



MUNICIPALITY OF ANCHORAGE  
DEVELOPMENT SERVICES DEPARTMENT

# Topics from Past Electrical Newsletters

1999 - 2/07

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**3 way switches and stairs.** The CABO Code requires switches to be operable without traversing the stairs. The NEC says provide a wall switch at each floor level when you have 6 or more stairs. Since the intent is to turn on the light before you go on the stairs don't put the switch over the stairs. **December 2001**

**60 degree conductors and 90 degree fixtures (luminaries).** The use of a "nonmetallic sheathed cable interconnection device" may be the solution when the remodeling customer wants a 90 degree fixture without replacing the cable all the way back to the switch. NEC Article 334.40 (B) allows such devices to be used in concealed spaces without a junction box for rewiring in existing buildings. Use at least 18" of NM-B and call for inspection before pushing the cable back into a concealed space. **February 200**

**725.52 Clarification on mixing class 2 and class 3 wiring in conduit with other power/ lighting systems.** The 2002 NEC included an exception that allows class 2 and 3 to be reclassified and installed as class 1 when the class 2 and 3 markings are eliminated and the entire circuit is installed using the wiring methods and materials in accordance with Part II, Class 1 circuits.

Since Class 1 circuits can be installed with other systems as long as you meet the various requirements, this should be a useful exception and worth reading up on. **October 2003**

**Air exhaust vents:** Direct vent heating appliances or other equipment that carry moisture that may form ice should not be placed over electrical services, for obvious reasons. In addition, the appliance manufacture's installation instructions will often require vents be kept specified distances away from the electrical equipment. **April 2004**

**Arc fault protection** requirements will allow an arc fault interrupter device to be located a within 6 feet of the branch circuit overcurrent device when inside a metallic wiring method. This will be a help when dealing with existing panelboards for which arc fault circuit breakers are not available. The new devices have been thru the listing procedures and were waiting for the code change allowing their use. It's interesting to note the portion of non-metallic cable **not protected** by the arc fault devices must be installed in a metallic wiring method. **December 2004**

**Arc-Fault Circuit –Interrupter Protection starts 1-1-02.** The currently adopted 1999 National Electrical Code contains the following:

210-12 (a) Definition: An arc-fault circuit interrupter is a device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

210-12(b). Dwelling Unit Bedrooms. All branch circuits that supply 125-volt, single phase, 15 and 20 ampere receptacle outlets shall be protected by an arc-fault circuit interrupter(s). This requirement shall become effective January 1, 2002.

The arc fault protection is built into circuit breakers, similar to a ground fault circuit breaker. I've talked with the local suppliers of General Electric, ITE, Siemens, Cuttler Hammer and Square D equipment, and the breakers are available and will run about \$40.00 apiece. There will be a problem with remodels that have existing panelboards that arc faults circuit breakers won't be available for. I would suggest adding a sub panel or replacing the old panel. The arc fault devices will be required on permits that begin with the number 02, which would be a permit number issued after 1-1-02. If the residential permit was issued before 1-1-01 and it's first 2 numbers are 01, arc fault circuit breakers will not be required even if you pay and pick up the

electrical permit after 1-1-02.

A considerable amount of information is available on the Internet, including demonstrations with arcing and sparking. Search for arc-fault or by panelboard manufacturer. **December 2001**

**Are slack wires on light fixtures required by the new International Building Code for the Anchorage earthquake zone?** IBC 1621.2.5.22 refers you to the Cisca Guidelines (Ceiling and Interior Systems Construction Association) which requires lighting fixtures less than 56 #'s to have 2 # 12 slack wires, for more fixtures weighing more than 56 #'s to be supported by approved hangers and for pendant-hung lighting fixtures to be supported directly using # 9 or approved alternate without using the ceiling suspension for direct support.

Slack wires are installed so as to prevent the fixture from dropping more than 6" if the ceiling came down. The angle of the wire between the attachment points should be close to vertical and the wire loose.

Note: The electrical section has not been requiring a slack wire on smoke detectors, as it's not a light fixture. **June 2003**

**Automatic transfer switch and optional power.** Ed Carlson has pointed out that the NEC Article 220.35 allows the use of utility records as a method of determining service loads for an existing structure. This would also be an appropriate method for sizing a generator when a generator is to be added to an existing facility to support the entire building load and automatic transfer switching is used. Thanks for the input. **April 2005**

**Automatic transfer switch and optional power.** It's well known that optional standby systems allow the user to select the loads to be supplied. Turning off heavy loads or shifting the loads around works good when you have a small generator and a manual transfer switch. Where we've run into some problems is when the transfer switch is automatic and the connected load is the entire building service. Article 702.5 Capacity and Rating requires that "an optional standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time". If you are switching the whole building onto the generator then it has to be large enough to carry whatever is on when that happens; water pump, heating, lights, refrigerator, head bolts and such. If you want to autotransfer a building with a generator smaller than the calculated load there should be load shed to drop off some portion of the load when the generator reaches its capacity. **February 2005**

**Automobile radio installation area.** Should it be classified as Article 511, Commercial Garages Repair and Storage. After discussion of opposing view points, perusing the NEC and finally referring to NFPA 88b, the electrical section concluded it should not be a classified location. However, the building code still requires that areas accessible by fueled vehicles has to have electrical equipment that can cause a spark or that operates at a high enough temperature to ignite fuel to be installed above 18". **August 2002**

**Bathroom branch circuits. 210-11-(c)-(3)** There is an exception to having only receptacles on a bathroom receptacle circuit: Where the 20-ampere circuit supplies a single bathroom, outlets for other equipment within the same bathroom shall be permitted to be supplied in accordance with Section 210-23(a). If you want to take a circuit to each bathroom and put fan, lights and receptacle on that circuit, that's o.k. as long as its not overloaded. **December 2000.**

**Bathroom vanity lights:** Most of the bathroom fixtures we deal with have a solid back plate with a k o for a cable to enter thru. These don't require a box behind. There is another set up we've been seeing that has a box size opening and no ½" knock out. The installation instructions

for these bath vanity fixtures call for a box in the wall with the splices inside the box. This fixture requires the use of a box; the cable cannot be brought into the wiring compartment and the splices can't be in the wiring compartment. Do not hole saw a knock out or bring the cable into the compartment **June 2002**

**Bonding around water meters** and other equipment that is likely to be disconnected for replacement or repair is found in 250.68(B) Effective Grounding Path. The "other equipment" mentioned would include pressure reducers and back flow prevention devices and such.. When installing the bonding jumpers make sure you go around all of those devices. **February 2004**

**Bonding communication conduits.** Conduit stub ups are normally provided for communication wiring from an outlet box in a wall up to a ceiling space. These are usually less than 10 foot pieces and are considered to be for physical protection as well as future access. On most projects the communication wiring then goes on J hooks thru the ceiling space. However, some projects have the conduits continue thru the ceiling space to terminate in close proximity to a cable tray. These conduits that extend out thru the ceiling should be bonded to the cable tray as required by NEC 392.6. **February 2004**

**Box and cable installations in suspended ceilings.** Installations of **boxes** in suspended ceilings are covered by Section 370-23(d). Supports. Boxes can be attached to the ceiling-framing members or to specially installed and identified support wires; fastened at both ends so as to be taut. The installation also has to comply with Section 300-11(a). Cables are also securely supported as by Section 300-11(a) and at intervals as specified by the appropriate articles. **August 2001**

The inspector will consider a box or cable supported if you pull down on it and it doesn't move. This would mean that the box has to be securely attached to the support means and that the support means, if flexible, would have to be nearly vertical. Related item: The slack wires required by the building code must also be installed on the vertical axis and allow no more than a 6" drop. They also can't be used for the support of wiring methods according to the building code. **August 2001**

**Cable ties (ty raps)** are suitable for use as a strap for MC cables when approved for the area/environment. The 99 code allowed the use of cable ties to secure AC and nonmetallic cables while skipping over the change in the support section of MC. However, the external physical characteristics of MC are identical to AC. There are times when a ty rap is the best way to secure the cable, such as when dropping a circuit down to aircraft cable or chain supported luminaries. **February 2003**

**Caddy stud clips for mc cable.** B-line 3/8 cables to stud clips, type bg-6, are being used to secure m c cables. The clips do not hold the cable tight. Contact the distributor for the proper fastener. The MOA does not approve BG-6 for 12-2 mc cable. **October 1999**

