, we will announce it in this newsletter. If you are not a subscriber, visit ***http://www.lni.wa.gov/Main/Listservs/Electrical.asp*** to join.

Limited Energy Workers Grandfathering Opportunity Begins June 12

Beginning June 12, 2014, eligible individuals who have unsupervised telecommunications experience can apply work experience towards eligibility for examination for an (06) limited energy systems certification. Please review ***last month's newsletter*** for eligibility requirements and the two methods that can be used to document your past work experience. If this applies to you, complete the ***special affidavit form*** - only available between June 12, 2014 and July 1, 2015 - and submit it as instructed on the form. Note: ***WAC 296-46B-942*** (8)(d) requires employers to provide the necessary documentation and the signed affidavit of experience to a worker within twenty days upon request.

Ugly Installation: Click on the picture to open larger image. Last month's picture was of a damaged section of NM-B cable with a nail shot through it. Submitted by the same L&I inspector, this month's picture is another serious condition caused by a sheathing or siding nail shot through the back of a panelboard into the bus. This caused a direct ground-fault that would have threatened life and property if the panel was energized. Fortunately, the inspector discovered it before approval was given to energize the panel. Last month we discussed ***WAC 296-46B-010***(6), which requires the exterior sheathing nail inspection to be completed by the building code inspector prior to the electrical cover inspection. This is another good example to ask if modifying the rule to require siding to be completed before cover approval could reduce the chances of this occurring or help inspectors catch more of these hazards prior to them becoming a serious safety issue.

Answer to Question of the Month: July 1, 2014. If you have not already taken a 2014 NEC update course, consider taking one prior to the July 1 effective date. Visit our ***Continuing Education*** webpage for more information.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 17 No. 5** **May 2014**

The Question of the Month

In the 2014 NEC, what table is used to size sizing grounded conductors, main bonding jumpers, system-bonding jumpers, and supply-side bonding jumpers?

Safety Tip of the Month!

Providing an accurate panel directory or circuit identification is not just a good safety practice, it is a National Electrical Code requirement.
Section 408.4 requires every circuit and circuit modification be legibly identified as to its clear, evident, and specific purpose or use. Spare breakers are to be marked as such.

Note from the Chief – Photovoltaic Rules Delayed

During the past few weeks, several Washington State manufacturers involved in the photovoltaic (PV) industry have contacted the electrical program. All expressed concerns that the industry is not ready for new PV requirements in the 2014 National Electrical Code (NEC) specifically, sections 690.11, Arc-Fault Circuit Protection (Direct Current), 690.12 Rapid Shutdown of PV Systems on Buildings and NEC 705.12(6), Wire Harness and Exposed Cable Arc-Fault Protection. Each manufacturer has technical obstacles in complying with the new NEC requirements by the July 1, 2014 effective date.

The electrical program conducted independent research and came to similar conclusions. We discussed the issues with all four in-state PV manufacturers, other PV industry experts, and the State of Oregon, which has already delayed implementation of NEC 690.11 until April 1, 2016 and NEC 690.12 until October 1, 2017. We conducted extensive online research and reviewed the Reports on Comments and Reports on Proposals for the 2011 and 2014 NEC revision cycles. All three requirements are meant to increase electrical safety for PV systems and in the future, no doubt will. However, by policy, I am granting a one-year delay, until July 1, 2015, in implementation of all three requirements, allowing the Washington State PV manufacturers time to address each of these issues. Enforcement will begin July 1, 2015. This reasonable approach will ensure an acceptable level of safety while not hampering Washington State's PV industry.

WAC Rule Revision Update – Proposed Effective Date July 1, 2014

In August 2013, the electrical program began publishing monthly articles to update our stakeholders on the process of making changes to WAC 296-46B. With the conclusion of the public comment period, the revised WAC 296-46B is scheduled to be adopted on May 20, 2014, with a proposed effective date of July 1, 2014. The 2014 edition of the National Electrical Code (NFPA 70-2014) will become effective July 1, 2014. If you have not attended a 2014 NEC code update course, you should consider doing so before it becomes effective. For current information on Washington State approved code update courses, please visit our ***Continuing Education*** webpage.

The 2014 rule making process would not be possible without the time and expertise of the many stakeholders who participated. Thank you to everyone that submitted rule proposals, the members of the technical advisory committee that reviewed all of the proposals and made recommendations, the Electrical Board, everyone who attended one of the 17 stakeholder meetings where proposed changes were discussed and those who submitted comments on the proposed rules.

Electrical Board Opportunities

There are currently four available positions on the ***Electrical Board***; a telecommunication contractor seat, an electrical utility representative seat, an electrical contractor seat, and a general public seat. I would like to thank out-going board members Brad King, Richard Damiano, Louis LaMarche, and Cathleen Bright for their service to the Electrical Program. For information on the qualifications of each seat, please visit: ***http://www.governor.wa.gov/boards/profiles/1000199.aspx***. Anyone interested in applying for a seat must submit the

application found at ***https://fortress.wa.gov/es/governor/boardsapplication*** as soon as possible. Send your resume and any additional information you would like considered in a separate email to the Boards and Commissions mailbox at: ***GovernorBoardsandCommissions@gov.wa.gov*** . Recommendation letters should be sent to the Governor's office. If you have questions about the positions or the Electrical Board, contact Elissa Zyski with the Electrical Program at 360-902- 5259.

Eligible Telecommunications Workers Can Receive Credit for Past Work Experience

During the recent session, the legislature passed ***House Bill 2253***, creating an open window of opportunity for eligible individuals who have unsupervised telecommunications experience to apply work experience towards eligibility for examination for an (06) limited energy systems certification. The opportunity begins June 12, 2014 and ends July 1, 2015. Those eligible will be able to document their past work experience on a special affidavit form that will soon be available on our ***Electrical Licensing Forms and Publications*** webpage. ***WAC 296-46B-942*** (8)(d) requires employers to provide the necessary documentation and the signed affidavit of experience to a worker within twenty days upon request.

Complete this checklist to determine your eligibility to take advantage of the HB 2253 Open Window	
I will be submitting a special open window affidavit form when it becomes available (June 12, 2014) with proof of experience, the WAC 296-46B-909 affidavit processing fee of $51.20 prior to July 1, 2015.	Yes No
I possess an electrical trainee certificate (required to apply, but previous experience obtained without a trainee certificate is eligible).	Yes No
The unsupervised hours of telecommunication work experience I will be submitting for credit toward the 06 limited energy exam were gained while employed by a 01 General or 06 Specialty Electrical Contractor.	Yes No
All hours I will be submitting were worked within Washington State.	Yes No
I have not previously received credit toward examination for the hours claimed.	Yes No
For experience worked within the previous 6 years, I will have my employer/previous employer document my experience on the special open window affidavit form **OR** I will use the form found at ***http://www.esd.wa.gov/newsandinformation/formsandpubs/own-record-request.docx*** to obtain records of my hours of experience and earnings gained while performing unsupervised telecommunications installations. For each 01 General or 06 Specialty Electrical Contractor where I claim to have gained experience , I will submit a separate special open window affidavit form.	Yes No
If you answered NO to any of the statements above, you are not eligible. Contact us at 360-902-5269 if you have questions.	

Ugly Installation: Pictured is a serious condition that an L&I inspector found during a cover inspection. Notice the nail shot through the NM-B cable, potentially causing an arcing condition, which could result in a fire if the circumstances are right. To help avoid this, WAC 296-46B-010(6) requires the exterior sheathing nail inspection to be completed by the building code inspector prior to the electrical cover inspection. If not, the wiring and device boxes must be installed a minimum of 2 ¼" from exterior edge of the framing, or wiring and devices must be protected by nail plates. Should the rule be changed to require completion of the siding before cover inspection?

Answer to Question of the Month: 2014 NEC new table 250.102(C) - Rather than Table 250.66, table 250.102(C) is used for sizing grounded conductors, main bonding jumpers, system-bonding jumpers, and supply-side bonding jumpers.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 17 No. 4** **April 2014**

The Question of the Month

As proposed WAC 296-46B-210 (4), Arc-Fault Circuit-Interrupter Protection, will be deleted from rule effective July 1, 2014. If this happens, what circuits will be required to be Arc-Fault Circuit-Interrupter protected for dwelling units with electrical permits purchased after June 30, 2014?

Note from the Chief – Electrical Board Vacancies

There are currently two vacant positions on the ***Electrical Board***. Richard Damiano and Louis LaMarche have served the board faithfully and I would like to thank them for their hard work and dedication to the electrical industry. There is an open electrical utility seat and the candidate must be an employee or officer of a corporation or public agency generating or distributing electric power. An electrical contractor's seat is also available and the candidate must be an owner or member of the firm for a licensed electrical contractor.

Anyone interested in applying for one of these openings must submit an application using the form on the Governor's website at: ***http://www.governor.wa.gov/boards/application/default.aspx***. Application must be made using the Governor's form. To be considered for these openings, your application must be received by May 16, 2014. Send your resume and any additional information you would like considered in a separate email to the Boards and Commissions mailbox at: ***GovernorBoardsandCommissions@gov.wa.gov***. Recommendation letters should be sent to the Governor's office. If you have questions about the positions or the Electrical Board, contact Elissa Zyski at 360-902-5259.

Safety Tip of the Month!

Arc-Fault Circuit-Interrupter protection saves lives and property. AFCI protection protects branch circuit wiring from arcing faults that could start an electrical fire. AFCIs monitor circuits for both normal and dangerous arcs. If the AFCI deems the arc's characteristics to be dangerous, it will open, removing the arcing condition.

Recall on Square D-Brand F and K Frame Circuit Breakers

Square D-Brand F and K frame circuit breakers manufactured between May 2, 2013 and June 21, 2013 may be on recall. Please visit the ***Consumer Product Safety Commission*** for more information.

Reminder - WAC Rule Revision Update – Public Comment Ends April 10, 2014 at 5 p.m.

You can submit comments about the proposed rule changes until April 10 at 5 p.m. Comments can be submitted in writing or heard during the public hearing, at 1 p.m. on April 10, 2014 at the ***Department of Labor & Industries***, Room S119, 7273 Linderson Way SW, Tumwater, WA 98501. To learn more, please review our ***Electrical Rules Information Packet*** and the proposed rules on the ***Rule Development*** page of our website.

Statewide Stakeholder Meetings Nearly Complete

If you have not had the opportunity yet this year, come visit with us at one of the five remaining stakeholder meetings. This is an opportunity for you to talk with Electrical Program representatives in an informal setting. At the previous meetings, we have listened to your concerns and received many constructive suggestions for improving our services.

Our goal is to use your ideas to create an Electrical Program that is easier to do business with. Meetings are held from 6 to 8 p.m. with the meeting dates and locations posted on our webpage at: ***http://www.lni.wa.gov/TradesLicensing/Electrical/WhatsNew/default.asp.***

Telecommunications Legislation Becomes Law

House Bill 2253 unanimously passed the legislature and was signed into law by Governor Inslee on March 31, 2014. The new law results in changes to ***RCW 19.28.191***, Certificate of competency – Eligibility for examination – Rules, and ***RCW 19.28.400***, Telecommunications definitions.

Effective June 12, 2014, the legislature created an open window of opportunity in RCW 19.28.191 for individuals who have unsupervised telecommunications experience to apply one hour of every two hours of that work experience towards eligibility for examination for an (06) limited energy systems certificate of competency. By that time, a special open window affidavit form will be available on our website. Employers are required by ***WAC 296-46B-942*** (8) (d) to provide the necessary documentation and signed affidavit of experience to a worker within twenty days upon request.

To be eligible for the open window opportunity:

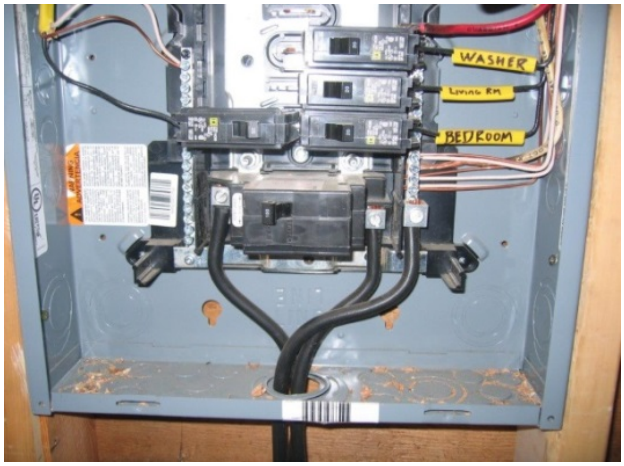
- All experience must have been gained while working with in Washington State while employed by an (01) general or (06) limited energy system electrical contractor.
- Applicants must possess an ***electrical trainee certificate*** before applying.

The legislature also added language to RCW 19.28.400 (13) that expands the (09) telecommunications scope of work. Effective immediately, 09 contactors and their workers will be able to install cabling and equipment as part of a limited energy power distribution system providing operational power to a "telecommunications device". Prior to the legislation, limited energy power distribution was not part of the (09) Telecommunications scope.

A "telecommunications device" is not defined in statute or rule. With the rapid growth of technology and the development of new limited energy products, a clear definition of a telecommunication device is needed to clarify what is and what is not a "telecommunications device". Telecommunications systems do not include horizontal cabling used for fire protection signaling systems, intrusion alarms, access control systems, patient monitoring systems, energy management control systems, industrial and automation control systems, HVAC/refrigeration control systems, lighting or lighting control systems, and stand-alone amplified sound or public address systems.

Until a definition of a "telecommunications device" is developed through stakeholder driven rulemaking , the (09) telecommunications scope of work will include all structured cabling systems, connecting hardware, telecommunications equipment, premises switching equipment providing operational power to the "telecommunications device" , infrared, fiber optic, radio-frequency, power distribution associated with telecommunications systems, and other limited-energy interconnections associated with telecommunications systems or appliances. In other words, if the system is not specifically excluded above and encompasses a form of information generation, processing, or transporting of signals conveyed electronically or optically, including voice, data, video, or audio the work is within the (09) telecommunications scope of work.

Ugly Installation: Pictured is a service panel found by an L&I inspector. This installation does not conform to several NEC requirements. Notice the unfused single service conductors running through the wall and entering the enclosure with no raceway or connector, the lack of a main bonding jumper and grounding electrode system. Also, notice the grounded conductors and equipment grounding conductors terminated together in the same hole on the neutral bus.



Answer to Question of the Month: NEC 210.12 (A) All 120 volt, 1Ø, 15- and 20-ampere branch circuits supplying outlets or devices installed in kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas shall be AFCI protected.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 17 No. 3** **March 2014**

Question of the Month

Is a 125-volt, single-phase, 15- or 20-amp receptacle required to be installed at or near electrical service equipment?

Note from the Chief

As I mentioned in previous newsletters, the department gave the electrical program approval to increase electrical inspection staff by restoring eight permanent inspector positions eliminated during the great recession. All eight were hired and all have completed initial training. Inspector training is very important to ensure efficient, consistent, and accurate inspections and compliance work. We have placed the new inspectors in areas based on the highest need as indicated by permit sales. Our ability to respond to inspection requests in a timely manner has declined with the steady increase in numbers of permits and resulting increase in inspection workload. With more inspectors on board and trained, our response time should improve. We understand the financial impact that delays in inspections have on our customers. We continue to focus on improving the customer experience by identifying and removing waste in our processes.

Safety Tip of the Month!

When operating a motor vehicle, your life and the lives of others hinge on your actions. Just sending or receiving a text at 55 mph takes your eyes from the road an average of 4.6 seconds, the equivalent of blindly driving the length of a football field.

Please do not text and drive. Nothing is worth jeopardizing your life or the life of another.

We are not able to add more inspectors because we are limited to the amount of money we can spend from the dedicated electrical fund, which consists of deposits from electrical permit and licensing fees. Because of the recovering economy, resulting in projected increases in workload, we have asked the legislature for approval to restore up to sixteen more inspectors and one technical specialist starting on April 1, 2014.

1-Day Inspector Training will Affect Inspections on March 11 & 12

In preparation for July 1, 2014, the National Fire Protection Association (NFPA) is providing training on the 2014 NEC for L&I and city electrical inspectors who enforce the NEC. There will no L&I electrical inspections on March 11 on the west side of the Cascades and March 12 on the east side.

We regret the inconvenience this may cause our customers who rely on timely inspections. Please let your customers know and plan for your inspections accordingly.

2014 NEC update training is important for inspectors, as well as installers and designers. If you are an electrical administrator, master electrician or electrician, you can find a complete list of approved 2014 NEC update classes on our ***Continuing Education*** webpage. If you are a trainee, approved classes are found on our ***Basic Classroom Instruction*** webpage.

WAC Rule Revision Update

On January 30, 2014, during their regular meeting, the ***Electrical Board*** reviewed the proposed changes to WAC 296-46B. The Electrical Board recommended that the department move forward with the proposed rules

as recommended by the 32 member Technical Advisory Committee after their extensive review and debate of rule proposals made by stakeholders and the department. The version of the proposed rules recommended by the Electrical Board is available on the ***Rule Development*** page of our website.

A public hearing is scheduled for 1 p.m. on April 10, 2014 at the ***Department of Labor & Industries***, Room S119, 7273 Linderson Way SW, Tumwater, WA 98501. This hearing is the last opportunity for public comment before the proposed rules become effective on July 1, 2014.

Reminder – Statewide Stakeholder Meetings Kicking Off in Longview March 4

If you participate in the electrical industry in Washington State, come visit us at one of our statewide stakeholder meetings. This is an opportunity for our customers to talk with Electrical Program representatives in an informal setting. Meetings are scheduled from 6 to 8 p.m. with the ***meeting dates and locations*** posted on our webpage.

Installations of Circuit Extensions Connected by Extension Cords can now be Approved

In previous versions of the NEC, there was not a provision to allow extension cords as a permanent wiring method. That is why the department published an article in this newsletter in the ***December 2009*** edition prohibiting circuit extensions powered by cords. 2014 NEC 400.7(11) now permits a cord between an existing receptacle outlet and an inlet, where the inlet provides power to an additional single receptacle outlet, if;

- The wiring interconnecting the inlet to the single outlet receptacle outlet is a Chapter 3 wiring method.
- The entire extension kit is a listed assembly specific for the application.

Although, the 2014 NEC is not effective until July 1, 2014, the department will accept the installation of listed circuit extension kits powered by cords as of the publication of this newsletter. An electrical work permit is required for this type of work. Because it is an extension of a branch circuit, this installation would be Class B permit eligible. See ***WAC 296-46B 908*** for more information on Class B permits.

NFPA Issues 2014 National Electrical Code Corrections and Revisions

The NEC is a complex document with thousands of people working together to bring it to publication every three years. Sometimes there are errors and omissions that need correction after publication. The NFPA addresses this by issuing an erratum or correction to a specific article after publication. There have been two errata issued to date. The latest, Errata No.: 70-14-2, dated December 3, 2014, includes all changes to date and can be found at ***https://www.nfpa.org/Assets/files/AboutTheCodes/70/Errata70-14-2.pdf***. Please be sure to incorporate these changes into your copy of the 2014 NEC.

Ugly Installations: Pictured is a computer server assembly in a shipping container. This installation does not conform to the requirements for information technology equipment in Article 645 of the NEC. Notice the 120-volt power supplies and circuit boards laying on the metal shelf, apparent lack of grounding, open wiring, cords used for permanent wiring, the list goes on.

Answer to Question of the Month: Effective July 1, 2014, NEC 210.64 will require a 125-volt, 15- or 20-amp rated receptacle to be installed within 50 feet of all electrical service equipment except for one- and two-family dwellings.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 17 No. 2** **February 2014**

Question of the Month

What electrical projects will be required to comply with the 2014 NEC when it becomes effective on July 1, 2014?

Note From The Chief

On March 4, in Longview, WA we have scheduled the first of 17 electrical stakeholder meetings to be held across the state. Check the schedule below and attend a meeting near you. I want to hear how the Electrical Program can better serve you, our customers. Attending a meeting will give you the opportunity to share information and help you stay up to date with any changes that might affect you and/or your business.

Meetings are scheduled from 6 to 8 p.m. at the locations listed below. Meeting dates and addresses will also be posted on our ***Electrical Calendar*** webpage and distributed on the program email list. If you are not on the email list, you may join at our ***Electrical Email List*** webpage.

Safety Tip of the Month!

When installing or using listed or labeled electrical equipment it is very important to follow the manufacturer's instructions.

This holds true for something as simple as selecting a light bulb for a light fixture. A bulb that exceeds the rating of a light fixture will create excessive heat and may shorten the life of the fixture or worse, start a fire.

These meetings offer an opportunity for our customers to talk with Electrical Program representatives in an informal setting. We encourage all our customers to be involved and attend a meeting near you.

Spring 2014 Stakeholder Meetings	
March 4 – Longview – ***Cowlitz PUD*** meeting room 961 12th Avenue	**March 25 – Mount Vernon** – ***Northwestern Washington Research and Extension Center***, 16650 State Route 536
March 5 – White Salmon – ***White Salmon Valley Community Library*** – 77 NE Wauna Avenue	**March 26 – Everett** – ***Snohomish County PUD*** Board Room 2320 California Street
March 6 – Vancouver – ***L&I Building*** 312 Southeast Stonemill Drive	**March 27 – Tukwila** – ***L&I Building*** 12806 Gateway Drive South
March 11 – Wenatchee – ***Chelan County PUD*** Auditorium 327 North Wenatchee Avenue – Parking in back (east) side of building	**April 1 – Pullman** – ***Gladish Community and Cultural Center***, 115 Northwest State Street
March 12 – Moses Lake – ***L&I Building*** 3001 West Broadway Avenue	**April 2 – Spokane** – ***Spokane Falls Community College*** 3410 W. Fort George Wright Drive, Bldg 17, Sub Lounges A & B
March 13 – Kennewick – ***Benton PUD*** Auditorium 2721 West 10th Avenue	**April 3 – Yakima** – Pacific Power Auditorium 500 Keys Road
March 18 – Bremerton – ***L&I Building***, basement 500 Pacific Avenue	**April 8 – Tumwater** – ***L&I Auditorium*** 7273 Linderson Way Southwest
March 19 – Port Angeles – ***Elwha Klallam Heritage Center***, 401 East First Street	**April 9 – Aberdeen** – ***L&I Building*** 415 West Wishkah Street, Suite B
March 20 – Tacoma – ***L&I Building*** 950 Broadway, Orcas Room, 5th floor	

This document may contain hyperlinks to internet web pages. To access this PDF document online, go to: ***http://www.ElectricalCurrents.lni.wa.gov***

WAC Rule Revision Update

On January 30, 2014, during their ***regular meeting***, the ***Electrical Board*** reviewed the proposed changes to WAC 296-46B. The board did not recommend any modifications, confirming the excellent work the Technical Advisory Committee did with their review, debate, and edits. The draft of the revised 296-46B is posted on the ***Rule Development*** page of our website for everyone's review.

A public hearing is scheduled for 1 p.m. on April 10, 2014 at the ***Department of Labor & Industries***, Room S119, 7273 Linderson Way SW, Tumwater, WA 98501. This hearing is the final opportunity for the department to consider comments before the revised WAC 296-46B takes effect on July 1, 2014.

Legislative Updates

If you are in the electrical or telecommunications industries regulated by L&I, lawmakers are considering several bills during the 2014 legislative session that might affect you. This legislation is not sponsored by L&I. This is your opportunity to review the bills and comment if you desire. The comment button is located to the right of the bill number on each bill information webpage, all linked below.

- ***House Bill 2146*** – Changes appeal bonds fees, in most cases lowers the fees substantially.
- ***House Bill 2213*** and companion ***Senate Bill 6019*** – Creates a joint legislative task force to determine the most appropriate and effective delivery of electrical code adoption, rule-making, and inspection services.
- ***House Bill 2253*** and companion ***Senate Bill 6206*** - Modifies the definition of "Telecommunications Systems", which would expand the work scope of the 09 Telecommunications specialty scope to include providing operational power to telecommunications devices.
- ***House Bill 2254*** and companion ***Senate Bill 6277*** - Creates a window of opportunity for some individuals with unsupervised telecommunications experience to apply one hour of every two hours of work experience towards eligibility for examination for an (06) limited energy system certificate of competency.
- ***House Bill 2275*** and companion ***Senate Bill 6037*** – Protects employees from workplace reprisal or retaliatory action occurring as a result of the employee making a whistleblower complaint about violations of the electrical laws and rules.
- ***House Bill 2323*** – Reverses the requirement individuals wear and visibly display his or her certificate while working in the electrical trade.
- ***House Bill 2500*** – Requires completion of an apprenticeship program to receive a journey level or residential specialty electrician certificate of competency.

You may also contact your legislator to share your opinion about any legislation by visiting the legislative website at: ***http://www.leg.wa.gov/LIC/Pages/hotline.aspx***.

Ugly Installations: A dangerous double-ended male cord, used to power an isolated circuit segment from an energized receptacle. When I was an inspector, I investigated an accident caused by a similar installation used to provide power to a "smoothie" stand. While mom was making a purchase, her toddler pulled the energized male end out of the receptacle on the stand and stuck it in his mouth. Fortunately, the toddler survived a very dangerous electrical shock with only minor burns. This accident should have never happened. If you see something like this, take corrective action immediately or report it to someone who will.

Answer to Question of the Month: The 2014 NEC will be enforced on all projects where an electrical work permit was obtained on or after July 1, 2014. If the electrical work permit was obtained before July 1, 2014, the work must be done in conformance with the 2008 NEC, and the currently adopted WAC 296-46B.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 17 No. 1** **January 2014**

Question of the Month

How long is the window for renewing an electrician's certificate without requiring the electrician to retake the examination?

Safety Tip of the Month!

Be safe be seen. Daylight is very limited this time of the year. High visibility is your best bet for safe working or outdoor activities in low light conditions. Always wear reflective clothing or accessories so that others can see you. Wearing reflective clothing reduces the possibility of injury from a motor vehicle or other mobile equipment.

Note from the Chief

Winter has arrived again and this is a good time for reminders about the importance of proper preparation and what to do in the event of damage to your electrical wiring. Wind, flooding, snow and ice will occur and with them, the likelihood of downed power lines and electrical outages. There is a great page on our website about dealing with ***Floods & Other Natural Disasters***.

Each year, we receive many questions about storm damage such as, how do I wire my generator? Installing a generator system is potentially one of the most dangerous types of electrical installations to your family, employees, and the utility's line workers. Legally and safely installing a generator system is very specialized work that requires expertise and experience. Prior to making a generator system purchase or installing a generator system, review the special edition *Electrical Currents* – ***October 2007***. All the information in the article is still relevant and accurate. L&I strongly encourages anyone interested in having a generator system installed at their home or business to work with a properly licensed electrical contractor. Before beginning the work, get written bids from two or three electrical contractors and verify that each has significant experience installing generator systems. Ask for references. Then make certain your contractor gets an electrical permit and has an inspection to verify that the work was done correctly and safely.

We have published several ***Electrical Currents Newsletter*** articles to help you prepare for the winter season. You can download all editions since January 2009 or the editions from 1998 through 2008. Use the search function and search for flood or generator.

What Questions Are Allowed To Be Answered By Electrical Inspectors

Electrical inspectors often face many different types of electrical installation questions from consumers, contractors, and electricians. ***WAC 296-46B-010***(2) states, "Electrical inspectors will give information as to the interpretation or application of the standards in this chapter, but will not lay out work or act as consultants for contractors, owners, or users." There are a couple of reasons for this rule. L&I cannot take on the responsibility of an incorrect installation because an installer misunderstood the information that was provided. In addition, this ensures a level playing field for all competing in the electrical industry by placing limits on the types of questions an inspector may answer. It would not be ethical for one contractor to win a bid over another because of consultation given by a L&I inspector.

Many people call to ask if they "can just run something by" the inspector. Inspectors are not allowed to enter into discussions about project bidding or design or other "what if" scenarios. It is not the inspector's role to make recommendations between design or installation options for the installer. The installer is responsible for the entire decision making process from bidding, to permit fees, to installation.

An inspector or supervisor can answer a specific question about a code interpretation or corrections you have been issued.

WAC Rule Revision Update

In Tacoma on December 19, the department met with the Technical Advisory Committee (TAC). After a long day with a "working" lunch and a few short breaks, every rule change proposal was addressed. The proposals were discussed and some modified prior to the TAC taking an advisory vote on each. We will soon compile all proposals to be presented to the Electrical Board into one document and post them on the ***Rule Development*** page of our website. On January 30, 2014, during their ***regular meeting***, the ***Electrical Board*** will consider the results of the TAC meeting and make recommendations on rule change proposals. Soon thereafter, the department will publish a final draft of the proposed rules.

On April 10, 2014, there will be a public hearing on the proposed rules at 1 p.m. at: ***Department of Labor & Industries***, Room S119, 7273 Linderson Way SW, Tumwater, WA 98501.

Electrical Equipment Must Meet Manufacturing Safety Standards

RCW 19.28.010 requires all materials, devices, appliances, and equipment under the jurisdiction of the electrical law to be "of a type that conforms to applicable standards or be indicated as acceptable by the established standards of any electrical product testing laboratory which is accredited by the department." The requirement that electrical equipment be manufactured to appropriate safety standards has been in Washington Law for over forty years. OSHA and most states have similar requirements. There are many quality manufacturing firms that get their products certified (and identified, marked, or labeled) by third-party product testing laboratories and safety standards experts. However, there are product manufacturers willing to sell untested electrical products to unsuspecting and uninformed customers. This questionable business practice may give additional profit and competitive advantage to the manufacturer, but it unfairly places the burden of proof of electrical safety on the consumer or end user.

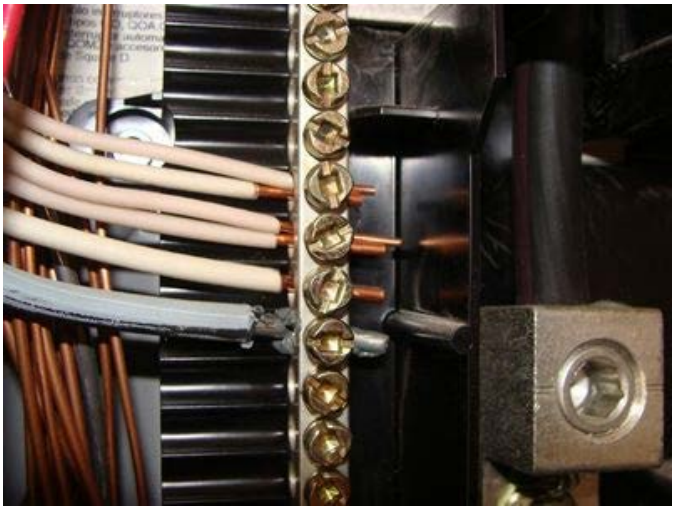
The electrical contractor and installer should make their customers aware of these requirements as early as possible in the design and planning stage of a project. Preventing the purchase of equipment that is not tested or evaluated for electrical safety can prevent costly delays at the end of the project.

Permit Fees - Temporary Connection of a Load Bank

The recent rulemaking activity allowing nonresidential maintenance 07 specialty contractors and 07 specialty electricians to make temporary electrical connections for the purpose of load testing electrical systems has created questions on permit fees.

When in L&I's jurisdiction, the fees are based on the temporary services fees found in ***WAC 296-46B-906***(3). For example, the permit fee for temporarily connecting a load bank to a 600 amp system will be the same as the permit fee for a 600 amp temporary service/feeder, or currently $121.10. A permit from a city jurisdiction is required to be obtained prior to performing the same electrical work within cities that have their own electrical inspection program.

Ugly Installations: 2008 NEC 408.41 - Each grounded conductor shall terminate within the panelboard in an individual terminal that is not also used for another conductor. In addition, most panelboard manufactures make this very clear in the panelboard installation instructions.



Answer to Question of the Month: 181 days – An electrician's certificate can be renewed ninety days prior and ninety days after the expiration date. Renewing after the expiration date will cause the renewal fee to double. Waiting more than ninety days after the expiration date requires reexamination. Save the time and money, renew online ***here***.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 12** **December 2013**

Question of the Month

How quickly is a ground fault circuit interrupter (GFCI) designed to trip?

Safety Tip of the Month!

Ground fault circuit interrupters save lives.

The correct way to check a GFCI is to use the test button on the GFCI. Push the test button, plug in a device, assure the device does not operate, push the reset button, the device should turn on. Testing should be done monthly.

This holiday season use GFCI protection on all your outdoor decorations.

Note from the Chief

Inspector Training – No inspections on December 10 and 11 - There will be no inspections scheduled in L&I's jurisdiction on December 10 and 11. To best prepare our inspectors for the 2014 National Electrical Code, which becomes effective in July of 2014, the department will be holding a two day training for all L&I inspectors. We regret the inconvenience this may cause to our customers who rely on timely inspections. We have found that a statewide approach to training improves consistency and is the most efficient use of our limited training budget. Together, we can work through this; please let your customers know and plan for your inspections accordingly.

WAC Rule Revision – During October, the Department solicited rule change proposals and applicants for the Technical Advisory Committee (TAC). The proposals are posted on the ***Rule Development*** page of our website. The committee members represent a fair cross section of electrical stakeholders, and will meet to review all rule change proposals and provide advice to the department on December 19 at 8:30 a.m. in the Orcas Room of the ***Tacoma Rhodes Center***. Thank you to everyone who submitted proposals and TAC applications. Your participation in the rule development process plays a valuable part in the effort to ***keep Washington's citizens safe and working***.

No Access For Inspection

The number one correction issued by electrical inspectors continues to be for no access for inspection. These unsuccessful inspection attempts are a drain on everyone's resources. Currently, 90% of inspections are made within 48 hours; our statewide target is 94%. Together, we can improve inspection response times by assuring inspections can be completed on the first attempt. Inspections in single-family homes where the homeowners both work can be challenging. In all occupied buildings, the contractor must ensure the customer is aware that they have requested an inspection and inform the customer of any special instructions communicated to the inspector in the inspection request comments field. Many contractors who work in this market provide their customer a flyer that describes the inspection process and informs the customer of their responsibility to help ensure the inspection process is completed.

The worst-case scenario for the department, and a contractor, occurs when someone is waiting at their house for an inspector without confirmation that an inspection will happen. If the contractor includes a specific comment with their internet inspection request, instructing the inspector to arrange access prior to inspection, the inspector will call the customer as instructed. If there is no answer, the inspector will leave a message requesting a call back. If the customer fails to return the inspector's call, the following day the inspector will make one more attempt to arrange access by contacting the customer. When a contractor's customer fails to respond to the inspector's calls, the responsibility for arranging access shifts back to the contractor. The inspector will write a correction for no access and call the contractor to inform them that they were not able to gain access for inspection and let the contractor know that they need to coordinate another inspection request with their customer.

If a customer is not responsive to the inspection process, many contractors immediately send the customer a certified letter or other confirmed method informing the customer that if they fail to communicate with the inspector and

arrange the inspection, they are accountable – penalties could include possible loss of power, citation, etc. The contractor should talk with the local inspection supervisor and communicate all actions being taken to ensure that the inspection will be made. If the contractor makes a good faith effort in coordinating inspection access, L&I will shift its focus to the customer in an attempt to complete the inspection process. Once an inspector arranges for an inspection with a customer, the inspector will do everything possible to make the inspection. If the inspector is delayed for any reason, the inspector will make every effort to contact the customer as soon as possible to explain the situation and make other arrangements. Contractors should work with their customers to help reduce the number of no access inspections to eliminate the frustration, time, and money wasted by everyone on these inspections.

