STATE OF NEBRASKA

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Tritium Exit Lights

SOMETIMES, "you can't get there from here" is a great truth, when trying to install exit lights in an existing structure. A very attractive alternative to hard wired lights are self-luminescent ones. All one must do is fasten them in place, and the job's done…no pipe, no wire, no fishing, etc. These lights glow due to the radioactive beta decay of Tritium.

The following information on self-illuminated exit lights is provided only to make you aware of facts. This is neither an endorsement, nor criticism of the product.

1. Tritium is a radioactive isotope of hydrogen, the chemical symbol for which is H^3.
2. Tritium decays by beta emission, and has a half life of 12.3 years. Over time, tritium exit signs will become dimmer, with a probable useful life ranging from ten to twenty years.
3. Self-luminescent exit lights may contain as many as 25 Curies of tritium.
4. A Curie is the old standard unit of radioactivity, equal to the amount of a radioactive isotope that decays at the rate of 3.7×10^{10} disintegrations per second. A Curie, which is roughly equivalent to the activity of one gram of radium, is a very large unit of measure, and has been replaced by a [much, much smaller] unit called a Becquerel, which is one nuclear decay per second. In other words, 1 Curie = 3.7×10^{10} Becquerels. (To put this in perspective for an electrician, it's somewhat like the difference between Farads and pico-Farads of capacitance. A Farad is a very large unit; most capacitors are in the micro 10^{-6}, nano 10^{-9}, and picofarad 10^{-12} range.)
5. The beta particles emitted by tritium decay are very low energy, and cannot penetrate the tubes used in exit lights to contain the H^3. In other words, as long as the exit light is undamaged, there is no danger from radioactivity.
6. If a self-luminescent exit light has the tubes inside it broken, up to 25 Curies of radioactive H^3 can be released. That would amount to a radioactive source comprising 925,000,000,000 decays per second, each releasing a beta particle.
7. The low energy beta particles emitted by tritium decay pose no great health hazard if kept outside the body, however, inside the body they have the ability to damage tissue. Tritium is a gas that reacts with the atmosphere and becomes radioactive water vapor. Then it collects on all the surfaces it touches in the vicinity. Tritium is relatively harmless in short exposures to small doses.
8. Tritium exit signs are licensed by the Nuclear Regulatory Commission under a general license. Owners are required under terms of the license either to return them to the manufacturer or dispose of them

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This is license renewal year! Mark your calendar!

If your address has recently changed, your mail will only be forwarded for a limited time. If you've moved, please notify this office of your new address! All electrical licenses expire December 31, 2006, and although our mailed reminder is a courtesy, it's easy to forget license renewal without it. We won't be able to remind you if you no longer have your mail forwarded.

….A NOTE FROM THE CHIEF

WELL, it is hard to believe it is 2006. It seems like just yesterday we had the Y2K ordeal. I guess we'll continue to move forward until the next big cyber crisis. Remember when all we had to worry about was lead in our pencil and paper in the bin? I used to think that was the way to go but today, without my computer, I am lost.

I would like to thank everyone for a good year, and I'd especially like to thank the Western part of the state. We have been without an inspector for some time in District 1, and I know it has been rough. Thank you for your cooperation and help.

I would like to clear up the issue of tapping #14 conductors from #12s at receptacle outlets. Article 210.19 covers this; I've left out the parts of the article which do not apply, in the interest of brevity:

210.19 Conductors — Minimum Ampacity and Size

(A) Branch Circuits Not More Than 600 Volts

(1) General Branch-circuit conductors shall have an ampacity not less than the maximum load to be served.

(2) Multioutlet Branch Circuits Conductors of branch circuits **supplying more than one receptacle** for cord-and-plug-connected portable loads **shall have an ampacity of not less than the rating of the branch circuit.**

Note to (2) Because the loading of branch-circuit conductors that supply receptacles for cord-and-plug-connected portable loads is unpredictable, it is safest simply to require such circuits to have an ampacity that is not less than the rating of the branch circuit. ***According to 210.3, the rating of the branch circuit is actually the rating of the overcurrent device.***

(4) Other Loads Branch-circuit conductors that supply loads other than those specified in 210.2 and other than cooking appliances as covered in 210.19(A)(3) shall have an ampacity sufficient for the loads served and shall not be smaller than 14 AWG.