**Chugach would like the line side wiring** to connect to the top terminals in CT cans for consistency's sake, whether it's overhead or underground. I understand it's required for the underground feeds as it provides a loop for frost heaves or ground settling. **February 2004**

**Circuit directory or circuit identification, 408.4.** Every circuit and circuit modification shall be legibly identified as to its clear, evident, and specific purpose or use. The identification shall include sufficient detail to allow each circuit to be distinguished from all others. The identification shall be included in a circuit directory that is located on the face or inside of the panel door in the case of a panelboard, and located at each switch on a switchboard. This commentary is a quote

from the 2005 NEC Handbook:

"Section 408.4 was revised for the 2005 Code to require that the identification for every circuit supplied by a panelboard or switchboard be legible and clearly state the specific purpose for which the circuit is used. Circuits used for the same purpose must be identified as to their location. For example, small appliance branch circuits can supply outlets in the kitchen, dining room and kitchen countertops. Identifying the circuits as small appliance branch circuits is not acceptable; instead they should be identified as "kitchen wall receptacles," or "dining" room receptacle," or kitchen countertop receptacles left of sink". Circuit directories containing multiple entries with only "light" or "outlets" do not provide the sufficient detail required by this section."

**October 2006**

**Classified location documentation.** All areas designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment at the location: "NEC500-3 (b)". When we come out to inspect a classified area the plans with the areas shown are the first thing we'll ask for. **August 2000**

**Cold weather...below 20 degrees...** local amendments prohibit installation of NM cables and thermoplastic insulated wires below 20degrees. Warm up the conductors during installation.

**December 2000**

**Colorado Jim Jiffy Clip.** Has been turned down for many years now, first as a support clip for NM cable ( Romex ) and then when they tried to introduce it for MC cable use. The clip not only moves in the wall but the cables easily move thru the clip giving no support or gripping power required for cables that need to be secured and supported within 12 inches of the boxes. It's just too loose to meet the requirements of 334-10. The local Erico representative knows these fasteners are not approved by MOA Building Safety. **January 1999**

**Combustible wall surface, mud ring to far back?** If your box is within ¼" of the surface, as required by 314.20 for a non-combustible surface, Anchorage electrical inspectors will accept using a fire rated caulking to protect that ¼" in lieu of a add a depth ring. If it's over ¼" use an add a depth ring.

Over the last 8-10 years most everyone doing commercial work has gone to using ¾ rings on 5/8 rock; that's worked out good for getting the proper depth. **June 2003**

**Commercial 200 amp service laterals** in Chugach Electric's area are required to be rigid, not liquid tight flexible metal conduit (sealtite) as required for a residential 200 amp services.

**August 2003**

**Common area branch circuits.** Branch circuits required for the purpose of lighting, central alarm, signal, communications, or other needs for public or common areas of a two-family or multifamily dwelling shall not be supplied from equipment that supplies an individual dwelling unit.

This means that if you have more than one meter on a building then common area equipment, including heat systems, well pumps and such, must be fed from their own meter. For example, a duplex with a boiler heating two units would have either 1 meter or 3. **August 2004**

**Common area equipment: 210-25 requires** such as furnaces, laundry, fire alarm and such not to be fed from equipment that supplies an individual unit. This means a separate meter for

common equipment if each unit has its own meter. However, if all units are fed from one meter then you don't need a separate meter for common equipment. The requirement for access overcurrent devices for occupants must still be met. **June 2001**

**Concrete encased electrodes (also called Uffer or rebar bond).** The 2005 NEC will require the concrete encased electrodes (and all other electrodes that are an inherent part of the structure) be used on new structures to form the grounding electrode system. An exception has been provided which does not require the concrete encased electrode to be used if it requires disturbing the finished concrete. Our Muni handout, Guidelines for Concrete Encased Electrodes, will be changed to require bonding to the footer rebar in all structures, including houses. Our current procedure of stubbing out a rebar and having it inspected as part of the rebar inspection by the structural inspector has been working well. Most problems we've had are from confusion regarding commercial and residential inspection procedures. **The structural inspector can sign off for up to triplexes and then only when the rebar is stubbed out as shown by handout.** Commercial projects and alternate bonding methods must be installed by the electrical contractor and inspected by an electrical inspector. **December 2004**

**Concrete encased electrodes** must be installed at the bottom of a foundation or in a footing, not in a floor slab. You do not need an electrical permit to call for a grounding electrode inspection. **April 2002**

**Cover panelboard interiors.** There has been several more mud or paint sprayed panel and meter interiors. Put the cardboard piece provided on the meter sockets and cut cardboard to protect panel interiors. The inspectors will start noting the lack of physical protection on the rough inspections now as an item that will require correction after a warning period that will end on March 15<sup>th</sup>, 2002. **February 2002**

Current carrying capacity (rating) of a 100 amp Sq D QOM circuit breaker at -10c ( 14 F ) is 135 amps, a 200 amp c b carries 275 amps. A 20 amp QO would be rated at 26 amps and a 40 goes for 50 amps. These figures are from a chart on the SQ D website under Current Carrying Capacity in Special Applications. Does anyone have comments or personal experience with any problems? I called the SQ D technical help line; the person I talked with hadn't thought about it and thought circuit breakers were always inside. The concern is for circuits inside a heated structure with the CB outside or with additional panels spliced on to the load side of a main CB, etc. **April 2001**

**Covering of combustible material at outlet boxes. 410.13 (THIS IS A REMINDER)** Any combustible wall or ceiling finish exposed between the edge of a luminaire (fixture) canopy or pan and an outlet box shall be covered with noncombustible material. Handbook comment follows:

"Luminaries must be designed and installed not only to prevent overheating of conductors but also to prevent overheating of adjacent combustible wall or ceiling finishes. Hence, it is required that any combustible finish between the edge of a luminaire canopy and an outlet box be covered with a noncombustible material or luminaire accessory. See NEC 314.20 for the requirements covering combustible finishes".

Where luminaries are not directly mounted on outlet boxes, suitable outlet box covers are required. **April 2003**

**Current transformers, relays and other devices cannot** be installed in panelboards and other listed equipment without voiding the listing of the equipment. A contractor recently

installed a listed watt meter package in a tenant space panelboard. He thought he was following the meter manufactures installation instructions. The instructions showed connecting into a blank picture labeled panel with another separate picture of some wires under lugs showing how to install and connect the wiring. The inference was to put the CTs in the panelboard and connect the other associated wiring to the main lugs. I call that misleading but they never really said to "install in the panelboard". When dealing with adding devices to equipment the rule of thumb is "changing the schematic or rating of a listed piece of equipment voids the listing". Another contractor was directed by a manufacture to connect power going to a dryer duct booster fan into the dryer junction box on a clothes dryer, changing not only the schematic but the connected load as well. A better solution was to install a current sensing RIB at the wall outlet. **March 2001**

**Damage to wire from drywall routers** appears to be on the upswing again. NM and MC cables are a quick wiring method but are easily damaged during drywall installation. The NEC requires a minimum of 6" of conductor from the point in the box where it emerges from the raceway or sheath and if the box is less than 8" in any dimension each conductor must be long enough to extend 3" past the opening. If the conductor is not long enough after the damaged portion is removed the wall may have to be opened to find slack or replace the wire. Drywallers should also be cautioned not to cram the wires back in the box with the hammer handle as conductors can be kinked, also a very bad idea. **December 2000**

**Dedicated equipment space.** Informal opinion received from NFPA: "In my opinion, the dedicated equipment space up to six feet above the equipment is reserved for the cables and conduits, etc. that are entering or leaving the equipment requiring the dedicated space. From the top of the six foot space to the structural ceiling foreign systems are allowed however, protection from leaks etc. must be provided where applicable". From: Mark R. Hilbert, Advisory Service Staff, NFPA

At the request of a local contractor I had sent in for an informal opinion from NFPA on our interpretation that electrical conduits cannot cross over a dedicated space unless going to that equipment. Let's consider this confirmation on not run running conduits across dedicated spaces and leave some room for future access. **March 2001**