Replacing or Repairing an Equipment Supply Whip larger than 120 Volts and 20 Amps is not Class B Permit Eligible

Recently, the department has received several questions regarding whether or not an equipment supply whip can be replaced or repaired with a like-in-kind furnace change out using a Class B permit. ***WAC 296-46B-908***(10) is very specific about what can be done using a Class B permit. If the electrical work requiring a permit is not described in this section, a Class B permit is not allowed. WAC 296-46B-908(10) (b) (iii) states Class B work includes *"An electric/gas/oil furnace not exceeding 240 volts and 100 amps when the furnace is connected to an existing branch circuit."* Alteration of or replacement of an equipment supply whip larger than 20 amps and 120 volts is not Class B eligible work, a regular electrical work permit is required.

Ground-Fault Circuit Interrupter vs. Ground-Fault Protection for Equipment

As defined by the NEC a Ground-Fault Circuit Interrupter (GFCI) is *a device intended for the protection of personnel that functions to deenergize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device*. Ground-Fault Protection of Equipment (GFPE) is *a system intended to provide protection of equipment from damaging line-to-ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device.*

A GFCI is a device intended for the protection of personnel and designed to open a circuit at a lower current and duration threshold than is harmful to a person. The NEC requires GFCI protection when exposure to an electrical ground fault is a greater risk (e.g., exposure to water; locations such as kitchens, bathrooms, outdoors, indoor wet locations, and equipment for swimming pools, hydromassage bathtubs, and hot tubs.

GFPE is intended to protect equipment not personnel. The current and duration thresholds are much higher than GFCI. These devices and/or systems are designed to protect equipment from ground faults that may damage equipment but may not trip the normal overcurrent protection device.

Ugly Installations: Online readers - click on the picture to open larger image. Violation: Cutting off a ground rod. NEC 250.53G requires that rod and pipe electrodes *"be installed such that at least 2.44 m (8 ft.) of length is in contact with the soil".* The use of short ground rods is a serious code violation, and the installer, contractor, and administrator will be subject to citations and possible suspension.

Answer to Question of the Month: 1/40th or 0.025 of a second. In a properly operating circuit, the electrical current going to and returning from an electrical device is equal. If it is not equal, current is flowing back to the source on a return path that it should not be, possibly through the user. A GFCI will sense this unbalance and disconnect power from the circuit. A difference of current as small as four milliamperes (mA) will cause a GFCI to trip in as little as 1/40th of a second.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 11** **November 2013**

Question of the Month

What are the savings for renewing a journey level or specialty electrician certificate online instead of renewing in person, by mail, or by fax? A general or specialty master electrician or administrator certificate?

Note from the Chief

In my note last month, I discussed how electrical inspection workload has exceeded the department's previous projections and that I would be assessing our budget allotment to determine if we can restore some electrical inspector positions eliminated in 2009 and 2010. I am happy to report that we believe there is sufficient positive variance in the budget allotment to be able to restore eight electrical inspector positions. This is good news to all who depend upon timely electrical inspections to help ensure progress of their construction projects. It is certainly good news for our hard working inspectors.

We will post recruitments for these positions on our website shortly. If you are interested in becoming an electrical inspector, please visit our web page, ***Find a job at L&I*** and search using keyword "inspector".

You may have noticed we did not schedule stakeholder meetings this fall as we normally do. We plan to hold stakeholder meetings at selected locations statewide next spring. With proposals for revisions to ***WAC 296-46B*** being accepted during October, this will allow the department to be able to discuss all of the proposed rule changes with our stakeholders and receive their feedback. Watch for a schedule of meetings in the *Electrical Currents* newsletter after the first of the year.

Safety Tip of the Month!

What Does a Safe Jobsite Look Like?

Electrical equipment can be located just about anywhere. Getting to the equipment safely can be challenging. Make sure you have a safe plan and take the proper precautions before beginning any electrical work. Some hazards you will want to pay special attention to may include:

- Rooftop installations.
- Unguarded stairs or catwalks.
- Fall hazards from overhead workers.

If you are aware of special hazards, alerting your inspector in advance can save unnecessary delays in your inspection response times.

2014 NEC Update

On March 1, 2013, Washington State adopted the 2014 edition of the National Electrical Code (NFPA 70-2014) with an effective date of July 1, 2014. The 2014 NEC is now available, and the department is approving 2014 code update courses. Since Washington State was not able to adopt the 2011 NEC, careful preparation is more important than ever. The 2011 NEC changes are not marked as changes in the 2014 NEC. To be prepared for the 2014 NEC, it is advisable to get a new codebook as soon as possible and enroll in a 2014 NEC update course.

Provisional Permits and the Unforeseen Situation

How can you have a valid permit when you want to make an electrical installation because of an imminent threat to life or property? Posting a provisional permit label allows an electrical contractor to begin an electrical repair or installation immediately. Any electrical work in L&I inspection jurisdiction can be started with a provisional label. Within the 2 days of posting a provisional label, a standard electrical permit must be obtained. Sometime within those 2 days, an electrical work permit must be obtained and request for inspection made within 1 day of energizing or 3 business days of completion, whichever occurs first.

The provision in ***WAC 296-46B-901***(5) allowing property owners to purchase and post the electrical permit after the work is begun should never be used by an electrical contractor. Only licensed electrical or telecommunications

contractors can use provisional electrical work permit labels. Provisional electrical work permit labels are sold in blocks of twenty for $248. Once purchased, they may be divided between the contractor's service vehicles or personnel. Refunds are not available for provisional electrical work permit labels, and the $12.40 individual label cost is not deducted from the normal permit fee. They are **not valid in city jurisdictions** that perform their own electrical inspections.

The certified electrician or telecommunications worker doing the installation must put the provisional permit label on the cover of the panelboard, overcurrent device, or telecommunications equipment supplying the circuit or equipment prior to beginning the work. All fields on the labels must be completely filled in using sunlight weather resistant ink. The contractor and job site portion of the label must include all of the following information:

The contractor's portion of the label must be returned to the L&I electrical office having jurisdiction for the inspection and a standard electrical work permit must be purchased for the work done within two working days after the job site portion of the label is posted.

Ductless Split System HVAC Equipment

Because of energy conservation and new equipment technology, HVAC contractors are installing more and more ductless split system HVAC units. The systems that are being manufactured meet the intent of the National Electrical Code (NEC); but, not necessarily the letter of the code. In order to better align current industry standards, equipment manufacturing practices, and the NEC, the following variances from the NEC are acceptable.

In one and two-family dwellings units, a disconnecting means is not required for the indoor unit(s) of a split system HVAC/R system if:

- An indoor disconnecting means is not required by the manufacturer;
- The indoor unit(s) is exclusively powered from the outdoor unit; and
- The outside unit's disconnecting means is lockable and identifies the location of the indoor unit.

Often, Type TC cable is installed as part of a Ductless split system. ***WAC 296-46B-336*** allows Type TC cable to be used in any location allowed for nonmetallic-sheathed cable in NEC 334. When Type TC cable is used in NEC 334 applications, it must be installed in strict conformance with Part II of NEC Article 334 and the bending radius requirements of NEC 336.26 or adhere strictly to the requirements of NEC Article 336. For split systems, taping TC cable to a line set is not an acceptable means of securing and supporting as required by NEC 334.30.

Typically, the multi-conductor type TC cable installed from the outdoor unit to each indoor fan unit contain power and control conductors for the indoor units. Installation of line voltage conductors is specifically excluded from the 06A HVAC/R work scope in ***WAC 296-46B-920***(f) (iv) (B). Electrical work excluded from the 06A work scope must be performed by properly licensed electrical contractors employing properly certified electricians.

Ugly Installations: Online readers - click on the picture to open larger image. Major violations: NEC 110.13; Service equipment is required to be securely mounted. NEC 334.12 (B) (4) & 334.15 (B); NM cable is not permitted for use in a wet location and not to be subject to physical damage. Possibly a violation of ***WAC 296-46B-230*** (1); Many serving utilities will not allow fittings, such as an LB ahead of the meter. These types of fittings allow access to conductors ahead of the meter.

Answer to Question of the Month: $10.40 savings for a journey level or specialty electrician certificate; $20.00 savings for a master electrician or administrator certificate, except (09) telecommunications administrators, who save $13.90. You can renew up to 90 days before your expiration date. Save time and money by using our ***online system*** to complete your renewal!

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 10** **October 2013**

Question of the Month

Interrupting rating is the highest current at a rated voltage that a device is identified to interrupt under standard test conditions. Per the NEC, if a circuit breaker is not marked with an interrupting rating, what is the interrupting rating of that breaker?

Safety Tip of the Month!

Call a licensed electrical contractor or your landlord if you have:

- Frequent problems with blowing fuses or tripping circuit breakers.
- A tingling feeling when you touch an electrical appliance.
- Discolored or warm wall outlets.
- A burning or rubbery smell coming from an appliance.
- Flickering or dimming lights.
- Sparks from an outlet.

Note from the Chief

During the month of October, the department will be accepting proposals for revisions to WAC 296-46B, as well as applications for the Technical Advisory Committee (TAC). This rulemaking is primarily to update department rules due to adoption of the 2014 National Electrical Code. The 2014 NEC is now available and a ***free read-only version*** is available for viewing on the NFPA website. The ***Special Edition*** *Electrical Currents* newsletter published in August provided information about how to submit a proposal and apply for the TAC, as well as a schedule outlining important dates for the rulemaking process. When the proposal acceptance period is over, the department will compile the proposals and post them on the ***Rule Development page*** of our website.

The electrical construction work picture is improving. Electrical inspection workload is increasing at a rate that has exceeded the department's projections. Inspection response times are increasing causing delays for our customers waiting for inspections on their projects. We have taken steps to become more efficient in our work and we will continue to look for ways to improve our process and eliminate waste. The department's expenditures are limited to the amount allotted by the legislature, and we are currently assessing our allotment to determine whether there is sufficient funding to bring back additional inspectors to help with the increasing workload. The department cut inspection staff by approximately thirty-five percent during 2009 and 2010 when the economy went into recession. The improving work picture is good news. We are preparing to seek legislative approval to bring back inspectors to help improve our ability to respond to our customers' expectations for inspections and compliance work. Our compliance efforts help to level the playing field for legitimate contractors by combating the underground economy and contractors who take unfair competitive advantage by violating the electrical laws.

Public Hearing for Comments on Proposed Electrical Rule Change

The Department will hold a public hearing to receive comments about a proposed rule change to chapter 296-46B-920 WAC, pertaining to scope of work requirements for load bank testing and preventative maintenance. The hearing will be held at 1 p.m. on Monday, October 14, 2013, at the ***L&I building***, 7273 Linderson Way SW, Room S119, Tumwater, WA. For more information, visit the ***Rule Development*** page of our website.

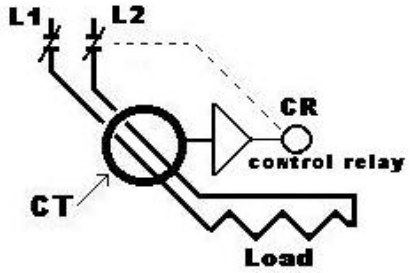
New Payment Option for Online Electrical Licensing and Certification Transactions

When using our ***online*** system, businesses and individuals can now make payments for electrical licensing and certification fees using Electronic Check. How does the Electronic Check payment option work? It simply makes a one-time withdrawal from your checking account.

For your convenience, replacement licenses and certificates are now available through our online system.

How Does a GFCI Circuit Work?

GFCI (ground fault circuit interrupter) protected circuits are prevalent in the electrical industry and having a thorough understanding of their operation is essential. The basic function of a GFCI is to monitor the current delivered to the load. If the amount of current delivered is more than the amount of current received back (by 4 to 6 milli-amps), the GFCI trips disconnecting all power from the load. This method is based on Kirchhoff's Current Law (I in - I out = 0), stating the sum of the current in a closed loop must equal zero. The most common way to achieve this monitoring is with a CT (current transformer).



When current flows through a wire, it develops a magnetic field in one direction and an opposite magnetic field when the current flows in the opposite direction. When these two fields come in close proximity to each other, they cancel each other out if they are equal, and opposite, in field polarity. When the current in L1 (supply) and the current in L2 or neutral (return) are equal, there is no net magnetic field present. With no magnetic field present, the CT will produce no current, telling the GFCI sensor circuit that the circuit is balanced with no ground fault current.
While GFCIs are effective tools to improve safety for personnel, GFCIs cannot provide personnel protection in all cases, such as direct contact between the line and neutral, caution is necessary anytime a power source is available. Monthly checks of GFCI products are required to verify that the device is operating properly. If upon testing the GFCI is found to be defective, it must be replaced. Defective ground fault circuit interrupters may allow current to flow in the circuits they are installed in even when the ground fault sensing capability of the device is no longer functioning.

Flexible Metal Conduit Not Permitted for Use in Wet Locations

Changes to 2008 NEC 348.12(1), removed the words “unless the conductors are approved for the specific conditions and the installation is such that liquid is unlikely to enter raceways or enclosures to which the conduit is connected”. Uses not permitted 348.12(1), now states “In wet locations”.

The former condition requiring the conductors or cable to be suitable for wet locations was easy to comply with because wet location cables and conductors are available. However, installing flexible metal conduit in such a manner as to assure water does not enter other connected raceways or enclosures is more difficult; and the interpretation could be subjective.

The revision in 2008 removed the allowance of flexible metal conduit in wet locations all together.

Ugly Installations: Online readers - click on the picture to open larger images. Major violations: NEC 110.3 – Improper use of the reused enclosure. NEC 110.12 (A) - Unused openings not sealed.

Answer to Question of the Month: *5000 amperes* - NEC 240.83 (C) Every circuit breaker having an interrupting rating other than 5000 amperes shall have its interrupting rating shown on the circuit breaker. Note: If the marked interrupting rating of the breaker exceeds the marked short circuit rating of the end-use equipment, such as a panelboard, in which the breaker is installed, the interrupting rating of the overall combination is still considered to be the lesser rating marked on the end-use equipment.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 9** **September 2013**

Question of the Month

When selecting overcurrent protection for conductors, at what overcurrent protective device (OCPD) ampacity rating is it not permitted to round up to the next higher standard rating?

Note from the Chief

The National Fire Protection Association has adopted the 2014 National Electrical Code and it will be effective in Washington State beginning July 1, 2014. A read-only version is available now on the NFPA website. Continuing Education and Basic Trainee Course Providers may now begin applying for and offering 2014 NEC update classes. The department must approve all courses. Continuing Education Information for Providers and a list of approved Continuing Education and Basic Classroom Instruction courses is available on our website.

Be sure to read the recently published August 2013 Special Edition *Electrical Currents* newsletter for information about the upcoming WAC 296-46B revision process regarding the 2014 NEC.

Safety Tip of the Month!

While working in the vicinity of overhead power lines;

- Use a wooden or fiberglass ladder, keeping at least 10 feet away from power lines.
- Have a professional tree cutting service trim branches that might fall on electric wiring.
- Never touch anyone or anything in contact with a power line.
- Downed power lines may be live, stay a safe distance away.
- Report downed wires to authorities right away.

I am sad to report to you that Dennis Patterson, former electrical inspection supervisor passed away at the age of 68 on August 16, 2013 in Mount Vernon. Dennis was the electrical inspection supervisor in the Mount Vernon area for 18 years until his retirement in 2011. Dennis will be greatly missed by all who knew him.

Public Comment on Proposed Rule Change

The department is seeking public input regarding the proposed change to WAC 296-46B-920(2)(g). The proposed change adds the underlined text below to WAC 296-46B-920(2)(g).

Nonresidential Maintenance (07): Limited to maintenance, repair and replacement of like-in-kind existing electrical equipment and conductors. This specialty does not include maintenance activities in the residential dwellings defined in (a) of this subsection for the purpose of accumulating training experience toward qualification for the residential (02) specialty electrician examination.

(i) This specialty includes the installation and connections of temporary conductors and equipment for the purpose of load testing, not to exceed 600 Volts.

This specialty may perform the work defined in (h), (i), (j), (k) and (l) of the subsection.

The department will hold a public hearing at the L&I building, 7273 Linderson Way SW, Room S119, Tumwater, Washington 98501 on October 14, 2013 at 1 p.m. You may submit written comments until 5 p.m. October 14, 2013 to Alicia Curry, Post Office Box 44400 Olympia, WA 98504-4400, email to Alicia.Curry@lni.wa.gov, or fax at -360-902-5292. You can stay current with all electrical rule making activity at our Rule Development page.

Changing an Existing 3-wire Service into a 4-wire Sub-Panel & Existing 3-Wire Circuits

Occasionally, inspectors encounter an existing service panel that has been modified into a 4-wire sub-panel. This may cause the existing 3-wire range and clothes dryer circuits to be out of compliance with NEC 250.140. When a service panel is modified to a 4-wire sub-panel, any existing 3-wire range or clothes dryer circuits are no longer compliant with 250.140, exception and must be modified to meet code. Code does not allow running a 4-wire feeder and re-bonding the equipment grounding conductor to the neutral downstream of the newly created sub-panel.

Classified Sign Retrofit Kits - Revisited

Recently Subject UL879A was upgraded from an Outline of Investigation for LED Kits to the ANSI UL Standard for Safety for LED Sign and Sign Retrofit Kits. Now that there is a UL Standard for Sign Retrofit Kits to be evaluated to, qualified testing laboratories can certify and list these kits. In addition, the 2014 NEC will include a new "Retrofit Kit" definition and Article 600 will require retrofit kits, as defined in the Code to be listed, provided with field wiring installation instructions, and installed in conformance with the listing.

As of March 31, 2013, WAC 296-46B-600(5) was changed to state, "A new listing mark must be applied to the sign by the electrical contractor or a field evaluation label must be applied by an approved testing laboratory". With the new UL879A standard and the impending changes to the NEC, the department will no longer require a new listing mark or field evaluation for retrofitted signs using listed retrofit kits installed per instructions.

L&I will allow the use of UL Classified and other listed retrofit kits if all the following conditions are met:

The installer:

- Is an (01) general electrical contractor or (04) sign contractor using properly certified individuals or properly supervised trainees;
- Obtains an electrical permit and inspection;
- Follows all the manufacturer's instructions and codes;
- Makes a copy of the manufacturer's instructions and field wiring instructions available to the inspector during the inspection;
- Provides physical access to the inspector for all components of the retrofit;
- Applies a label, made of a background color contrasting to the listed product, in a location visible during servicing near the listed retrofit subassembly that states, *"This equipment contains a retrofit subassembly that may present a risk of electrical hazard. Replace parts only with same type and rating".* The label's font must be Ariel size 16 bold. This label must be an "identification plate" as defined in WAC 296-46B-100. This label is in addition to any labeling required by the manufacturer's instructions or the UL Standard used to manufacture the retrofit kit; and
- Removes all parts of the replaced component(s) so that the new configuration is evident to the consumer (e.g. Remove the ballast and associated wiring when a LED listed retrofit kit is used to replace fluorescent ballast).

The listed retrofit kit is to be used to replace component(s) on or within a sign already listed or field evaluated by a qualified testing laboratory.

Ugly Installations: Do not establish a grounded conductor (i.e. neutral) termination point from your neighbor's service, even for a temporary repair. Any unbalanced currents between the two systems could create a difference of potential between the neutral conductor and ground; a serious safety hazard for anyone unfortunate enough to come in contact with this creative but dangerous installation.

Answer to Question of the Month: NEC 240.4 (B) Over 800 amps. When the rating of the OCPD is over eight hundred amps, the ampacity of the conductors must meet or exceed the rating of the OCPD.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 8 SE** **August 2013**

SPECIAL EDITION

● New 2014 Electrical Code and Other Possible WAC Changes

The 2014 edition of the National Electrical Code (NEC) was adopted by the NFPA in late August 2013 and published editions will soon be available, the ***NFPA*** also provides free access on their website. The upcoming rule development process will allow Washington's electrical stakeholders to make recommendations to the department regarding adoption of specific sections of the 2014 NEC. The department will evaluate proposals and determine the extent of stakeholder support and economic impacts. This rule development process will include possible modification to all sections of WAC 296-46B, excluding the scopes of work in WAC 296-46B-920.

● Keep Informed

There will not be a specific mailing list for this WAC revision process. Special WAC update postings will be maintained using the Electrical Program's ***Electrical Email List***, ***Rule Development*** page of our website, and ***Electrical Currents*** newsletter.

The best way to stay informed of the WAC process and other electrical issues is to join the *Electrical Email List* at:

http://www.lni.wa.gov/Main/Listservs/Electrical.asp

● The Department Is Seeking Stakeholder Input for Proposed Rule Changes

Any stakeholder in the electrical industry may make proposals for additions and/or revisions to the Washington Administrative Code WAC 296-46B – Electrical Safety Standards, Administration, and Installation electrical rules. Proposals from stakeholders may be submitted from October 1, 2013 through October 31, 2013. Proposal submission guidelines are detailed below.

Rules are developed to aid both stakeholders and the department in clarification or enforcement of the intent of the electrical statute. Technical changes require evidence of a specific problem and substantiation that the proposal will provide a solution for that problem.

The department is responsible for development of all rules. The department will act as the correlating body during the rule development process and may at any time promote rule change as necessary to accommodate statutory change or department policies or procedures.

The **Proposal Form for 2014 WAC 296-46B Rule Changes** shown on page four of this edition must be used to submit rule proposals for the 2014 revision cycle. An electronic MS Word version of the form will soon be available on our Rule Development page at:

http://www.lni.wa.gov/TradesLicensing/Electrical/LawRulePol/RuleDev/default.asp

Stakeholder proposals **must be received from 12:01 a.m. October 1, 2013 through 11:59 p.m. October 31, 2013**. **Any proposal received before or after these dates will be rejected**. **All proposals must be made electronically** using the form supplied by the department.

The submitter may submit a proposal(s) by:

- Sending the proposal(s) as an email attachment to ***ElectricalWAC@lni.wa.gov***. Please do not attempt to submit early, as this email address will not function until October 1, 2013; or

- Mailing a compact disc containing the proposal(s) to Chief Electrical Inspector, P.O. Box 44460, Olympia, WA, 98504-4460 – must be received by the closing date.

Proposed revisions should include the relevant existing text and should use legislative format (i.e. Use underscore (or underlining) to denote wording to be inserted (i.e. inserted wording) and strike-through to denote wording to be deleted (i.e. ~~deleted wording~~)).

Proposals not submitted according to these instructions will be rejected.

● Technical Advisory Committee (TAC)

The TAC process has proven to be very valuable in past years. The department will again appoint a General TAC made up of experts and interest group representatives to review and make recommendations on proposals from the electrical industry.

Persons interested in becoming TAC members must submit a letter of interest for specific positions to the Chief Electrical Inspector, P.O. Box 44460, Olympia, WA, 98504-4460 **to be received from** October 1, 2013 through October 31, 2013. The letter should show constituency support for the prospective member. All applications will be evaluated to determine that the applicant meets the requirements for the position.

In order to keep the size of the TAC to an efficient and effective number, the committee will be limited to 32 voting members. The TAC makeup will be based on an equitable distribution relative to proportion of involvement within the electrical industry in Washington. TAC membership provides an opportunity for everyone interested in the Electrical Program's WAC development to participate in the process.

If necessary, each successful candidate may have an alternate attend the TAC meeting. There will be no formal alternate assigned by the department. Any TAC member that is absent must notify the Chief Electrical Inspector of the alternate's name one week prior to the TAC meeting. Failure to make the required notification will result in the position being vacant during the meeting.

● The TAC – Process

The TAC will make recommendations on industry proposals and identify proposals that may have an economic impact on other specialties, small businesses, construction costs, or the cost of enforcement. Members who know they will be absent from a TAC meeting should make every effort to send an alternate. The TAC must review and evaluate proposals based on the need:

- To address a critical life/safety need;
- To address a specific state policy/statute;
- To maintain a fair competitive environment;
- To address a unique character of the State; or
- To correct errors and omissions.

The TAC will operate on a majority basis. A majority vote in support of a motion, of members in attendance, will be considered as significant support for the motion made on a specific proposal. The TAC can propose amended language to a proposal. All voting members share an equal vote. The department will consider all TAC recommendations.

● 2014 WAC Revision Process – Proposed Sequence of Events

- **September 2013** – File CR 101 – pre-proposal statement of inquiry.
- **October 1 through October 31, 2013** – Accept proposals from stakeholders to: amend or add to the existing WAC.
- **October 1 through October 31, 2013** – Accept applications for TAC.
- **Early/Mid December (possible 2nd day)** –TAC meeting, Tukwila L&I office.
- **January 2014** – Electrical Board review and recommendation on proposals.
- **Spring 2014** – File CR 102 –rule filing (opens the official required public comment period).
- **Spring 2014** – Public hearing(s).
- **July 1, 2014** – Effective rule.

General TAC – Membership

Chairperson– Chief Electrical Inspector (non-voting)

2	Electrical Board Members (non-voting)	1	WA Manufacturing Business
1	Training School/Continuing Education Provider	1	Electrical Engineer
1	Electrical Apprenticeship Representative	1	Electrical Testing Laboratory
1	Electrical Manufacturer Representative	1	Utility
2	L&I Inspection (Supervisor & Inspector)	10	Electrical Contractors
2	City Regulator (Supervisor & Inspector)	10	Electricians
1	Plumber (Contractor or Worker)		

Notes:

- Contractor positions must be filled by a licensed electrical/telecommunications contractor or representative of an electrical contractors' association in Washington representing that specialty.
- Electrician positions must be filled by a certified electrician who is not an owner in an electrical contracting business.
- The AD HOC contractor and electrician positions must be filled by a specialty not otherwise represented on the TAC.
- The plumbing position must be filled by a registered general or plumbing contractor or a representative of a plumber contractor's association in Washington or certified journeyman plumber.

Methodology for Determining the Number of Electrical Contractor and Electrician Members

Active Licenses & Certificates	# of Contractors	% of All Licenses	# of TAC Members	# of Electricians	% of All Certificates	# of TAC Members
01	2,758	51%	5	15,620	56%	6
02	287	5%	0	2,352	9%	1
03	121	2%	0	488	2%	0
03A	56	1%	0	378	1%	0
04	83	2%	0	232	1%	0
06	557	10%	1	2,370	9%	1
06A	726	14%	1	3,475	13%	1
06B	10	0%	0	69	0%	0
07	110	2%	0	1,329	5%	0
07A	17	0%	0	76	0%	0
07B	65	1%	0	377	1%	0
07C	0	0%	0	13	0%	0
07D	41	1%	0	188	1%	0
07E	7	0%	0	110	0%	0
09	352	7%	0		0%	0
10	25	0%	0	52	0%	0
Ad Hoc Group	1,318	24%	3	3,312	12%	1
Total	**5,359**		**10**	**27,129**		**10**
Notes:	<9% of Licenses/Certificates joins the Ad Hoc group					
	The Ad Hoc group will be filled on an equitable basis with an emphasis on representation closely following the % of licenses, with an effort to fairly represent the different specialties.					
	Unfilled positions will remain vacant.					

PROPOSAL FORM for 2014 WAC 296-46B Rule Changes

Email to: ElectricalWAC@lni.wa.gov as an attachment

Mail CD to: Chief Electrical Inspector
Department of Labor & Industries
Electrical Section
PO Box 44460

Olympia, WA 98504-4460

FOR L&I USE ONLY

Specific Rule #:

Date Received:

NOTES:

1. All proposals must be **received from 12:01 a.m. October 1 through 11:59 p.m. October 31, 2013**.
2. Limit each proposal to a single rule section. Use a separate copy for each proposal.
3. **ENTER TEXT ONLY IN THE UN-SHADED SPACES ON THIS DOCUMENT – SAVE AS A NEW FILENAME BEFORE RETURNING**

Date submitted: _____ **Name:** _____

Representing: _____ **Telephone:** _____

Mailing Address: _____

Email Address: _____

1. Proposal: *Include new or revised wording, or identification of wording to be deleted. Proposed text should be in legislative format. Use underscore to denote wording to be inserted (e.g. inserted wording) and strike-through to denote wording to be deleted (e.g. ~~deleted wording~~).*

2. Statement of Problem & Substantiation for Proposal: *Note: State the problem that will be resolved by your proposal and substantiation for your proposal.*

3. Check one: ☐ This proposal is original material ☐ This proposal is not original material

(END OF PROPOSAL)

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 8** **August 2013**

Question of the Month

Hospitals require an electrical system designed to ensure continuity of electrical power, what is the correct terminology for each system and each branch of each system?

Safety Tip of the Month!

In the State of Washington, it is a misdemeanor to attach signs, posters, vending machines, or any similar object to a utility pole without the permission of the utility. Such items can interfere with the climbing gear used to keep electrical workers safe while climbing poles. RCW 70.54.090

Note From the Chief

In anticipation of the previously adopted 2014 NEC becoming effective on July 1, 2014, the department is starting the process for revising WAC 296-46B. During this process, you will have the opportunity to submit rule proposals to amend the 2014 NEC or existing rules in WAC 296-46B. A draft of the 2014 NEC Reports on Proposals (ROP) is currently available on the NFPA website. The electrical program will publish a special edition *Electrical Currents* Newsletter later in the month of August. It will contain complete information about the rulemaking timeline and Technical Advisory Committee (TAC), as well as proposal and TAC application forms. The department cannot accept early TAC applications; please do not put your name in for the TAC prior to reading the special edition.

The last two editions of this newsletter contained updates about a proposal to expand the scope of work of (07) nonresidential maintenance electrical contractors and electricians. At their regular meeting on July 25, 2013, the Electrical Board expressed support for the proposal. Soon, a public comment period and a hearing date for this single issue rulemaking will be announced.

You can stay aprised of new developments by visiting the Rule Development page.

Sizing an Equipment Bonding Jumper on the Supply Side of Service

There is more than one way to bond service equipment on the supply side of a service. What is the minimum size of a single bonding jumper used for bonding a CT metering enclosure to the grounded conductor when the service consists of two separate service disconnects supplied each by a set of, 3/0 copper service entrance conductors originating from the CT enclosure? The size of the bonding jumper is based on the sum areas of corresponding ungrounded conductors. For this exercise, the following would apply. NEC Chapter 9, Table 8 lists the area of 3/0 copper as 167800 circular mils. Two 3/0 conductors would be equal to 335600 circular mils. Using NEC Table 250.66, 335600 circular mils of service entrance conductor requires a #2 AWG copper or 1/0 aluminum equipment bonding jumper. Below are NEC references that apply to this example.

NEC 230.40 Exception No. 2 allows for up to six service disconnects in separate grouped enclosures, each served by one set of service entrance conductors. Service entrance conductors as defined by the NEC are the service conductors between the terminals of the service equipment and the service drop or overhead service conductors for overhead services or the service lateral or underground service conductors for underground services. In the case of a CT enclosure, they are the service conductors between the CT enclosure and the terminals of the service equipment.

NEC 250.102(C) and Table 250.66 utilize the size of the largest ungrounded service entrance conductor to size the supply side bonding jumpers. Note #1 of Table 250.66, states “Where multiple sets of service entrance conductors are used as permitted in NEC 230.40 Exception No. 2, the equivalent size of the largest service entrance conductor ***shall*** be determined by the largest sum of the areas of the corresponding conductors of each set”.

Information Technology Cabling in Dwellings – 06 Limited Energy or 09 Telecommunications?

Contractors and installers must know the end use of information technology cabling prior to beginning installation. This knowledge allows them to ensure they are properly licensed and their installers are properly certified and a valid electrical work permit is obtained prior to start of installation if it is required.

Rampant innovation in the information technology industry is shifting toward systems that employ cables that not only carry signals, but power equipment at ever increasing power levels. Changes in technology - signal and power distribution in the same cable - have caused work traditionally performed by 09 telecommunications contractors to fall outside the 09 work scope.

Some examples:

"Daisy chained" cabling originating at the service provider's point of demarcation terminated on jacks (typically RJ 11) inside the dwelling.	09
Multiple cables originating at the service provider's point of demarcation terminated on jacks(typically RJ 11) inside the dwelling.	09
Cable only or prewire installations where the end use of the cable is not known or evident at the time the installer has completed installation.	06
Cable or equipment for systems that employ Power over Ethernet (PoE), HDBaseT or similar technologies which provide signal and power distribution in the same cable.	06
Systems comprised of non-PoE cable and equipment – jacks, patch panels, routers, Ethernet switches, racks, enclosures etc. - that form a complete telecommunication system.	09

All 09 telecommunications installations within the residential dwelling units of single-family, duplex, and multi-family dwellings do not require permits or inspections. In residential multi-family dwellings, permits and inspections are required for all backbone installations, all fire barrier penetrations, and installations of greater than ten outlets in common areas.

Electrical permits are required for 06 limited energy systems, except those exempted in WAC 296-46B-901(7)(c). Many limited energy installations are eligible for Class B random inspection electrical permits as described in WAC 296-46B-908(10)(c).

The links provided in this article are not endorsements of products or technologies; they merely serve to provide additional information for clarity.

Ugly Installations: Online readers - click on the picture to open larger images. Violations: Unlicensed contractor doing unpermitted electrical work. NEC 300.3 single conductors shall be installed as part of a recognized wiring method. Multiple grounding and bonding issues; four supply conductors with the grounded conductors, equipment grounding conductors, and the grounding electrode conductor all connected to the same isolated bar. Numerous other violations.

Answer to Question of the Month: NEC 517.30; a NEC 517 essential electrical system for a hospital is supplied by both a normal and alternate power source. The normal source supplies both nonessential and essential loads. The alternate power source is the backup for the essential system. The essential electrical system supplies the emergency system and the equipment system; the emergency system is comprised of both the critical branch and the life safety branch. Note: In the 2014 NEC, the term emergency system was removed from Article 517, leaving the essential system with the critical, life safety and equipment branches.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 7** **July 2013**

Question of the Month

What is the minimum size of ungrounded copper feeder conductors allowed to supply a 200 amp, 120/240 Volt, 3-wire, 1Ø manufactured home from a mobile home pedestal that also supplies a well and a septic system?

Note from the Chief

It is important to make certain your work is inspected. To fulfill our mandate of Keeping Washington Safe, we ensure that all appropriate inspections are made. An inspection request must be made within three business days of fully completing the job or within one business day after energizing any work - see WAC 296-46B-901(9)(a). Progress inspections must also be made prior to covering any portion of the installation.

We have been finding many expired permits where an inspection request has never been made. The permit purchaser has the responsibility of ensuring the work is properly completed and that an inspection request is made. Failing to request the inspection puts the permit purchaser and consumers at risk. We have been working to ensure that all inspections are requested and made.

If the permit purchaser has let the permit expire without the appropriate inspection, a new permit must be purchased and an inspection requested. In addition, the permit purchaser is likely to receive an electrical citation(s) for failing to request the inspection. Be proactive and avoid these problems by verifying the inspection status of your permits before compliance action is necessary. Most permits need at least a progress inspection shortly after the permit is purchased. It is the permit purchaser's obligation to ensure inspections are requested.