Exception No. 1: Tap conductors shall have an ampacity sufficient for the load served. In addition, they shall have an ampacity of not less than 15 for circuits rated less than 40 amperes and not less than 20 for circuits rated at 40 or 50 amperes and only where these tap conductors supply any of the following loads:

(c) Individual outlets, **other than receptacle outlets**, with taps not over 450 mm (18 in.) long.

Now in a nutshell you see 210.19[A][2] prohibits reducing the conductor size on branch circuits supplying more than one receptacle and [a][4] covers other loads [which could be an individual receptacle] but exc.1 [c] prohibits using this exception on receptacle outlets. **The bottom line is you can't use #14 tails off of #12 branch circuit conductors for receptacle outlets on 20 amp circuits.**

Randy Anderson
Chief State Electrical Inspector

….FROM MELISSA HAMILTON, SECRETARY II

Just a reminder that the State Electrical Division changed all of its e-mail addresses last year. The new e-mail addresses are: firstname.lastname@sed.ne.gov

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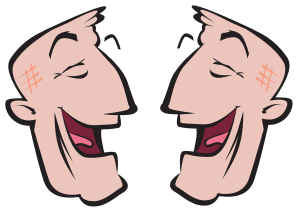
Hi!! This is for any contractor of any type doing work in a county with a population of more than 100,000:

We received a call from the Department of Safety and Labor Law concerning a contractor who was turned in for not complying with the *Contractors Registration Act, Neb. Rev. Stat. "48-2101 to 48-2116.* Did you know such a law exists for all contractors (be it electrical to construction) doing work in Nebraska counties with a population of more than 100,000?

The hyper-link to the applicable web page is: http://www.dol.state.ne.us/legallaws/Contractor%20Registration%20Act.pdf



Once there were four engineers traveling in a car. While they were traveling to their destination the car stalled on them.

The first engineer who was a mechanical engineer said, "don't worry it's probably engine problems. I"ll just pop open the hood and take a look at the motor".

The second engineer, who was an electrical engineer, said, "no, no ,no. it's an electrical problem. Let me look at the fuse box and I'll find the problem".

The third engineer, who was a chemical engineer, said, "its just a problem with the fuel. Flush all of the gas and replace it with new gas and you'll see that the car will be fine."

Then the three engineers looked at the fourth who was a "Microsoft" computer engineer. And his response was... "Why don't we just get out of the car, shut all of the doors, and then open them again and get back in and start it!"

Code Question Corner

Q. The home I wired called for a 10-kW electric furnace and I installed the proper size feeder. The mechanical contractor installed a 15-kW furnace and said to disconnect as many elements as I needed to get down to 10 kW. Am I changing the listing on the electric furnace?

A. You yourself can't actually change the listing, but you will void the listing, because 110.3(B) requires equipment to be installed and used in accordance with any instructions included in the listing or labeling. Besides which, 424.28 says the nameplate has to have the normal rating in volts and watts, or volts and amps, and disconnecting the elements will change both watts and amps from those on the label from the factory.

Besides everything else, why did the mechanical contractor install a 15KW unit in the first place? Was it because he had it on hand, or was it because he did a Manual J calculation, and needed 15KW? If that's case, those disconnected elements very easily could be hooked back up to provide more heat, and cause a problem later.

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Q. An extended stay motel has small apartment type suites with a kitchen, living room, bathroom and one or two bedrooms. Are these units required to be wired as dwelling units?

A. They meet the definition of a dwelling unit, per article 100, but they are also a guest room, so the answer is "kinda sorta." 210.18 says:

Guest rooms and guest suites that are provided with permanent provisions for cooking (a counter top microwave is usually not considered permanent provision for cooking, but a built-in may be….one should consult the AHJ) shall have branch circuits and outlets installed to meet the rules for dwelling units.