**Dedicated space above panels, switchboards and motor control centers** as described in 110-26 (f). The NEC says no piping, ducts, or equipment foreign to the electrical installation shall be located in this zone. Some installers take this to mean you can run a conduit from an electrical panel directly over the foot print of another panel, just because they are both electrical panels! I think that if the requirement were just to keep liquid from dripping onto a panel then ducts or equipment wouldn't have been mentioned. This requirement also reserves room for conduits to enter the panel. Route conduits around equipment with dedicated footprint space. **March 2000**

**Different codes different requirements for the same area.** The Building Code type "S3" occupancy places repair garages and parking garages in the same group. The NEC treats these areas very differently. The NEC article 511, "Commercial Garages, Repair and Storage" separates garages where repair work is performed from parking garages where no repair work is performed. A garage where repair work is performed is classified as hazardous by the NEC and includes a requirement for explosion proof wiring in a portion of that area. A parking garage where repair work is not performed is not classified by the NEC. **December 2000**

**Disconnecting means. 620-91(c)** The disconnecting means required by Section 620-51 shall disconnect the elevator from both the emergency or standby power system and the normal

power system. Where an additional power source is connected to the load side of the disconnecting means, which allows movement of the car to permit evacuation of passengers, the disconnecting means required in Section 620-51 shall include an auxiliary contact. This contact shall cause the additional power source to be disconnected from its load when the disconnecting means is in the open position. **February 1999**

**Drywall support of devices:** Provided by the USG corporation, manufactures of drywall, states that "**Gypsum boards used in the ceiling** are not designed to support light fixtures or troffers, air vents or other equipment. Separate supports must be provided". The accommodation we have reached with this installation requirement is for the fixture to have its weight supported by attachment into a structural member, with toggle bolts used to snug up and close gaps. This would apply to light track of more than 2' length or a fixture weighing more than 2 pounds. **June 2002**

**Duplexes or townhouses** are often completed without the adjacent unit being completed. This could leave open conductors exposed at the headbolt outlet at the unit roughed in next door. If the inspector is doing a final on one unit, make sure the exposed wiring next door that could become energized is covered. **February 2002**

**Electric discharge fixtures** can be cord connected if terminated in a grounding type attachment plug cap, busway plug or have a fixture assembly with a strain relief and canopy. The fixture assembly would be supplied from the manufacturer and be part of a listed assembly. A flexible cord attached to a 4 sq. box with a stress relief connector won't work. See 410-30-(c) (b). **October 2001**

**Electrical equipment encroaching on right of way.** There are some buildings in the older parts of Anchorage that are built on the property line with an ally behind. You need to get an easement variance if the meter or other electrical equipment extends over the property line. Go to the Right Of Way Dept. at 4700 Bragaw (the public works building). **August 2000**

**Electrical services Handout E-03** replaces all the old handouts referring to electrical services. The new handout refers to the standards published by the utilities and then goes into the additional requirements of the NEC. Gas pipe bonding, ground rods, existing 3 wire feeds, inspections and such are covered. Suitable reading for electricians and homeowners alike. **August 2000**

**Elevation of appliances and other ignition sources,** Mechanical amendment **23.20.304.3** Occupancies with flammable and combustible liquids that have devices capable of generating a glow, spark or flame that shall not be located below 18" does **not mean** that the area in a parking garage or warehouse **without repair work** being performed must be wired as a hazardous location. It just means no receptacles, switches or such devices below 18". **December 2000**

**Elevator safety disconnect contacts.** Elevator service personnel require a way to be able to disconnect any auxiliary electrical power source to the elevator during service repairs. These Safety Switch Electrical Interlock Kits are available factory installed or in kit form for field installation for most 30 – 600 ampere safety switches. These should be specified for the job during the design phase when ever backup power is included as part of the elevator system. It is often forgotten and not supplied when the elevator disconnect is installed. Only those electrical interlock kits listed to be used with the manufacturers disconnect may be installed by the electrical contractor. **February 1999**

**EMT installed in the ground** in Anchorage? Figuring out how a particular soil is going to react with conduit is not within our area of expertise. In the Anchorage the call is not to install EMT in ground slabs or underground; ok in above grade slabs. The NEC mentions using supplemental corrosion protection. The UL Electrical Construction Equipment Directory notes that "Supplementary nonmetallic coatings presently used have not been tested for resistance to corrosion". The coatings I have seen applied were required by job specs and were considered as being in addition to the minimum requirements of the NEC. **June 2001**

**Enstar** has requested we let the electricians know there has been a problem with the ground rods and grounding electrode conductors being located where they have to dig to install gas lines. As a result, they are in the process of drafting a policy that prevents installing rods and conductors within 3 feet of the gas meter location. I expect this will be less of a problem when we adopt the 2005 since concrete encased electrodes will be required for all structures, including houses. **April 2005**

**Equipment grounding conductor and remodels.** The equipment grounding conductor required in conduit systems by the local amendment does not need to be added to an existing conduit unless a conductor is being added or replaced. **January 2001**

**Equipment grounding conductor in conduits for class 1, 2, or 3?** The question came up if these circuits were installed in conduit would they have to have an EGC because of the muni amendment deleting most metallic wiring methods as a grounding means. NEC 250-122(I) says class 1, 2, and 3 equipment must be grounded when system grounding is required by Part II and VIII of Article 250. So, there would be cases where the equipment must be grounded and in those cases an EGC would be required in the Municipality of Anchorage. **February 2004**

**Equipment not 3rd party certified?** Standard Operating Procedure for the electrical inspector is to **red tag** the equipment and note the relevant information on the inspection report. We also forward the information to the State of Alaska Attorney Generals Office. They have contacted the Manufacture or supplier to inform them of the 3rd party certification state law. **January 2001**

**Exceptions to utility standards.** Utility standards may have requirements that exceed the NEC requirements, such as larger conduits, enclosures and such. Building safety division inspectors will accept written exceptions given by the utility company when a copy is provided to BSD. Please have the copy for the inspector when the service is being inspected. **April 2005**

**Existing 3 wire service entrance cable.** Much discussion has gone into using an existing 3 wire service entrance cable when the service has been changed out and the new service has the main breaker outside and the grounding electrodes connected as per current codes. The existing 3 wire cable may be uninsulated and the neutral was usually bonded inside at the panel. Now the neutral must be insulated, the panel inside the house can no longer have the neutral bonded to the can and an equipment ground wire must be in the cable unless its less than 6 foot long. Is the any case to be made for using the 3 wire cable beyond saving the customer big bucks?

The requirement that the neutral be insulated and not bonded a second time in the inside panelboard must be followed **to prevent a parallel path for current flow in water piping** and other metallic paths. I think an exception could be taken for the equipment grounding conductor, for example the code allows a separated equipment grounding conductor for installation of grounded receptacles on 2 wire systems and for branch circuit extensions. True, we are dealing with a feeder here but again in these situations it would be 100 amps or less. If anyone cares to comment on the 3 wire problem I would appreciate their input. Meanwhile, the

municipality electrical inspector will accept a 3 wire feed only if the grounded conductor is **insulated**; the neutral is **bonded only at the main disconnect** and a bond wire sized to the panel feeder overcurrent device is installed from an equipment grounding bar in the panelboard to the grounding electrode system. All equipment grounds in the panelboard have to be separated from the neutral bar and any means bonding the neutral bar removed. **September 1999**

**Existing installation issues as related to working clearances, access and exiting in electrical rooms and dedicated working space** continue to be difficult to resolve. Once an exception is given, say switchgear with reduced working clearance as an example, it becomes a preexisting condition and tends to stay that way from then on. Because of this the electrical inspector is directed to follow the 110-26 requirements to the letter. 36" is not 35" and so on. If you have a problem don't put it off...get the engineer and inspector involved? **June 2001**

**Existing three wire cable problems for residential service work and remodels.** See NEC section 250-140.: frames of ranges and clothes dryers. This section applies to existing branch circuit installations only. The section says the frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers and outlet or junction boxes that are part of the circuit for these appliances shall be grounded in the manner specified by section 250-134 and 250-138 or shall be permitted to be grounded to the grounded circuit conductor only if all of the following requirements are met. Of the 4, # 3 is the one that will usually cause a problem. It reads "(3) The grounded conductor is insulated, or the grounded conductor is uninsulated and part of a type S E service-entrance cable and the branch circuit originates at the service equipment". If your new service disconnect is outside and your branch circuit feeding the dryer or electric range has an uninsulated neutral you need to install a new cable. Note the requirement is for an insulated neutral, not a neutral covered by a cable sheath. **October 1999**

Existing wiring may be a problem on residential remodels! Before you give a cost you had better take a close look at the cables for uninsulated neutral conductors. If your old service entrance feeder cable neutral is uninsulated it may have to be replaced, certainly if you are installing a new service. Then investigate the existing Range and dryer circuits. If they use an uninsulated neutral (grounded conductor) to ground the appliance frames they will be permitted to remain (as per 250-140) if they meet all four of the conditions found in the section. Meeting the following requirement is usually the one that causes the problem: "or the grounded conductor is uninsulated and part of a Type SE service-entrance cable and the branch circuit originates at the service equipment". This usually gets to be a problem when the service disconnect in the older structures is moved outside.