Safety Tip of the Month!

If enjoying the outdoors this summer involves the use of a portable generator, take special care, misuse can lead to injury or worse. Tips include:

Keep the generator dry.

Assure extension cords are rated for the load, free of damaged insulation, and have the third grounding prong.

Plug larger loads directly into the generator.

Do not overload the generator.

Assure the area is not enclosed and well ventilated, internal combustion engines produce deadly carbon monoxide.

Use a ground fault circuit interrupter (GFCI). Portable GFCIs are inexpensive and require no tools to install.

Assure the generator is properly grounded and bonded. (Use only cord and plug connected equipment through the receptacles mounted on the generator. Verify all the noncurrent-carrying metal parts of the generator and the generators receptacle's equipment grounding terminals are bonded to the generator's frame).

Inspection history and information is available for every permit by visiting the ***Permits, Fees & Inspections*** page of our website.

Rulemaking Update – Expansion of Maintenance Specialty to Include Load Bank Connection

Last month's newsletter addressed a possible rule change proposal and as anticipated, a group of external stakeholders has submitted a proposal to amend WAC 296-46B-920 to allow the 07 nonresidential maintenance specialty the ability to connect temporary load banks and their associated cables to existing premises wiring. Currently, WAC 296-46B-920 requires that a 01 general electrical contractor employing 01 general journey level electricians perform new electrical work of this nature. The Electrical Board will review and make recommendations on the proposal at their next regular meeting before filing the CR-102 which will establish a public comment period and public hearing date.

Visit the electrical program Rule Development page on a regular basis to stay apprised of new developments in this process.

In-Class Education Required Before Approval for Electrician Examination

Applicants for journey level, or specialty electrician examination whose applications are received on or after July 1, 2013, or that have been previously denied must demonstrate they have completed approved in-class training required in RCW 19.28.205 and WAC 296-46B-945(1) as follows:

Applicants for 2000 hour specialty certificates: 24 hours of in-class education

Applicants for 4000 hour specialty certificates: 48 hours of in-class education

Applicants for general journey-level certificates: 96 hours of in-class education

Why? – Stakeholders worked with the legislature resulting in the passage of Senate Bill 6133.

What qualifies? – Any of or a combination of the following:

Washington in-class hours: (e.g. someone who has the prescribed number of hours of Washington approved in-class training in RCW/WAC, NEC, or electrical theory)

Washington electrical construction trade apprenticeship graduate: (e.g. someone who has the prescribed number of hours of Washington approved in-class training in RCW/WAC, NEC, or electrical theory reported by their training director)

Other electrical construction trade apprenticeship: an apprenticeship completion certificate or letter from the registered training director of the apprenticeship outlining the curriculum in NEC or electrical theory and number of in-class hours.

Nationally recognized contractor/labor organization in the electrical construction trade: a course completion certificate or letter from the registered training director of the program outlining the curriculum in NEC or electrical theory and number of in-class hours.

Public community or technical colleges or not-for-profit nationally accredited trade or technical school: a notarized transcript from the office of the registrar listing the course names, hours, and credits of in-class NEC or electrical theory training completed by the applicant.

WAC 296-46B-406 Exceptions to NEC 406.11 for Tamper Resistant Receptacles

Effective on March 31, 2013, WAC 296-46B-406 was amended to allow five exceptions to the NEC 406.11 requirements for tamper resistant receptacles in dwelling units.

Receptacles in the following locations will not be required to be tamper-resistant: receptacles located more than 5 ½ feet above the finished floor; receptacles that are part of a luminaire or appliance; a single receptacle or a duplex receptacle for two appliances located within dedicated space for each appliance that, in normal use, is not easily moved from one place to another and is cord and plug connected in accordance with NEC 400.7(A(6), (A)(7), or (A)(8); non-grounding receptacles used for replacements as permitted in NEC 406.4(D)(2)(a); or receptacles located above a countertop where required by NEC 210.52(C).

Ugly Installations: Online readers - click on the picture to open larger images. Violation: RCW 19.28.101 Electrical work completed and energized without obtaining a permit or an inspection. This service was approved by L&I with one light and one receptacle connected. When it caught fire, it had several additional circuits and feeders that had been installed. This fire may have been prevented if the additional work had been properly permitted and inspected.

Answer to Question of the Month: NEC Table 310.15(B)(6) - 2/0. 310.15(B)(6) states the conductors are to supply "*all loads that are part or associated with the dwelling unit*", it would seem the well and septic would be associated loads and Table 310.15(B)(6) would not apply. However, the manufactured home itself is a dwelling unit with all the typical dwelling unit diversities; therefore, it is acceptable to use Table 310.15(B)(6) to size the feeder to the home.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 6** **June 2013**

Question of the Month

In Washington State, which option is an approved wiring method for a new installation of service conductors not exceeding 600 volts within a building or structure?

A) EMT **B)** PVC schedule 40 **C)** MC Cable **D)** SE Cable

Safety Tip of the Month!

With summer quickly approaching and all the fun activities involving water to keep cool, protect yourself, family, and friends. Please remember a Ground Fault Circuit Interrupter should be used in any area where water may come in contact with electrical products. If a GFCI senses a minimal current leakage through water to ground in an electrical circuit, it assumes a ground fault has occurred. It then interrupts power fast enough to prevent serious injury from electrical shock.

Note from the Chief

It is my pleasure to announce that Trent Harris has accepted the position as Electrical Technical Specialist. Trent is a certified ME01 Master Electrician with twenty-two years of diverse experience in the electrical industry. He came to the department in March of 2005 as an electrical construction inspector. He has also worked as an industrial relations agent with prevailing wage, and most recently as an electrical plans examiner. Trent has been in a temporary assignment as an electrical technical specialist since January. Trent demonstrates a very high level of professionalism, technical expertise, and communication skills, which will serve to help him succeed as a technical specialist.

In addition, we had to say goodbye to Brandi O'Shurak, my administrative assistant, who left the department to pursue an adventurous career in the private sector. Brandi had been with L&I since 1999 and will be greatly missed. I have temporarily appointed Megan Eriksen as my administrative assistant. Megan has been in the electrical licensing department and is doing an excellent job in her new position.

Reciprocity with Other States

In January of 2009, the Electrical Board weighed the pros and cons of reciprocity and temporary certification and made a nearly unanimous recommendation to withdraw from all reciprocal agreements. The board felt having all electrician candidates take the Washington exams would help ensure that the candidate has up to date knowledge of the electrical code and Washington's laws and rules. After the recommendation, L&I stopped issuing temporary electrician certificates and notified reciprocal states, we will no longer honor requests for electrician certification reciprocity. Over the years, L&I has removed most of the obstacles to obtaining electrical certification that existed when reciprocity began in the early 1990s. It used to take months to get an electrician certification in Washington when coming from out of state.

It is now much easier for a qualified candidate to obtain their certificate, even before moving to Washington. Taking the Washington exam requires some investment from the candidate. It takes a few hours of time, the exam fee, and as of July 1, 2013 the newly required in class education discussed in last month's newsletter. Exams are available worldwide through our exam administrator, PSI. PSI offers exams five days per week with immediate results and the ability to immediately schedule a follow-up exam if necessary. Certificates are generally issued within three days of examination completion.

Increase in Hours of Basic Trainee Classes – 48 Hours Effective July 1, 2013

House Bill 2546 passed in 2010 raising the requirements for classroom training for trainees in RCW 19.28.161. The additional educational requirements will improve the trainees' educational process and knowledge, helping them to become better electricians. Effective July 1, 2013 electrical trainees must complete 48 hours of approved basic trainee classes to renew or reactivate their training certificate, raising the requirement from 32 hours to 48 hours. This means for a trainee card to be renewed or reactivated on or after July 1, 2013 the trainee will be required to have 48 hours of basic trainee classes, regardless of when the renewal fee was paid. If your certificate is renewed and all class hours are properly reported before July 1, 2013, 32 hours are required. Beginning July 1, 2013, 48 hours are required for your certificate to be renewed or reactivated. Contact Electrical Licensing at 360-902-5269, if you have any questions regarding this information.

Heat Pump Water Heaters

Household heat pump water heaters are considered "household appliances" as defined in WAC 296-46B-100. A heat pump water heater is not a heat pump; it is an electric water heater that happens to employ heat pump technology and resistive heating elements…Article 440 does not apply when installing a heat pump water heater. Replacing a standard electric water heater with a heat pump water heater may be considered like-in-kind if it meets the definition. "Like-in-kind" means having the same overcurrent protection requirements and similar characteristics such as voltage requirement, current draw, short circuit characteristics, and function within the system and being in the same location. Replacing a conventional electric water heater with a heat pump water heater could likely be exempt from electrical permit and inspection requirements because a heat pump water heater qualifies as a household appliance as described in WAC 296-46B-901(7)(b).

Heat pump water heaters are not within the scope of the HVAC/refrigeration specialties, because "HVAC/refrigeration system" is defined in WAC 296-46B-100 as *…a system of HVAC/refrigeration: Wiring, equipment, and components integrated to generate, deliver, or control heated, cooled, filtered, refrigerated, or conditioned* ***air.***

If not the owner of the property owner, the entity offering to make such a replacement must be a properly licensed electrical contractor employing properly certified electricians or a properly registered construction contractor employing properly certified plumbers as described in RCW 19.28.091(8). Plumbers may not alter a circuit (e.g. change the overcurrent protection, extend the circuit, etc.) and are limited to disconnecting and reconnecting an existing circuit.

Potential Rulemaking – Expansion of Maintenance Specialty to Include Load Bank Connection

The Department filed a CR 101 pre-proposal statement of inquiry with the Office of the Code Reviser on May 21, 2013 in anticipation of the possibility of a rule change proposal from the generator maintenance industry to expand the allowed work scope of 07 nonresidential maintenance specialty electricians. This potential rulemaking could amend or add new language in WAC 296-46B 920 to allow the 07 nonresidential maintenance specialty the ability to connect load banks and their associated cables.

Currently, WAC 296-46B 920 requires that a 01 general electrical contractor employing 01-general journey level electricians perform new electrical work of this nature.

Visit the electrical program Rule Development page on a regular basis to stay apprised of new developments in this process.

Ugly Installations

Online readers - click on the picture to open larger images.

Violation: NEC 225.26 or NEC 230.30 Vegetation such as trees shall not be used for support of overhead feeder or service conductors; NEC 250.53(G) Ground rods are to be driven or buried with top at or below grade, others too numerous to list.

Answer to Question of the Month:

WAC 296-46B-230(7)(B) PVC Schedule 40

Note: Some utilities may have more stringent requirements than L&I, always consult the serving utility before installing service equipment.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 5** **May 2013**

Question of the Month

No parts of a pendant, lighting track, ceiling suspended paddle fan, or hanging type fixture can be located within a zone of how many feet horizontally and vertically from the top of a bathtub rim or shower stall threshold?

A) 1', 6' **B)** 1 ½', 7' **C)** 2', 7 ½' **D)** 3', 8'

Safety Tip of the Month!

Electrical safety is a major concern at all construction sites. Electrical accidents injure and kill workers each year. Make sure all electricians understand and follow electrical safety procedures, especially those new to the trade. Use proper safety and personal protective equipment at all times to help prevent these accidents.

Note From the Chief

The electrician examination pass rate report is discussed at each meeting of the Governor's Electrical Board. The results of this report indicate a need for candidates for electrician examinations to be more prepared.

Examinations consist of a National Electrical Code and theory section and a Washington State laws and rules section. Electrician candidates had an overall 55% first time pass rate. Candidates for the 01 general journey level exam had a first time pass rate of 73% for the NEC and theory section, and 66% for the laws and rules section. Our primary concern is specialty electrician candidates. Specialty electrician candidates had a very low pass rate of 29% for the NEC and theory section and 50% for the laws and rules section. All specialty contractors should make a better effort to ensure the candidate receives appropriate training. It is both the individual's and the contractor's responsibility to ensure that the individual gets the training necessary to become a quality electrician.

Examination questions were developed and chosen with participation of electrical industry stakeholders representing all specialties. The examinations are very challenging, and for good reason. Industry stakeholders demand that the standards be kept at a high level to ensure that those who obtain electrical certification have demonstrated adequate knowledge of the National Electrical Code, electrical theory, and the electrical laws and rules to ensure that electrical installations are performed by qualified individuals.

Quality electricians will improve the safety of electrical installations for consumers and will save the contractors they work for time and money by doing better work that does not require call backs for repairs.

Product Safety Alert – Fluke Meter Recalls

In cooperation with the Consumer Products Safety Commission, Fluke issued recalls for five of its products. Go to ***http://www.fluke.com/fluke/usen/support/safety/*** for the Fluke recalls, details about the items involved, and the specific follow-up actions for each. In all cases, users are directed to stop using the product immediately.

Legislative Updates

Senate Bill ***5077*** making technical corrections to gender-based terms was signed by the Governor and becomes effective on July 28, 2013. This legislation will require replacement of the term "journeyman" where it exists in RCW 19.28 with the term "journey level." The RCW 19.28 terms "journey level" and "journeyperson" are synonymous with the term "journeyman" for the purposes of enforcing the electrical laws and rules of the state of Washington.

The Senate budget proposal contains a provision to transfer 3.4 million dollars from the Electrical License Fund to the General Fund. The electrical program relies on this fund to provide the services that consumers, contractors, and electricians have paid for, and a reduction in the fund will have a significant impact on the department's ability to provide these services. The Governor's budget proposal and the proposal from the House of Representatives do not

include the transfer of funds. The Legislature will reconvene a special session starting May 13 to develop a final budget for the 2013 – 15 biennium.

Electrical Board Openings

There will be three vacant seats on the Electrical Board in July. Bruce Turner, Rocky Sharp, and Don Guillot have served the board faithfully and I would like to thank them for all their hard work and dedication to the electrical industry. The three available positions are the licensed professional electrical engineer seat, the electrical contractor's association seat, and the outside line worker's seat.

Anyone interested in applying for one of these openings must submit an application using the form on the Governor's website at: ***http://www.governor.wa.gov/boards/application/default.aspx***. Application must be made using the Governor's form. To be considered for these openings, your application must be received by May 31, 2013. Send your resume and any additional information you would like considered in a separate email to the Boards and Commissions mailbox at: ***GovernorBoardsandCommissions@gov.wa.gov***. Recommendation letters should be sent to the Governor's office. If you have questions about the positions or the Electrical Board, contact Elissa Zyski at 360-902-5259.

Displaying Certificates

The requirement in ***WAC 296-46B-940(3)*** and ***WAC 296-46B-942(1)*** for wearing and visibly displaying a valid certificate while engaged in the electrical construction trade went into effect on March 1, 2013. You must display your original certificate, not a copy. Visibly displaying certification allows the public, customers, and other workers to know that properly certified persons are performing electrical work. The requirement acts as a deterrent for contractors who knowingly work trainees unsupervised and will help fight the underground economy and level the playing field for those who comply with the law.

The certificate may be worn inside the outer layer of clothing when outer protective clothing (e.g. rain gear when outside in the rain, arc flash, welding gear, etc.), is required. The certificate must be worn inside the protective clothing so that when the protective clothing is removed, the certificate is visible. A cold weather jacket or similar apparel is not protective clothing. The certificate may be worn inside the outer layer of clothing when working in an attic or crawl space or when operating equipment (e.g. drill motor, conduit threading machine, etc.) where wearing the certificate may pose an unsafe condition for the individual.

L&I received feedback regarding concerns some had about specific address information printed on the certificates. As a result of those comments, changes were made so that newly issued certificates no longer display a street address.

Training requirements for new applicants

Effective July 1, 2013, in accordance with Senate Bill 6133 passed by the legislature during the 2012 session, all applicants for master, journey level, or specialty electrician examinations must demonstrate completion of in-class education hours based upon the number of hours of work experience required to qualify for the examination as follows:

- Twenty-four hours where 2,000 or more; but less than 4,000 hours of work experience is required.
- Forty-eight hours where 4,000 or more; but less than 6,000 hours of work experience is required.
- Seventy-two hours where 6,000 or more; but less than 8,000 hours of work experience is required.
- Ninety-six hours where 8,000 or more hours of work experience is required.

This change will require all applicants for examinations to demonstrate that they have completed all of the required in-class education. In-class education means approved classroom training covering the current ***19.28 RCW*** and ***WAC 296-46B***, the national electrical code, or electrical theory; or equivalent classroom training taken as part of an approved apprenticeship program under chapter ***49.04*** RCW or an approved electrical training program under RCW ***19.28.191***(1)(h). If your training was obtained out of state, contact electrical licensing and certification at 360-902-5269 with your detailed training history for assistance in qualifying for an examination.

Answer to Question of the Month: NEC 410.10(D) – **D)** 3', 8'

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 4** **April 2013**

Question of the Month

What size copper equipment bonding jumper is required to be run with the 3/0 copper phase conductors from the source of a separately derived system to the first disconnecting means sized at 200 amps?

Safety Tip of the Month!

Use ground fault circuit interrupters (GFCI) to reduce the risk of shock. GFCIs shut off an electrical circuit when it becomes a shock hazard. Current National Electrical Code requirements require these devices in new home bathrooms, kitchens, and garages. All outdoor receptacles should be GFCI protected. Test GFCIs once a month to make sure they are working properly.

Note From the Chief

Springtime brings a new season of growth and change. We have a new ***Governor***, a new ***Director*** at L&I, and a new chief electrical inspector. One thing that will not change is our commitment to L&I's mission to ***Keep Washington Safe and Working***. The electrical program performed almost 180,000 inspections in the past year to help ensure that Washington is an electrically safe place for consumers to live and work. Our inspectors, auditors, and ***E-CORE*** team members perform compliance investigations to help ensure that electrical installations are performed by qualified electrical contractors and electricians. They also help ensure that legitimate contractors do not have to compete against the underground economy and contractors who try to gain unfair competetive advantage by violating the electrical laws.

As the economy improves and electrical work increases, the Department must continue to work as efficiently as possible to provide the best service to our customers. The electrical program has become more efficient by using principles learned using the Toyota Production System's LEAN process to identify and eliminate waste and standardize our processes. We continue to improve our efficiency by expanding LEAN to all workgroups including program supervision and management. Customer needs define value for any process. LEAN distinguishes steps that create value from those that do not. A LEAN culture is based upon continuous improvement and respect for people who do the work. We continue to challenge ourselves to provide our customers with better value by eliminating waste within our processes. This aligns with L&I's mission of Keeping Washington Safe & Working by providing safety, service, and value.

Safety on the Jobsite

Electricians and electrical inspectors are exposed to various jobsite hazards daily while performing their job duties. The Department takes the welfare of its employees very seriously. Any jobsite where an inspection is to be made, must meet minimum safety requirements before the inspection can be performed.

In particular:

- In accordance with ***WAC 296-155 Part C-1***, all fall hazards of four feet or greater must be abated using adequate guardrails or additional fall protection will be required.
- Adequate access ways must be maintained in the inspection area. This includes removing tripping hazards and sufficiently covering or identifying any floor openings.
- Stairways and construction openings must be protected on all open sides by adequate guardrails.
- Illumination must be provided in interior areas where ambient light does not provide a safe level of illumination.
- If the inspection requires a vertical elevation change of more than 18 inches a ladder, stairway or ramp must be provided.

If fall protection is required, (e.g., fall arrest, fall restraint, etc.), or if the inspection is on a roof of any kind (including large flat roofs), alert the inspector prior to the inspection by describing the hazard in detail in the inspection request

comments. If the jobsite does not meet the minimum safety requirements, a correction will be written and a trip fee may be assessed.

For questions about jobsite safety for inspections, you may contact Ed Whitney at 360-902-4243.

Electrical Board Openings

There will be three openings on the Electrical Board in July. Bruce Turner, Rocky Sharp, and Don Guillot have served the board faithfully and I would like to thank them for all their hard work and dedication to the electrical industry. The three available positions are the licensed professional electrical engineer seat, the electrical contractor's association seat, and the outside line worker's seat.

Anyone interested in applying for one of these openings must submit an application using the form on the Governor's website at: ***http://governor.wa.gov/boards/application/application.asp***. Application must be made using the Governor's form. Send your resume and any additional information you would like considered in a separate email to the Boards and Commissions mailbox at: ***GovernorBoardsandCommissions@gov.wa.gov***. Recommendation letters should be sent to the Governor's office. If you have questions about the positions or the Electrical Board, contact: Elyssa Zyski at 360-902-5249.

Communications and Limited Energy Cables Installed in Wet Locations

An article entitled *Telecommunications Conductors and Cables Installed in Wet Locations* appeared in the ***April 2005*** edition of the *Electrical Currents* newsletter. At that time, communications cables suitable for use in wet locations were not widely available. Cables are now available in Categories 5, 5e, 6, and 6a that are approved for use in wet locations. Some manufacturers will not warrant the installation of cables in wet locations unless they are approved for such use. The department will no longer accept the installation of cables in underground raceways or in other wet locations as defined by the National Electrical Code unless they are suitable for use in wet locations.

Nonprofit Organizations – Contractor Exemptions

In the 2003 Legislative Session a bill was passed that allows an electrical contractor licensing exemption for a nonprofit corporation under 26 U.S.C. Sec. 501 (c)(3). ***RCW 19.28.091(7)*** allows the nonprofit corporation to use appropriately certified electricians and supervised trainees to perform electrical installation, repair, or maintenance on nonprofit corporation facilities. Volunteer electricians and trainees cannot receive any type of compensation for the work.

The total value of the electrical work (e.g., design, labor, materials, equipment, permits, etc.) for the entire project cannot exceed $30,000. The project cannot be done in phases in an attempt to stay below the $30,000 maximum.

Although exempt from electrical contractor licensing, the nonprofit corporation must obtain the proper electrical work permits and ensure they follow all electrician certification and trainee supervision requirements of chapter 19.28 RCW. Any group attempting to purchase a permit under this exemption should be prepared to supply a copy of the "qualifying" letter from the Internal Revenue Service (IRS) granting the entity the right to claim 501(c)(3) non-profit status.

The statute change did not grant these exemptions to U.S.C. Sec. 501(c)(4) entities (e.g., civic leagues, social welfare organizations, and local associations of employees with earnings devoted exclusively to charitable, educational, or recreational purposes).

Ugly Installations Online readers - click on the picture to open larger images. Violation: WAC 296-46B-901 - Electrical permit and inspection required, too many corrections to list – An electrical contractor was hired to correct this very unsafe installation.

Answer to Question of the Month: 4 AWG copper – NEC 250.30(A)(2), NEC 250.102(C), Table 250.66

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Rod Mutch, Chief Electrical Inspector **Vol. 16 No. 3** **March 2013**

Question of the Month

Is it permissible for the electrical equipment associated with a hydromassage bathtub to be solely accessible from a crawlspace below the tub? See correct answer on page 2.

Safety Tip of the Month!

The amount of electricity required to kill a person is very small. According to the OSHA publication ***Controlling Electrical Hazards***, 50 to 150 milliamperes of electricity will cause extreme pain, respiratory arrest, severe muscular contractions and possible death. Use extreme caution, follow all safety procedures, and use required personal protective equipment while working on or near energized circuits.

Note From José Rodríguez, Assistant Director for Specialty Compliance Services

It is my pleasure to announce the appointment of Rod Mutch as the new Chief Electrical Inspector.

Rod has over 35 years of experience in the electrical construction and maintenance industry and most recently has served as an Electrical Technical Specialist, a position he has held since September 2011. Rod holds a commercial electrical inspector certification with the International Code Council, Washington state general electrical (AD01) administrator's certificate, and Washington state general electrical (EL01) certificate of competency. Rod began his electrical career as an electrical construction apprentice and has been an electrical construction supervisor, plant engineer and electrical maintenance supervisor, small business owner (electrical contractor), project manager and electrical foreman in the private sector. Rod has been with L&I for eleven years and served as an electrical inspector, lead electrical inspector, and technical specialist.

The selection process was very competitive and demonstrated the high levels of technical proficiency, practical experience, and leadership that we have in the Electrical Program, within our agency, and the private sector. Rod has the well earned respect of superiors, peers, and stakeholders and has demonstrated his capability to lead the Electrical Program, develop good public policy, and enforce the electrical laws. For these reasons, and many more, I am confident that he is the right person for this assignment. Rod's appointment is effective on March 1, 2013.

I would like to thank Larry Vance for his willingness to serve and for the excellent job he did as interim Chief.

Revised WAC 296-46B effective March 1, 2013

The revision process for WAC 296-46B, Electrical Safety Standards, Administration, and Installation is complete. The revised rules are effective March 1, 2013.

The process began in January 2012 when the department notified stakeholders of the upcoming rulemaking. During May 2012, the department accepted revision proposals from stakeholders as well as applications for membership on the Technical Advisory Committee (TAC). All proposals were reviewed by the TAC in June, and then presented to the Electrical Board at their July meeting. The department then presented the recommended changes at seventeen stakeholder meetings conducted around the state from September through December. In December, the department received and responded to public comments on the proposed changes. The director of L&I, Joel Sacks, signed the CR-103P adopting the new rule on January 22, 2013 with an effective date of March 1, 2013.

Printed copies of the rules will be available at L&I offices for $5.60. You can download an electronic copy by visiting the ***Laws & Rules*** page of our website. For a summary of the major changes, see the ***January 2013*** Special Edition *Electrical Currents* newsletter. Keep yourself up to date on important developments by joining L&I's ***Electrical Email List*****.**

New Class B Labels

Beginning March 1, Class B random inspection labels will have a **new look** and process for validation and use. The new labels are salmon colored and no longer consist of two parts. Contractors using salmon colored Class B labels will no

longer mail in the contractor portion to L&I, but must validate the label prior to use in the Electronic Permit and Inspection System using their Secure Access Washington account. Contractors may continue to use the two part labels and process for unused Class B labels purchased prior to March 1. The scope of work for Class B labels has changed significantly and in most cases, has expanded. Beginning March 1, the new scope of work will apply to all Class B labels. See ***WAC 296-46B-908*** for complete rules on the use of Class B random inspection labels.

Refunds Are Available For Unused Class B Books Sold Before March 1

The Department is offering refunds for unused Class B books purchased prior to March 1, 2013. This limited time offer allows contractors to take advantage of the convenience of the new Class B label process sooner. The refund must be requested by, and will only be issued to the original purchaser for the amount of purchase. The department will only grant refunds for complete books (twenty labels per book). The Class B books must be unused and intact. Refund requests must be received by the department by June 15, 2013.

Class B refund request forms and instructions are available from your local ***L&I Office*** or you may ***download*** a copy from our website.

Legislative Updates

Lawmakers are considering several bills during the 2013 legislative session that might affect the electrical program. If you are interested in these bills or other proposed legislation, you can find bill information at the legislative website: ***http://apps.leg.wa.gov/billinfo/.*** Enter the bill number, review the legislation and comment if you desire.

- ***Senate Bill 5189*** – Creates a photovoltaic installer endorsement to allow holders of a valid limited energy (06) specialty electrician's certificate or a valid telecommunications electrician's certificate (which does not exist) to install solar photovoltaic electrical systems up to 90 volts and 25 kilowatts.
- ***Senate Bill 5077*** – Technical corrections to gender based terms. (e.g., requires replacement of the term "journeyman" with "journey level").
- ***Senate Bill 5682*** and companion ***House Bill 1760*** – Allows HVAC/refrigeration specialty electricians to perform like-in-kind replacement of household appliances.
- ***House Bill 1855*** – Allows nonresidential maintenance (07) specialty electricians to perform generator load bank testing and eliminates permit and inspection requirements for load bank testing.
- ***House Bill 1681*** – Eliminates immunity from prosecution for criminal trespass for government personnel while performing their duties on private property.

This legislation is not sponsored or promoted by L&I. You may contact your legislator to share your opinion about these bills by visiting the legislative website at ***http://app.leg.wa.gov/DistrictFinder/***.

Be Sure We Have Your Correct Address

For your convenience, the department sends important notices such as renewal notices approximately 6 weeks prior to those nearing their expiration date. Many license and certificate holders do not receive these notices due to an incorrect mailing address in our database. You can update your mailing address by visiting the ***Licensing, Registration, and Certification (Quickcards)*** page of our website.

Ugly Installations Online readers - click on the pictures to open larger images. Violation: WAC 296-46B-990(3)(a) – Serious violation of RCW 19.28 that creates a hazard of fire, and imminent life safety danger to the public. The serving utility disconnected this installation.

Answer to Question of the Month: No. WAC 296-46B-680(13) For hydromassage bathtubs, all electrical equipment installed to support the bathtub (e.g. disconnecting means, motor, etc.) must be accessible at the same grade level as the tub or from a landing on the exterior of the building without the use of a ladder or other access device.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Acting Chief Electrical Inspector **Vol. 16 No. 2** **February 2013**

Question of the Month

A ground ring is an electrode encircling the building or structure, in direct contact with the earth, consisting of at least _____ of bare copper conductor not smaller than _____. The ground ring shall be buried at a depth below the earth's surface of not less than _____. See correct answer on page 2.

Safety Tip of the Month!

Select tools designed for the intended and specific use purpose. Using a tool for something other than its intended purpose often damages the tool and could cause you pain, discomfort, or injury.

Note From The Assistant Director for Specialty Compliance Services

The process for filling the vacant Chief Electrical Inspector position is nearing conclusion. First and second round interviews have been completed. Electrical industry stakeholders were included on the interview panels. The department is committed to recruiting the best candidate for this important position, and an announcement will be made as soon as the position is filled. In the interim, Larry Vance, Electrical Technical Specialist, has been appointed as the Acting Chief Electrical Inspector.

Legislative Proposals for the 2013 Legislative Session

Legislators began introducing legislation January 14. So far, there are four bills are being considered that might affect the Electrical Program. If you are interested in these bills or other proposed legislation, you can find bill information at the legislative website: ***http://apps.leg.wa.gov/billinfo/***

- Senate Bill 5189 relates to adding a new section to RCW 19.28, which would allow a person with a valid limited energy system electrician certificate or a valid telecommunications electrician certificate to obtain an endorsement from the department allowing the person to install, maintain, replace, or repair photovoltaic electrical systems. The scope of work under a photovoltaic electrical system endorsement would be limited to the installation, maintenance, replacement, and repair of photovoltaic electrical systems that generate a maximum of ninety volts and twenty-five kilowatts of power, and includes all electrical wiring and electrical equipment used to create or convey photovoltaic energy up to and including the inverter. Only proof of photovoltaic installer certification by the North American Board of Certified Energy Practitioners or an equivalent certification board would be required to qualify for the endorsement. You may view and comment on this bill by visiting the bill information page, ***SB 5189 - 2013-14*** on the Washington State Legislature's website. You may view a video of the bill reading and testimony before the Senate Committee on Commerce & Labor on ***TVW***. Scroll the video forward to the 1:19:00 point to hear testimony for this bill.
- Senate Bill 5077 relates to technical corrections to gender-based terms. This legislation would require replacement of the term "journeyman" where it exists in RCW 19.28 with the term "journey level." You may view and comment on this bill by visiting the bill information page, ***SB 5077 - 2013-14***.
- Senate Bill 5682 and companion House Bill 1760 relate to allowing a certified HVAC/refrigeration specialty electrician to perform electrical work that is incidentally, directly, and immediately appropriate to the like-in-kind replacement of a household appliance or other small household utilization equipment that requires limited electric power and limited waste and/or water connections. You may view and comment on these bills by visiting the bill information pages, ***SB 5682 - 2013-14*** and ***HB 1760 - 2013-14***.

This legislation is not sponsored or promoted by L&I. You may contact your legislator to share your opinion about these bills by visiting the legislative website at ***http://app.leg.wa.gov/DistrictFinder/***.

New Requirement for Concrete Encased Electrodes (Ufer Grounds)

Beginning March 1, in accordance with ***WAC 296-46B-250(2)***, except for mobile/manufactured homes, a concrete encased grounding electrode must be installed and used at each new building or structure that is built upon a permanent concrete foundation. If the concrete encased grounding electrode is not available for connections, a ground ring must be installed per NEC 250. The concrete encased electrode must comply with NEC 250.52(A)(3). Inspection of the electrode may be accomplished by the following methods:

a) At the time of inspection of other work on the project, providing the concrete encased electrode is accessible for a visual inspection;
b) At the time of the service inspection providing the installer has provided a method so the inspector can verify the continuity of the electrode conductor along its entire length (e.g. attaching a length of copper wire to one end of the electrode that reaches the location of the grounding electrode conductor that will enable the inspector to measure the resistance with a standard resistance tester). The concrete encased electrode does not have to be accessible for a visual inspection; or
c) Other method when prior approval, on a jobsite basis, is given by the inspector. If a special inspection trip is required to inspect a grounding electrode conductor, a trip fee will be charged for that inspection in addition to the normal permit fee.

Fighting the Underground Economy

Operating outside the requirements for licensing, certification, and permitting is very tempting to some individuals and contractors working in today's economy. The underground economy and companies attempting to operate with an unfair competitive advantage take work away from legitimate contractors and individual electricians who take pride in their work and the electrical industry.

L&I is actively doing everything possible to reduce these impacts. Because of the efforts of our electrical inspectors, E-CORE, and audit teams, we have had another successful year working proactively with the industry and combating companies and individuals not playing by the rules. For the 2012 calendar year the electrical program issued 4,385 citations for unlicensed contracting, uncertified electricians, doing work with no permit, or a related issue. All these violations are considered a part of the underground economy.

No matter what you do, inspector, contractor, electrician, regulator, or citizen, we encourage you to do your part in reducing the negative effects of the people who choose to violate the electrical laws and compete unfairly and in many cases unsafely with the legitimate electrical industry. We welcome your referrals about this type of unfair and illegal activity. If you know or suspect this type of violation, we encourage you to notify your local L&I electrical inspection office or a member of our compliance investigative team. You can find contact numbers for our offices at the ***Office Locator*** page of our website. You can also visit the ***Report Electrical Law Violations*** page of our website for additional information and contact information for the E-CORE team.

Please do your part by helping provide a level competitive environment for legitimate contractors so they can provide safe electrical installations for their customers.

Ugly Installations

Online readers - click on the pictures to open larger images.

Violations: Citation for serious non-compliance. An installation that presents imminent danger of fire or life safety hazard. Possible suspension or revocation of license and or certificate. ***WAC 296-46B-990***

Answer to Question of the Month:

6.0 m (20 ft.); 2 AWG; 750 mm (30 in.) NEC 250.52(A)(4), NEC 250.53(F)

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Acting Chief Electrical Inspector **Vol. 16 No. 1 SE** **January 2013**

SPECIAL EDITION

WAC 296-46B Revisions

This issue is dedicated to a review of the changes to WAC 296-46B. The rulemaking process is complete with an effective date of March 1, 2013. A Technical Advisory Committee made up of a diverse group of electrical industry stakeholders reviewed and approved all of the proposals. On December 10, the department received public comments. The department has considered all of the comments and responded to the commenters. The only variance from the proposed changes was the removal of a proposed definition of "telecommunications" due to numerous stakeholder comments. The director of L&I, Joel Sacks, signed the CR-103P adopting the new rule on January 22, 2013.