210.60(A) specifically states that if a guest room or suite is provided with permanent provisions for cooking, receptacle outlets have to be installed in accordance with all the applicable rules of 210.52. 210.18 and 210.60 then pretty much get you GFCI and AFCI requirements, plus locations for receptacles, except that 210.60(B) allows latitude for where receptacles must be mounted. The total number of receptacles has to be the same as would be required for a dwelling unit, but they may be located conveniently.

INSPECTOR'S COLUMN

….from Kim Farnstrom, District 6 Inspector

HAPPY NEW YEAR! I hope everyone had a safe and productive 2005. I want to thank all the contractors for their good workmanship and timely notifications on inspection requests. Remember the days when you mailed off your application, which took a couple of days, we processed it the next day, and mailed it back, which took a couple of more days, ending up at least 5 days in process. Today you can process an application on line and have it in your hands in about 5-10 minutes. I know this because I stopped by a job while working outside of my area; the electricians were on site working, and did not have their job site ticket. Which by the way should be posted at the job site. Anyway, they said they had an application filed. I was not working my normal area, so I had no access to the information on my computer. I stopped back 10 minutes later and they gave me the inspection number. It turns out they had not filed an application so their office filed one on line and got them a number pretty quick. Anyway, if you are not utilizing our online services, I would like to suggest you give it a try. Right now out of my 312 applications 88 are e-applications. Give Melissa a call in the Lincoln office and she can get you set up.

With the arrival of the New Year comes a few new requirements. If there is metal rebar in the footings of a building or structure it has to be used as a grounding electrode.

250.50 Grounding Electrode System.

All grounding electrodes as described in 250.52(A)(1) through (A)(6) that **are present** at each building or structure served shall be bonded together to form the grounding electrode system.

(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, **located within and near the bottom of a concrete foundation or footing that is in direct contact with the earth,** consisting of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (? in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means.

The grace period is over. Several building inspectors have said jack hammering out the footing to bond to the rebar is not an option, and they will reject the footing if this is done. A few solutions, if you are not contacted, and the footing rebar is inaccessible.

1. Install another footing, beside the lowest footing of the

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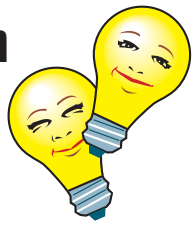
Tritium Exit . . . (Cont'd)

by approved means at the end of their useful life.

9. The Nebraska Department of Health and Human Services System (HHSS) licenses and tracks tritium exit lights. There is a $70 fee per year, per facility, payable to HHSS, to register self-luminescent lights. Disposal fees are variable, and handled by the private sector. Manufacturers of self-luminescent exit lights will take the lights back at the end of their life for a fee.

Q: Do you know how an electrician tells if he's working with AC or DC power?



A: If it's AC, his teeth chatter when he grabs the conductors. If it's DC, they just clamp together.

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Inspector's Column . . . (Cont'd)

building or structure, at least 20' in length, and bond to the rebar in it. Don't forget to call for an inspection so we can see the bond to the rebar and verify the length.

2 Install a bare #4 copper conductor, at least 20' long, encased in at least 2" of concrete, along side the lowest footing of the building or structure. Again call for an inspection before concrete is poured.

3 Contact your electrical inspector to discuss other ideas or options.

Coordination and inspection of this requirement is essential. Once we get everyone in the loop it should not be a problem. I have been educating all of the area contractors that do that type of work for a year now. I have inspected 90% of the footing grounds in the past 3-4 months. It is working, and it is not a big problem.

Another requirement is the use of the EMT fittings that are listed rain tight. The old compression fittings lost their UL listing for rain tight, and cannot be used as of Jan. 1 2006. Several contractors in my area have been using them for several months now. They are available in sizes up to 2".

In conclusion; I would like to thank everyone in my area for their patience, and understanding, while I was on vacation. You are a good group of Contractors. Thank you!

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