Note: Type S E has a flame-retardant, moisture resistant covering; this is not the cable with the uninsulated neutral wrapped around the outside. **June 2003**

**Field installed signage for arc hazard.** Required by 2002 NEC 110.16 Flash Protection. "Switchboards, panelboards, industrial control panels, and motor control centers that are in other than dwelling occupancies and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment." **August 2003**

**Fluorescents over boxes.** From time to time a fixture that was planned to be installed on a box is changed to a fluorescent. You will not be required to have accessibility to box if the sheath of a cable is brought thru into fixture via a connector. Accessibility to the box thru the fixture will be required if the sheath is removed. **October 2003**

**Freezer receptacles in the garage** must be ground fault current interrupting unless either the freezer is in place at the time of inspection or the receptacle is identified for “freezer use only, not GFCI protected”. **February 2000**

**Furnace overcurrent.** For years we have used the 15 amp circuit breaker as a default size as required by the listing process. Recently we have encountered a number of furnaces with large blowers that need a 20 amp circuit breaker to handle the load. A cut sheet for York furnaces was sent over to us that shows a max overcurrent protection of 20 amps, even on units that draw 9 amps. We are going to go with information in the installation instructions; if they say 20 you can install a 20. **April 2004**

**Gas fireplaces in the bathroom.** Some of the new home designs include gas fireplaces in the bathrooms, sometimes immediately adjacent to the soaking tub or Jacuzzi. The electrical section has concerns with these appliances in close proximity to the bathtub because of shock hazard. We are requiring fireplaces with electrical equipment that are installed in the bathroom to be provided with GFCI protection. To take care of possible voltage gradients, a hydro massage type tub within 4 feet of the metal must be bonded to the hydromassage tub bonding system. **April 2001**

**Gas pipe bonding, NEC 250-104.** Size by Table 250-122 Equipment Grounding Conductors rather than Table 250-66 Grounding electrode conductors. . .a change in policy! The size of the bonding conductor has been a controversial subject since the requirement was rewritten in the 99 code. The MOA has been requiring sizing by the table used for grounding electrodes on the basis of the NEC handbook and section meeting consensus. The handbook opinion I’m referring to is on page 191, middle of the right hand column and contains a statement that is not correct for piping other than water. 250-104(c) gives the requirements other metal piping sizes as by table 250-122. This was a topic of discussion at the grounding seminar with Phil Simmons with Mr. Simmons endorsing the use of table 250-122. Effective immediately: MOA inspectors will accept gas pipe bonding sized in accordance with table 250-122 based on the largest overcurrent device protecting the feeder conductors going into a structure.

There is another problem with gas piping in multiplex units that needs to be looked at. The requirement is for all gas piping systems in a building to be bonded. In a multiplex with 4 gas meters that supply 4 separate gas piping systems we want to prevent the alteration of one system from isolating the other systems. There isn’t a problem with running one bond wire from the grounding electrode system and interconnecting to the 4 gas piping systems as long each gas piping system has a bond wire path to the grounding electrode system. Don’t use the gas pipe as a bonding conductor. **March 2000**

**G.E.C. and the main bonding jumper installed in the C.T can in Anchorage?** Yes it is acceptable, even encouraged on occasion. A good example would be when you have multiple service disconnects; by bonding in the C.T. enclosure you can avoid splicing onto the building steel or water pipe GEC with the smaller GEC’s sized for the disconnects. **December 2001**

**Ground movement. 300.5 (J)** This requirement was added to the 96 NEC: “Where direct-buried conductors, raceways, or cables are subject to movement by settlement or frost, direct-buried conductors, raceways, or cables shall be arranged to prevent damage to the enclosed conductors or to equipment connected to the raceways.  
FPN: This section recognizes “S” loops in underground direct burial to raceway transitions, expansion fittings in raceway risers to fixed equipment, and, generally, the provision of flexible

connections to equipment subject to settlement or frost heaves.”  
This would apply to wiring between buildings. **August 2003**

**Ground rods for temporary buildings, coffee carts and such.** Coffee carts in Anchorage are hard to define...a second building or a vehicle plugged into a receptacle? What has evolved has been a combination of both and although the NEC doesn't give a minimum distance on setting up another grounding electrode system our default position has been if the cart is less than 30 feet from the service to the disconnect or coffee cart attachment cap one ground rod at the 2<sup>nd</sup> structure is sufficient. Over 30 feet 2 rods should be installed at the 2<sup>nd</sup> structure. **June 2002**

**Grounding and bonding of antennas**, including television, broadband network and such. These require a grounding conductor run to an electrode, usually a #14. If a new electrode is installed for the equipment then it must be also bonded to the electrode system supplying power to the antenna, usually with a #6. One of the area electrical engineers noted that ATT was not bonding the electrode they installed as part of their Internet package to the building electrode system. Checking around it seems to be a common practice for communications companies. This is a code violation that has been overlooked because we don't require permits or inspections for these voltage/power levels. Be that as may, the State of Alaska and the Municipality has adopted the entire NEC and the electrodes must be bonded as per adopted code. **October 2001**

**Grounding, Class I, Division 1 and 2\_ 1996 NEC 501-16.** Wiring and equipment in Class I, Division 1 and 2 locations shall be grounded as specified in Article 250 and with the following additional requirements:

- (a) Bonding. The locknut-bushing and double-locknut types of contacts shall not be depended upon for bonding purposes, but bonding jumpers with proper fittings or other approved means of bonding shall be used. Such means of bonding shall apply to all intervening raceways, fittings, boxes, enclosures, etc., between Class I locations and the point of grounding for service equipment or point of grounding of a separately derived system.

Exception: The specific bonding means shall only be required to the point of grounding of a building disconnecting means as specified in Sections 250-24(a), (b), and (c), provided that branch-circuit overcurrent protection is located on the load side of the disconnecting means. **February 1999**

**Grounding electrode connections to large water pipes** should be made with a listed water pipe clamp or other means as permitted by 250-70. If you want to use a pressure connector as the terminating means the attachment bolt should not be used for another purpose, such as bolting pipe sections together. **December 2000**

**Grounding point for telephone and antenna systems:** The NEC provides for an accessible means that is external of the service enclosure for connection of intersystem bonding and grounding. This means we need to have a section of the grounding electrode conductor exposed for the communication utility to connect to. This usually would be the conductor coming from the ground rods. Now that we've started using concrete encased electrodes we've run into a problem making that wire available on the outside of the structure, especially since there is no longer is a need for it to be out there. The NEC fine print note describes an alternate method of providing a minimum of 6 inches of # 6 copper outside of the service enclosure that terminates in the equipment. This method would be acceptable to the Municipality of Anchorage. Staple the end to prevent movement of the wire, which could cause loosening at the terminal. **August 2004**

**Having a house built by others and want to wire it?** There is a difference between owning a house and being the intended buyer. Until the prospective owner signs the papers transferring ownership into their name they are not legally able to wire that house. This was in response to a question from a local general contractor with a client that wanted to wire the house being built for him. The contractor is the one who had the financing and owns the house and property until the buyer has his closing. Al Nagel over at the Alaska Dept of Labor was able to give a definite answer to the question. **August 2003**

**Hazardous boundaries:** the question has come up regarding wiring inside a wall when the wall provides the separation. Case in point: an auto repair garage (NEC 511) with an adjacent room without any openings into the classified area, with the unbroken partition constructed of wood studs and drywall. Could you put a receptacle at 12" inside the adjacent wall of the unclassified room? No, according to both the National Electrical Code Handbook published by NFPA and the National Electrical Code Handbook put out by McGraw-Hill. Their opinion is that the unclassified area begins at the surface of the partition in the nonclassified room. This would leave the inside of the wall classified and the wiring would have to meet the classification. **March 2000**