Here is a summary of the major changes. For the complete text of the changes, visit the ***Rule Development*** page of our website. A printable version of WAC 296-46B with an effective date of March 1, 2013 will be available on the website soon.

- **WAC 296-46B-010 Adopted standards**

The 2014 edition of the National Electrical Code will be adopted on July 1, 2014. The latest versions of national telecommunications standards are being adopted, and several unnecessary standards were deleted.

- **WAC 296-46B-100 General definitions**
  - "Installation" – A sentence was added to state that an installation is not the passive testing or operational programming of an electrical system, component, equipment, or wire. See the new definition below for "passive testing". This change was made to clarify that passive testing is not regulated by RCW 19.28, which prohibits additional certification by cities, counties, or other entities beyond certification as an electrician (e.g. NICET for fire alarm system installations, etc.)
  - "Identification plate" was changed to allow modern adhesive labels to be used with departmental approval.
  - New definition – A "jobsite" is a specific worksite having a single address or specific physical location (e.g. a single-family residence, a building, a structure, a marina, an individual apartment building with a specific address, etc.).
  - New definition – A "member of the firm" – means the member(s) on file with the Department of Licensing for sole proprietorships/partnerships or with the Secretary of State for corporations.
  - New definition - "Passive testing" (e.g. pressing of test buttons, use of testing equipment like voltage testers, clamp-on meters, removal of a device head where the wiring is terminated on a separate base plate, etc.) means testing that does not require any:
    - Physical modification to the electrical system wiring; or
    - Wiring to be disconnected or terminated, except as necessary for an approved electrical testing laboratory or approved engineer performing an equipment evaluation.
  - New definition - "Supervision" - For the purpose of supervising electrical trainees means that that the supervising electrician is on the same jobsite as the trainee being supervised. The trainee is not considered to be on the same jobsite if the supervising electrician and the trainee are working:
    - In separate buildings at a single address except for a single-family residence; or
    - On an outdoor project where the trainee is more than 1000 feet from the supervising electrician, or where the trainee is out of sight and more than 200 feet away.

- **WAC 296-46B-225 Outside branch circuits and feeders**
  - Number of supplies - This change allows a building/structure that is supplied from a remote service to be supplied by no more than six feeders originating from the service equipment and with each feeder terminating in a single disconnecting means at the building/structure. The service equipment must contain overcurrent protection appropriate to each feeder. The building disconnecting means required by NEC 225.32 must be grouped, within sight, and all be within 10 feet of each other.

- Location of outside feeder disconnecting means, suitable for use a service equipment – This change adopts department policy for feeders that does not require a service rated disconnecting means when the disconnecting means, including that required by NEC 700, 701, or 702 for a generator, is installed on or within 15 feet of the exterior of the building.

- **WAC 296-46B-250 Concrete encased electrode required**
  - Grounding electrodes – This change requires, except for mobile/manufactured homes, a concrete encased electrode to be installed and used at each new building or structure that is built upon a permanent concrete foundation. If the concrete encased grounding electrode is not available for connections, a ground ring must be installed per NEC 250. See the complete text of the rule for alternate inspection methods.

- **WAC 296-46B-336 Power and Control Tray Cable – Type TC**

This change was made to allow the use of Type TC cable in any location allowed for nonmetallic-sheathed cable in NEC 334 if all of the installation requirements in NEC 336, 334, and WAC 296-46B-334 are met. Type TC cable is commonly supplied by manufacturers for use when installing split-system HVAC/R equipment.

- **WAC 296-46B-406 Tamper resistant receptacles**

Tamper resistant receptacles in dwelling units – This change allows five exceptions to the requirements for tamper resistant receptacles. Receptacles in the following locations will not be required to be tamper-resistant.

- Receptacles located more than 5 ½ feet above the finished floor;
- Receptacles that are part of a luminaire or appliance;
- A single receptacle or a duplex receptacle for two appliances located within dedicated space for each appliance that, in normal use, is not easily moved from one place to another and that is cord and plug connected in accordance with 400.7(A(6), (A)(7), or (A)(8);
- Nongrounding receptacles used for replacements as permitted in 406.4(D)(2)(a); or
- Receptacles located above a countertop where required by NEC 210.52(C).

- **WAC 296-46B-550 Mobile homes, manufactured homes and mobile home parks**

Mobile/manufactured homes – inspection. This change aligns the electrical and factory assembled structures sections and clarifies permitting requirements. All alterations to the mobile/manufactured home electrical system must be permitted and inspected as follows:

- Any circuit or feeder that is fed from the pedestal or panel from an outbuilding feeding the mobile/manufactured home requires a permit from the electrical section.
- Any circuit or feeder that originates from the mobile/manufactured home's (i.e. red Factory Assembled Structures label) panel and feeds an addition or equipment that is attached (e.g. garage, heat pump or air conditioning unit) requires an FAS alteration permit.
- Any circuit or feeder that originates in the mobile/manufactured home panel and feeds an unattached structure or equipment (e.g. detached garage, hot tub, pool, well, septic system, yard lighting or generation equipment, etc.) requires two inspections. An FAS permit is required for the circuit or feeder from the panel and must terminate in a J-box located under the home's exterior wall near the rim joist. A second permit is required from the electrical section for electrical work from the J-box to the equipment or structure.

- **WAC 296-46B-600 Electric signs and outline lighting**
  - Markings - When neon channel signs are retrofitted from neon to an LED light source, a licensed electrical contractor may make the retrofit with the channel(s) in place so long as all the retrofit components are listed and the manufacturer's instructions for making the retrofit are available for the inspector's use at the time of the inspection and physical access is provided to allow the inspector access to all components of the retrofit. A new listing mark must be applied to the sign by the electrical contractor or a field evaluation label must be applied by an approved electrical testing laboratory.
  - Grounding and Bonding - Remote metal parts of a section sign or outline lighting system only supplied by a remote Class 2 power supply that is listed or is a recognized component in a listed section sign or outline lighting is not required to be bonded to an equipment grounding conductor.

- **WAC 296-46B-680 Hydromassage bathtubs**
  - For hydromassage bathtubs, the ground fault circuit interrupter device must be identified as to use and not located in a building or tub cavity, crawlspace, or attic.
  - For hydromassage bathtubs, all electrical equipment installed to support the bathtub (e.g. disconnecting means, motor, etc.) must be accessible at the same grade level as the tub or from a landing on the exterior of the building without the use of a ladder or other access device.

- **WAC 296-46B-690 Solar photovoltaic systems**

A change to this section defines building integrated photovoltaic modules, panels, or arrays that are integrated into the outer surface or structure of a building (e.g. roofing, skylights, windows, or facades). The entity placing a building integrated cell, module, panel, or array is not subject to the requirements for electrical inspection, licensing, or certification so long as the work is limited to the placement and securing of the device and an electrical work permit has been previously obtained for the electrical work related to the equipment by an entity authorized to do that electrical work. All electrical work, including wiring installation, terminations, etc., necessary to complete the electrical installations must be completed by an entity authorized to do the electrical work (i.e. owner or appropriate electrical contractor).

- **WAC 296-46B-800 Communications systems – Communications circuits**

Chapters 1 through 7, NEC, supplement and modify the requirements of Chapter 8, NEC. If there are specific requirements or exceptions described in Chapter 8, NEC, that are different from those in Chapters 1 through 7, NEC, Chapter 8 will prevail. This change replaces WAC 296-46B-300(1) for communications systems and allows other important NEC requirements to apply to communications systems such as requirements to follow a manufacturer's instructions found in Chapter 1 and the burial depth requirements for outdoor installations found in Chapter 3.

- **WAC 296-46B-901 Electrical work permits**
  - Posting of permits – The vast majority of electrical permits are purchased online. This change allows, in lieu of posting a printed copy of the permit, for the permit number to be conspicuously posted on the jobsite. If posting the permit number, it must be identified as the electrical work permit number and be posted on or adjacent to the electrical service or feeder panel supplying power to the work prior to beginning any electrical work and at all times until the electrical inspection process is completed.
  - The Class A list of like-in-kind replacement work that is exempt from permitting requirements was expanded to include multiples of most items and to include replacement of a single battery smaller than 150 amp hour. It also clarifies that, for the purposes of like-in-kind replacement of circuit breakers, "circuit breaker" means a circuit breaker that is used to provide overcurrent protection only for a branch circuit, as defined in NEC 100.
  - Electrical work permits will expire one year after the date of purchase unless permission is granted by the Chief Electrical Inspector or when the permit is closed or completed by the inspector.
  - Posting of corrections – A printed copy of the correction notice will only be posted at the jobsite by the inspector for permits not purchased electronically. Online permit purchasers have the ability to view all corrections online.

- **WAC 296-46B-908 Class B permits**

Significant changes are being made to the Class B permit section. The labels, manner of validation, and posting requirements will change for all Class B permits purchased after February 28, 2013.

  - The new Class B labels will no longer have two portions (jobsite and contractor). Instead of sending the contractor portion to the department, the purchaser must validate the label prior to use by entering the jobsite information into the department's online Class B system using ***SecureAccess Washington***. If the posting occurs on a weekend or a federal/state holiday, the information must be entered no later than the next business day.
  - Prior to beginning the installation, the person identified as the installer on the Class B label is responsible for posting the label in a conspicuous permanent manner, at the:
    - Main service/feeder location supplying the structure or system; or
    - Purchaser's equipment, or on the equipment conductors if the equipment is not in place.
  - Class B labels will still be sold in blocks of twenty and are non-refundable and non-transferable.
  - A separate label is required for each line item in the list of eligible Class B work listed in WAC 296-46B-908(10).
  - An entity using Class B labels is restricted to using no more than two labels per week per jobsite.

- All Class B work must be completed within fifteen days after the label is validated. If the work is not completed, another Class B label may be validated and posted. Exception: In a one- or two-family residential structure, a label is valid for ninety days after the label is validated, so long as all work described on the label is performed by the purchaser.
- The list of eligible Class B work was modified and in most cases, expanded:
  - Like-in-kind replacement of an individually controlled electric room heater, air conditioning unit, heat pump, or refrigeration unit was expanded to include units up to 40 minimum circuit amperes.
  - Installations of Class 2 or 3 low voltage and telecommunications wiring is limited to 5000 square feet.
  - Added the like-in-kind replacement of up to twenty: paddle fans, luminaires not exceeding two hundred seventy-seven volts and twenty amperes; snap switches, dimmers, receptacle outlets, line voltage thermostats, heating elements, luminaire ballasts, circuit breakers, contactors, relays, timers, starters, circuit boards, fuses, or similar control components.
  - Added the replacement of not more than two luminaires with paddle fans if a listed fan box has been previously installed to support the luminaires.
  - Added the replacement of not more than four batteries rated not larger than 150 amp hours each that supply power to a single unit of equipment (e.g. uninterruptable power supply, photovoltaic storage system, control panel, etc.).
  - Added the installation or repair of equipment powered by a standalone solar photovoltaic source where the:
    (i) Electrical equipment requires no field assembly except for the attachment and electrical connection of the solar photovoltaic source to the equipment, the installation and attachment to a grounding electrode, and the placement of the equipment on a pad, pole, or other structure;
    (ii) Solar photovoltaic source and the equipment operates at less than 15 volts DC;
    (iii) Solar photovoltaic source is the only source of external power; and
    (iv) Equipment and the solar photovoltaic source are appropriately labeled as a single unit. The label must be by an approved electrical testing laboratory or for equipment used for traffic control, labeled according to WAC 296-46B-010(21).

- **WAC 296-46B-940 and WAC 296-46B-942 Electrician certificate of competency and training certificates**

In accordance with Substitute House Bill 1055 which was passed by the legislature in the 2009 session, electricians and trainees are now going to be required to wear, and visibly display on the front of the upper body a valid certificate while performing electrical installation work requiring certification.

The certificate may be worn inside the outer layer of clothing when outer protective clothing (e.g. rain gear when outside in the rain, arc flash, welding gear, etc.), is required. The certificate must be worn inside the protective clothing so that when the protective clothing is removed, the certificate is visible. A cold weather jacket or similar apparel is not protective clothing.

The certificate may be worn inside the outer layer of clothing when working in an attic or crawl space or when operating equipment (e.g. drill motor, conduit threading machine, etc.) where wearing the certificate may pose an unsafe condition for the individual.

The certificate must be immediately available for examination at all times.

When working as a certified electrician, the electrician must not display a training certificate.

When supervising a trainee(s), the supervising electrician's certificate must be appropriate for the work being performed by the trainee(s).

Any person working as an electrician or trainee must also possess government issued photo identification and immediately present that identification when requested by the inspector.

- **WAC 296-46B-945 Qualifying for master, journeyman, specialty electrician examinations**

Effective July 1, 2013, in accordance with Senate Bill 6133, which was passed by the legislature in the 2012 session, all applicants for master, journeyman, or specialty electrician examinations must demonstrate completion of basic trainee classes based upon the number of hours of work experience required to qualify for the examination.

- Twenty-four hours where 2,000 or more; but less than 4,000 hours of work experience is required.
- Forty-eight hours where 4,000 or more; but less than 6,000 hours of work experience is required.
- Seventy-two hours where 6,000 or more; but less than 8,000 hours of work experience is required.
- Ninety-six hours where 8,000 or more hours of work experience is required.

Currently, basic trainee classes are required to be completed only for renewal of a training certificate. This change will require all applicants for examinations to demonstrate that they have completed all of the required classes.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Larry Vance, Acting Chief Electrical Inspector **Vol. 16 No. 1** **January 2013**

Question of the Month

What is the ampacity of three parallel 4/0 Type W portable power cables with a temperature rating of 90°C connected to equipment terminals having a temperature rating of 75°C? - See correct answer on Page 2.

Safety Tip of the Month!

- Read the manufacturer's instruction manual before using any space heater. Check to make sure the heater bears the mark of a certified testing organization.
- Keep space heaters at least three feet away from any combustible materials, such as bedding, clothing, draperies, furniture and rugs.
- Test space heaters frequently to ensure that the shut-off function works when heater is tipped or knocked over.

Note From The Assistant Director for Specialty Compliance Services

The Department of Labor & Industries is in the process of recruiting a Chief Electrical Inspector. Ron Fuller, the departing Chief Electrical Inspector, retired on December 31, 2012, after having held the position for 12 years and completing 21 years of state service. The recruitment notice was published on October 16, 2012 and closed on December 14, 2012. First round interviews are scheduled for January 16, 2013. Electrical industry stakeholders have been included on the interview panel. The department is committed to recruiting the best candidate for this most important position, and an announcement will be made as soon as the position if filled.

In the interim, Larry Vance, Electrical Technical Specialist, has been appointed as the Acting Chief Electrical Inspector. Larry has been working as an Electrical Technical Specialist in the Electrical Program from November 2007 to the present with a brief period from April 2010 through June 2011 when he was a Electrical Inspection Field Supervisor for L&I'sTacoma office. Prior to becoming an Electrical Technical Specialist, Larry was an Electrical Field Inspector from 2004 through 2007 and has eighteen years of electrical experience in the private sector electrical construction industry. He has held a Master Electricians certificate (ME01) since 2003.

Larry's unique experience working directly with the Chief Electrical Inspector, central office electrical program staff, industry stakeholders, the Electrical Board, and Field Electrical Supervisors and Field Inspectors, provides him with a deep understanding of the vision, mission, history, and authority of the Electrical Program. He is the most knowledgeable person with the required leadership skills who can perform these interim responsibilities and assist in the transition to a new Chief.

Railroad Installations

The scope of the National Electrical Code (NEC) 90.2(B)(3) says, *"…installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling stock or installations used exclusively for signaling and communication purposes*" (e.g., rail signal control houses; communications buildings; lift and swing bridges; switch heaters; railway yard, track switch, and yard area lighting)are not covered by the National Electrical Code.

These installations are not within the scope of the NEC and are not regulated by chapter 19.28 RCW. L&I's and authorized cities/towns' jurisdiction ends at the load terminals of the service disconnect supplying power to these installations.

L&I or an authorized city/town has jurisdiction over railway related facilities that are accessible to the general public (e.g., administrative facilities, passenger terminals, etc.) and other railway facilities (e.g., offices, employee lunch/break areas, warehouse spaces, vehicle garages, shops, etc.) that are not directly required to operate the railway. These facilities or portions of facilities not directly required to operate the railway must comply with all permitting, inspection, licensing, and certification laws of chapter 19.28 RCW.

It is important to note that "light rail" systems are not considered a railway under federal law. Electrical aspects of light rail systems are regulated under chapter 19.28 RCW.

Electrical Certification Applicants Must Demonstrate Completion of Basic Trainee Classes

Effective July 1, 2013, all applicants for master, journeyman, or specialty electrician examinations, must demonstrate completion of basic trainee classes based upon the number of hours of work experience required to qualify for examination. This new requirement is a result of Senate Bill 6133 passed by the legislature in 2012. The amount of basic trainee classroom hours required for new applicants will be:

- Twenty-four hours where 2,000 or more; but less than 4,000 hours of work experience is required.
- Forty-eight hours where 4,000 or more; but less than 6,000 hours of work experience is required.
- Seventy-two hours where 6,000 or more; but less than 8,000 hours of work experience is required.
- Ninety-six hours where 8,000 hours or more of work experience is required.

Currently, only trainees renewing their training certificate are required to demonstrate completion of required basic trainee classes. You can find a list of currently approved basic trainee classes on the ***Basic Classroom Instruction*** page of our website.

Licensing and Certification required for Connection of Temporary Load Banks

Many facilities have alternate power sources (e.g., uninterruptible power supplies, generators, batteries, etc.) that require periodic testing which includes connecting a load bank and exercising the system using an actual load. Connecting a temporary load bank to the premises wiring system falls within the definition of "*electrical construction trade*" in accordance with ***RCW 19.28.006***. This work is required to be performed by licensed electrical contractors and certified electricians in accordance with ***RCW 19.28.041*** and ***RCW 19.28.161***, unless the work is performed by the owner of the property, or their regularly employed employees in accordance with ***RCW 19.28.261(5)(a)***.

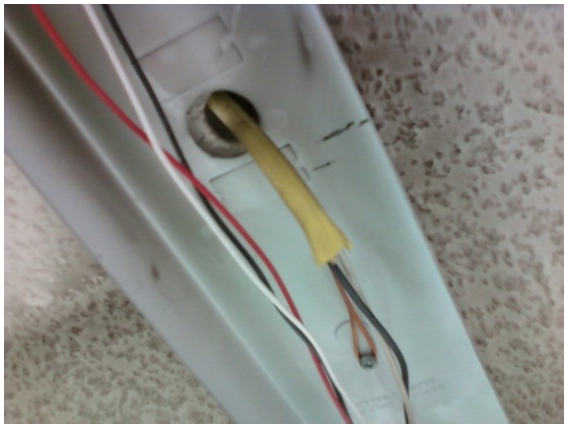
Temporary wiring and connections are new installations that do not fall within the scope of work for the maintenance specialties as described in ***WAC 296-46B-920(g), (h), (i), (j), (k), and (l).*** Installation of wiring and connections between a temporary load bank and a premises wiring system is not maintenance, repair, and replacement of like-in-kind existing electrical equipment and conductors. An entity performing this work for a property owner must be an (01) general electrical contractor and the individuals performing the wiring and connections must be (01) general certified electricians and/or properly supervised trainees. If the work is performed at a one- or two-family dwelling, or a multifamily dwelling not exceeding three floors above grade, (02) Residential specialty electrical contractors and certified electricians may perform the wiring and connections.

All temporary wiring installations require electrical permits prior to performing the work. Some cities issue their own permits and conduct inspections. You may find a list of those cities on the ***City Electrical Inspectors*** page of our website.

You must make requests for inspections for Labor & Industries electrical permits or from cities that issue permits and perform inspections no later than three business days after completion of the electrical/telecommunications installation or one business day after any part of the installation has been energized, whichever occurs first.

Ugly Installations

Online readers - click on the picture to open a larger image.



Violations: NEC 410.48 – Conductors exposed to physical damage; NEC 410.56 – Conductors not secured, subject to cutting and abrasion where passing through metal; 250.8 – Sheet metal screw not permitted for connection of equipment grounding conductor.

Answer to Question of the Month: 1080 amperes – NEC 400.5(A), 400.2

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 12** **December 2012**

Question of the Month

What is the minimum number of wires required within electrical metallic tubing installed on the outside of a building to supply an HVAC unit rated at 208V three-phase? - See correct answer on Page 2.

Note From The Chief

Sadly, this is my last **Note From The Chief**. I am retiring from state service at the end of the year. During my twenty-two years with L&I, thirteen as Chief Electrical Inspector, I have had the wonderful opportunity to work with some of the best professionals in the electrical and construction industry. The Electrical Program has rewarded our customers and me by steadily improving and providing better and better service.

I am very proud of the many accomplishments we have made over the years and am grateful to everyone I have worked with for your insights and support. You have helped guide the Electrical Program and me over these many years. I am very thankful to all of you.

Safety Tip of the Month!

Standing water, ice, or snow may conceal hidden hazards.

Avoid slips, trips and falls by wearing proper footwear and proceeding with caution at all times.

Trust your instincts and training. If your path is unsafe, find a safe route to get there or do not go!

Your support in legislation, rule making, and combating the underground economy has been invaluable. Together we have made great strides in simplifying the Electrical Program's permitting, inspection, and licensing processes. Electrical contractors now purchase ninety-nine percent of their permits online. Since I became Chief, our licensing turn-around time has gone from weeks/months to four days – with no additional staff – even though the number of licenses has increased from 19,000 to 55,000 with the inclusion of companies and individuals who were previously working unlicensed. We now have inexpensive random inspection Class B permits. We created a master electrician certificate that incorporates administrator and electrician status into one certificate. We consolidated three electrical rules into one, saving hundreds of pages of rulemaking. We controlled our fee increases to be lower than the allowed annual cost of living index…and the list goes on.

I am certain to miss my work, colleagues, and this organization; but I feel ready and comfortable to hand guidance of the program to the remaining professionals in the Electrical Program who have played such a big part of our successes.

Thanks again for all your support during our many years working together. I will miss you after I leave L&I.

Continuing Education Requirements for Electrician Certificate Renewal

If you are an Administrator, Master Electrician, or Electrician, you are required to take twenty-four hours of continuing education classes in the three years between your certification renewals. Eight hours must be on changes in the currently adopted, or any more recently published National Electrical Code. Four hours must be on the currently adopted ***Chapter 19.28 RCW*** and/or ***Chapter 296-46B WAC***. The remaining twelve hours of continuing education credit may be your choice of currently approved classes. You can find approved classes listed on the ***Continuing Education*** page of our website. Approved first aid classes are limited to four hours of credit toward renewal of your certificate.

Do not wait until the last minute. You must complete the required training before your certificate expires. If you have not satisfied the training requirements, you may still renew your certificate by paying the appropriate fee; but your certificate will be in inactive status. In inactive status, you may not perform any work requiring a valid certificate until your continuing education training is completed and your certificate has been re-activated.

A class is not completed until the roster is submitted. The department will not grant credit for the class until the course sponsor's online attendance/completion roster is submitted and shows that you successfully completed the class. Class providers are required by ***WAC 296-46B-970*** to complete the online attendance/completion roster within seven days after a student completes the class.

Basic Trainee Education Requirements

Electrical training certificates are valid for two years. Trainees must take thirty-two hours of basic trainee classroom education before their certificate may be renewed. Beginning July 1, 2013, trainees must complete forty-eight hours of basic trainee classroom education before their renewal date. These classes are different from the continuing education classes required for electrician certificate renewal. You can find approved trainee classes on the ***Basic Classroom Instruction*** page of our website. Do not wait until the last minute. Until the roster is completed, the class is not complete. You may not perform electrical work after your renewal date if you have not been given credit for the required classroom training and renewed your certificate.

Public Hearing for Comments on Proposed Electrical Rules

The Department will hold a public hearing to receive comments about proposed rule changes to chapter 296-46B WAC. The hearing will be held at 9 a.m. on Monday, December 10, 2012, at the ***L&I building***, 7273 Linderson Way SW, Room S119, Tumwater, WA. For more information, visit the ***Rule Development*** page of our website.

Requirements For Contractor Installing Service Laterals/Drops For Developers Or Utilities

RCW 19.28.091(1) provides for exemption from the permitting, inspection, licensing, and certification requirements for service lateral installations, owned and controlled by the electrical utility, if the entity doing the work is employed by the utility. The firm/contractor and utility must have a contract in place (not implied) prior to performing the installation. Inspectors are finding general contractors installing service risers in violation of the Electrical Law.

A utility may establish ownership using a formal contract with a subcontractor. Utilities usually establish control in the formalized design and installation requirements published by the utility. If the agreement between the utility and the developer is in place prior to beginning the work, the developer and/or the developer's sub-contractor may install the service lateral without having an electrical contractor's license, certified electricians, or electrical permit. The utility work must be ahead of the utility's service point and the work restricted to utility distribution system.

Even if the lateral is exempt, the riser portion of all underground conduit runs attached to any structure must either be installed by the owner (as allowed in the owner exemption) or a licensed electrical contractor. The electrical utility never owns or controls conduit risers in the concrete footing or installed on the outside of a building.

Some general contractors may not be aware of these requirements. It is the responsibility of each installer to determine if they are working in an exempt situation. Until February 1, 2013, if a general contractor is found to be illegally installing a riser or service lateral conduit, the department will issue a warning for first offenses. The department will issue citations for repeat offenses and for all violations after February 1. See the April 2004 and March 2006 *Electrical Currents*, for more information.

Ugly Installations

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Violations: Too many corrections to list. The inspector should write only one correction for WAC 296-46B-906(7)(b) - Trip fee for requesting inspection when not ready for inspection.

Answer to Question of the Month: Four - WAC 296-46B-358(2) now requires an equipment grounding conductor in all EMT installed in wet locations.

Washington State Department of Labor & Industries

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Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 12** **December 2012**

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Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 11** **November 2012**

Question of the Month

All metal piping systems and all grounded metal parts in contact with the circulating water in a hydromassage bathtub must be bonded together using a solid copper bonding jumper, insulated, covered, or bare, not smaller than 8 AWG. Question: If the water piping serving the hydromassage bathtub is non-metallic, is the bonding jumper required to extend to another area? (e.g., other metal water piping, the panel serving the tub, a grounding electrode, etc.) - See correct answer on Page 2.

Safety Tip of the Month!

In the coming months, be prepared for deteriorating driving conditions. Rain, fog, ice, and snow are on the way. Slow down and increase your following distance to help compensate for decreased traction and visibility. Make sure your windshield wipers work well and wiper fluid is full. To help prepare for winter driving, see the ***Winter Travel*** page on the WA State Department of Transportation website.

Note From The Chief

The winter season has arrived. Wind, flooding, snow and ice will occur. Be prepared for these problems and the likelihood of short and long-term power outages. We have published several Electrical Currents articles to help you prepare for the winter season. Each year, we receive many questions about storm damage such as; how do I wire my generator? Learn what repairs you must make when ***floods and other natural disasters*** damage your wiring.

Improper generator installations and flood damaged wiring pose some of the most significant risks to your family and property. Before the flood or wind damage, search the entire ***Electrical Currents Newsletter*** by downloading all editions since January 2009 or the editions from 1998 through 2008. Then use the search function and search for flood or generator.

Do not be sorry, be SAFE!

Stakeholder Meetings

Remember to attend a stakeholder meeting to receive the latest information about the Electrical Program and for a chance to provide feedback to the Department. You can attend a meeting in Tukwila, Wenatchee, Yakima, Mount Vernon, and Everett during November and in Kennewick, Pullman, Spokane, and Moses Lake during December. You can find a list of meeting locations in the ***September 2012*** *Electrical* Currents or by visiting the ***Electrical Calendar*** page on our website.

Generator Backfeed Near-Miss

Last month, a Potelco line crew working in Pierce County experienced a dangerous near-miss. A backfeed from a customer's temporary generator had energized the utility's wiring. Luckily, the crew discovered that power was present and was not injured.

A similar situation occurred in Yakima a few years ago when a new service panel was energized during construction by a temporary generator. While working on the utility system, a meter technician was injured. The service conductors were energized by backfed power from an improperly installed generator.

With the coming storm season, anyone doing electrical work needs to be aware of the potential for a circuit that is de-energized to suddenly become energized. Always verify that a circuit is isolated from it's source of supply and from any potential sources of backfeed before working on it.

Installing a generator system is potentially one of the most dangerous types of electrical installations to your family, employees, and the utility's line workers. Legally and safely installing a generator system is very specialized work that

requires expertise and experience. Prior to making a generator system purchase or installing a generator system, review the special edition *Electrical Currents* – ***October 2007***. All the information in the article is still relevant and accurate.

L&I strongly encourages anyone interested in having a generator system installed at their home or business to work with a properly licensed electrical contractor. Before beginning the work, get written bids from two or three electrical contractors and verify that each has significant experience installing generator systems. Ask for references. Then make certain your contractor gets an electrical permit and has an inspection to verify that the work was done correctly and safely.

GFCI and AFCI Requirements

We are re-visiting the subject of an article published in the ***March 2006*** *Electrical Currents.*

NEC 210.8 contains the requirements for GFCI protection for personnel. Studio apartment receptacles must comply with 210.8(A). There are no exceptions to the bathroom GFCI requirement. For example, if a washing machine is located in the bathroom, the required laundry receptacle must be GFCI protected. Receptacles installed to serve the countertop surfaces in kitchens and receptacles that are within six feet of the outside edge of laundry, utility, and wet bar sinks must also be GFCI protected.

WAC 296-46B-210(4) requires AFCI protection only in dwelling unit bedroom spaces. The dictionary defines bedroom as *"a room intended for sleeping."* In a studio apartment, the living area and sleeping area is one room. AFCI protection is required for all 120-volt, single phase, 15- and 20-ampere outlets in the studio's living area because there is only one room and it includes the sleeping area (i.e., bedroom). AFCI protection is required for outlet circuits in any other area that shares the studio's bedroom area (e.g. kitchen, dining area, etc.). See NEC 100 for definition of outlet) circuits in the shared living/bedroom.

Neither the NEC nor the WAC prohibits installing AFCI protection on other circuits, in locations other than bedrooms, or on circuits having GFCI protection.

More Payment Options Are Now Available

The department now accepts Visa, Mastercard, Discover, and American Express both online and in field service locations.

Permitting Concerns

The department's recent upgrade of the online electrical permitting system resulted in some online purchased electrical permits not being completely saved into the permitting system. Working with our customers, L&I staff has recreated these permits. If you experience problems with the permitting system, contact Phyllis Cooper at 360-902-5293 or Kellie Carlson 360-902-5223 for assistance.

Ugly Installations

Online readers - click on the picture to open a larger image in another window.
Violations: NEC 110.3(B) - Improper use of conduit sealing fitting. (This circuit does not serve a hazardous location)

Answer to Question of the Month: Not unless the manufacturer's installation instructions require it. According to NEC 680.74, the bonding jumper is required for equipotential bonding in the area of the hydromassage bathtub. The NEC does not require it to be extended or attached to any remote panelboard, service equipment, or any electrode.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 10** **October 2012**

Question of the Month

Why did Mr. Ohm marry Mrs. Ohm? - *See correct answer on Page 2.*

Safety Tip of the Month!

Are you sure that circuit you are about to touch is dead? Do not trust your life to a switch or circuit breaker that is marked off. Always verify the circuit is off by using a tester. Test your tester on a known live circuit, then test the circuit you are working on to make sure it is really off before locking it out and touching it.

Note From The Chief

The department is nearing the public comment phase of WAC rule making. The 30-day window for written comments will begin sometime in October. The public hearing will be in November. The exact dates for both are yet to be set; but, if you are a member of the Electrical Program's automatic email notification system, we will send you a notification, including the exact dates. You may join the ***Email Notification System*** by selecting *Join Email List* on the ***Electrical*** page on our website.

The Technical Advisory Committee and the Electrical Board have reviewed the changes and both groups were in support of moving forward with the proposal. Use the public comment period and hearing to provide your feedback on the proposal – supportive or unsupportive.

You may find a draft version of the proposed changes on the ***Rule Development*** page on our website.

Remember to attend a stakeholder meeting to receive the latest information on the Electrical Program and for a chance to provide feedback to the Department. You can find a list of meeting locations in the ***September 2012 Electrical Currents*** or by visiting the ***Electrical Calendar*** page on our website.

No Inspections on October 30 - 31

On October 30 – 31, all of the electrical inspectors will be in required training. No electrical inspections will be performed for these two days. Be sure to plan ahead and notify your customers to help minimize delays in their job schedules.

Electric Vehicle Supply Equipment Load Calculations

NEC 625.14 requires that Electric Vehicle Supply Equipment (EVSE) must have sufficient rating to supply the load served and considers electric vehicle charging loads as continuous loads. The NEC requires continuous loads to be calculated at 125% of the nameplate rating of the EVSE when determining service and feeder size. The addition of an EVSE load to an existing electrical service may result in the overload of the premises wiring system based on NEC calculations.

Many EVSE systems incorporate "smart" technology or load management systems, which will sequence the load(s) based on actual vehicle charging demand. These systems limit the total load applied to the premises wiring system.

Code Making Panel 12 processed a tentative interim amendment, ***TIA 11-3***, which became effective in November of 2011. The amendment added another sentence to NEC 625.14. It states, *"Where an automatic load management system is used, the maximum electric vehicle supply equipment load on a service or feeder shall be the maximum load permitted by the automatic load management system."* The department will allow this method for calculating EVSE loads.

When performing an installation or inspection of EVSE, consult the manufacturer's instructions and the equipment nameplate to determine if the equipment has an automatic load management system. If it does, you may calculate the feeder or service load using the maximum load permitted by the load management system.

Replacement of Alarm And Security Devices Requires a Permit

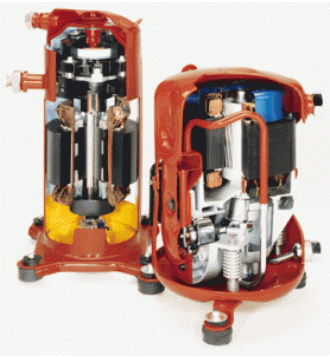
WAC 296-46B-901(8)(b)(i) contains the Class A basic electrical work list which is exempt from permits and inspections. It includes the like-in-kind replacement of a: *"Contactor, relay, timer, starter, circuit board, or similar control component; household appliance; circuit breaker; fuse; residential luminaire; lamp; snap switch; dimmer; receptacle outlet; thermostat;*

heating element; luminaire ballast with an exact same ballast; component(s) of electric signs, outline lighting, skeleton neon tubing when replaced on-site by an appropriate electrical contractor and when the sign, outline lighting or skeleton neon tubing electrical system is not modified; ten horsepower or smaller motor;…

…Unless specifically noted, the exemptions listed do not include: The replacement of an equipment unit, assembly, or enclosure that contains an exempted component or combination of components (e.g., an electrical furnace/heat pump, industrial milling machine, etc.) or any appliance/equipment described in this section for Class B permits."

The term "similar control component" has caused some confusion. The Class A list of permit exempt items does not include devices like fire/smoke and burglar alarm detection and signaling devices, nurse call stations, security cameras, etc. These items are not exempt from permit requirements.

Air Conditioner/Heat Pump Compressor Replacement – Permit Required?



Occasionally, installers ask if a permit and inspection is required to replace an air conditioner or heat pump compressor. You can find requirements for electrical permits in ***WAC 296-46B-901***. Paragraph (8)(b)(i) contains the list of "Class A basic electrical work" that is exempt from permit requirements. The like-in-kind replacement of a 10 horsepower or smaller motor is on the list and no permit is required for this work.

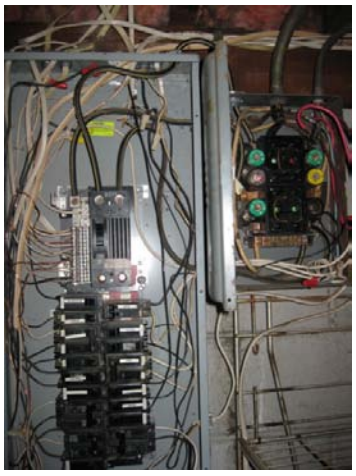
Hermetic refrigerant motor-compressors are considered motors for the purpose of permit requirements. They are not marked with horsepower ratings, so you must determine what the equivalent horsepower of the motor is. NEC 440.12(A)(2) gives the method for determining equivalent horsepower for sizing the disconnecting means, and you may use this method to determine if a permit is required. You must select the horsepower rating from Tables 430.248, 430.249, or 430.250 corresponding to the rated-load current or branch-circuit selection current, whichever is greater; or Table 430.251(A) or (B) corresponding to the locked-rotor current. For currents that do not correspond to those shown in the table, you must select the next higher horsepower rating.

Electrical Licensing/Certification Requirements - Working On or Near Exposed Energized Parts

An article appeared in the ***January 2004*** *Electrical Currents* entitled "*Who May Remove Electrical Wiring and Equipment?*" The article stated, "*Un-trained workers are typically unaware of the potential electrical hazards they often leave behind when disconnecting or abandoning electrical wiring and equipment. Until a licensed electrical contractor properly disconnects and properly terminates circuits being abandoned or demolished, all work on the electrical circuit(s) is considered electrical maintenance and appropriate licenses and certificates are required from anyone working on the circuit(s)…Non-electrical contractors or individuals are not allowed to perform any type of work inside energized electrical enclosures (e.g. panels, switches, junction boxes, etc.)*".

The passive testing of electrical systems and equipment as described in the ***April 2010*** *Electrical Currents* newsletter is not considered electrical work for the purposes of electrical licensing and certification of workers. Workers without electrical certification may perform passive testing on energized or potentially energized electrical systems.

Even though electrical licensing/certification may not be required for passive testing, employers and employees must comply with the requirements of ***Chapter 296-45 WAC: Safety standards for electrical workers***. Persons working on or near exposed energized parts operating at 50 volts or more must be "qualified employees" in accordance with ***WAC 296-45-325*** Safety Standards for Electrical Workers. A qualified person or employee, as defined in ***WAC 296-45-035: Definitions***, and NEC 100 is a person who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.



Ugly Installations

Online readers - click on the picture to open a larger image in another window.
Violations: NEC 110.12, 110.14, 110.26(A) 200.6, 200.7, 240.4, 250.24(A)(5), 250.110, 300.3(A), 300.12 300.20, 312.5(C), 334.15, 334.30, 408.41 (There are probably others)

Answer to Question of the Month: Because he could not resistor. ☺

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Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 9** **September 2012**

Question of the Month

You are installing three 4 AWG THHN conductors in 1 inch EMT conduit on the roof of a building in Yakima with 1 ½ inches between the roof and the bottom of the conduit. What is the ampacity of the conductors after adjustment for ambient temperature and exposure to rooftop sunlight?

Note From The Chief

We will be beginning our Fall stakeholder meetings across the state this month. Check your schedule and do your best to attend a meeting in your area. It is important for you to stay up to date with changes that might affect you.

Meetings will be held from 6 to 8 p.m. in the locations listed below. Meeting dates and addresses will also be posted on the Electrical Program website and distributed on the program email list. If you are not on the email list, you may join by going to this link: ***http://www.lni.wa.gov/Main/Listservs/Electrical.asp***.

These meetings have proven to be an important tool in communicating with the electrical industry, and offer an opportunity for our customers to ask questions directly to the Electrical Program and get instant feedback. We encourage all our customers to stay involved and attend these important annual meetings.

Safety Tip of the Month!

Listen to your breaker! A circuit breaker that trips immediately after it is reset is telling you that there is an electrical problem. Sure, sometimes the breaker itself is to blame, and in some cases there may just be too large an electrical load operating on that circuit. But it is more likely that the breaker is tripping because there is a severe electrical problem. Keep resetting that breaker, and you are likely to cause a fire.

Fall 2012 Stakeholder Meetings	
September 25 – Tumwater – L&I Auditorium 7273 Linderson Way SW	**November 5 – Wenatchee** – Chelan County PUD Auditorium 327 N Wenatchee Avenue – Parking in back (east) side of building
September 26 – Aberdeen – L&I Building 415 W Wishkah Street Suite B	**November 6 – Yakima** – Pacific Power Auditorium 500 Keys Road
October 2 – Tacoma – L&I Building 950 Broadway, Orcas Room, 5th floor	**November 27 – Mount Vernon (5-8 p.m.)** – Padilla Bay Interpretive Center, 10441 Bay View-Edison Rd
October 3 – Port Angeles – Elwha Klallam Heritage Center 401 E First Street	**November 28 – Everett** – Snohomish County PUD Auditorium, 2320 California Street
October 4 – Bremerton – L&I Building basement 500 Pacific Avenue	**December 3 – Kennewick** – Benton PUD Auditorium 2721 W 10th Avenue
October 16 – Kelso – L&I Building 711 Vine Street	**December 4 – Pullman** – Gladish Community and Cultural Center, 115 NW State Street
October 17 – Vancouver – L&I Building 312 SE Stonemill Drive	**December 5 – Spokane** – Spokane Community College *Campus Map: 1810 N Greene St – Lair Bldg – Sasquatch Room*
October 18 – White Salmon – White Salmon Valley Community Library – 77 NE Wauna Avenue	**December 6 – Moses Lake** – L&I Building 3001 W Broadway Avenue
November 5 – Tukwila – L&I Building 12806 Gateway Dr S	

Ambient Temperature Adjustment for Conductors in Rooftop Conduits

The interior of conduits exposed to direct sunlight, such as those containing conductors supplying air conditioning units on rooftops, become significantly hotter than the outside air (which is always measured in the shade).

NEC 310.15(B)(2)(c) states: *Where conductors or cables are installed in conduits exposed to direct sunlight on or above rooftops, the adjustments shown in Table 310.15(B)(2)(c) shall be added to the outdoor temperature to determine the applicable ambient temperature for application of the correction factors in Table 310.16 and Table 310.18.*

One source for the average ambient temperatures in various locations is the ASHRAE Handbook of Fundamentals. The table to the right is an excerpt from a ***Publication*** printed with permission of the ***Copper Development Association Inc.*** and gives outdoor temperatures inside rooftop conduits for selected locations in Washington. The 2% design temperature is the appropriate temperature average to be used for determining outdoor ambient temperature. The footnotes at the back of the publication explain how the temperatures are determined.

Table 310.15(B)(2)(c) gives the temperature adder for conduits exposed to sunlight on or above rooftops. The closer the conduits are installed to the rooftop, the higher the temperature adder that must be applied.

Table 310.15(B)(2)(c)				
Distance above roof to bottom of conduit	0 – ½"	> ½" – 3 ½"	> 3 ½" – 12"	> 12"
Temperature adder °F	60°	40°	30°	25°

		2% Design Temp.	Temperature inside conduit in direct sunlight				Max Temp.
			Distance above roof. Up to:				
			1/2"	3½"	12"	36"	
WA	**Washington**						
WA	ARLINGTON MUNI	81	141	121	111	106	99
WA	BELLINGHAM INTL AP	78	138	118	108	103	95
WA	BREMERTON NTNL AWOS	84	144	124	114	109	102
WA	DESTRUCTION ISLAND	63	123	103	93	88	80
WA	FAIRCHILD AFB	90	150	130	120	115	106
WA	FELTS FLD SPOKANE+D935	93	153	133	123	118	107
WA	FRIDAY HARBOR	77	137	117	107	102	98
WA	GRAY AAF	84	144	124	114	109	103
WA	HANFORD	99	159	139	129	124	114
WA	HOQUIAM AP	73	133	113	103	98	95
WA	KELSO WB AP	85	145	125	115	110	107
WA	OLYMPIA	85	145	125	115	110	104
WA	OMAK	96	156	136	126	121	109
WA	PASCO	97	157	137	127	122	118
WA	PEARSON FLD	89	149	129	119	114	108
WA	PULLMAN/MOSCOW RGNL	90	150	130	120	115	105
WA	QUILLAYUTE	77	137	117	107	102	100
WA	SEATTLE BOEING FIELD	84	144	124	114	109	101
WA	SEATTLE/TACOMA	83	143	123	113	108	102
WA	SPOKANE	91	151	131	121	116	105
WA	STAMPEDE PASS	77	137	117	107	102	98
WA	TACOMA MCCHORD AFB	84	144	124	114	109	101
WA	TACOME NARROWS	82	142	122	112	107	105
WA	TATOOSH ISLAND	62	122	102	92	87	79
WA	WALLA WALLA	96	156	136	126	121	114
WA	WENATCHEE/PANGBORN	94	154	134	124	119	107
WA	WEST POINT (LS)	69	129	109	99	94	82
WA	WHIDBEY ISLAND NAS	71	131	111	101	96	88
WA	WILLIAM R FAIRCHILD	77	137	117	107	102	100
WA	YAKIMA	94	154	134	124	119	108

Once the total ambient temperature is determined, you must adjust the ampacity of the conductor. Remember that NEC 110.14(C) allows the use of the full temperature rating of the conductor for ampacity adjustment, correction, or both, as long as the temperature rating of the termination is not exceeded. Multiply the ampacity of the conductor taken from table 310.16 or 310.18 by correction factor found in the lower portion of the ampacity table.

Example: What is the ampacity of three 2 AWG THHN copper conductors in conduit 3 ½ inches above a rooftop in Olympia?

Olympia 2% design temperature = 85°; Table 310.15(B)(2)(c) adder for 3 ½ inches above rooftop = 40°; Total ambient temperature = 125°; 2 AWG (90° temperature rating) ampacity = 130 amperes; Table 310.16 correction factor for 125° ambient temperature =.76; 130 amperes X .76 = 98.8 amperes adjusted ampacity.

After the ambient temperature correction factor has been applied, an additional adjustment factor may be required in accordance with NEC 310.15(B)(2)(a) if more than three current-carrying conductors are installed in the raceway.

Ugly Installations

If viewing this document online, you may click on the picture to open a larger image in another window.

Violations: NEC 250.52(A)(5) Ground rods shall not be less than 8 ft. in length; WAC 296-46B-990 Serious non-compliance (Installing a shortened rod/pipe grounding electrode). Possible suspension or revocation of license/certificate of installer may result.

Answer to Question of the Month: ASHRAE 2% design temperature for Yakima = 94°; Table 310.15(B)(2)(c) adder for 1 ½" above rooftop = 40°; Total ambient temperature = 134°; 4 AWG (90° temperature rating) ampacity = 95 amperes; Table 310.16 correction factor (134° ambient temperature) = .71;
95 amperes X .71 = 67 amperes adjusted ampacity.

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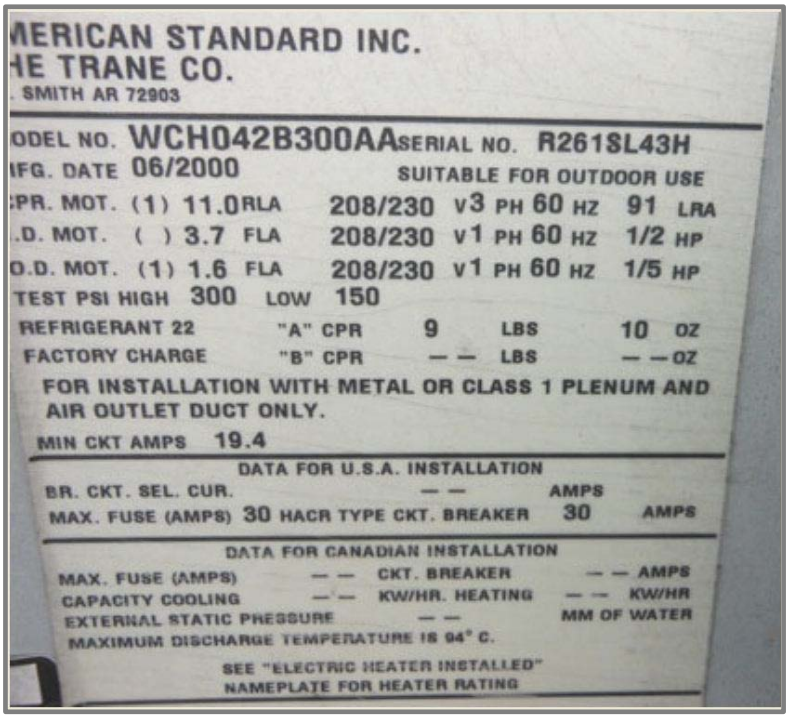
Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 8** **August 2012**



Safety Tip of the Month!

Do not allow a game of hide-n-seek to become deadly. CPSC has received reports of numerous suffocation deaths involving children who crawled inside old cedar chests, latch-type freezers and refrigerators, iceboxes in campers, clothes dryers and picnic coolers. Childproof old appliances, warn children not to play inside them.

Question of the Month

You are installing branch circuit conductors in liquidtight flexible metal conduit between a non-fusible disconnect and an HVAC unit with the nameplate shown in the image to the left. There is no auxiliary electric heat installed. A 30-ampere circuit breaker protects the circuit. What are the minimum size THHN copper conductors you must use for this installation?

Note From The Chief

It continues to be very important that you communicate essential requirements with our inspection staff when planning your inspections. RCW 19.28.101(4) requires electrical wiring and equipment to be accessible for inspection. This includes access to ceiling spaces and elevated areas inside buildings. The permit holder must provide a means of accessing all electrical equipment for inspection.

Providing access may require the permit holder to supply the inspector with a bucket or ladder truck, scaffolding, ladder, or other equipment. Avoid unnecessary additional inspection trips and trip fees by making prior arrangements with the electrical inspector to provide access to conduct these inspections. If you need us to contact your customer prior to going to the inspection, let us know in advance, preferably by sending a comment in your online inspection request.

Your best method to communicate access arrangements or other special needs to the inspector is to use the comments section when making your online inspection request. The department's inspectors will make every possible effort to accommodate your request to be there when the access equipment is in place and safe. Inspectors have appropriate personal protective equipment (PPE) and training to identify potential exposure to hazards and know when it is safe to utilize the contractor's safety system.

Renew Online – Don't Waste Your Money and Time

The Electrical Program has made online licensing renewals available for several years. Renewing online saves you and the program time and money. Almost 60% of all electrical contractors, administrators, electricians, and trainees renew online.

Our online renewal process takes only a few minutes. The department will process your renewal immediately if it is complete (i.e. education classes completed and fees paid by valid credit card).

If you complete the renewal online by 6 p.m. on Tuesday, the department's mailing contractor will mail your new certificate on Friday.

Online renewal will save you:

• Electrical Contractor - $36	• Master Electrician/Electrical Administrator - $20
• Electrician - $10.40	• Trainee - $6.50

Do not wait until the last minute, you can renew up to 90 days before your expiration date. RCW 19.28.161 and 271 require you to have a valid electrician certificate in your possession while working in the trade.

Save everyone, including you, time and money by joining thousands of others successfully using our online renewal system at: http://www.lni.wa.gov/TradesLicensing/LicensingReq/Legal.asp

HVAC Equipment Nameplates

NEC 424.28 and 440.4 give the requirements for marking of Fixed Electric Space-Heating Equipment and Air-Conditioning and Refrigerating Equipment. Nameplates must be located so they are visible or easily accessible after the installation is complete. The nameplate contains vital information that the electrician installing the branch circuit must have to select the proper wire size and overcurrent protection for the unit. Inspectors refer to the nameplate when performing their inspection of the installation.

The installer must accurately complete the optional heating package label provided with most electric furnaces. The person installing the auxiliary heater must mark the label showing the ratings of the installed package. Sometimes a supplementary label showing the ratings is included in the box with the heating package that the installer must affix to the furnace.

Failure to complete the equipment nameplate information will result in electrical corrections to the contractor who installed the auxiliary heater package for not meeting the marking requirements of NEC 424.28 or 440.4 and for not following the equipment manufacturer's instructions, NEC 110.3(B). The inspector may issue other corrections if the electrical installer uses inappropriately sized and protected wiring.

The person installing the furnace equipment is responsible for marking the label accurately. However, the electrician connecting power to the furnace has the responsibility to ensure the branch circuit conductor size and overcurrent protection meets the code and the manufacturer's requirements for the unit. The inspector may not be able to verify your installation is correct if the label is not posted and complete.

Avoid delaying your jobs by completely and accurately supplying the information required on the nameplate. Electricians should only connect wiring to equipment that has a completed and accurate nameplate installed.

Ugly Installations

If viewing this document online, you may click on the picture to open a larger image in another window.

Major violations: NEC 110.3(B) - Lugs not listed for terminating multiple small conductors; NEC 240.4 - Improper overcurrent protection of conductors; NEC 300.3(B) – If cable is used, all conductors of the same circuit shall be contained within the same cable.

Answer to Question of the Month: 14 AWG - NEC 440.35; Table 310.16; Nameplate minimum circuit ampacity – 19.4

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Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 7** **July 2012**

Question of the Month

You have calculated the load for a feeder at 733,200 volt-amps, of which 388,800 is continuous load. What is the minimum ampacity for the 480V 3-phase feeder conductors to supply this load?

Note From The Chief

During this past year, we have improved our service in several areas. We responded to 93% of inspection requests within 48 hours and reduced our plan review turnaround time from 3.6 to 2.0 weeks. Our Correction Reduction Initiative – consisting of over 700 electrical contractors – has seen contractors reduce their number of corrections per inspection by 19% from the previous year.

Safety Tip of the Month!

Major appliances (refrigerators, dryers, washers, stoves, air conditioners, etc.) and space heaters should be plugged directly into a wall receptacle outlet. Extension cords and plug strips should not be used. Here is a good ***Video*** on the subject.

During this past year, compared to Fiscal Year 2011, the department's electrical inspectors, auditors, and E-Core team issued 754 more citations – 4,136 – for violations identified by our stakeholders as representing the underground economy – no electrical contractor license (1,204), no electrician certificate (1,133), and no permit (1,799). This represents an increase of 22% more than issued in FY 11. Focusing our compliance efforts helps better address our customers' expectations regarding compliance enforcement in the underground economy, helping maintain a level competitive playing field for legitimate electrical contractors, and keeping Washington's electrical installations safe.

Our focus, during the next year, will remain on these items. We expect to continue to improve our service to the electrical industry.

José Manjares has joined our ECORE team and will be working from our Yakima office. He will primarily cover the area from Oregon to Canada through central Washington. If you would like to join us in the battle against the underground economy, you can make a big difference by watching for and reporting illegal electrical activity. Stay competitive; you may report violators at ***Report Electrical Law Violations***, by contacting a ***Local L&I Office***, or the ECORE team:

- Central Washington, José Manjares - Jose.Manjares@lni.wa.gov 509-454-3769 (office) or 509-263-3583 (cell)
- Puget Sound, Jack Oxford - Jack.Oxford@lni.wa.gov 206-835-1130 (office) or 360-471-0796 (cell)
- NW Washington, Rand Jones - Rand.Jones@lni.wa.gov 206-515-2773 (office) or 360-561-0440 (cell)
- SW Washington, Bob Matson - Bob.Matson@lni.wa.gov 360-902-4987 (office) or 360-471-0588 (cell)
- Eastern Washington, Phil Jordan - Phillip.Jordan@lni.wa.gov 509-324-2542 (office) or 360-471-0691 (cell)

Electrical Plan Review Fee Procedure Changes July 1

As of July 1, 2012, all fees for plan review submittal, handling/shipping, and 35% of the estimated electrical permit fee for the project are required to be paid at the time the plans are submitted for review.

The department will verify the correct permit fee during the plan review process. If the permit fee used to calculate the 35% was incorrect and/or if the review required excessive time to complete, the department will bill the submitter for the balance due when the review is completed. The department will return all plans to the submitter when the review is completed. The department will return the plans along with a billing statement if the plans are received without the initial payment. If you have any questions about the plan review process, please direct them to Electrical Plan Review at 360-902-5246. Information is also available on the ***Electrical Plan Review*** page of our website.

Grounding Permanently Installed Generators – Part 2 (Nonseparately Derived Systems)

A generator having a solidly connected grounded conductor (not switched) in the transfer switch is not a separately derived system. See NEC 250.20(D), FPN No. 1. Nonseparately derived systems do not require a separate grounding electrode.

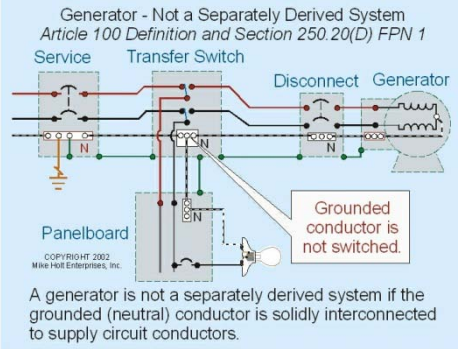

Image provided courtesy of Mike Holt Enterprises www.Mikeholt.com

NEC 250.35(B) contains the requirements for providing an effective ground-fault current path between the generator and the first disconnecting means. Normally, the first disconnecting means will be factory installed on the generator frame. An equipment bonding jumper between the generator and the first disconnect will be installed as part of the listed generator assembly by the manufacturer.

If the first disconnecting means is not part of the listed generator assembly, an equipment bonding jumper must be installed. The bonding jumper size will depend upon the location of the generator overcurrent device:

- NEC 250.35(B)(1) - The bonding jumper installed on the supply side of the overcurrent device must be sized in accordance with 250.102(C) based upon the size of the generator conductors.
- NEC 250.35(B)(2) - The bonding jumper installed on the load side of the overcurrent device must be sized in accordance with 250.102(D) based upon the rating of the overcurrent device.

You must install an equipment grounding conductor between the generator disconnect and the transfer switch enclosure. The equipment grounding conductor must run with the feeder conductors and:

- May be any of the types listed in NEC 250.118; and
- Must be sized in accordance with NEC 250.122 based upon the size of the overcurrent device protecting the generator feeder conductors.

A sign must be placed at the service location. This sign will indicate the type and location of the standby power source. An additional sign is required at the meter base if the service disconnect(s) and the meter base are not within sight and within 5 ft. of each other in accordance with ***WAC 296-46B-700***, ***701***, and ***702***.

In addition, NEC 700.8(B), 701.9(B), and 702.8(B) require that if the grounded conductor connection to the grounding electrode conductor is remote from the alternate power source, a sign must be located at the grounding location identifying all alternate power sources connected at that location. Signs must be an "identification plate" in accordance with ***WAC 296-46B-100***.

Ugly Installations

If viewing this document online, you may click on the picture to open a larger image in another window.

Violations: Too many corrections to list. The inspector should write only one correction for WAC 296-46B-906(7)(b) - Trip fee for requesting inspection when not ready. See *Note from the Chief* in the ***March 2011*** *Electrical Currents* newsletter. The installer is subject to citation and possible suspension or revocation of license/certification per ***WAC 296-46B-990*** and the inspector will begin the process for ordering a power disconnection.

Answer to Question of the Month:

NEC 215.2(A)(1): Total load = noncontinuous load + 125% of continuous load. (733,200 – 388,800) + (388,800 X 1.25) = 830,400 volt-amps; 3 phase current = volt-amps ÷ (V X √3); 830,400 ÷ (480 X 1.73) = 1000 amperes.

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Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 6** **June 2012**

Question of the Month

A pad mount oil-filled transformer installed outdoors must maintain a minimum clearance of ___ feet from any portion of a building with a combustible surface.

Safety Tip of the Month!

Pay attention to the road! A new report from the National Safety Council reveals that cell phone use while driving, whether handheld or hands-free, contributes to more than 1 million crashes a year. Do not become a statistic. Drive defensively and be alert for distracted drivers around you. Distracted driving is dangerous.

Note From The Chief

In May, many individuals and groups within L&I were recognized for their accomplishments in public service. I would like to recognize a special group within the Electrical Program for their ongoing commitment and expertise in helping our electrical customers.

The ECORE (Electrical Compliance, Outreach, Regulation and Education) team has been working throughout our state since 2005. Their efforts in combating the negative effects of the underground economy are unparalleled. Each year, they have become more effective. They provide training to contractors and inspectors. They communicate our mission and goals to customers across the state. They take compliance action when they find violations of the electrical law.

In the first ten months of this fiscal year, the ECORE team has exceeded their goal of focused citations and warnings by 25%. Even with the significant time they have spent training contractors and inspectors and doing customer outreach, the ECORE team has issued 642 violations to unlicensed electrical contractors, 604 violations to uncertified electricians, and 267 for no electrical permit since July 1, 2011.

We must applaud the team's diligence in uncovering the people working in the underground economy. I personally thank Phil Jordan, Jack Oxford, Bob Matson, Rand Jones, and Faith Jeffrey for their tireless efforts in helping make Washington safe.

WAC Revision Update

During the month of May, the Department accepted proposals for revision of WAC 296-46B. You will be able to view all of the proposals received on the ***Rule Development*** page of our website during the first week of June.

Underground Wet Locations

NEC 300.5(B) says the interior of enclosures or raceways installed underground is a wet location. Wet location listing and compliance with NEC 310.8(C) is required for all conductors and cables and for all splices or connectors in underground installations.

NEC Article 100 defines Wet Location (i.e. Location, Wet) as *"Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather*." All installations underground or in concrete slabs or masonry in direct contact with the earth are wet locations regardless of whether they are subject to saturation or in a protected location. An installation in or under an interior building concrete slab in contact with the earth is always a wet location even if a vapor barrier is installed between the slab and the earth.

Optional Standby System Feeder Conductors and Table 310.15(B)(6)

The capacity of an optional standby system must be determined in accordance with NEC 702.5. You must calculate the load on the standby source in accordance with Article 220 or by another approved method. If manual transfer equipment is used, the system must have adequate capacity and rating to supply all equipment intended for operation at one time. If automatic transfer equipment is used, the system must be capable of supplying the full load that is transferred, or it must be equipped with automatic load management equipment. The feeder conductor size must be determined in accordance with NEC 225.5. You must calculate the load on the optional standby system's feeder conductors in accordance with Article 220 for all the loads on the feeder. The ampacity of the optional standby system's feeder conductors must be in accordance with NEC 310.15.

The feeder size reductions allowed in NEC 310.15(B)(6) only apply when the optional standby system's feeder supplies all the loads for an individual dwelling unit of one-, two, and multifamily dwellings. To qualify for this reduction, the optional standby system's feeder must supply all loads in the dwelling unit. Feeder conductors that supply a portion of the loads, a sub-panel, or an outbuilding, must be sized in accordance with NEC 310.15 for their full ampacity because load diversity is not available and the conductors may be loaded to their maximum capacity.

Grounding Permanently Installed Generators – Part 1 (Separately Derived Systems)

NEC 250.35 specifies the grounding requirements for permanently installed generators. The first step is to determine whether your system is separately derived. If the grounded conductor is switched in the transfer switch, the generator is a separately derived system. This type of system must be grounded much the same as a typical transformer in accordance with NEC 250.30.

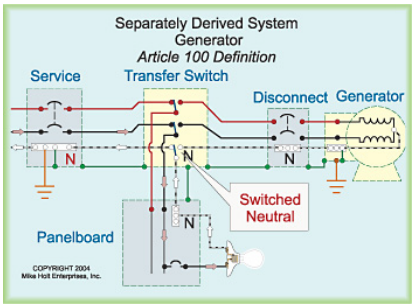


Image provided courtesy of Mike Holt Enterprises www.Mikeholt.com

A system bonding jumper must be installed to connect the grounded conductor of the generator to the equipment grounding conductors of the separately derived system. This connection must be made at any single point on the separately derived system from the source to the first system disconnecting means. A grounding electrode conductor, sized per NEC 250.66 for the derived phase conductors, must be connected to the same point on the system where the system bonding jumper is connected. The grounding electrode must be installed as near as possible to the point on the system where the grounding electrode conductor connects to the system. In most cases, this will be at the generator. NEC 250.58 requires that all of the grounding electrodes in or at a building or structure be bonded together to form a single grounding electrode system.

All structural steel and metal water piping shall be connected to the grounded conductor of a separately derived system in accordance with 250.104(D). This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected.

Permit Fee Information

Electrical permit fees have been the topic of many ***Electrical Currents Newsletter*** articles. The majority of permits are purchased online. Online purchasers are required to select the correct fees at the time of purchase, but they are frequently incorrect resulting in an adjustment by the inspector at the time of inspection. To aid in the proper selection of permit fees, an enhanced ***Electrical Fee Table With Notes*** is available online.

A series of articles addressing permit fees appeared in the *Electrical Currents* newsletter between May and November of 2010. Here is a list of those articles with links to access them online:

May 2010	Single/2-Family Residential New Construction
June 2010	Single/2-Family Residential Existing Structures And Systems And Multifamily Dwellings
July 2010	Mobile or Modular Homes and RV Parks or Sites
August 2010	Commercial And Industrial
September 2010	Temporary Services, Concert And Stage Productions, Irrigation Systems
October 2010	Miscellaneous - Low Voltage; Yard Pole, Pedestal, Meter Loops; Generators; Annual Permits; Ditches
November 2010	Miscellaneous – Trip Fees; Progress Inspections; Plan Review; Variance; Class B; Provisional

More Payment Options for Online Transactions

The department will be offering more ways for you to pay for your permits and licenses online. Soon we will be accepting Visa, Master Card, American Express, Discover credit cards and providing e-check as a method of payment. E-Check is a one-time charge to your checking account. This change is scheduled to be available sometime in late June or July.

Ugly Installations

If viewing this document online, you may click on the picture to open a larger image in another window.

Violations: NEC 300.3 - Single conductors to be in raceway; NEC 300.4 - Conductors subject to physical damage; NEC 250.110 – Equipment grounding conductor required for feeder.

Answer to Question of the Month: 8 Feet – WAC 296-46B-450

This document may contain hyperlinks to internet web pages. To access this PDF document online, go to:
http://www.ElectricalCurrents.lni.wa.gov

Electrical Section Internet Address: ***http://www.ElectricalProgram.Lni.wa.gov/***

This document is available in alternative formats to accommodate persons with disabilities. For assistance, call 1-800-547-8367. (TDD/TTY users, please call 360-902-5797.) Labor & Industries is an Equal Opportunity employer.

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 5** **May 2012**

Question of the Month

According to the 2011 NEC, a connector or terminal for a 1 AWG to 4/0 copper conductor with more than ___ strands shall be identified for the specific conductor class or classes.

Safety Tip of the Month!

Inspect power tools and electric lawn mowers for frayed power cords, broken plugs and cracked or broken housings. If the product is damaged, stop using it and have it repaired or replace it. All tools should be unplugged when not in use and stored in dry areas.

Note From The Chief

The annual summer construction season is rapidly approaching. Better weather will likely bring an increase in opportunity for everyone in the construction trades. This includes the underground economy and contractors who choose to not follow the law. We anticipate seeing even more attempts by the underground economy to do electrical work illegally in the State of Washington.

Our inspectors and the ECORE compliance team will continue to be vigilant in locating and taking compliance action with anyone who is not working legally. We will continue to focus on unlicensed electrical contractors, uncertified electricians, and anyone who does not get the required permits and inspections.

In the past 12 months, we took action on 822 unlicensed electrical contractors, 999 uncertified electricians, and 1,744 cases with no electrical permit. This is up 29% from the same period one year before (contractor licensing up 11%, electrician certification up 85%, no permit up 18%). It is critical that we continue to maintain our focus on these three underground economy issues to protect the safety of consumers and the livelihoods of legitimate electrical contractors and electricians.

Listing Requirements for Luminaire Poles

In September of 2011 an article was published in the *Electrical Currents* newsletter stating that beginning April 1, 2012, all lighting poles up to 100' in height would be required to be listed or field evaluated to UL standard 1598. Since UL standard 1598 does not apply to taller poles, this requirement will only apply to poles that do not exceed 12' in height measured from the bottom of the base, or from the intended grade level of poles when installed partially in the ground. You can find information on these products in the ***UL Online Certifications Directory***. UL category ***IFFX*** for Luminaire Fittings covers poles up to 12' in height. These poles are required to be listed or field evaluated by an accredited Electrical ***Product Testing Laboratory***.

Luminaire poles exceeding 12' in height are "Classified" by UL under UL product category ***IEUR*** for Luminaire Poles and not listed because evaluation is limited and does not include mechanical strength for luminaire support and wind load conditions.

All requirements for luminaires and their supporting means, including the requirements of NEC 410.30 will be enforced for all luminaire poles, metal and non-metallic.

WAC Rule Update

The department is accepting proposals for revision of WAC 296-46B and applications for membership on the Technical Advisory Committee (TAC) until May 31st. In March, we published a ***Special Edition*** *Electrical Currents* newsletter with details about the process, timeline, and instructions for submitting proposals and applications. If you have a proposal for WAC revision, it must meet the requirements of the Governor's rule moratorium. The special edition newsletter describes those requirements. Stakeholders must submit their proposals electronically using the form supplied by the department. The department will only accept proposals received between May 1st and May 31, 2012.

There is a change to the timeline published in the special edition newsletter. The TAC meeting will be held in Tukwila on June 27th. You can find further information on our website on the ***Rule Development*** page.

Notify the Department if You Will Not Be Finishing the Job

Sometimes, customers hire an electrical contractor to perform only a portion of the job (e.g. to only install the conduit, a panel with no branch circuits, or rough-in wiring). If you know this when the permit is purchased, provide a detailed description of the scope of work

on the permit indicating that you will not be performing all of the electrical work on the job. If, after purchasing the permit, you become aware that you will not be completing any portion of the job, you must notify the department so the department may add any appropriate notes to the permit; otherwise, the department may hold you responsible for all the work. According to ***WAC 296-46B-901(4)***, an electrical work permit is only valid for the work performed by the entity that purchased it. If you are not going to be completing the job, someone else will, and having an accurate description of the work scope on the permit will help to protect you from any liability arising from work for which you are not responsible.

According to ***WAC 296-46B-901(10)(a)***, requests for inspection must be made no later than three business days after completion of the installation or one business day after any part of the installation has been energized, whichever occurs first. You must request an inspection when you are completed even if there will be more work performed by others. The inspector will document the portion of the work performed on your permit and indicate that others will perform additional work.

You should inform the owner that an additional permit will be required of whoever completes the remaining work. The ***Home & Business Owner Basics*** page on our website provides information to owners about permitting and inspection requirements.