**Hazardous (classified) locations.** We have to inspect the seal off packing before it is poured. This allows us to make sure the conductors are separated properly. Please have the installation instructions as each brand has its own peculiarities. You may want to oversize the fitting if you have numerous conductors. **October 2001**

**Homeowner wiring.** Due to a number of incidences with "homeowner wired houses" that turned out to be done by "others" we are having the homeowner meet us for inspections. Homeowners are welcome to do their own wiring but they or an immediate member of the family must do the work. There is no problem with getting advice from "others" but....the homeowner must do the work. **August 2001**

**If a part of a light fixture extends into a classified area,** the fixture must be listed as approved for that area. For example, you have a fixture on the outside of a fully enclosed paint booth and that fixture extends 4 inches inside the 3' radius of a door then it must be approved for a class 1, division 2 area. **February 2002**

**In Sink-Erator appliance switch for disposal & insta-hot.** a plumbing contractor brought by an appliance switch for our opinion. The unit plugs into an unswitched undercounter receptacle with an air tube that runs up to a push button that mounts in a 1¼" sink hole. What's unusual about this one is that the built in duplex receptacle switches from one ½ to the other ½ when the switch is pushed. This means that the 2 appliances that may have overloaded a single circuit can't run at the same time and that means a receptacle that previously served a waste disposer could now also serve an insta-hot. The unit is UL listed for a 12-amp load for use with food waste disposers and hot water dispensers. (Yes...according to UL that means only disposers and hot water dispensers). **January 2001**

**Interesting thought for the day.** How much protection does that overcurrent device provide at 14 degrees (outside during the winter)?

**Junction boxes above hard lid ceilings.** Ceilings that are framed with steel studs or other light weight support members should not be considered as suitable for providing access to boxes from above. Bending or kinking the support members is damaging the structure or finish, which is not acceptable by the NEC definition. Locate boxes where they can be reached without crawling out on ceilings that aren't intended to support your weight. **December 2001**

**Keyless fixtures** are often used at residential final inspections until the owner-selected fixtures are installed. When they are used as wall sconces they will have to have cages installed to prevent people from running into the bare bulbs. **February 2003**

**Kirk Key switching.** ML&P will not accept a standby power system that uses Kirk Key switching as an alternate to a double throw transfer switch, citing the requirements of the service standard and ML&P tariff. After contacting the Kirk Key company they concluded that extra Kirk Keys are easily obtained and that there exist a unacceptable possibility of inadvertent connection of standby power to the utility grid by untrained persons . It should be noted that both utilities require double throw switches in their standards; further, MLP requires approval of any generator system that connects to wiring energized by them at any time. **April 2004**

**Layout of kitchen counter receptacles.** Another change has been made to the in the form of an exception that says receptacles do not have to be installed behind sinks when the space to the wall is less than 18". The intent, according to the NEC analysis, is to require the receptacles when the distance is longer. An example of where this would count is behind a **corner sink**. **December 2004**

**Light poles and sign bases.** A significant number of instances concerning damage to raceways (and the conductors inside) supplying pole bases has been noticed in the last several years. A pole base extending below the frost line and the raceway entering above the frost line seems to be the common point. A proposal to require rigid conduit extending out of the pole base was discussed in the code amendments committee but was dropped because we found that the NEC included language for "protection from damage" for buried conductors, raceways and cables in Article 300.5(J). In the absence of specific instructions from the designing engineer addressing this problem our default solution is a 5-foot stub out of rigid metallic conduit without fittings. Another possibility an engineer could consider would be to connect below the frost line (40"). **February 2003**

**Maintenance or work that needs a permit?** The Anchorage Administrative Code provides a list of what **does not** require a permit. All other electrical work does. Note that light fixtures are not mentioned. Receptacles (#5) are but only for reinstalling the receptacle, not relocating the outlet or replacing the wire. Here is the electrical section from the administrative code.

"An electrical permit shall not be required for the following:

1. Portable motors or other portable appliances energized by means of a cord or cable having an attachment plug end to be connected to an approved receptacle when the cord or cable is permitted by the Electrical Code.
2. Repair or replacement of fixed motors, transformers or fixed approved appliances of the same type and rating in the same location.
3. Temporary decorative lighting.
4. Repair or replacement of current-carrying parts of any switch, contactor or control device.
5. Reinstallation of attachment plug receptacles, but not the outlets.
6. Repair or replacement of any overcurrent device of the required capacity in the same location.
7. Repair or replacement of electrodes or transformers of the same size and capacity in the same location.
8. Taping joints.
9. Removal of electrical wiring.
10. Temporary wiring for experimental purposes in suitable experimental laboratories.

11. Wiring for temporary theater, motion picture or television stage sets.
12. Low-energy power, controls and signal circuits of Class II and Class III as defined in the Electrical Code.
13. Installation, alteration or repair of electrical wiring, apparatus or equipment or the generation, transmission, distribution or metering of electrical energy or in the operation of signals or the transmission of intelligence by a public or private utility in the exercise of its function as a serving utility.
14. The provisions of this code shall not apply to electrical equipment used for radio and television transmissions, but shall apply to equipment and wiring for power supply, the installations of towers and antennas.
15. Installation of any temporary system required for the testing or servicing of electrical equipment or apparatus." **February 2007**

**Metal elbows** that are installed underground in PVC must be isolated by a minimum cover of 18". **February 2002**

**Metallic enclosures for grounding electrode conductors.** If you are installing a grounding electrode conductor into a raceway system it must be bonded to the raceway where it enters and leaves the metal enclosures. If it passes through a pull box or other enclosure electrical continuity of the system must be ensured by one of the methods approved for service bonding as found in 250-94. It doesn't mean you have to bond to the GEC each time you go thru a J box. **February 2002**

**Miscellaneous field change to approved plans.** A new form is available. The intent is to speed up the plan review/inspection process by separating small changes from those that require a more detailed plan review. This also gives inspectors more room to accept minor plan revisions that are code compliant but provide less (or more) in some way than the approved plans. The form also provides documentation for the inspector of the design engineer's approval of the change and on the revision itself. The completed and signed off form becomes a part of the permanent records. It can be found in the "forms" link on the building safety website. **April 2003**

**Mobile home dryer and range receptacles and cords** have been required to be 4 wires as far back as 1968 (our oldest code book). We have been finding replacement dryers and ranges installed with 3 wire connections that must be redone to code when the mobile home is relocated. Contractors involved with mobile home set ups need to keep this in mind. The note will be added to Mobile Home Handout #4. **August 2001**

**Mobile home feeders.** If a new feeder is being installed from service to the mobile home location in an existing park, a disconnect means must be installed within 30 feet as per NEC 550-23(A). Many of the older mobile home parks are grandfathered in and are not required to upgrade until the wiring is replaced. **August 2002**

**Mobile homes with aluminum wiring** have had serious problems with heating at the screw terminals of devices. In the past the MOA has required all splices to be pigtailed with copper wire to the devices. This requires the use of the copper to aluminum wire connectors (marked CU/AL-dry location) at each splice, which is expensive and takes additional room in the boxes. The handout on mobile homes, #04, has been revised to permit the use of suitable devices as an alternate to the pigtailling. The devices suitable for aluminum terminations are marked as noted below:

- a) All switches and receptacles rated at 15 and 20 amperes must be marked CO/ALR

- b) Devices rated 30 amps and over must be marked AL-CU.  
Note: The "push in" type of connection is not approved for aluminum wire.  
**August 2000**

**MONOCOAT or other required fire protection?** 1997 UBC Section 704.2.4.... Conduit and pipes shall not be embedded in required fire protection of structural members. If you aren't sure if you are dealing with required fire protection, check with the inspector. Relocating conduit or MC runs adds cost and blood pressure points. **January 2001**

**MSF spring clips** are not approved as sole support of boxes because they allow the box too much movement in the wall and the cover faceplate ends up as the box support. **January 1999**

**Multi-meter service installations** must have the permanent designations of what each service disconnect supplies when the meter is installed as noted in utility standards. Since when we put the green meter tag on it means that the service meets those standards and is safe to energize, the designations should be in place. **April 2003**

**Nail plate requirement.** Even if shear wall material has been installed, the edge of hole to surface of stud should be no less than 1<sup>1/4</sup>" (don't count the shear wall material). **August 2002**