Online Renewal Will Save You Time and Money

Online renewal of Electrical licenses and certificates became available 10 years ago this month. In May of 2002, the department implemented this convenient tool for electrical contractors, electricians, trainees and administrators. The electrical licensing group won a Governor's award for improvements to streamline the electrical licensing and certification renewal process. These changes reduced the renewal backlog from 13 weeks to 3-5 days. Today, online renewals account for approximately 55 percent of all renewals.

If you renew your electrical contractor's license or electrician certificate online, you will save approximately 10 percent compared to the cost of renewing at the local L&I office or through the mail. The current proposed fee increase does not apply to online renewals, making the cost savings even greater. You will also save time and receive your new license or certificate faster by renewing online.

To renew your electrician or training certificate online, you must have completed all required CEU or Basic Classroom training. You may renew your electrical contractor's license or electrician certificate up to 90 days prior to the expiration date by going to the ***Contractor Licensing, Registration, and Certification*** web page. You may renew up to 90 days after the expiration date, but you will have to pay the late (double) renewal fee. If your electrical certificate renewal is more than 90 days late, you will need to apply for and pass the ***Electrical Certification Exam*** before renewing. You cannot renew if you have any unpaid citations with L&I or a collection agency. Currently, combination (electrical/plumbing) pumping industry licenses and certificates are not renewable online.

Proper Supervision of Trainees

Appropriately certified electricians must supervise trainees learning the electrical trade. The department receives many questions about what proper supervision consists of. ***RCW 19.28.161(3)*** contains a definition of proper supervision: *…Supervision shall consist of a person being on the same job site and under the control of either a certified master journeyman electrician, journeyman electrician, master specialty electrician working in that electrician's specialty, or specialty electrician working in that electrician's specialty*. When the electrical work is in the scope of the 03A, 06B, 07A, 07B, 07C, 07D, 07E, or 10 certification limits, the individual must be supervised 100% of the time until they get the minimum 720 or 1,000 hours of experience and pass their examination. Appropriately certified electricians must supervise trainees performing all other types of work on each jobsite for a minimum of 75% of the time the trainee works. The contractor must provide a trainee working on multiple job sites in one day with supervision for 75% of the time on each job site during the day. If an inspector finds a trainee working without supervision, but who claims to have been supervised for the required 75% time, the inspector will give the trainee an electrical trainee supervision statement to document the supervision. The trainee and supervising electrician must fill out and sign the form. The trainee is responsible to return the completed form to the inspector within 24 hours.

Ugly Installations

If viewing this document online, you may click on the picture to open a larger image in another window.

Violations (to name a few): NEC 334.12(B) NM cable in wet location; NEC 312.2 panels subject to water damage; NEC 358.30(A) securing and supporting requirements for EMT

Answer to Question of the Month: 37 – NEC 110.14; Chapter 9, Table 10

Washington State Department of Labor & Industries

Electrical Currents

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 4** **April 2012**

Question of the Month

What is the maximum rating for a motor branch-circuit protective device that can be used to protect a #12 AWG copper motor control circuit running to an external pressure switch? *-See the correct answer on page 2.*

Safety Tip of the Month!

"When in doubt, lock it out" is a poor policy. A better policy is, when working on a potentially energized circuit or piece of equipment, always lock it out. A de-energized circuit rarely shocks anyone.

Note From The Chief

The *Electrical Currents* newsletter was first published in January of 1998 to provide code guidance and to promote installation and inspection consistency statewide. It is also a valuable source of important information regarding issues relevant to electrical contractors and individuals doing electrical work in the State of Washington. Here is an excerpt from the first article in the first newsletter in January of 1998: *"In response to requests from electricians, electrical contractors, engineers, and our own electrical inspectors we have initiated "ELECTRICAL CURRENTS" as a forum for the code interpretations that are requested from the Chief Electrical Inspector. We hope that the publication of this information will result in fewer electrical corrections and improve consistency in the enforcement of the NEC and Electrical Installation Laws of Washington."*

From time to time, I receive questions regarding interpretation of codes and policies. Legislative change in 1997, made the Chief, subject to the review of the Director of the Department of Labor & Industries, responsible for providing the final interpretation of adopted state electrical standards, rules, and policies for the department and its inspectors. Prior to the 1997 change, the Electrical Board made those types of final determination.

I use the *Electrical Currents* newsletter as one forum to inform customers of potential code concerns, interpretations, and policy. You can download all of the previous editions of the ***Electrical Currents*** newsletter from our website in searchable PDF format and search for code interpretations, policy, etc.

Encourage others you know in the electrical industry, along with property owners, to join the ***Electrical E-mail List*** so they can stay informed on what is happening with the Electrical Program.

Where to Affix Class B Labels

Users of Class B labels often ask questions about the proper location on the jobsite to affix the label. WAC 296-46B-908(4)(a) states: The certified electrician/telecommunications worker performing the installation must affix a Class B installation label on the cover of the panelboard or overcurrent device supplying power to the circuit or equipment prior to beginning the work. There are many types of jobsites. In some cases, Class B eligible work is started before any panelboards are installed. Some panelboard covers have no additional room to affix a Class B label. Installers are concerned about posting the label in a manner that is acceptable to the Department and protecting it from damage or removal during ongoing construction.

You must fill the label out completely and affix it in a conspicuous location on the jobsite before beginning the wiring installation. This can be done in a variety of ways. You must post the label where it will not be covered. The attachment method may have to be temporary. For example, it might be attached to framing member while the cable is being installed, then attached to a cable(s) with a zip lock bag or document protector, then transferred to an enclosure or piece of equipment when it is installed. Posting the label in a job trailer, keeping it in a folder or file cabinet, or in a vehicle is not an acceptable method. It must be affixed to a part of the building or electrical installation in a location where the inspector will be able to find it before the electrical installation is begun.

Public Hearing Announcement

The Department will hold a public hearing to receive information and comments about proposed changes to the electrical fees in Chapter 296-46B WAC. The meeting will be held on April 10, 2012 at 9 a.m. at the Department of Labor & Industries building, 7273 Linderson Way SW, Tumwater, WA. For more information, please visit the ***Rule Development*** page on our website.

Save a phone call by looking up permit and inspection information online

You can look up information about your permits and inspections online. On the ***Look Up a Permit or Inspection*** page on our website, you will see two options for getting permit information. Public information is available to everyone. Secure information is only available to the permit holder. Contractors may log into their Secure Access Washington (SAW) account to view information about their permits. Permit purchasers (i.e. contractors and property owners) may view information about a specific permit by using the authorization code received when the permit was purchased. You may look up permits using a permit number, or by entering applicant or site information.

Electrical inspectors normally download their workload for the day by 8:30 a.m. After 8:30 a.m., on the morning the inspection is requested, you may check the status of your inspection request online to see if an inspector has downloaded your job into the daily itinerary. The *Requests* box shows the date of the inspection request and the request status. If the inspection request has not been downloaded by an inspector, the status column will show *Pending*. If an inspector has downloaded your inspection request into the daily itinerary, the status column will show *Request Taken*.

Inspectors normally upload their inspection results by 4 p.m. If the inspector is working in an area with no cell phone coverage, the day's inspection information may not be uploaded until the next morning. If you check your inspection after the inspector has uploaded, you will be able to view results of the inspection in the "Inspections" and "Details" boxes. If you log into the permit to view secure information, you will also be able to view the details of any corrections issued by clicking on the number under the box "Corrections Written". See example of permit information screen below:

Requests

Created	Requested	Reason	Status
2/9/2012	2/13/2012		Pending
1/13/2012	1/14/2012		Request Taken

Inspections

Inspected	Inspector	Corrections Written	Corrections Completed	Comments
1/17/2012	ULMER, DONALD	0	0	

Details

Inspected	Inspection	Result	Comment
1/17/2012	Cover,Conduit Only,Underground	AC - Approved Complete	well

Ugly Installations

If viewing this document online, you may click on the picture to open a larger image in another window.

Violations: NEC 334.(B)(4) and 110.11 NM cable not permitted in wet location; NEC 334.15(B) Protection from physical damage; NEC 334.30 Securing and supporting; NEC 300.15 Box required for splice; NEC 110.14(B) Improper splices; NEC 250.8 Improper grounding connection; 110.12(B) Damaged cable sheath; WAC 296-46B-110(2) Wiring exposed to water damage.

Answer to Question of the Month: 60 amps – NEC 430.72(B)(2)

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 15 No. 3** | **March 2012**

● **This Month's Question of the Month** – Electrical equipment and wiring that has been submerged or exposed to water must comply with the following: All breakers, fuses, controllers, receptacles, lighting switches/dimmers, electric heaters, and any sealed device/equipment (e.g. relays, contactors, etc.) must be _____. A) cleaned, B) replaced, C) repaired, D) dried out – *See the correct answer on page 2.*

Safety Tip of the Month!

Stay at least 10 feet away from overhead wires during cleanup and other activities.

Assume that all overhead wires are energized at lethal voltages. Never assume that a wire is safe to touch even if it is down or appears to be insulated.

● Note From The Chief

The amnesty I offered from January 1st through February 15th to allow permit purchasers an opportunity to clean up their old permits that have never had a requested inspection and the permit has expired. If you have an expired permit without an inspection request, a regional supervisor/representative will contact you within the next two months to determine the department's course of action. Depending upon your situation, you may be required to obtain a new permit and request and arrange an electrical inspection. You may also receive a civil penalty for failing to make a timely inspection request or have the electrical power to the installation ordered disconnected.

Beginning this week, if you have not requested an inspection within 90 days after your permit purchase, you will be receiving a letter letting you know there is no inspection request. In accordance with WAC 296-46B-901(10), the permit purchaser must make an inspection request no later than three business days after an electrical installation is completed or one business day after any part of the installation has been energized. Failure to make the required inspection request may result in the permit purchaser receiving a civil penalty or disconnection of electrical power.

● Leveling the Playing Field, Accomplishments in 2011

During 2011, the department's electrical inspectors, auditors, and E-Core team issued 3,382 citations for violations identified by our stakeholders as representing the underground economy (i.e. no electrical contractor license, no electrician certificate, and no permit). This represents an increase of approximately 15% over those issued in 2010. Focusing our compliance efforts on unlicensed electrical contractors, uncertified electricians, and anyone who does not obtain an electrical permit and inspection will address our customers' expectations regarding compliance enforcement in the underground economy, helping maintain a level competitive playing field for legitimate electrical contractors, and keeping Washington's electrical installations safe.

Because of their proven success, we were able to add two positions to our E-Core team last year. If you would like to join us in the battle against the underground economy, you can make a big difference by watching for and reporting illegal electrical activity. There is a page on our web site, http://www.lni.wa.gov/TradesLicensing/Electrical/Violators/ECORE/default.asp that is dedicated to reporting violators. If you notice illegal activity, contact your local electrical inspection office or one of the following E-Core team members:

- Puget Sound, Jack Oxford oxfj235@lni.wa.gov 206-835-1130 (office) or 360-471-0796 (cell)
- NW Washington, Rand Jones jonv235@lni.wa.gov 206-515-2773 (office) or 360-561-0440 (cell)
- SW Washington, Bob Matson mabq235@lni.wa.gov 360-902-4987 (office) or 360-471-0588 (cell)
- Eastern Washington, Phil Jordan jorp235@lni.wa.gov 509-324-2542 (office) or 360-471-0691 (cell)

You will increase the chances for a successful investigation if you e-mail an E-CORE team member a completed *Electrical Inspection Witness Statement* (form F500-087-000) or *Investigation Report* (form F500-076-000) available on our Web site at: **http://www.lni.wa.gov/TradesLicensing/Electrical/FormPub**

Ladders, Bucket Trucks, and Scaffolding

RCW 19.28.101(4) requires electrical wiring and equipment to be accessible for inspection. This includes access to ceiling spaces and elevated areas inside buildings. The permit holder must provide a means of accessing all electrical equipment that must be inspected. Providing access may require the permit holder to supply the inspector with a bucket or ladder truck, scaffolding, ladder, or other equipment. Avoid unnecessary additional inspection trips and trip fees by making prior arrangements with the electrical inspector to provide access to conduct these inspections.

Your best method to communicate access arrangements or other special needs to the inspector is to use the comments section when making the inspection request. The department's inspectors will make every possible effort to accommodate your request to be there when the access equipment is in place and safe.

We provide our inspectors with appropriate personal protective equipment (PPE) and training to identify potential exposure to hazards, and when it is safe to utilize the contractor's safety system.

Don't be an Absentee Administrator

"Absentee Administrator" is a term used to describe a person who is assigned as the administrator or master electrician for an electrical contractor, but is not actually involved and responsible for the day-to-day electrical activities of the company. The department takes this issue very seriously and monetary penalties for this type of violation begin at $1,000.00 each for both the contractor and the administrator or master electrician.

RCW 19.28.061 states that the person designated as the master electrician or administrator for an electrical contractor must be a member of the firm or a full-time supervisory employee. He/she must be available during working hours to carry out the duties of an administrator. Further clarification of the terms "member of the firm" and "full time supervisory employee" is provided in WAC 296-46B-930.

The contractor must name all members of the firm on the electrical contractor's license. Partners must be on file with the department of licensing and corporate officers or members of an LLC or INC must be on file with the secretary of state.

When determining the full-time supervisory employment status of the assigned person, the department will consider whether the individual is on the contractor's full-time payroll; receives a regular salary or wage similar to other supervisory employees; has supervisory responsibility for work performed by the contractor; is available during normal business hours, and carries out the duties shown in RCW 19.28.

Ugly Installations

To enlarge the picture, Rclick on the picture, select Copy, and Paste into an MSWord document. Then, you can LClick on the picture, place your cursor over the picture's corner until a ↕ symbol appears and then hold the LClick button and drag your mouse to expand the picture.

Violations: NEC 300.3(A) Single conductors to be in raceway; NEC 300.20 Induced currents in metal enclosures - group conductors; NEC 250.24(B) Main bonding jumper required; RCW 19.28.101 No permit, Covered prior to inspection

Service Panel

Answer to This Month's Question of the Month: **B**) replaced – WAC 296-46B-110(2)(a)

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 2** **February 2012**

● **This Month's Question of the Month** – In straight pulls, the length of the box or conduit must not be less than _____ times the trade size of the largest raceway. A) 4, B) 6, C) 8, D) 10 – *See the correct answer on page 2.*

Safety Tip of the Month!

Look inside your light fixture. Find the label that tells you which light bulb size (wattage) and type is right your fixture.

All electrical cords should be in good condition – no breaks, exposed conductors, or crush points.

● Note From The Chief

Everyone in our industry knows that things change. As I have stated in previous *Electrical Currents*, the Electrical Program has been implementing LEAN principles that will enable us to identify and eliminate waste and deliver a distinctively better and more consistent quality product for our customers – search previous issues for LEAN at:

http://www.lni.wa.gov/TradesLicensing/Electrical/WhatsNew/Currents/default.asp

While we know we are going in the right direction, we still have significant challenges and very hard work ahead of us to prove that we can achieve and sustain greater results. We face these challenges with confidence and momentum that comes from impressive accomplishments. We are investing in a major effort to standardize our inspection and compliance procedures and processes. Our LEAN work will create a more consistent, efficient, and effective product for our customers.

The key to our success will be remaining clearly focused on achieving and sustaining our goals, better inspections, and improved compliance action with the underground economy.

● Town of Eatonville

Effective immediately, L&I's Electrical Program will be selling permits and doing inspections in the Town of Eatonville. The Town of Eatonville has elected to terminate their electrical inspection program.

● Inspection Amnesty

Use the amnesty opportunity, offered in the January *Electrical Currents*, to clean up your expired permits without inspections, avoid penalties, and ensure you have a safe installation. Amnesty from compliance action as described in the previous article ends February 15th. After that date, the Department will begin searching our records to find any remaining permits without inspection and will take compliance action on all identified permits with inspection request violations.

● DEF Dispenser Equipment

New federal laws are requiring the installation of Diesel Exhaust Fluid (DEF) dispensers where commercial diesel dispensers are installed. DEF is corrosive, but is not a hazardous substance. Neither NEC 500 nor 514 are applicable to DEF dispensers. DEF dispensers may be a part of a diesel dispenser or be a separate dispenser.

A new electrical standard, UL 87C, has been developed for DEF dispensers. As with many new products and standards, the DEF manufacturing industry needs additional time to get their equipment listed. L&I inspectors will not require listing or field evaluation of DEF dispensers until August 1, 2012. Until August 1st, L&I inspectors will inspect the dispensers to WAC 296-46B and the NEC requirements as an electrical installation and will not issue a correction for the lack of a testing laboratory listing.

● Electrical Board Vacancies – Applications Due Before March 1, 2012.

Do not forget to make application for the currently and upcoming vacant Electrical Board positions. This is a great opportunity for you to be a voice for your industry. The Electrical Board has one current vacancy, a telecommunication utility representative, and three positions that expire July 7, 2012. The expiring positions are:

- Electrical utility representative
- Telecommunications contractor

- Building official from a city or town with an electrical inspection program

For more information, see the December 2011, *Electrical Currents* at http://www.lni.wa.gov/TradesLicensing/Electrical/files/currents/elc1112.pdf.

Stakeholder Meetings

In February, stakeholder meetings will be held at four locations. We look forward to this opportunity to communicate with our customers. It is important for you to stay up to date with changes that might affect you. Attending stakeholder meetings gives you an opportunity to get your questions answered and give us your input. All meetings are from 6:30 p.m. to 8:30 p.m. The locations are:

February 7th – Vancouver Labor and Industries, 312 SE Stonemill Dr Suite 120	**February 8th – Tumwater** L&I Auditorium, 7273 Linderson Way SW
February 21st – Port Angeles – Elwha Klallam Tribe Heritage Center, 401 E First Street	**February 22nd – Tacoma** - L&I Building, 950 Broadway, Orcas Room, 5th floor

Temporary Plug and Cord Wiring – Carnivals, Fairs, Concerts, Trade Shows and Similar Events

Due to recent questions, we are revisiting and clarifying a newsletter article printed in September 2008. Wiring a temporary power distribution system, using plug and cord wiring methods, is not exempt work even if the power source is from a permanently installed electrical receptacle. A permit and inspection is required for any type of temporary power distribution system that uses generators, dimmers, transformers, feeders, branch circuits, or other means that distribute power to electrical equipment (e.g. amplifiers, lights, etc.). A distribution system means the interconnecting wiring, spider boxes, or other equipment that is installed to distribute power to the end user (e.g. booth operator, vender, etc.) for plugging in their equipment.

If the plug and cord system and all of the equipment it supplies are owned by the installer (e.g. show operator, road crew, etc.), the installer is considered to be an owner and is exempted from the requirements for electrical contractor licensing and certification by RCW 19.28.261(1) so long as: the installer has approval from the property owner to make the electrical installation and there is no hard wiring involved in the system. When these conditions are met, the plug and cord electrical distribution system is the "place of business" for the system/equipment owner or firm. Firms that install temporary power wiring including plug and cord systems to other end users are required to be properly licensed electrical contractors.

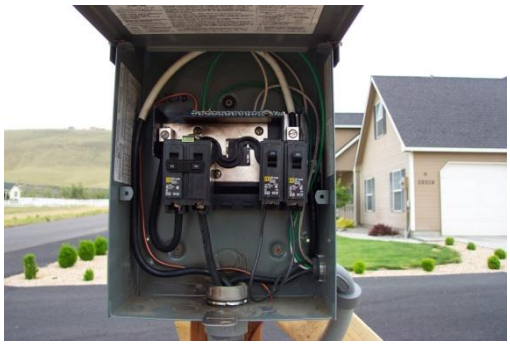
Correction – WAC Rule Update

The January 2012 *Electrical Currents* newsletter incorrectly stated that the department has filed a CR101 pre-proposal statement of inquiry to begin rule making for WAC 296-46B. The CR101 statement will be filed in August or September of 2012. Look for more information on the WAC rule revision process in a special edition *Electrical Currents* newsletter in March.

Ugly Installations

To enlarge the picture, Rclick on the picture, select Copy, and Paste into a MSWord document. Then, you can LClick on the picture, place your cursor over the picture's corner until a ⇕ symbol appears and then hold the LClick button and drag your mouse to expand the picture.

Violations: NEC 230.74 – each service disconnect shall simultaneously disconnect all ungrounded service conductors, NEC 110.7 – wiring integrity, free from short circuits.



Answer to This Month's Question of the Month: C)8 – 2008 NEC 314.28(A)(1)

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 15 No. 3 SE** | **March 2012**

SPECIAL EDITION

● WAC Changes

The Governor's Executive Order, 11-03, extended the restrictions on rule making to December 31, 2012. The program will to move forward with adoption of the 2014 NEC and rule proposals that are intended to be implemented by the legislative act, or have no significant opposition, benefit the electrical industry, and have minimal or positive economic impacts. This rule development process will include possible modification to all sections of WAC 296-46B.

The Department will evaluate each proposal to ensure that it meets the criteria listed above. This means that proposals will need to include complete substantiation when submitted for review.

● Keep Informed

There will not be a specific mailing list for this WAC revision process. Special WAC update postings will be maintained using the Electrical Program's *Electrical Email List,* internet website, and *Electrical Currents* newsletter.

The best way to stay informed of the WAC process and other electrical issues is to join the *Electrical Email List* at:

http://www.lni.wa.gov/Main/Listservs/Electrical.asp

● Proposals For Change

The Department develops rules to aid stakeholders and the department in clarification or enforcement of the intent of the electrical statute. Any stakeholder in the electrical industry may make proposals for additions and/or revisions to the Washington Administrative Code WAC 296-46B Electrical Safety Standards, Administration, and Installation electrical rules.

The department is responsible for and has final authority for developing all rules. The department will act as the correlating body during the rule development process and may at any time promote rule change as necessary to accommodate statutory change, department policies or procedures, or industry benefit.

The form shown in this edition must be used to submit rule proposals for the 2012, revision cycle. An electronic MS Word version of the form is available on our Rule Development page at:

http://www.lni.wa.gov/TradesLicensing/Electrical/LawRulePol/RuleDev/default.asp

Stakeholder proposals **must be received from 12:01 AM May 1, 2012 through 11:59 PM May 31, 2012**. **Any proposal received before or after these dates will be rejected**. **All proposals must be made electronically** using the form supplied by the department.

The submitter may submit a proposal(s) by:

- Sending the proposal(s) as an email attachment to ***mailto:ElectricalWAC@lni.wa.gov***; or
- Mailing a compact disc containing the proposal(s) to Chief Electrical Inspector, P.O. Box 44460, Olympia, WA, 98504-4460 – must be received by the closing date.

Proposed revisions should include the relevant existing text and should use legislative format (i.e. Use underscore (or underlining) to denote wording to be inserted (i.e. inserted wording) and strike-through to denote wording to be deleted (i.e. ~~deleted wording~~)).

Proposals not submitted according to these instructions will be rejected.

All proposals require:

- Evidence of a specific problem, and

- Substantiation showing that the proposal meets all the following requirements:
  - Will provide a solution for the problem,
  - Has positive or minimal negative economic impacts (Include an economic analysis of the total estimated cost/saving to the electrical industry and the Department including a breakdown of the estimate that clearly shows the impacts considered), and
  - Has no significant opposition (Document anticipated support or opposition).

● Technical Advisory Committee (TAC)

The TAC process has proven to be very valuable in past years. The department will again appoint an advisory General TAC made up of experts and interest group representatives to review and make **recommendations** on proposals from the electrical industry.

Persons interested in becoming TAC members must submit a letter of interest for specific positions to the Chief Electrical Inspector, P.O. Box 44460, Olympia, WA, 98504-4460 **to be received from May 1, 2012, through May 31, 2012**. The letter should show constituency support for the prospective member. The Department will not consider letters submitted outside these dates. All applications will be evaluated to determine that the applicant meets the requirements for the position and have constituency support.

In order to keep the size of the TAC to an efficient and effective number, the committee will be limited to 32 voting members. The TAC makeup will be based on an equitable distribution relative to proportion of involvement within the electrical industry in Washington. TAC membership provides an opportunity for everyone interested in the Electrical Program's WAC development to participate in the process.

If unable to attend the TAC meeting, the member may identify an alternate to attend the meeting. There will be no formal alternate assigned by the department. Any TAC member that may be absent must notify the Chief Electrical Inspector of the alternate's name at least one week prior to the TAC meeting. Failure to make the required notification will result in the position being vacant during the meeting.

● The TAC – Process

The TAC will review industry proposals and identify those that may have an economic impact on other specialties, small businesses, construction costs, or the cost of enforcement. Members who know they will be absent from a TAC meeting should make every effort to send an alternate. The TAC must review and evaluate proposals based on:

- The need to:
  - To address a critical life/safety need;
  - To address a specific state rule/policy/statute;
  - To maintain or improve the state's economy,
  - Improve a fair competitive environment for electrical contractors; or
  - To correct errors and omissions.
- Having positive or minimal negative economic impacts (Include an economic analysis of the total estimated cost/saving to the electrical industry and the Department including a breakdown of the estimate that clearly shows the impacts considered), and
- Having no significant opposition.

In making recommendations to the Department, the TAC will operate on a super-majority basis. A super-majority vote in support of a motion, of members in attendance, will be considered as 2/3 affirmative support, of the voting members present, for the motion made on a specific proposal (i.e. 22 affirmative votes if all voting members are present). The TAC may propose amended language to a proposal. All voting members share an equal vote. The department will consider all TAC recommendations.

● 2012 WAC Revision Process – Sequence Of Events

- **May 1 through May 31, 2012** – Accept WAC proposals from industry stakeholders
- **May 1 through May 31, 2012** – Accept applications for TAC
- **July 31, 2012** – TAC meeting, Tumwater L&I office
- **September 2012** – File CR 101 – pre-proposal statement of inquiry
- **October 25, 2012 –** Electrical Board review

- **November 2012** – File CR 102 –rule filing (opens the official required public comment period)
- **January 2013** – Public hearing(s)
- **Spring 2013** – Effective rule

General TAC – Membership

Chairperson– Chief Electrical Inspector (non-voting)

2	Electrical Board Members (non-voting)	1	WA Manufacturing Business
1	Training School/Continuing Education Provider	1	Electrical Engineer
1	JATC	1	Electrical Testing Laboratory
1	Electrical Manufacturer Representative	1	Utility
2	L&I Inspection (Supervisor & Inspector)	10	Electrical Contractors
2	City Regulator (Supervisor & Inspector)	10	Electricians
1	Citizen		

Methodology for Determining the Number of Electrical Contractor and Electrician Members

Active Licenses & Certificates	# of Contractors	% of All Licenses	# of TAC Members	# of Electricians	% of All Certificates	# of TAC Members
1	2,785	55%	6	16,409	63%	6
2	288	6%	0	2,073	8%	0
3	125	2%	0	472	2%	0
03A	65	1%	0	199	1%	0
4	88	2%	0	272	1%	0
6	540	11%	1	2,420	9%	0
06A	537	11%	1	2,543	10%	1
06B	12	0%	0	66	0%	0
7	103	2%	0	1,076	4%	0
07A	20	0%	0	81	0%	0
07B	65	1%	0	299	1%	0
07C	0	0%	0	9	0%	0
07D	38	1%	0	153	1%	0
07E	3	0%	0	85	0%	0
9	352	7%	0	0	0%	0
10	22	0%	0	52	0%	0
Ad Hoc Group	1,181	23%	2	5,184	11%	3
Total	**5,043**		**10**	**26,209**		**10**
Notes:	Specialties with <10% of Licenses/Certificates joins the Ad Hoc group					
	The Department will fill the Ad Hoc group on an equitable base with an emphasis on representation closely following the % of licenses to fairly represent the different specialties.					
	Unfilled positions will remain vacant					

PROPOSAL FORM for 2012 WAC 296-46B Rule Changes

Mail CD to:

Chief Electrical Inspector
Department of Labor and Industries
Electrical Section
PO Box 44460
Olympia, WA 98504-4460

Email to: *mailto:ElectricalWAC@lni.wa.gov* as an attachment

FOR L&I USE ONLY

Specific Rule #:

Date Received:

NOTES:

1. All proposals must be **received from 12:01 AM May 1 through 11:59 PM May 31, 2012**.
2. Limit each proposal to a single rule section. Use a separate copy for each proposal.
3. **ENTER TEXT ONLY IN THE UNSHADED SPACES ON THIS DOCUMENT – SAVE AS A NEW FILENAME BEFORE SUBMISSION**

Date submitted: _____ **Name:** _____

Representing: _____ **Telephone:** _____

Mailing Address: _____

Email Address: _____

1. Proposal: *Include new or revised wording, or identification of wording to be deleted. Proposed text should be in legislative format. Use underscore to denote wording to be inserted (e.g. inserted wording) and strike-through to denote wording to be deleted (e.g. ~~deleted wording~~).*

2. Statement of Problem & Substantiation for Proposal: *Note: State the problem that will be resolved by your proposal and all substantiation for your proposal (e.g. technical, economic impact, support, etc.).*

3. Check one: ☐ This proposal is original material ☐ This proposal is not original material

(END OF PROPOSAL)

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 15 No. 1** **January 2012**

● **This Month's Question of the Month** – No transformer may be installed in a location where dust with _____ characteristics may be present. – *See the correct answer on page 2.*

Safety Tip of the Month!

Never pull a cable to release a plug from the wall. It might take longer to cross the room, but stay safe by ensuring that you hold the plug, not just the cable, as you pull it out of the wall.

● Note From The Chief – Amnesty Offer

We continue to see a significant number of permits purchased and the work completed or energized with no inspection request. Electrical permits expire 12 months after the purchase date if there is no inspection request. Refunds are not available for an expired electrical permit. If electrical work was performed and the permit expired without an inspection request, a new permit must be purchased and an inspection request made.

3,000 permits purchased from January 1, 2009, through December 31, 2010, were not requested for inspection and have expired. 3,800 additional permits purchased from January 1, 2010, through August 31, 2011, have had no inspection request. Permit holders are required by WAC 296-46B-901(10)(a) to make inspection requests within:

- 3 business days after completing the installation; or
- 1 business day after energizing circuits or equipment, whichever comes first.

In an effort to ensure safe electrical installations were made on these permits, I am offering amnesty from any compliance action for any electrical contractor that purchased an electrical permit:

- Since January 1, 2009, and is expired, and failed to request an inspection of the electrical work on that expired permit. To qualify for the amnesty, the contractor must:
  - Obtain a new permit and request inspection for the work before February 15, 2012, and
  - Ensure the local supervisor is aware that the new permit is replacing an expired permit when making the request for inspection on the new permit. Do this by entering *"Replaces expired permit # _____"* as well as a description of the work in the Description of Work field when obtaining the new permit and again in the Comments field when making the inspection request online.
- Since January 1, 2010, for active permits where the holder failed to request an inspection of the electrical work on that permit within 3 business days after completing the installation or within 1 business day after energizing circuits or equipment, whichever comes first. To qualify for the amnesty, the contractor must request the inspection before February 15, 2012.

On a monthly basis beginning in February 2012, we will:

- Send out a *"no inspection request"* warning letter approximately 90 days after a permit purchase where there has been no inspection request made.
- Review our records to find expired permits without an inspection request.
- The department will take compliance action on all identified permits with inspection request violations.

Use this amnesty opportunity to clean up your expired permits without inspections, avoid penalties, and ensure an electrically safe installation was completed for your customers. You can view your permit history and identify any permits without an inspection request by logging into your Secure Access Washington (SAW) internet account. If you have any questions about how to review your permits, call Elissa Zyski at (360) 902-5906 or Phyllis Cooper at (360) 902-5293.

● WAC Rule Update

The department has filed a CR101 notice of intent to begin rule making for WAC 296-46B. I will publish a special edition *Electrical Currents* newsletter in March. It will contain complete information about the rulemaking timeline, Technical Advisory Committee, proposals, etc. Do not put your name in for the TAC prior to reading the special edition. Governor Gregoire has extended the moratorium on new rule making for rules considered non-critical. Rule making proposals will be considered non-critical unless:

- Required by law or court order;
- Necessary to manage budget shortfalls or maintain fund solvency;

- Necessary to protect public health, safety, and welfare;
- Beneficial to or requested by and supported by the regulated entities or small businesses that it affects; or
- Necessary to respond to current economic conditions or assist in long-term recovery, to include employment assistance, consumer protection, or government reform.

Electrical Board Vacancies – Applications Due Before March 1, 2012.

Do not forget to make application for the currently and upcoming vacant Electrical Board positions. This is a great opportunity for you to be a voice for your industry. For more information, see the December 2011, *Electrical Currents* at http://www.lni.wa.gov/TradesLicensing/Electrical/files/currents/elc1112.pdf.

When The General Contractor Doesn't Completely Finish The Walls

It is common today for the general contractor to leave unfinished spaces for the owner to complete after moving in. L&I electrical inspectors will not provide a fully completed final approval when this occurs. If the wiring is code compliant, complete, and all devices are in place, the inspector will mark the final inspection *"approved partial"* and will enter a comment that specific spaces are unfinished. If a final "approved complete" notice is needed by the owner after the finish is completed – drywall, etc.:

- The original electrical contractor must pay a progress inspection fee on the original permit and request a final inspection; or
- The owner may obtain a safety inspection permit and request the inspection.

When spaces are left unfinished, wiring is left exposed before the final finish material is installed. Ground and arc fault protection devices will only be required as necessary to protect the circuits as intended after the installation of the final finish. In spaces intended for occupancy (i.e. not garages, shops, and similar spaces) that will be later finished, exposed wiring will not be required to have physical protection beyond what is required for a rough-in inspection where the space will be finished later (e.g. no running boards, etc.), but final inspection approval will not be given. Physical protection will be required for garages, shops, and similar spaces.

Focused Compliance

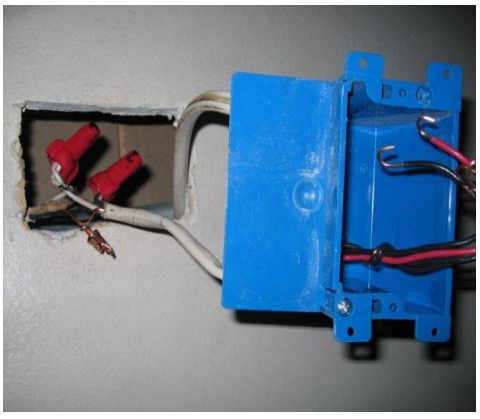
L&I inspectors are focusing their compliance efforts on the underground economy and contractors who fail to obtain electrical permits and inspection in an attempt to gain a competitive advantage over other contractors. By focusing our compliance efforts on unlicensed electrical contractors, uncertified electricians, and anyone who does not obtain an electrical permit and inspection, we will address our customers' expectations regarding compliance enforcement in the underground economy and helping maintain a level competitive playing field.

You must be a licensed electrical contractor if you advertise, bid, or are otherwise in the business of installing, repairing, or maintaining electrical wiring or equipment. Being a certified electrician does not allow a person to be an electrical contractor. Penalties for a violation of the electrical contractor law begin at $500. For more information on becoming a licensed electrical contractor, go to:

http://www.lni.wa.gov/TradesLicensing/Electrical/LicenseExamEd/default.asp

Electrical contractors should routinely check that their electricians' and trainees' electrical certificates are active and valid for the scope of work they are doing.