**NM cable can be installed** in a house when the roof has been sheathed, providing protection from rain/snow. **August 2003**

**Non-metallic boxes and oversize holes - when and how should they be sealed?** Some of the non-metallic boxes end up with a large hole around a cable and you end up with a note from the inspector asking you to seal the oversize opening. How do you know "when" is too large? The NEC just says, "Openings through which conductors enter shall be adequately closed" (370-17-a). A good rule of thumb is if the space beside the installed wire is large enough to install another cable, plug up the oversize hole with duct seal or fire seal. The idea is to contain sparks inside the box if there is a problem. **March 2001**

**Not enough holes for neutrals at the panel?** NEC 408.21" Grounded Conductor Terminations" requires that each grounded (neutral) conductor shall be terminated within the panelboard in an individual terminal that is not used for another conductor. There is an exception for parallel conductors if the terminal is rated for two conductors. **August 2003**

UL Standard 67 (panelboard) requires that neutral terminations be provided for 75% of the poles in the panelboard. This has been adequate for the normal mix of 220 loads and multiwire branch circuits, although there has been an occasional problem. Now that we are dealing with arc fault circuit breakers and the new 12-4 NM cable, the lack of neutral terminations is going to be more of a problem. The only correct solution, because of the requirements of NEC 408.21, would be to install a listed accessory neutral bar. **August 2003**

**Open individual overhead conductors** within 10 feet of building are required to be covered or insulated by 225-4. There is an exception for equipment grounding conductors and grounded circuit conductors when specifically permitted elsewhere in the code. The only exception I could find for bare grounded conductors were for service entrance conductors ahead of the main disconnect. Load side bare grounded conductors run overhead are not acceptable within 10' of a building. **March 2001**

**Outlet boxes in shear walls.** we have revisited our position concerning the use of cut-in boxes on shear walls. The 2005 NEC has included the use of "listed box extenders" (add a depth rings) to keep the device from being set back in the finish surface. Based on that change along with the

2002 NEC change to box mounting using clamps, anchors or fittings we will now accept cut in boxes clamped to the shear wall sheathing and flushed out with the listed box extender. We will not accept the use of cut in boxes supported by drywall on **new** work walls and ceilings.

**October 2006**

**Outlets behind corner sinks: 210.52 (C) (1)** this section includes a diagramed exception for outlets behind a corner sink when it's less than 18" to the corner. When the measurement is more than 18" the outlets are installed as per the usual wall receptacle spacing requirements, including behind the sink. This can be difficult when corner windows are present. We checked with the structural inspectors and found that often extra 2 by's may have added below windows that are not structurally required. Check to see if outlet boxes could be cut in without impacting the structural elements. A rule of thumb is if a sink is wider than 36" receptacles are usually needed. **February 2007**

**Paralleling or sectioning?** There is an apparent conflict between NEC and UL Standards concerning paralleling conductors. Manufacturing Standards allows "sectioning" of equipment grounding conductor in cables, this means the equipment grounding conductor may be made of several smaller conductors rather than 1 large conductor. NEC 310-4 prohibits paralleling of conductors smaller than 1/0. A listed cable with a sectioned EGC will be accepted. **August 2002**

**Pex pipe (plastic) has been approved for domestic hot and cold water** inside of buildings in the Municipality. This means we are going to have to watch out for isolated sections of metal piping in both new and old buildings. The safety of a grounded electrical system relies on a permanent and effective grounding path. Any water pipe interrupted by a pex pipe will have to be bonded together with a bonding jumper as required by 250-104(a). The water piping from the utility will still be metal and will be available for use as a grounding electrode. The MOA policy on pex piping systems is 066. It will be suitable for use with hot and cold potable water systems inside of buildings with restrictions on placement in areas where it may freeze. **March 2000**  
We have had calls already about Pex tubing and Jacuzzis. 680-73 says "All metal piping systems, metal parts of electrical equipment, and pump motors **associated with the hydromassage tub** shall be bonded together using a copper bonding jumper, insulated, covered, or bare, not smaller than No. 8 solid. If you don't have a metal piping system for the water it's not necessary to run a #8 back to the grounding electrode system. If you have more than one metal item associated with the tub then bond'em together and call it good. **March 2000**

**Pex water tubing** must be kept 6" horizontal and 12" vertical from recessed lighting fixtures, as required by installation instructions from tubing manufacturer. This varies by the manufacturer. **August 2000**

**Physical protection from cars, etc.** Suitable physical protection of electrical equipment depends a lot on how big, how fast and how often. Headbolt panels in a parking area for semi's will need considerably more help than a service on a building adjacent to office parking. As a general recommendation, we say bollards used to protect electrical equipment from vehicles should be at least 4" in diameter, extend 4' above ground and go down 3' below ground. We have accepted concrete "jersey" barriers as suitable for temporary barriers such as over winter. **June 2002**

**Pigtailing #14 to # 12 to use stab in receptacles?** The question has come up again. The answer is **no, with one exception:** because of a code revision to the 1999 NEC section 210-19 (b) Multi-outlet Branch Circuits which says, " 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." The confusion starts in table 210-24 "Summary of Branch Circuit Requirements", which says that a 20 amp circuit rating can use #14 as a tap to a 15 amp receptacle. Well, you can if you have a single receptacle not on an individual branch circuit (as described by 210-21 (b)) with a non-portable load, such as a garbage disposal and that doesn't draw over 12 amps. Not much use in real life. The easy solution to be able use #14 as a tap is to use 15-ampere circuit breakers instead of 20. The local amendment standardizes the wire size only. Pay attention though because there are circuits in a house that are required to be 20 amps. In response as to why you can tap small light fixture wires, the code allows you to tap onto other loads such as a light fixture as noted by 210-19(d). The original problem was that the stab-in connections on 15-ampere receptacles were failing under heavy loads. (Note that the max allowable load is 12 amps on a 15-amp receptacle and 16 amps on a 20-amp receptacle). **August 2002**

**Pole lights used as overhead conductor supports.** With food wagons, espresso wagons and such springing up in parking lots the need for overhead conductor support has led to use of pole lighting fixtures as cheap and convenient supports. Unfortunately these fixtures are not designed for the sideways stress and bend noticeably. Unless the fixture installation instructions indicate that it is suitable as an overhead conductor support you should provide a pole for your wiring. **March 2000**

Chugach Electric Association has higher service drops requirements for over driveways and parking areas than the NEC. The Chugach standard for **overhead 200 amps (ss-3a) requires 18 feet over driveways and parking areas without regard to residential or commercial use.** The reason is because of RV parking, moving vans, etc. **ML&P requires 17' above residential and 18' for non-residential driveways.** Remember to check the utility handouts. They can be more restrictive than the NEC! **March 2000**

**Propane dispensing equipment.** A gasoline dispensing and service station is a location where gasoline or other volatile flammable liquids **or liquefied flammable gases are transferred to** the fuel tanks (including auxiliary fuel tanks) of self-propelled vehicles or approved containers. That means the neighborhood hardware store that has propane "fill your tank" dispensing equipment has to meet the explosion proof requirements and provide an emergency disconnection switch the same as a gas station. That would also apply to a business such as roofing contractor that refills their own tanks. **August 2000**

**Protective cardboard cover provided with meter sockets** must be in place at time of service inspection on structures. Recently 2 meter interiors were thoroughly painted by careless spray painters. Usually it's the inside panels that get it. Most electrical contractors have been taking care of the interior panelboards by cutting and installing cardboard to protect from drywall mud and paint, although we had to have several cleaned and breakers replaced. In any case, here's the code section:

"Mechanical Execution of Work (c) Integrity of Electrical Equipment and Connections. Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues". There shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating." **April 2001**

**PVC conduit exposed to very cold temperatures** has a tendency to break. If you are installing it where exposed to the cold make sure it is secured to something that will prevent it

from being bent and that it is not exposed to damage from snow shovels and such. **December 2001**

**Ranges.** a range with a nameplate rating of 14.1 kW and supplied with a 50-amp receptacle and a 50-amp circuit. That was a 64-amp load according to the nameplate. Was it ok to use the 50-amp cord set and 50 amp branch circuit? Digging into the NEC we found that ranges are allowed to be sized by the following code sections: receptacle size 210-21-(b)(4), branch circuit size 422-10(a), appliance disconnect 422-32(c). These sections refer you to Table 220-19. See note 4.