If you do not get an electrical permit and electrical inspection for your work, you place your customers and the public at risk and are competing unfairly.



Ugly Installations

Violations: NEC 110.3(B) – improper equipment ground crimp, NEC 300.15 – splice without a box, WAC 296-46B-990(3)(h) – serious noncompliant installation

Answer to This Month's Question of the Month: hazardous – 2008 NEC 502.100(3)

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 12** | **December 2011**

● **This Month's Question of the Month** – The minimum number of 120-volt, 20-ampere, 2-wire lighting branch circuits required for a residence that measures 50 feet by 30 feet is _____. A) 2, B) 3, C) 4, D) 5 – *See the correct answer on page 2.*

Safety Tip of the Month!

The presence and accumulation of combustible dust is a serious hazard. Keep your workplace clean and use wiring methods appropriate to the potential explosive hazards.

There were at least six deaths from dust explosions and a fatality or injury occurred in 71% of all combustible dust incidents across the USA last year. Between 1980 and 2005, there were 119 workers killed and 718 injured in dust explosions across the nation (US Chemical Safety Board data).

● Note From The Chief

As I discussed in the May 2011, *Electrical Currents*, the Electrical Program has embarked on a long-term plan to become even more efficient and effective. The initial project with the Tukwila and Everett inspectors has ended. They were successful in developing new standard work practices that were presented to all L&I inspectors at their November 30th training. Both offices have proven that LEAN principles work. Both offices have improved their inspection response time (now about 98% <48 hours) and compliance enforcement focused on unlicensed electrical contractors, uncertified electricians, and entities that do not get permits and inspections. I want to offer my sincere thanks to both offices for their hard work and to everyone who supported them during this very successful project.

They used the Toyota Production System's LEAN process to eliminate waste and standardize our processes. As I said in the May newsletter, LEAN is a set of concepts, principles, and tools used to create and deliver the most value while consuming the fewest resources while engaging all program staff in a continuous improvement effort.

LEAN addresses problems at the systems level and within individual processes. Customer needs define value for the process. LEAN distinguishes steps that create value from those that do not. It reduces waste and builds in quality using LEAN's systematic problem solving methods. Using LEAN principles helps us to repeat and implement successes on a statewide basis.

The project team's work is being implemented across the state. You will see better and more consistent overall service and a reduction in the negative impacts of the underground economy. As I said in May, we will continue to challenge ourselves to provide a better product with less waste.

● Why Study The 2011 NEC?

Electricians and administrators are required to have twenty-four hours of continuing education in order to renew their certificates. At least eight of those hours must be NEC update training. Several years ago, the electrical program rules changed to allow credit for NEC update training covering the currently adopted NEC (currently the 2008 printing) or the most recently published version (2011). At this time, anyone seeking electrical certificate renewal may use a 2008 or a 2011 NEC updates class to satisfy their renewal requirement for code update. After the NFPA publishes the 2014 NEC, 2014 NEC update classes will also be approved.

Even though Washington did not adopt the 2011 NEC, it is important for electricians and administrators to remember that the NFPA made changes to the 2011 NEC that will affect them when the 2014 NEC is adopted in Washington. The changes made in the 2011 NEC will not be marked in the 2014 NEC. If you do not review and understand the 2011 changes, you may not be aware of changes that will affect you when Washington adopts the 2014 NEC. You should study the changes made in both the 2008 and 2011 versions.

● Electrical Board Vacancies – Applications Due Before March 1, 2012.

The Electrical Board advised the Director on all matters pertaining to the enforcement of the electrical and telecommunications law. The board normally meets once each quarter – the last Thursday in January, April, July, and October.

The Electrical Board has one current vacancy, telecommunication utility representative, and three positions that expire July 7, 2012. The expiring positions are:

- Electrical utility representative
- Telecommunications contractor
- Building official from a city or town with an electrical inspection program

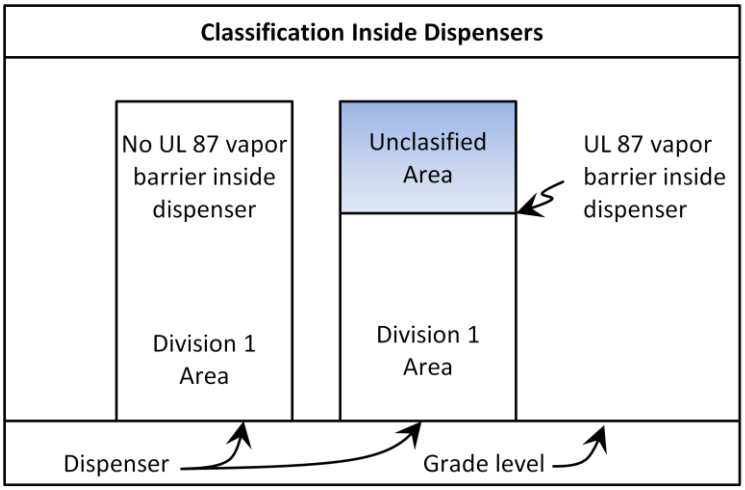
The telecommunications utility position's term will expire on July 7, 2014. All the other positions are four-year terms expiring on July 7, 2016.

The Governor's office has asked L&I to assist in recruiting applicants for the four positions. Applicants must send their applications and supporting recommendations and supplementary information directly to the Governor's office. Board information and applications are available on the Governor's website at: http://www.governor.wa.gov/boards/default.asp. Applicants must use the Governor's form when applying.

Contact L&I, Crystal Forsberg at (360) 902-5249 if you have questions about the positions or the Electrical Board.

● Fuel Dispensing Pump – How Is It Classified?

The question has come up whether the area inside a fuel dispenser is a classified location. 2008 NEC Table 514.3(B)(1) refers to UL 87 as the Standard for classification of areas inside of a fuel dispenser. After reviewing UL 87, it is clear that the answer is, "It depends." If the dispenser is constructed with a vapor barrier separating the dispenser compartments, the area above the vapor barrier is not a classified area as shown in the drawing below.



In Washington, the 07E equipment repair specialty may perform electrical work on limited "utilization equipment (see RCW 19.28.095 for the complete scope of work). However, for the 07E specialty the equipment must not be in a classified location.

If the dispenser meets the vapor barrier construction requirements of UL 87, the 07E specialty may work inside the unclassified area above the vapor barrier. If there is no vapor barrier, the entire interior of the dispenser is a classified location beyond the allowed work scope of an 07E specialty electrician.

● Ugly Installations

This month will begin a series of recent photographs of extremely poor and dangerous electrical installations found by L&I's inspectors across the state. Please, do not let one of your installations become an Ugly Picture in the *Electrical Currents*.

The first Ugly Picture is an unpermitted and uninspected service panel replacement found by one of our inspectors. Look closely and see how many code violations can you find?

● Answer to This Month's Question of the Month: A) – 2008 NEC 220.12

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 11** | **November 2011**

● **This Month's Question of the Month** – Multiple power sources that may include photovoltaic, wind, micro-hydro generators, engine driven generators, etc., but do not include utility distribution systems or batteries are defined as: A) hybrid systems, B) composite systems, C) mixed systems, D) photo voltaic distribution systems – *See the correct answer on page 2.*

Safety Tip of the Month!

NW rains are coming. When flood waters suddenly inundate a building the damage can be catastrophic. For helpful information go to: http://www.lni.wa.gov/TradesLicensing/Electrical/BasicElectInstall/NaturalDisasters/default.asp

● Note From The Chief

The Governor's Executive Order 11-03 extended the restrictions on rule making to December 31, 2012. I will be seeking an exception to the order that may allow for adoption of the 2014 NEC and adoption of rule proposals that have no significant opposition and benefit the electrical industry.

The Electrical Program will likely begin rule development about April 2012. WAC 296-46B will be opened for proposals and a Technical Advisory Committee will be formed to help review proposals and make recommendations to the department.

If you are interested in being a part of the program's rule making process and receiving other general Electrical Program information, you should join the Electrical Email List at: http://www.lni.wa.gov/Main/Listservs/Electrical.asp Additional information will also be published in the *Electrical Currents* newsletter *in* the coming months.

● Grounding Electrode Conductor – Protection From Physical Damage

Inspectors have been encountering grounding electrode installations that are subject to physical damage. NEC 250.64(B) has specific requirements for protection of exposed grounding electrode conductors.

Exposed grounding electrode conductors:

- Smaller than 6 AWG must always have physical protection.
- Sized 6 AWG that are free from exposure to physical damage are permitted to run along the surface of the building construction without protection where it is securely fastened to the building surface.
- Sized 4 AWG or larger must be protected where exposed to physical damage. This requirement was changed from "severe" physical damage in the 2005 NEC.

Physical damage is not defined in the NEC. The department's electrical inspectors will consider the grounding electrode conductor to not be exposed to physical damage when:

- The conductor is buried more than 12" deep in the earth outside the building's footprint.
- Encased or covered by 2" of concrete or asphalt.
- The conductor is inside the building footprint and protected by the building's structural elements or when inside and determined, by the inspector, to not be subject to physical damage.
- Enclosed by a metal or nonmetallic raceway or enclosure. The raceway or enclosure must be approved to protect from severe physical damage if it is not protected by appropriate physical barriers from contact with vehicles, lawn mowers, and other equipment that might damage the conductor or enclosure.

If ferrous metal raceways or enclosures are used to protect the conductor, they must be bonded at both ends to the conductor according to the requirements in NEC 250.64(E).

Problems with physical protection may be avoided by using grounding electrodes that do not require supplemental electrodes or where the grounding electrode conductor can be installed solely inside the structure of the building (e.g. concrete-encased electrode, exterior metal underground water pipe with 10' or more of the pipe in direct contact with the earth, etc.).

Electrical Inspections On Tribal Trust or Fee Land

In simple terms, tribal trust lands are held in trust by the United States government for the use of a tribe. The United States holds the legal title and the tribe holds the beneficial interest. The electrical law does not apply on trust land. Fee lands are held by an owner, whether Indian or non-Indian. It is not uncommon for trust and fee lands to be intermingled with each other.

On tribal fee land, the electrical law applies and L&I will inspect electrical work and enforce licensing compliance as required by the electrical law. You must determine if you are working on fee land. If you are, you and your workers must be appropriately licensed and certified and get the appropriate permits and inspections.

The Electrical Program is often asked to make electrical inspections on tribal trust land. The program will make those inspections if the tribe is in agreement that we do our inspections using our normal methods (i.e. complete inspection of all electrical work – permit, cover, service, feeders, correction repair, etc.). If the tribe does not support having L&I do those activities, we will not inspect any of the electrical work. To not inspect the work behind a service potentially places the program and consumers at risk from possible electrical hazards that are not inspected. Before applying for an electrical permit, check with your tribal representative to determine if your work is on trust land. If the answer is yes, you should ask the tribe's representative to contact your local electrical supervisor with the tribe's approval to inspect.

Placing Pre-manufactured Heat Mats

The placement of pre-manufactured heat mats in tile grout was added to Class A basic electrical work (i.e. work that doesn't require a permit) in a rule change that became effective November 25, 2005. WAC 296-46B-900(8)(b)(iv) says: "*Embedding pre-manufactured heat mats in tile grout where the mat is listed by an approved testing laboratory and comes from the manufacturer with pre-connected lead-in conductors. All listing marks and lead-in conductor labels must be left intact and visible for evaluation and inspection by the installing electrician and the electrical inspector*." The placement of pre-manufactured heat mats is considered a Class A electrical installation.

The mat installer does not have to be a certified electrician or an electrical trainee under supervision to place the pre-manufactured heat mat in tile grout (e.g. a tile setter). However, the connections of the cable leads to the controlling device must be done by a licensed electrical contractor using a certified electrician. An electrical permit and inspection is required for the electrical work. The field installation of single-wire heat cables or any mats that require field-connection of the non-heating leads to the mat is an electrical installation that requires electrical contractor licensing, electrician certification, permitting, and inspection.

You Must Have Your Electrician Certificate On Your Person

Since 2009, all electricians and trainees have been required to have their certificate and a government issued photo identification in their possession at all times when working as an electrician or trainee. All electrical inspectors have the right to ask you to provide both. If you do not comply with the request for identification or do not have them in your possession, you are subject to civil penalties.

When Do You Need To Be A Licensed Electrical Contractor?

You must be a licensed electrical contractor if you advertise, bid – a registered general contractor can also advertise and bid, or are in the business of installing or working on electrical wiring or equipment. Being a certified electrician does not allow a person to be an electrical contractor. Penalties for a violation of the electrical contractor licensing law begin at $500 per violation. To become an electrical contractor, you must apply to L&I – electrical contractor application, an assigned electrical administrator, and a $4,000 bond or assignment of savings.

An administrator is responsible to ensure the electrical contractor and the contractor's electricians follow the electrical law's requirements (see RCW 19.28.061(5)) and must be an officer in the company or a full-time supervisory employee. For more information about exams or becoming an electrical contractor or administrator call (360) 902-5269 or go to:
http://www.lni.wa.gov/TradesLicensing/Electrical/LicenseExamEd/LicenseCert/default.asp

Answer to This Month's Question of the Month: A) – 2008 NEC 690.2

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 10** | **October 2011**

● **This Month's Question of the Month** – EMT is not allowed to be used where _____. A) subject to severe physical damage during installation, B) connected to aluminum conduit, C) it is the only means of support for a luminaire, D) in a Class 3 area – *See the correct answer on page 2.*

Safety Tip of the Month!

- Look around you and avoid any close encounter with an overhead utility distribution line. Death or serious injury is the outcome if you get too close to a utility line.

● **Note From The Chief**

The Electrical Program's mission is to "Keep Washington Safe and Working." We do inspections and compliance to help ensure that electrical installers provide an electrically safe place for Washington consumers and workers to live and work and so legitimate electrical contractors do not have to compete with the underground economy. We also work collaboratively and assist our customers in complying with the electrical law using education and communication. The program leads, coordinates, and directs statewide electrical activities that promote uniform electrical installations, worker certification, licensing, and compliance.

We respect our customers and always strive to work with them to provide them the knowledge they need to succeed. It is important that we sometimes let our customers know how we have made a positive impact on their industry. We work hard to provide high quality inspections and compliance enforcement. Some of the tools we use to help our customers include: the *Electrical Currents* newsletter, a great website, electronic technology to buy permits and request inspections, renew licenses and certificates, and face-to-face stakeholder meetings and contractor trainings to educate and inform the people we work with.

We regularly receive positive comments about the customer service we deliver. Here are some of those comments:

- 25 year electrical contractor – "…very happy with the compliance work being done."
- Electrical Administrator – "…appreciate the L&I electrical divisions work on behalf of my personal betterment and that of our trade, as well as the safety of our customers."
- Manager – "…consistently provides an outstanding level of service."
- Owner – "After you explained about the hazards, it makes sense to get a permit… I really do appreciate the information. Rarely have inspectors been so helpful"
- Engineer – "It is so nice to always have someone willing to help and answer questions on the other end of the phone."
- 25+ year electrical contractor – "…was a wealth of knowledge. Thank you for providing this important training to our employees."

● **Getting Credit For Out Of State Specialty Electrician Training Experience**

The Electrical Program regularly gets requests from applicants, with out of state training experience, seeking to qualify for a Washington specialty electrician examination. Applicants must keep in mind that there are no specialty electrician scopes-of-work that are identical from state to state. It is common that the scope in one state will allow work or training credit that is prohibited in another state, even when the name of the specialty is very similar. Candidates must also keep in mind that any experience gained in another state must have been gained in compliance with that state's law. When scopes are different, it is not uncommon for the candidate to only get partial credit for the experience gained in the other state.

For instance, both Washington and Oregon have "sign" specialty certificates. Oregon rules allow sign apprentices to gain credit for work done inside the contractors shop. Washington rules do not allow for shop credit in any specialty, so sign candidates, with Oregon experience, seeking to qualify for the Washington sign electrician examination cannot receive training credit for their shop time in Oregon. The candidate must document the training received that directly relates to and is allowed by the Washington scope of work. It is up to the candidate to provide verifiable documentation that will support the request for hours when scopes-of-work are different.

- **Stakeholder Meetings**

Stakeholder meetings will begin this month. Check the schedule and do your best to attend a meeting in your area. Attending stakeholder meetings gives you an opportunity to get your questions answered and give the program your input. The program will be conducting stakeholder meetings beginning this fall. Meetings will be held from 6:30 to 8:30 in the following locations:

October 4th – Spokane, Labor and Industries, 901 N Monroe Street	**October 18th – Mount Vernon,** Padilla Bay Interpretive Center, 10441 Bay View-Edison Rd
October 5th – Kennewick, Benton PUD Auditorium, 2721 W 10th Avenue	**October 19th – Everett,** Snohomish County PUD Auditorium, 2320 California St
October 6th – Yakima, Pacific Power Auditorium, 500 Keys Road	**November 2nd – Tukwila,** Labor and Industries, 12806 Gateway Dr S

- **Sign Grounding and Bonding - Exception**

L&I's Electrical Inspectors will allow an exception to 2008 NEC 600.7(B)(1). Section (B)(1) was changed in 2008 to say, "Metal parts and equipment of signs and outline lighting shall be bonded together and to the associated transformer or power-supply equipment grounding conductor of the branch circuit or feeder supplying the sign or outline lighting system and shall meet the requirements of 250.90." The load side wiring of light emitting diode (LED) signs is usually wired with a Class 2 cable that does not provide a bonding path. 2008 NEC 725.2 demonstrates that due to its power limitations, a Class 2 circuit is considered inherently safe from a fire initiation standpoint and provides acceptable protection from electric shock.

The NFPA determined that an exception to that requirement can be made. Remote metal parts of a section sign or outline lighting system only supplied by a remote Class 2 power supply that is listed or is a recognized component in a listed sign or outline lighting is not required to be bonded to an equipment grounding conductor. This exception eliminates a potential conflict between 2008 NEC 600.7(B)(1) and Article 725 and aligns the department's requirements with those of the NEC.

- **Electrical Board Recruitment – Applications Due Before December 1, 2011**

We have been advertising for applicants to fill the one Electrical Board position– Telecommunications Utility representative, but have received no applications. Filling this position on the Electrical Board is important and will ensure the industry is represented.

The Governor is seeking applicants for this position. Candidates should work for and represent telecommunications utilities in Washington. The term will expire on July 7, 2014.

Applications should be submitted to the Governor. Supporting recommendations and information should also be mailed to the Governor's office. Board information and applications are available on the Governor's website at: http://www.governor.wa.gov/boards/default.asp

- **Answer to This Month's Question of the Month:** A), B), C), and D) – NEC 358.12

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ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 9** | **September 2011**

● **This Month's Question of the Month** - Since Class 3 control circuits permit higher allowable levels of voltage and current, additional _____ are specified to provide protection against the electric shock hazard that could be encountered. A) circuits, B) safeguards, C) procedures, D) devices– *See the correct answer on page 2.*

Safety Tip of the Month!

- Keep power cords clear of tools during use.
- Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.
- Replace open front plugs with dead front plugs. Dead front plugs are sealed and present less danger of shock or short circuit.
- Do not carry electrical tools by the power cord.
- Do not tie power cords in tight knots. Knots can cause short circuits and shocks.

● **Note From The Chief**

Take the Annual Permit test!

Do you run a large operation and employ your own electrical maintenance staff or contract your maintenance to a licensed electrical contractor?

Does your staff or electrical contractor maintain your facility's electrical system – alter new circuits, install new circuits or feeders from existing equipment, retrofit lighting systems? If you answered "yes" to either of those questions, an annual electrical permit could benefit your company.

One annual permit would cover your electrical maintenance and new wiring in your existing facility. You would no longer need to purchase individual permits or arrange individual inspections. Instead, you would have one permit that is valid for a year and regularly scheduled visits from our inspection staff to inspect your work.

To be eligible, the facility must employ full-time electrical maintenance staff or have a yearly maintenance contract with a licensed electrical contractor. An annual permit can be used for retrofit, replacement, maintenance, repair, upgrade, and alterations to electrical systems at a single plant or building location. The annual permit does not include new or increased services or new square footage.

If you are interested in getting an annual permit or have questions about them, contact your local electrical inspection supervisor. Contact information for all L&I offices is available at:
http://www.lni.wa.gov/Main/ContactInfo/OfficeLocations/default.asp

● **Electrical Board Recruitment – Applications Due Before September 15, 2011**

One Electrical Board position is vacant – Telecommunications Utility representative. The Governor is seeking applicants for this position. Candidates should work for and represent telecommunications utilities in Washington. The term will expire on July 7, 2014.

Applications should be submitted to the Governor. Supporting recommendations and information should also be mailed to the Governor's office. Board information and applications are available on the Governor's website at: http://www.governor.wa.gov/boards/default.asp

● **Stakeholder Meetings**

Because of our limited budget, the Electrical Program has not had formal customer stakeholder meetings across the state in several years. The budget is still very tight, but we cannot afford to lose the opportunity to communicate with our customers. It is important for you to stay up to date with changes that might affect you. Attending stakeholder meetings gives you an opportunity to get your questions

answered and give the program your input. The program will be conducting stakeholder meetings beginning this fall. Meetings will be held from 6:30 to 8:30 in the following locations:

October 4th – Spokane Labor and Industries, 901 N Monroe Street	**November 2nd – Tukwila** Labor and Industries, 12806 Gateway Dr S
October 5th – Kennewick Benton PUD Auditorium 2721 W 10th Avenue	**February 7th – Vancouver** Labor and Industries, 312 SE Stonemill Dr Suite 120
October 6th – Yakima Pacific Power Auditorium 500 Keys Road	**February 8th – Tumwater** L&I Auditorium, 7273 Linderson Way SW
October 18th – Mount Vernon – Padilla Bay Interpretive Center, 10441 Bay View-Edison Rd	**February 21st – Port Angeles –** Elwha Klallam Tribe Heritage Center, 401 E First Street
October 19th – Everett – Snohomish County PUD Auditorium, 2320 California Street	**February 22nd – Tacoma –** L&I Building, 950 Broadway, Orcas Room, 5th floor

- **Wiring Requirements For Modular Office Furnishings Or Relocatable Wired Partitions**

When manufactured office partitions contain an electrical distribution system (including switches, receptacles, flexible cable assemblies with quick-connect electrical interconnections, or any branch circuit conductors connected to the premises wiring), all work on the electrical devices and conductors must be done by properly certified electricians and licensed electrical contractors.

Uncertified individuals may assemble the panels, work surfaces, cabinets, shelves, and structural elements of the partitions. Owners and their regularly employed staff may work without being certified electricians, but they should be qualified to work on electrical systems.

Except for some limited device replacement – see RCW 19.28.006(2)(a) for a list of permit exempt work – the work will generally require an electrical permit and inspection. The permit must be obtained prior to beginning any electrical work. Permit fees are generally based upon the addition or alteration of commercial branch circuits described in WAC 296-46B-906(2)(c).

- **Rule Development**

The Electrical Program will begin rule development about April 2012. WAC 296-46B will be opened for proposals and a Technical Advisory Committee will be formed to help review proposals and make recommendations to the department. If you are interested in being a part of the program's rule making process and receiving other general Electrical Program information, you should join the Electrical Email List at: http://www.lni.wa.gov/Main/Listservs/Electrical.asp

Additional information will also be published in the Electrical Currents newsletter in the coming months.

- **New Standard for Light Poles, Effective April 1, 2012**

Underwriters Laboratories has had an electrical standard for light poles under 8' in height for some time. Recently, a new standard, UL 1598, was created for lighting poles from 8' to 100'. As is common when a new standard is implemented, there are very few manufacturers who have completed the listing process with an approved electrical testing laboratory for these tall poles

L&I will not be enforcing a listing or field evaluation requirement for them until April 1, 2012. Beginning on that date, all poles from 8-100' in height will be required to be listed or field evaluated by an approved electrical testing laboratory. All requirements for luminaires and their supporting means, including the requirements of NEC 410.30(B) will be enforced for all lighting poles, metal and non-metallic – hand hole and grounding terminal.

- **Answer to This Month's Question of the Month:** B) safeguards – NEC 725.2

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 8** | **August 2011**

● **This Month's Question of the Month** - Once a violation of the RCW or WAC becomes a final judgment, each subsequent violation within _____ becomes a second or additional offense. A) 1 year, B) 2 years, C) 3 years, D) 4 years – *See the correct answer on page 2.*

Safety Tip of the Month!

Electrical safety is everyone's responsibility.

Electrical safety should be observed every time you even think about touching something connected to an electrical circuit.

With the invention of electrical testers, circuits are easy to test and with circuit breakers and fuses, circuits can be shut off to avoid contact with electricity all together.

If at all possible, turn the circuit off before testing or working on it.

● **Note From The Chief**

Recently, a group of electrical contractors were sent a letter notifying them that they were selected to participate in this year's Correction Reduction Initiative. The selected contractors received more than the average number of corrections per inspection during the past year.

Last year's contractor group reduced their corrections per inspection by 26%. This improvement greatly reduced the number of repairs and re-inspections required for their work. That saved them and the program a significant amount of time and money.

Each month, participants in the initiative will receive a summary letter of their previous month's results and a report detailing the number of corrections they received on each jobsite. If you are in the initiative this year, use your reports to identify your most frequently issued corrections so you can reduce your costs and improve the overall quality of your jobs.

● **New Electrical Contractor License and Electrician Certificates Are Coming**

All our licenses and certificates have been redesigned. Electrical contractors and administrators will no longer receive a wallet size card. Electricians, master electricians, and trainees will no longer receive a wall certificate.

Electrician and trainee certificates will be made of material similar to a driver's license and be much more durable. Another feature will be a colored stripe that will indicate to consumers what the certificate is for. A green stripe will indicate that the holder is an 01 general journeyman or 01 general master electrician. A yellow stripe will indicate that the holder is a specialty electrician, specialty master electrician, or an electrical trainee authorized to work without supervision. A red stripe will indicate that the holder is a trainee that requires supervision.

The new certificates and cards will be issued beginning this month. The Electrical Program will not be re-issuing cards/licenses to those who have active licenses/certificates. The new licenses/certificates will be issued through standard renewal, a new license, or a request for a replacement card.

Electricians and trainees must have their certification wallet card with them when on the jobsite along with a separate form of government photo identification.

● **Electrical Board Recruitment – Applications Due Before September 15, 2011**

One Electrical Board position is vacant – Telecommunications Utility representative. The Governor is seeking applicants for this position. Candidates should work for and represent telecommunications utilities in Washington. The term will expire on July 7, 2014.

Applications should be submitted to the Governor. Supporting recommendations and information should also be mailed to the Governor's office. Board information and applications are available on the Governor's website at: http://www.governor.wa.gov/boards/default.asp

- **Pre-inspection Requirements For Wind and Photovoltaic Systems**

Before getting your wind or solar photovoltaic system inspected, you must prepare the documentation necessary for the inspector to be able to quickly evaluate your installation for code compliance. WAC 296-46B-445 and 690(3) have similar requirements.

A design review must be available to the inspector, on the jobsite, at the 1st inspection. It is helpful to contact the inspection office and provide the design review before requesting inspection. The design review must include copies of the equipment manufacturer's installation information, and a one-line diagram of the design and calculations used to determine voltage and current within the system. The diagram must show all equipment, devices, overcurrent protection, conductor sizing, grounding, ground fault protection, and all system interconnection points.

The design information will also be required before your installation qualifies for production incentives provided by The Renewable Energy Cost Recovery Program. Incentives start at $0.15 - $1.08/kWh for solar photovoltaic systems and $0.12 - $0.33/kWh for wind systems. Gathering the information required by the inspector before completing the job will help you successfully complete the inspection process and be prepared to get your installation certified for the production incentives. If you have questions about the production incentives, contact Phil Lou, Solar Energy Specialist with the WSU Energy Program at (360) 956-2132 or loup@energy.wsu.edu. For additional program details, see WAC 458-20-273.

- **Work Outlook Is Improving**

The program has seen a growth in permit sales this past year. Of special interest is the growth in plan review workload – up about 50% over last year. Plan review work typically indicates increased electrical construction activity about 5-6 months after the review is completed.

So we can accommodate the current workload and be prepared for a continued increase in inspections, we are bringing back 6 non-permanent electrical inspectors, 1 plan reviewer, and 1 customer service specialist. In the last two years, the program laid off 52 inspection and technical staff and 8 customer service staff due to the recession. Bringing these staff back will enable us to more quickly respond to your needs for inspection, plan review, and licensing.

- **Provisional Permits Eliminate the Emergency**

In 2004, the provisional permit label was created to allow an electrical contractor to begin their electrical work immediately in an emergency situation when a permit is required. Provisional labels allow an electrical contractor to immediately have a valid permit when doing service or maintenance work where the exact nature of the repair is unknown until the electrician is on the job site. In L&I jurisdictions the provisional label is an inexpensive and acceptable substitute for a normal permit for two working days.

Use of the provisional label is similar to a Class B label. The electrician must fill the label out and post it on the jobsite prior to beginning the permitted work. The 2nd half of the label must be returned to the local L&I office and a regular permit purchased within 2 working days after beginning the permitted work. For more information, see WAC 296-46B-907.

- **Correction:** In the July 2011, Temporary Services article, the WAC reference should have been WAC 296-46B-901(15) instead of WAC 296-46B-902(15).

- **Answer to This Month's Question of the Month: C) 3 years** – WAC 296-46B-915

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 7** | **July 2011**

● **This Month's Question of the Month** - Street lighting circuits may be grounded using a multi-grounded neutral system. A) True, B) False – *See the correct answer on page 2.*

Safety Tip of the Month!

Before removing any fuse from a circuit, be sure the switch for the circuit is open or disconnected.

When removing fuses, use an approved fuse puller and break contact on the hot side of the circuit first.

When replacing a fuse, install the fuse into the load side of the fuse clip first, then into the line side.

● Note From The Chief

The Electrical Program's fiscal year ended June 30th. The program's performance goals will be shifting with a focus on better customer service and improving our ability to reduce the effects of the underground economy and people who do not get electrical inspections.

The program's performance measures for the next year include:

- Statewide, doing 94% of all electrical inspections within 48 hours after the inspection request,
- Helping the contractors who received more than the average number of corrections per inspection in the last fiscal year improve the quality of their work – reduce corrections by 15%,
- Increasing focused compliance activity on the underground economy – contractor licensing, electrician certification, and no permit violations,
- Reduce the turn-around time for processing an electrical license to 3 days, and
- Reduce the plan review backlog to 2 weeks for an average set of plans.

We are now beginning the peak summer/fall season for construction activity. Having clear goals will help us to provide better and more consistent service for our customers.

Despite the continuing turbulent economy and large staff reductions during the past two years, we have provided high quality service. It is often difficult to balance between our mission and budget restrictions. Our continued focus on holding expenditures to the lowest possible level, continuous improvement, and meeting/exceeding our performance goals will be key to our future success in the continued improvement of our customer service.

We are in this together – creating affordable excellence.

● Changes To Electrical Trainee Education Requirements

Effective **July 1, 2011,** electrical trainees must have **32 hours** of basic electrical classroom education to renew or reactivate their training certificate. This is to enforce changes enacted in the 2010 legislative session to RCW 19.28.161.

This means that for a trainee certificate to be renewed or reactivated on or after July 1, 2011, and prior to June 30, 2013, the trainee must have 32 hours of reported basic classroom instruction regardless of when the renewal fee was paid.

I paid my renewal fee prior to June 30, 2011 how many hours will I need to renew or reactivate my training certificate?

*If you had 16 hours of training **reported** to the department by June 30, 2011, your certificate will be issued with the 16 hours. If your hours are not **reported** to the department by June 30, 2011, you will need to complete 32 hours for your certificate to be issued.*

Effective **July 1, 2013,** electrical trainees will be required to have **48 hours** of reported basic classroom education to renew or reactivate their training certificate.

If your training certificate is placed inactive for lack of education, the class sponsor must have reported the required hours – 32 hours - July 1, 2011 to June 30, 2013 or 48 hours - July 1, 2013 and later.

Correction Reduction Initiative

The program's Correction Reduction Initiative will continue next year. In July, a new list of contractors will be developed for the coming twelve months. This last year, the identified contractor group reduced their corrections per inspection by over 20%. This year's group will again include all contractors who have more corrections per inspection than the average electrical contractor.

Because the need to reduce corrections is more important than ever, the program will continue to be proactive in helping all contractors reduce their corrections and the related reinspections. We will be closely watching for contractors who routinely have the same type of corrections on their jobs or are not improving the quality of their jobs. We will be contacting and working with those contractors to reduce their corrections. Contractors should use their monthly reports and these contacts to improve the quality of their jobs, while saving them and the Electrical Program time and money.

Temporary Services – Modifying and Installations by General Contractors

Inspectors have been finding many temporary service installations that have been modified after the initial inspection approval. If any installation is modified, after the approval, a supplementary electrical permit and inspections is required. An example is when a hard wired feeder is connected to a temporary service panel board. Temporary services and systems may be expanded without a supplementary permit and inspection if all the connections are made by plug and cord. A permit and inspection is required when any hard wired connections are made.

Several general contractors have been found installing temporary services and feeders that are not in compliance with the WAC requirements. General contractors are allowed to make limited temporary power connections, using the owner's exemption, per WAC 296-46B-901(15). The contractor must be registered as a general contractor under chapter 18.27 RCW. The contractor can install a single electrical service per address for the purposes of temporary power during the construction phases of a project. General contractors cannot install feeders from that service unless they are cord and plug to a 50 ampere or smaller receptacle at the service. This means, a general can never connect a job site office or trailer to the temporary service. The general will need to contract all hard wired work to an electrical contractor.

The general contractor must meet all the following conditions and limitations:

- The installation is limited to the mounting and bracing of a preassembled pole or pedestal mounted service, the installation of a ground rod or ground plate, and the connection of the grounding electrode conductor to the ground rod or plate;
- The total service size does not exceed 200 amperes, 250 volts nominal;
- The service supplies no feeders;
- Branch circuits not exceeding 50 amperes each are permitted, provided such branch circuits supply only receptacles that are either part of the service equipment or are mounted on the same pole;
- The general contractor owns the electrical equipment;
- The general contractor has been hired by the property owner as the general contractor for the project;
- The general contractor must purchase an electrical work permit for the temporary service, request inspection, and obtain approval prior to energizing the service.

Answer to This Month's Question of the Month: B) False – 2008 NEC 250.20

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 6** | **June 2011**

This Month's Question of the Month – A contractor using a provisional permit to begin electrical work must return the contractor portion of the label to L&I within ___ days after affixing the jobsite portion of the label. A) 1, B) 2, C) 15, D) 20 – *See the correct answer on page 2.*

Safety Tip of the Month!

The Consumer Product Safety Commission reports a significant upward trend in injuries from the use of inflatable rides and structures.

CPSC's annual report shows 4 fatalities and 4,900 injuries requiring emergency room treatment in the U.S.

Make certain the ride/structure you and your family uses has an L&I operating label. The label is issued when the ride/structure has had an annual inspection and the operator has insurance. The label must be visible on all amusement rides and structures.

Note From The Chief

Electrical Technical Specialist, Doug Erickson, long time member of the L&I Electrical Program, is retiring June 30th. Doug and I have worked together through an amazing range of roles, challenges, and successes during the thirteen years we have worked together. He has been a tremendous leader, an invaluable member of my leadership team, a trusted colleague, and a great friend.

He has had a tremendous impact on our program and the electrical industry. During his time at L&I, Doug has inspired new ideas, driven innovation, and taken risks to improve the program and the industry. He helped lead the Electrical Program into the 21st century.

I will miss Doug and I know that all of us who have worked with him over the years will greatly feel this loss. At the same time, I am happy to know that he will be enjoying a well earned retirement from his many years of public service. I am very grateful for his insights and support during these past years.

Please join me in congratulating Doug on a job well done and wishing him well in his new adventure.

Passed That Specialty Electrician Exam? Keep Your Training Certificate?

When you pass a specialty electrician examination and receive your specialty certification, you are only allowed to work in that specialty as an unsupervised specialty electrician. If you want to work in or gain on-the-job experience towards qualifying for another specialty or the journeyman electrician examination, you must keep your training certificate in active status and work under the appropriate supervision in that specialty.

It is not uncommon for an individual to qualify for and pass a specialty examination and then let the training certificate lapse. That is OK, but it prevents the individual from gaining additional experience towards another specialty or towards the journeyman electrician examination. Many specialty electricians keep their training certificate active so they can continue to do work in all the electrical scopes and gain additional experience.

If you do not have an active training certificate and are found to be working in a specialty where you do not have certification, you and the contractor you are working for may receive civil penalties. You will not be allowed to use that experience towards examination qualification.

Class B Permit Labels – When They Are Not Allowed

WAC 296-46B-908(7)(b) lists the specific types of work where a Class B, random inspection, label cannot be used.

- Areas classified as Class (I), Class (II), or Class (III),
- Areas regulated by NEC 517 or 680,
- Any work where electrical plan review is required, or fire alarm, nurse call, lighting control, industrial automation/control or energy management systems.

Class B labels can never be used for these types of work, no matter how small the scale of the work being done. Several other articles regarding Class B restrictions have been written. See the *Electrical Currents* for January 2010,

January 2007, December 2006, and December 2005. All back issues are available at: http://lni.wa.gov/TradesLicensing/Electrical/WhatsNew/Currents/default.asp.

Installers should also be aware that the Class A list of permit exempt items does not include devices like: fire/smoke detectors, nurse call stations, burglar alarm detection devices, etc. A complete list of Class A exempt items is in WAC 296-46B-901(8)(b).

- **Traffic Management Systems**

WAC 296-46B-010(15) through (22) describes the inspection process and equipment approval process for traffic management systems. A traffic management system can provide signalization for controlling vehicular, pedestrian, or rolling stock traffic. Traffic management systems include:

- Traffic illumination, signal, and monitoring systems,
- The electrical service cabinet and all related components and equipment installed on the load side of the service cabinet supplying electrical power to the traffic management system, and
- Signalization systems necessary for the operation of a light rail system.

WAC 296-46B-010(16) lists the standards allowed to be used in evaluating traffic management system components. Paragraph (21) allows the local government jurisdiction (i.e. transportation authority) to act as the certifying authority for the safety evaluation of all components. This includes all equipment and wiring. There is a requirement that the service cabinet must be listed by an approved electrical testing laboratory or only contain electrical testing laboratory listed components. If the local government traffic jurisdiction chooses to evaluate equipment for safety, it must identify the controller cabinet or system components with an identification plate (WAC 296-46B-100(38). The plate must be inside the cabinet and may be attached with a suitable adhesive.

WAC 296-46B-010(17) says induction loops or similar circuits with no electrical hazard do not require inspection. WAC 296-46B-100(22) says that conductors of different circuits are permitted to be in the same raceway without regard to voltage characteristics provided all electrical conductors are insulated for the maximum nominal voltage of any conductor in the raceway. This allows limited energy and line voltage conductors to be in the same raceway. Fiber optical cables may also be in a raceway with electrical conductors. Fiber optical cables will only have a voltage rating when they are a multi-use cable (i.e. fiber and electrical within the same cable).

WAC 296-46B-010(20) describes the requirements for underground inspection. When a raceway is installed without an open trench (e.g. plowing, boring, etc.), a visual inspection is not required. The permit purchaser must coordinate the visual inspection of raceway installed in open trenches by providing a written inspection request at least two working days prior to the day inspection is needed. If the underground raceway inspection cannot be made at the time of inspection, the raceway may be covered after inspection by the local government jurisdiction's (i.e. traffic) project inspector/designee. Written documentation of the local government jurisdiction's inspection must be provided to the department when requested. The written documentation must contain: the date and time the inspection was done, location, installing firm, owner, type of raceway, size of raceway, depth of raceway, and the project inspector/designee's name and contact information.

Jurisdictions are considered to be owners of the traffic management systems when doing electrical work on their system or on the system of another jurisdiction when working under a valid Interlocal agreement as permitted by chapter 39.34 RCW.

Jurisdictions with an established chapter RCW 19.28 electrical inspection authority (i.e. city electrical inspectors) and WSDOT may only perform electrical inspection on their rights of way or for each other by Interlocal agreement. Transportation authorities are not allowed to do electrical inspections except for underground conduit only as allowed in WAC 296-46B-010(20)(b).

- **Answer to This Month's Question of the Month:**

B) 2 – See WAC 296-46B-907(2)(e).

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 5** | **May 2011**

This Month's Question of the Month – Grounded DC photovoltaic arrays shall be provided with _____ to reduce fire hazards. A) flame-proof support structures, B) high temperature-limiting switches, C) arc-fault protection, D) DC ground-fault protection – *See the correct answer on page 2.*

Safety Tip of the Month!

CPSC, National Electrical Safety Foundation Urge Consumers to Plug Into Electrical Safety

The U.S. Consumer Product Safety Commission (CPSC) and the National Electrical Safety Foundation (NESF) are urging consumers to look for and correct electrical safety hazards in their homes this May as part of National Electrical Safety Month.

Note From The Chief

The Electrical Program is embarking on a long-term plan to become even more efficient and effective. We will be using the Toyota Production System's LEAN process to eliminate waste and standardize our processes. LEAN is a set of concepts, principles, and tools used to create and deliver the most value while consuming the fewest resources. Why LEAN? L&I's goal is to engage all program staff in continuous improvement to achieve the best quality, the shortest lead time, the lowest cost, the best safety, and the highest morale. LEAN has proven to achieve results.

LEAN addresses problems at the systems level and within individual processes. Customer needs define value for the process. LEAN distinguishes steps that create value from those that do not. It reduces waste and builds in quality. LEAN is a systematic problem solving method that is where successes and failures can be evaluated and documented. Using LEAN means successes can be repeated and implemented on a statewide basis.

Inspectors in the Everett and Tukwila offices have teamed together to create this new culture within the Electrical Program. For them, there are three primary areas of focus:

- Improving our response times for our inspections,
- Focusing our compliance efforts on the underground economy and contractors that do not get electrical inspections, and
- Improving the quality of our compliance efforts.

The results of their efforts will be implemented across the state next winter. As a result, our customers will see better and more consistent overall service and a reduction in the negative impacts of the underground economy.

A LEAN culture is based upon continuous improvement and respect for people. We will continue to challenge ourselves to provide a better product with less waste. This aligns with L&I's mission of *Keeping Washington Safe & Working* by providing safety, service, and value.

WAC Rule Change – Trainee Education Requirements

Beginning July 1st, all trainees seeking to renew their training certificate must have completed 32 hours of electrical trainee classroom education. On July 1, 2013, renewals will require 48 hours of classroom time. This legislation passed in the 2010 legislative session. There are no alternatives to having the required training.

Electrical Board

The Electrical Board has lost 33 years of board experience. Gloria Ashford - Chair, Jim Simmons – Vice Chair, and David Bowman are all ending their third terms on the board. They have each served as your representatives for eleven years. Each has been a great asset to the board and the electrical industry. They will all be greatly missed. Their years of service have shown them to be leaders in state service and the electrical industry.

No Access For Inspection

By far, the number one correction issued by electrical inspectors continues to be for no access to do the inspection. There are several things to remember when a contractor talks with their customers and requests inspections. The best way to request an inspection is by using L&I's on-line inspection request system. The

request will be downloaded by the inspector the next morning and placed in the inspector's queue for inspection. Statewide, 89% of inspections are made within 48 hours. Longer delays may happen with sudden upswings in inspection requests or in remote areas.

Especially in occupied buildings, the contractor must ensure the customer is aware of the requirement for inspections and the need to work with L&I's inspectors in scheduling inspections. This can be accomplished in several ways. Many contractors provide the customer a flyer that details the requirement for inspection, the customer's responsibility to help to ensure the inspection is made, and that the customer will be held accountable if they block inspection access or fail to help the inspector to make the inspection happen.

If the contractor enters a comment in the on-line system asking the inspector to arrange access prior to making the inspection, the inspector will make two calls to the customer asking for a call back. If the customer fails to call back, the inspector will go to the site in an attempt to make the inspection. If the customer is available, the inspection will be made. If not, the inspector will leave a *No Access* door hanger and asses the contractor a trip fee. The responsibility for arranging access is then shifted back to the contractor. The contractor must work with the customer to ensure the inspector can gain access to make the inspection.

Many contractors immediately send the customer a certified letter or other confirmed method informing the customer that if they fail to communicate with the inspector and arrange the inspection they will be accountable – possible loss of power, citation, etc. The contractor should talk with the local inspection supervisor and communicate all actions being taken to ensure that the inspection will be made. If the contractor makes a good faith effort in arranging the inspection access, L&I will shift its focus to the customer in making the inspection happen. If the contractor is making every effort to arrange the inspection, additional fees and compliance action towards the contractor will likely be unnecessary.

Contractors should work with the local supervisor to help reduce the number of no access inspections. Eliminate the frustration and time and money wasted on these inspections. Once an inspection has been arranged with a customer, the inspector will do everything possible to make the inspection when it was arranged. If the inspector is delayed, for any reason, the inspector will make every effort to contact the customer as soon as possible to explain the situation and make other arrangements.

- **Photovoltaic Fees**

For electrical permit fee purposes, photo voltaic (PV) systems should be considered a generator. WAC 296-46B-906(5)(g) tells you to use the appropriate residential or commercial new service or feeder section to calculate the fees for a permanent generator. Each direct current PV system has at least one inverter. For fee calculation, the output rating of the largest inverter will determine the initial feeder size. Each additional inverter will be considered an additional feeder when calculating the total fee.

When micro inverters, 500 watts or smaller, are connected together and supply a single output circuit, the entire micro inverter circuit will be considered as one feeder. Additional circuits supplied by micro inverters will be considered to be separate feeders.

When an overcurrent device or panelboard (e.g. circuit breaker, combiner panel, etc.), rated 30 amperes or larger, is on the input side of an inverter, the device's/panel's output wiring will also be considered to be a feeder.

In a new residence: For a PV system with three inverters with an output rating from 0 to 200 amperes, the fee for the PV system will be $148.80 (i.e. $93.40 for the first inverter and $27.70 for each of the two remaining inverters).

In a new nonresidential installation: For a PV system with three inverters with each having an output rating from 0 to 100 amperes and a DC combiner with an overcurrent device rated 50 amperes, the fee for the PV system will be $264.70 (i.e. $93.40 for the first inverter and $57.10 for each of the two remaining inverters and $57.10 for the combiner overcurrent device).

- **Answer to This Month's Question of the Month:** D) DC ground-fault protection – NEC 690.5

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 14 No. 4** **April 2011**

This Month's Question of the Month – Power factor is the ratio of _____ power or watts to _____ power or volt amps. – *See the correct answer on page 2.*

Safety Tip of the Month!

Don't even think about bypassing or removing a ground fault circuit or arc fault circuit protection device(s).

They protect lives and property!

This is a serious violation and you will lose your license or certificate if you do it.

- **Note From The Chief – protect yourself by using a licensed electrical contractor**

Homeowners, beware of unscrupulous general contractors who say they are qualified to do your electrical work. Any contractor doing any type of electrical work – wiring, maintenance, repair, etc. – must be a licensed electrical contractor. Here is a true story example of how you can be taken advantage of.

An unknowing homeowner hired a general contractor to do a kitchen remodel. The general told the homeowner no electrical permit was necessary even though outlets and lighting were being relocated and added. The homeowner did ask if the general was going to do the electrical work or if he was going to sub it out. The general responded by saying the John (not the real name) was an electrician and worked for him, the general part time.

The first problem happened when digging outside the basement stairs. The general dug up and damaged the utility service conductors going to the house. John made the repair by cutting the wires, relocating them, and re-splicing the wires. It was only three wires. That evening the exterior garage's mercury vapor light outside came on and within a couple of minutes turned red hot and began to burn. Luckily, the homeowner was outside and knew enough to quickly turn off the garage panel's main breaker. Unluckily, the homeowner was shocked after just getting close to the panel. Luckily, the homeowner knew enough to retreat and turn off the main breaker to the house. The next day, the general had his "electrician" – John – make a repair and actually connect the correct wires together. Two days later, the general "had" to undo the wires again and relocate them because they were in the way of a concrete pour.

Unfortunately, that was not the end to the story. The general installed several can lights and had to call the "electrician," John, in again to troubleshoot. Most of the wire nuts were loose and the wiring had come apart. One receptacle in a nearby bedroom is still not working after the remodel.

The homeowner has since hired a legitimate electrical contractor to make the necessary repairs, but only after paying the general contractor several thousand dollars for his high quality electrical work. The only good news in this story is that nobody was killed as a result of the incompetence of the general and his "electrician."

PROTECT YOURSELF! Use the L&I website to look up your contractor and his compliance history.

http://www.lni.wa.gov/TradesLicensing/Contractors/HireCon/default.asp

Make certain he has an electrical contractor's license. You can also check the contractor's permit history at:

http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermInsp/LookupPermInspect/

- **Nonprofit Organizations – Contractor Exemptions**

In the 2003 Legislative Session a bill was passed that allows an electrical contractor licensing exemption for a nonprofit corporation under 26 U.S.C. Sec. 501 (c)(3). The bill also allows the nonprofit corporation to use appropriately certified electricians and supervised trainees to perform electrical installation, repair, or maintenance on the corporation's facilities. Volunteer electricians and trainees cannot receive any type of compensation for the work.

The total value of the electrical work (e.g. design, labor, materials, equipment, permits, etc.) – entire project – cannot exceed $30,000. The work cannot be parceled into smaller portions in an attempt to stay below the $30,000 maximum.

Although exempt from electrical contractor licensing, the nonprofit corporation must obtain the proper electrical work permits and ensure they follow all electrician certification and trainee supervision ratio requirements of chapter 19.28 RCW. Any group attempting to purchase a permit under this new exemption should be prepared to supply a copy of the "qualifying" letter from the Internal Revenue Service (IRS) granting the entity the right to claim 501(c)(3) non-profit status. According to federal requirements, U.S.C. Sec. 501 (c)(3) nonprofit corporations include corporations, and any community chest, fund, or foundation organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary, or educational purposes, or to foster national or international amateur sports competition, or for the prevention of cruelty to children or animals. None of the corporation's net earnings may benefit any private shareholder or individual. No activities may carry on propaganda, influence legislation, or intervene in any political campaigns for public office.

The statute change did not grant these exemptions to U.S.C. Sec. 501(c)(4) entities (e.g. civic leagues, social welfare organizations, and local associations of employees with earnings devoted exclusively to charitable, educational, or recreational purposes).

- **Air Conditioner or Heat Pump – Class B Usage**

A heat pump is considered to be the same as an air conditioner for the purposes of using a Class B inspection label. The use of a Class B label is allowed for the:

- Like-in-kind replacement of the internal wiring of an air conditioner/heat pump; or
- Like-in-kind replacement of and air conditioning/heat pump unit not exceeding 240 volts, 30 minimum circuit amps (MCA) when the unit is connected to an existing branch circuit.

- **Identification Plates/Labels/Signs**

It is important that identification plates/labels/signs be installed to identify the equipment/circuit that is being disconnected. This identification plate/label/ sign must be an identification plate as described in WAC 296-46B-100(38) or an adhesive label approved by the electrical inspector.

Identification plates are required in several locations in the National Electrical Code. Here are some locations:

110.22	Disconnecting means		690.5	PV system – ground fault protection
404.6	Switches		690.7	PV system – bipolar source and output
430.75	Motor control circuits		690.53	PV system – DC power source
430.102	Motor controllers		690.64	PV system – Inverter output connection
430.113	Multiple sources of power		700, 701, 702	Emergency, legally required, and option standby systems (700, 701, & 702.8)
490	Over 600 volts (490..21, .22, & .44)		705.12	Interconnected system – inverter output connection
520.27	Stage switchboards			

Don't forget to install all the required identification plates, labels, and signs that help remind people of electrical hazards.

- **Arc Fault Circuit Interrupters – New Products**

There are now some solutions available that will allow contractors to meet National Electrical Code AFCI requirements. With the release of the UL listed Cooper AFCI receptacle you no longer have to change out the panel if an AFCI breaker won't fit. It will also work for protecting some circuit extensions. Siemens also now has a listed 2-pole AFCI breaker that will be useful in some situations.

- **Answer to This Month's Question of the Month:**

Power factor is the ratio of true power or watts to apparent power or volt amps.

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector | **Vol. 14 No. 3** | **March 2011**

This Month's Question of the Month – During contact with an energized component, what amperage level will cause loss of muscle control in a male, in a female? *– See the correct answer on page 2.*

Safety Tip of the Month!

The impedance of the fault current path plays a critical role in removing dangerous voltages from metal parts and preventing electric shock by facilitating the opening of the branch-circuit overcurrent protection device.

Be sure you don't take this path for granted. Do not rely on the earth as a grounding conductor. Terminate equipment-grounding conductors properly and make sure all mechanical connections are secure.

One final tip: Only a GFCI can protect you from direct contact with an energized conductor.

● Note From The Chief

Field inspectors are continuing to find many installations with serious corrections where the inspection is not ready to be passed. In January alone, L&I inspectors issued 4,092 serious corrections. Any one of these corrections is considered serious enough to prevent inspection approval or the authorization to energize power. Each installer and contractor should review the *Electrical Currents – Note From The Chief*, November and December 2010, for more on this problem. (All back issues are available at: http://www.lni.wa.gov/TradesLicensing/Electrical/WhatsNew/Currents/default.asp.)

Inspectors are expected to stop the inspection process and to issue a trip fee for the inspection not being ready when they encounter inspection stopping problems. As stated in the November 2010, *Electrical Currents*, *"The contractor must then pay the assessed trip fee, make the corrections noted, and do the required quality assurance before requesting a re-inspection. When the inspector returns, the remainder of the job will be inspected, including the repairs for the corrections previously noted. The job should be ready to be passed each time an inspection request is made."*

Being *"ready to be passed"* means that the contractor and/or the assigned Administrator/Master Electrician have ensured that the work is installed to code and complete before the inspection request is made. Contractors who continually have the same serious violations may be issued additional civil penalties for their improper work.

● "Classified" Retrofit Kits

Electrical testing laboratories are increasingly using the electrical testing laboratories' classification process in lieu of product listing or field evaluation as a safety evaluation method for retrofit kits and other product evaluations – especially for LED lighting and other energy conservation measures. L&I has not accepted the classification process as a substitute for listing or field evaluation, except for replacement circuit breakers. Unlike product listing, testing laboratories do not consider classification as a complete product evaluation process.

Testing laboratories have told L&I that they cannot assure the use of a classified product without field inspection by the electrical inspector. Testing laboratories have also indicated that the use of a classified product should be restricted to within a product that is also listed by the classifying laboratory.

L&I will not allow the use of a classification label for:

- Any work related to the use of a Class B, random inspection, inspection label;
- Ensuring product acceptability for stand-alone electrical equipment; or
- Use on any equipment that has and engineer approval label.

L&I will allow the use of a classification label if all the following conditions are met:

- The classified product is only used in a retrofit situation.
- The installer:
  - Buys an electrical permit and gets all electrical work inspected;
  - Follows all the manufacturer's instructions and codes;
  - Makes a copy of the manufacturer's instructions available to the inspector during the inspection;

  - Applies a label, made of a background color contrasting to the listed product, in a visible location near the classified product that says, *"This equipment contains a Classified product that may present a risk of electrical hazard if the manufacturer's instructions are not followed exactly."* The label's font must be Ariel size 16 bold. This label may be an identification plate as described in WAC 296-46B-100(38) or an adhesive label approved by the electrical inspector. This label is in addition to any labeling required by the manufacturer's instructions or the electrical standard used to manufacture the classified product; and
  - Removes all parts of the replaced component(s) so that the new configuration is clearly evident to the consumer (e.g. Remove the ballast and associated wiring when a LED classified retrofit kit is used to replace fluorescent ballast).
- The classified product is used to replace a component(s) on or within a product already listed or field evaluated by the testing laboratory classifying the replacement component – that is: a UL classification label should only be used within a UL listed product; an ETL classification label should only be used within an ETL listed product, etc.

● WAC Rule Public Hearing

Before the Governor's Executive Order last fall, the Electrical Program opened the electrical rules for proposed changes. After carefully evaluating each of these proposals, the department determined that the proposals did not meet the Executive Policy Office's guidelines for moving forward with a critical rule change. The only section that will be amended will be to implement of SHB 2546 – a requirement for additional trainee classroom education as required by the legislature in the 2010 legislative session.

At the January 27th Electrical Board meeting, the board discussed the options for rule making (e.g. NEC 2011 adoption, technical and administrative changes, etc.) and unanimously recommended to only move forward with the implementation of SHB 2546.

A public hearing will be held April 26, 2011, on the rule proposal at the L&I building – 7273 Linderson Way, Tumwater. Written comments will be accepted between March 22nd and April 26, 2011. The rule will be effective on July 1, 2011.

● Service Connection By An Electric Utility

The authorization for an electric utility to connect or re-connect an electrical service is limited in the electrical law. For all services – both new and existing services where power has been disconnected from the premises wiring system – there must always be a permit posted on the jobsite. The electric utility is only authorized to connect or re-connect power based upon RCW 19.28.101(2) and (5). Below are the only scenarios when a utility is authorized to connect or re-connect power:

1. RCW 19.28.101(5) – The electric utility may connect a new service if:
   - Approval has been granted by the electrical inspector; and
   - Approval is posted or otherwise communicated by the inspector to the utility,
2. RCW 19.28.101(2) – The electric utility has the discretion to connect a service when:
   - It can verify that a permit is posted on the jobsite; and
   - The electrical inspector has received a written request for inspection, but cannot complete the inspection within twenty-four hours; and
   - If the service relates to a mobile home, a current building permit from the local building official is posted.
3. RCW 19.28.101(5) – The electric utility has the discretion to immediately reconnect a service that has been increased in size or relocated before the inspector's approval if an electrical permit is posted.

In scenario 2 and 3, the utility may choose to not connect power until the inspection is complete and approved. For instance, if the customer asks the utility to disconnect power so that a main service breaker or other equipment can be replaced or repaired and the service has not been increased or relocated, the utility is only allowed to re-connect power when all the requirements in scenario 1 or 2 are fully met.

● Answer to This Month's Question of the Month:

15 milliamperes in a male or 9 milliamperes in a female for .43 seconds (IEEE).

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 14 No. 2** **February 2011**

This Month's Question of the Month – A child was born in Boston, Massachusetts, to parents who were born in Boston, Massachusetts. But, the child was not a US citizen. How is this possible? *– See the correct answer on page 2.*

Safety Tip of the Month!

During a typical year in the U.S.A., home electrical wiring problems account for 67,800 fires, 485 deaths, and $868 million in property losses.

Home electrical wiring causes twice as many fires as electrical appliances *(U.S. Fire Administration).*

Get your electrical work permitted and inspected!

Note From The Chief

The Electrical Program's online permitting and inspection system has reached record levels of usage. 95% of all contractor permits and 44% of all property owner permits are now purchased online. 78% of contractor and 26% of property owner inspection requests are now made online. If you have not made the move to online permitting and inspection requests, you are losing out on the savings in time and money that are available to you. Speed up your projects by going online for your permitting, inspection, and license renewal needs.

Study Before You Test

Everyone wanting to take an electrician examination must be prepared. It is the individual's and the contractor's responsibility to ensure that the individual gets the training necessary to become a quality electrician. Electrician exam results show this is not happening on a consistent basis. Electrician candidates had an overall 50% pass rate. This may sound low, but, almost 2/3rds of all 01 journeyman candidates passed their examinations.

Of primary concern are specialty electrician candidates. Specialty candidates had a very low pass rate of 38%. All specialty contractors and candidates should make a better effort to ensure the candidate receives appropriate training. Quality electricians will improve the safety of electrical installations for consumers and will save the contractors they work for time and money by doing better work that does not require call backs for repairs.

LED Street & Area Lighting Retrofits

Because of energy conservation measures and new technology, local governments and developers are retrofitting existing street and area pole lights with LED technology. LED's provide extremely long lamp life and use much less electricity to operate.

Many existing installations utilize heavy-duty lamp holders in the luminaire. National Electrical Code (NEC) 210.23(B) & (C) allows non-residential fixed lighting units to be supplied by 30, 40, or 50 ampere branch circuits when the luminaire uses a heavy-duty lamp holder. This creates a problem, with LED retrofits, where an existing 30, 40, or 50 ampere branch circuit is installed. The new LED lamps do not use heavy-duty lamp holders. When a standard lamp holder is used, NEC 210.23(A) limits the branch circuit size to 15 or 20 amperes.

In order to accommodate the changing technology and provide an appropriate level of safety, L&I will allow the use of existing 30, 40, and 50 ampere branch circuits on non-residential street and area lighting LED retrofits when all the following conditions are met:

- The LED replacement luminaire must be listed or a listed or a classified LED retrofit kit must be used;
- The branch circuit's overcurrent protection device must have ground fault circuit interrupter protection for personnel;
- There must be supplementary overcurrent protection for each ungrounded conductor at the base of each lighting pole or adjacent junction box;
- The supplementary overcurrent protection device must be no larger than 125% of the calculated continuous ampere load for the lighting on that pole;
- The supplementary overcurrent protection device must be capable of being removed without exposing any live parts; and

- At the access point to each supplementary overcurrent protection device, a label must be installed that says that access to the supplementary overcurrent protection device is limited only to certified electricians or linemen as allowed in RCW 19.28.261(6)(b).

This variance will allow LED retrofits to occur without changing the underground wiring for the branch circuit. Meeting these minimum installation requirements will maintain the safety of the installation at a level that meets the intent of the NEC and will allow the continued use of most existing lighting branch circuits.

● (06) or (09) Licensing & Certification?

We have been asked to clarify which specialties are allowed to do work associated with various technologies used in the installation of telecommunications type equipment.

During the development of the telecommunications bill in the 2000 legislative session, telecom industry representatives agreed that telecom workers would only install voice, data, video, and limited audio cables at signal levels well below the level of limited energy (typically Class 2) power conductors. For this concession, telecommunications workers were not required to have individual certification. The installation and maintenance of limited energy power conductors, including all power over Ethernet (POE) circuits, remained exclusive to the (06) limited energy specialty scope requiring (06) contractor licensing and (06) electrician certification.

RCW 129.28.400(13)(b), allows "*other limited-energy interconnections associated with telecommunications systems or appliances.*" This exception allows the installation of local plug-in Class 2 power to supply fixed telecommunications equipment (e.g. plug-in power supply to phone equipment or wireless alarm panel, etc.).

Below are some examples of some possible licensing and certification scenarios:

Example:	License Type
1. Power over Ethernet – where the power for the equipment is superimposed over the data cable supplying the equipment.	06
2. Separate low voltage and data cable(s) supply equipment.	06
3. Equipment is powered using a listed Class 2 power supply/transformer plugged into a local electrical outlet, installed by an electrician, where there is no external power feed (i.e. data only) from the equipment to other remote equipment/device.	09 or 06
4. Cable only installation (excluding coaxial only or fiber optical cable)	06
5. Cable only installation (including only coaxial only or fiber optical cable)	09 or 06

● What Questions Are Allowed To Be Answered By An Electrical Inspector

Electrical inspectors are faced with many different types of questions from consumers, contractors, and electricians. WAC 296-46B-010(2) ensures a level playing field by placing limits on the types of questions an inspector may answer. Inspectors cannot *"lay out work or act as consultants for contractors, owners, or users."* Inspectors are only allowed to answer specific code questions.

Many people call to ask if they *"can just run something by"* the inspector. Inspectors are not allowed to enter into discussions about project bidding or design or other *"what if"* scenarios. It is not the Inspector's role to choose or even make recommendations between design or installation options for the installer. The installer is responsible for the entire decision making process from bidding, to permit fees, to installation.

If you have a specific question about a code interpretation or would like to discuss corrections you have been issued, the inspector or the supervisor is available to get you an answer. If you need to arrange inspection access, take advantage of your ability to communicate directly to the inspector by entering detailed access instructions in the comments field on your inspection request. If access conditions change at the last minute, our customer service staff is available to assist you.

● Answer to This Month's Question of the Month:

D) The child was born before 1776.

Washington State Department of Labor & Industries

ELECTRICAL CURRENTS

Newsletter from the Office of the Chief Electrical Inspector

Ron Fuller, Chief Electrical Inspector **Vol. 14 No. 1** **January 2011**

Safety Tip of the Month!

Plan every job and think about what could go wrong.

Use the right tools for the job.

Think safety. Live Safely!

This Month's Question of the Month

If an administrator or electrician fails to renew their certificate within ____ days they must retest and pass the exam before being allowed to renew. A) 30 B) 60 C) 90 D) 120 – *See the correct answer on page 2.*

Note From The Chief

The Electrical Program is responding to contractor and consumer requests by adding two members to the E-CORE compliance team. New team member Rand Jones (206-515-2773) will be primarily working Regions 1 &2 – King County and north. A second position will be working primarily in Region 5 – central Washington from Oregon to Canada. The E-CORE team is very effective in reducing the effects of the underground economy, eliminate fraud, improve the economic vitality of business and individuals, improve the electrical safety of people and property, and increase awareness of the underground economy's negative impact on consumers and businesses; but, there is always more work for them.

Electrical Board Recruitment – Applications Due Before February 1, 2011

Four Electrical Board positions are due for re-appointment by the Governor on July 7, 2011, and one electrician position is now vacant. We are seeking applications from: two electrical contractors, two electricians, and one electrical manufacturer. Contractor candidates must be an owner, member of a firm, or represent an electrical contractors' association. Electrician candidates must be a certified electrician and not have ownership in an electrical contracting business. The manufacturer candidate must represent an electrical manufacturer or an electrical manufacturing association.

The re-appointed positions have a four year term and the vacancy will serve until July 7, 2014. Applications should be submitted to the Governor. Supporting recommendations and information should be mailed to the Governor's office. Board information and applications are available on the Governor's website at: http://www.governor.wa.gov/boards/default.asp

WAC Rule Update

On November 17, 2010, the Governor signed Executive Order, 10-06. The order suspends non-critical rule development and adoption until December 31, 2011. The order and the guidelines from the Governor's Executive Policy Office recognized the benefits of a stable regulatory environment.

House Bill 2546 passed during the 2010 Legislative session. It increases the required classroom education hours an electrical trainee must have in order to renew their electrical training certificate. The department is required to adopt rules in order to implement HB 2546 by July 1, 2011. Before the Executive Order was signed, the Electrical Program opened the electrical rule for proposed changes. The program developed proposals and also received several proposals from stakeholders. After carefully evaluating each of these proposals, L&I has determined that none meet the Executive Policy Office's guidelines for moving forward with a critical rule change. Rulemaking for WAC 296-46B will proceed, but will be limited to the implementation of HB 2546.

Split System HVAC Equipment

Because of energy conservation concerns and new equipment technology, HVAC contractors are installing more and more split system HVAC units. The systems that are being manufactured meet the intent of the National Electrical Code (NEC); but, not necessarily the letter of the code. In order to better align current industry standards, equipment manufacturing processes, and the NEC, L&I inspectors will accept the following variances from the NEC.

- In one and two-family dwellings units, a disconnecting means is not required for the indoor unit(s) of a split system HVAC/R system if:
  - An indoor disconnecting means is not required by the manufacturer;
  - The indoor unit(s) is exclusively powered from the outdoor unit; and

  - The outside unit's disconnecting means is lockable and identifies the location of the indoor unit.
- For split system installations, Type TC cable may be used in any location allowed for nonmetallic-sheathed cable in NEC 334 if all the installation requirements in NEC 336 and 334 and WAC 296-46B-334 are met.

Field Evaluations & Temporary Power For Equipment Testing

It is not uncommon for electrical inspectors to find equipment that has not been listed by an approved electrical testing laboratory. When unlisted equipment is found, the inspector will issue a correction notice to the installer. The equipment must not be operated until the inspection is approved.

The owner or installer must contract directly with an approved electrical testing laboratory or for industrial equipment as allowed in WAC 296-46B-903 an approved engineer to get the equipment approved and labeled. You can find a list of all approved laboratories and engineers at:

http://www.lni.wa.gov/TradesLicensing/Electrical/Install/default.asp

In an effort to expedite the equipment evaluation process, approved testing laboratories and engineers may immediately begin the evaluation process without requesting permission from L&I. Laboratories and engineers no longer need to request permission to perform field evaluations or engineer reviews. Except for the owner's final report, no reports are necessary. The equipment may only be operated temporarily as necessary to allow completion of the evaluation process. When the laboratory or engineer approval label is placed on the equipment:

- The laboratory or engineer will send the final evaluation report to the equipment owner within 30 days; and
- The installer may request a re-inspection to remove the correction notice so that the equipment can be operated on a permanent basis.

During the re-inspection, the inspector may post a correction and make a referral to the laboratory or engineer if a problem with the equipment is noted.

When Is A Permit Refundable? How Much?

WAC 296-46B-901(12) restricts refunds. The WAC says no refund is allowed for any permit:

- That is expired;
- Where the work has begun; or
- Where an inspection request has been made.

This can be a problem for individuals or contractors who begin the work and, for some reason, do not finish all the permitted work after obtaining the permit. It can also be a problem for those who mistakenly buy a permit in L&I's jurisdiction when the work is actually being done in a city that does their own inspections. L&I allows permit refunds based upon the intent of the WAC and good judgment that does not penalize the permit purchaser. Save yourself and L&I time and money! When buying your electrical permit, make sure you are buying it from the correct inspection jurisdiction.

A refund will be allowed for a permit where:

- The work has begun; but, an inspection request has not been made – $25 of the permit fee will be retained to cover the cost of the refund;
- The work has begun and a first inspection request has been made – $25 of the permit fee will be retained to cover the cost of processing the refund. If the work is in a city jurisdiction and an L&I inspector goes to the site, a dollar amount equal to the portal to portal cost of the first inspection will be withheld in addition to the $25 processing cost; or
- The work has begun and a refund request has been made after an L&I inspection has been made – $25 of the permit fee will be retained to cover the cost of processing the refund. If the work has been ongoing and a previous inspection(s) has been made, a dollar amount equal to the fee line(s) amount for all the work inspected, partial or complete, will be withheld in addition to the $25 processing cost.

Answer to This Month's Question of the Month:

C) 90 days. (See RCW 19.28.061(4) and RCW 19.28.211(2).