**August 2000**

**Receptacle layout and door swings.** Long standing area practice has been to not count the space behind a door swing as useable space. This generally doesn't causes problems as far as everyone knowing what's required except when the door opens in the middle of a wall. That has caused a few phone calls and cut in receptacles. To clear up the question and stay with the area practice here's the guideline. "The distance along a floor line occupied by a door opened fully against that space shall not be required to be included in establishing the horizontal measurement if the door swing is limited to 90 degrees nominal by that wall space. **April 2001**

**Receptacle required at all mechanical equipment,** including large exhaust fans such as in a commercial kitchen hood. The requirement is from the mechanical code, which doesn't limit to specific equipment as the NEC does. It is not intended to include bathroom exhaust fans. If you have questions about the need for an equipment receptacle in relation to a piece of mechanical equipment contact Gary Hile, Lead mechanical inspector at 343-8390. **August 2001**

**Receptacles behind Modular office furniture.** If the receptacles are used ready access must be provided to the plug . If not then furniture can be placed in front and can be accessible by NEC definition. **August 2002**

**Recessed luminaire trims that have had listing re-evaluated for wet locations.** Question came from local lighting supplier "can in stock trims that are now approved for wet locations with waterproof bulb be used"? According to the supplier the trim is now listed as waterproof when used with a waterproof bulb. That information must be on the trim label so that the homeowner has a clue to provide the right light bulb. Using the correct bulb as required by the label on all luminaries is VERY IMPORTANT. **August 2002**

**Reducing washers** are not approved for grounding. If you use reducing washers you need to use a bond bushing to ground the conduit. Yes, it's true if the other end of the run doesn't have reducing washers the conduit is grounded but its not always practical to find the other end and besides things get changed. Use a grounding bushing! **February 2002**

**Remote control, signaling, and power-limited circuits.** There has been a big misconception that these conductors could be installed in a raceway with power wiring. At first glance, Section 300-3-(c) (1) says its O.K. However, down at the bottom of the section is a fine print note: See Section 725-54 (a) (1) for class 2 and class 3 circuit conductors. It's OK to put different voltages of power and light circuits in the same conduit as long as the conductors are insulated for the maximum voltage in the conduit; so what's' with this class 2 and 3 wiring? Mike Holt in his "Guide to Low Voltage Systems & Limited – Energy Systems (to us by the local NECA chapter) gives a good description.

**A class 2 circuit** is that portion of the wiring system between the load side of a class 2 power source and the connected equipment. Class 2 circuits consider safety from a fire initiation standpoint and provide protection from electric shock by limiting the current

(chapter 9 Table 11(a)). Class2 circuits (not over 30 volts at 100 VA) include wiring for thermostats, programmable controllers, burglar and security systems, as well as limited-energy voice intercom, sound systems. Class 2 power sources must be durably marked where plainly visible.

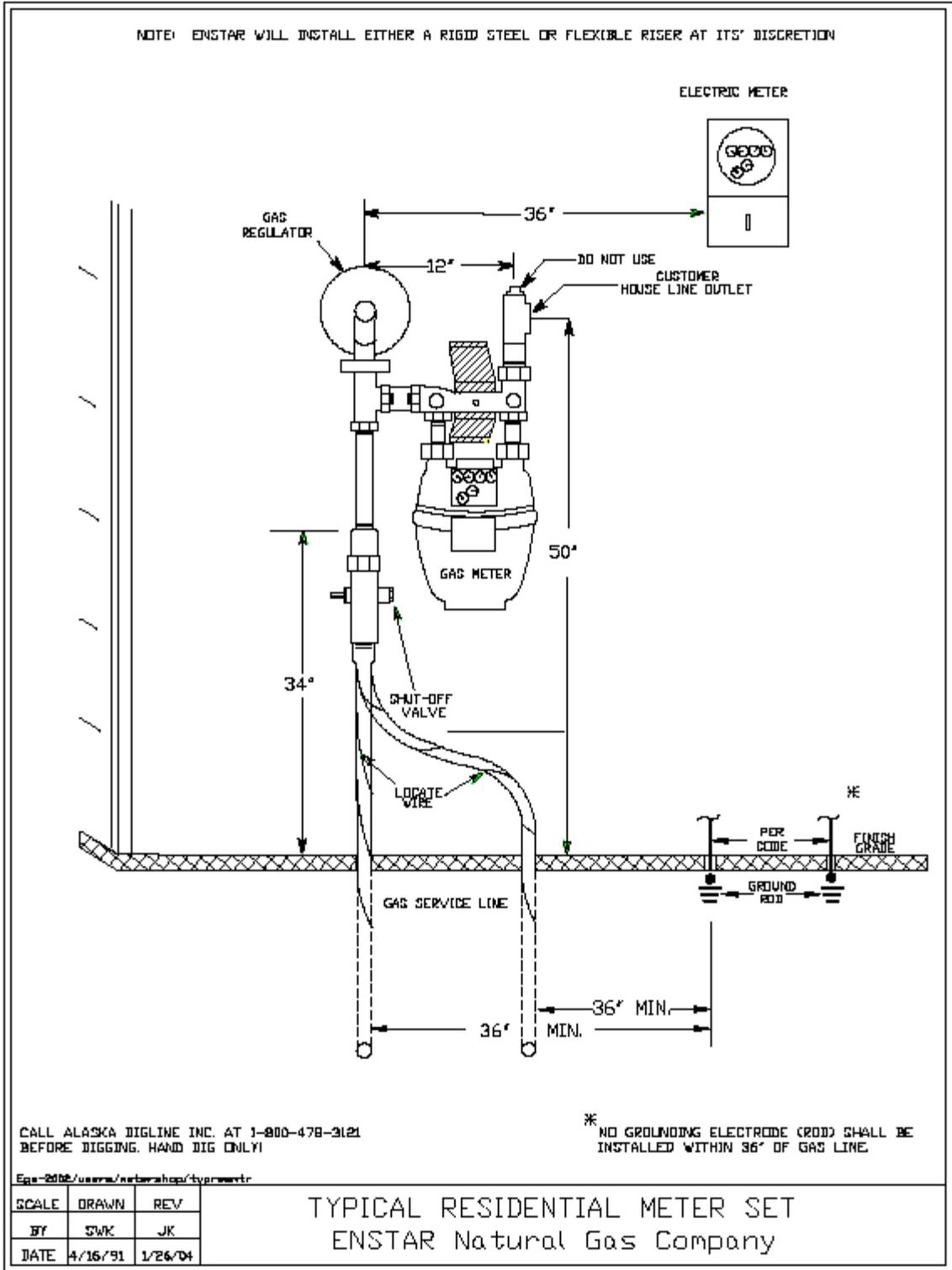
**A class 3 circuit** is that portion of the wiring system between the load side of a class 3 power source and the connected equipment and considers safety from a fire initiation stand point. Because these circuits permit dangerous voltages and power levels the code provides additional requirements to safeguard against electric shock. Examples of class 3 circuits would be some burglar and security system, voice, intercom, and nurses call systems. Class 3 power sources must be durably marked where plainly visible.

Per the 99 NEC handbook, what it comes down to is that the jackets of class2 and class 3 cables do not have sufficient construction specifications to be installed with electric light power, class1 nonpower-limited fire alarm circuits, and medium power broadband communication cables. Failure of the cable insulation due to a fault could lead to hazardous voltages being imposed on the Class 2 or 3 circuit conductors. So what you do is look at the power supply for the equipment, say a temperature control system, and see if it says class 2 or 3; If it does keep the wires separate from the power wiring. There are transformer and relays available that provides separate wiring compartments. They can enter the same enclosure for connection to the same equipment but must be kept ¼' minimum apart. If the power supply is not identified as to what class then you can assume it's a class 1. Class 1 can be installed in a chapter 3 method (can be in the same raceway as power wiring), must be 600 volt insulation and be provided with overcurrent protection. **October 1999**

**Residential service change, connecting to the water pipe.** Connecting to or even locating the water pipe where it enters the older homes can be very difficult. In some cases the water pipe may be located in the middle of the finished basement or just lost in the walls. Rather than tearing the house up (and if the inspector agrees to the alternate) we may accept going to the cold-water side of the water heater, or, in a really difficult situation, another portion of the cold-water piping. This would be on a case-by-case, best of situation type solution. **June 2003**

**Seal offs have to be inspected before they are poured** to verify the conductors are separated and that the seal off is not overfilled. Pay close attention to the requirements that are specified in the manufactures literature; remember, the 2002 NEC 501.5(C)(6) limits you to 25% unless it's specifically identified for a higher % fill. The seal offs must be kept from freezing when poured in order to cure properly. If heating the area is not possible, another way could be to wrap the seal off with a chemical body warmer and insulation. You will see the inspector check the cured compound with a probe, if it's powdery; it froze before curing and will have to be redone. **February 2003**

**Separation from Enstar equipment.** Enstar has asked us to pass around this attached drawing showing a 3 foot separation from ground rods to their underground gas lines and also for a 3 foot separation for the meter from the gas regulator **February 2004**



**Service heads** and goosenecks in service-entrance cables shall be located above the point of attachment of the service-drop conductors to the building or other structure.

Exception: Where it is impracticable to locate the service head above the point of attachment, the service head location shall be permitted not farther than 600 mm (24 in.) from the point of attachment **April 2002**

**Sign poles are permitted to enclose supply conductors, 600.5 (C) (3)** provided they comply with 410.15 (B). The reason I'm bringing this up is because of the requirement for hand holes and grounding terminals found in 410.15(B). If the conduit comes up in the pole there must be a hand hole with an accessible ground terminal. If the conduit comes up on the outside of the pole there should be a threaded fitting or welded nipple opposite of the hand hole.

**October 2003**

**Signs required for alternate power supply systems.** Each of the 3 code articles concerning alternate power sources (700,701, &702) has requirements for signage for the safety of the electrical workers. The language is almost identical for each and 700-8 noted below works as an example for all.

"700-8. Signs700-8 (a) Emergency sources. A sign shall be placed at the service entrance equipment indicating type and location of on-site emergency power sources.

Exception: A sign shall not be required for individual unit equipment as specified in Section 700-12(e)."

700-8(a) is basic and easy to comply with, although often forgotten. 700-8(b) on the other hand has caused considerable confusion.

"Where the grounded circuit conductor connected to the emergency source is connected to a grounding electrode conductor at a location remote from the emergency source, there shall be a sign at the grounding location that shall identify all emergency and normal sources connected at that location."

The NEC handbook gives an opinion that must have been written by the Cosmo editor and without getting into that one here's the explanation from Soares: Alternate power supply systems that have an unswitched neutral, that are grounded at the service entrance, present a safety concern, as electricians that are unfamiliar with the system grounding scheme may inadvertently disconnect the grounded (neutral) conductor when working on the normal source. If the emergency system is operating, the neutral conductor from the transfer switch to the location it is grounded will function as a grounding electrode conductor, and disconnecting it may present a serious shock hazard.

Install a sign where the grounded conductor for the alternate power system is bonded to the grounding electrode system that says" alternate power and utility power grounded conductors (neutrals) are connected to this bonding location". This connection is always made in the service disconnecting means and may also occur at a CT can. **January 2001**

**Sizing conduit bodies.** The question came up concerning conduit bodies with the number of conductors printed on them. Fred McBride over at PST plowed thru the standards and spent some time on phone calls trying to find out why the number of conductors on the conduit body was less than that allowed by the NEC. It seems a conduit body could be listed that doesn't have the required dimensions of 370-28(a)(1) and (2): we just haven't run across them. I agree with Fred's conclusion that if the body meets the requirements of 370-28, then the fitting is suitable for the same number of conductors as the raceway it is attached to as long as the conductor bending radius per table 373-6(a) is not exceeded. **August 2000**

**Slack wires on fixtures in suspended ceilings** are required by the Uniform Building Code. The UBC says to install 2 slack wires on any light fixture weighing less than 56 pounds and to support anything over 56 lbs. from the structure, not the ceiling grid. The MOA has a handout called "Clarification on Suspended Ceilings and Elements, # 71 that goes into more detail. This handout is available on the Municipal of Anchorage website under Building Safety Handouts or at the handout board in the lobby of the Permit Center. The handout adds that the fixture should not drop more than 6 inches if it were to come out of the ceiling.

A concession to reason, since there is no bottom limit to the "need 2-wire " category; when dealing with small, lightweight fixtures such as a recessed can or emergency light the electrical inspector will accept 1 wire. Small and lightweight is not an exact definition so if you have doubts check with the inspector assigned to that area of town. Be sure that it is installed so that any part of the fixture with 1 slack wire can't drop more than 6 inches. This means the wire would have to be run vertical and attach to the fixture body itself. Note - Slack wires cannot be used to provide raceway support. **March 2001**

**Snap in back plates on the fluorescent drop in fixtures.** We find that these plates are often loose and pull off easily. What makes the problem worst is that the plates are also where the equipment-grounding conductors are usually terminated. To prevent this problem the MOA electrical inspectors require a screw to secure the plate in place (and have for several years). **June 2001**

**Spacer on Chugach service lateral.** Service laterals in Chugach Electric's service area are required to enter the meter enclosure in a straight line. The service lateral is the conduit with utility wires going into a service from underground. This usually means installing a spacer block beneath the strap that's required within 12" of the enclosure. See Chugach service standard SS-6 if clarification is needed. **August 2005**

**Spaces about electrical equipment, 110.26 a concern even in residential structures.** A little co-ordination between trades can go a long way in making a house go together smoothly. A recent instance of where a duct was placed caused the panel to be moved from a garage wall to a laundry room wall that looked good... until the final electrical inspection. At that point the dryer had been installed across from the panel and all of a sudden there was 30 inches in front of the panel instead of 36. Reworking the exhaust duct behind the dryer eventually got the problem solved but it took several days.. Space at services or panels must be at least 30" wide, extend out 36" and have headroom of at least 6'6". Existing dwelling units with service equipment and panels with less than 6"6" are grandfathered. Another dedicated space is directly above and below electrical panels. That space from floor to 6 feet above the equipment or to the structural ceiling is dedicated to the electrical installation and nothing else can be in that space. The NEC allows other piping, ducts and such 6 feet above the panel but protection from leaks must be provided. **October 2004**

**Split receptacle fed with two circuits?** It is perfectly acceptable to take a 12-3 NM cable to a duplex receptacle and break the tab on the hot side to feed a dishwasher and a garbage disposal. Just remember that the resulting single receptacle would have to be a 20-amp receptacle if it's on a 20-amp circuit breaker and that both circuit breakers have to disconnect simultaneously at the panelboard. See 220-21(b)(1) and 210-4(b). **December 2001**

**Switches over stairs.** In the December newsletter, light switches over stairs was mentioned, the point being that since the intent is to turn on the light before you go on the stairs don't put the switch over the stairs. What was happening was some switches were down 2 or 3 steps or they were mounted so high above the step you had to go up the steps to reach them. Some of

the contractors want to be able to put the switch over the bottom stair at the switch height used for the rest of the house. That's not a problem or what we were trying to prevent. **June 2002**

**Table 300-5 Underground installations.** A question was brought up if you could use row 2 depths under roads and other locations mentioned in the table. The shallower Row 2 depths (with the addition of 2" of concrete or equivalent) can be used instead of row 1 but you would use the depths for the locations specified in rows 3 thru 7. And the cover is measured from the top of the wiring method to the top of the finished grade. **October 2001**

**Temporary power 220-volt receptacles must be GFCI or comply with the assured grounding program.** MOA's assured equipment grounding conductor program is as provided by Handout number 75. This must be posted at the temporary service. Several of the general contractors have had 220v GFCI CB's installed with no problems reported. I expect that the 220-volt assured equipment grounding program would be deleted by the next code amendment cycle. **October 1999**

**Temporary power services.** Checking the service for obvious damage when placing on site would help prevent delays in getting approved. Posting the permit enables the inspector to make sure it's the right service. **August 2004**

**Toggle bolts in ceiling drywall.** The Gypsum Construction Handbook, Transformer grounding electrodes and required water pipe bonding: The NEC code section to refer to is 250-30(3). The first sentence says the electrode you use shall be as near as practicable to and preferably in the same area as the grounding electrode conductor connection to the system. It then goes on to say you have to use the nearest of either 1) an effectively grounded structural metal member of the structure or 2) an effectively grounded metal water pipe within 5 feet of the point of entry into the building. Only if the structure doesn't have structural steel or metal water piping could a made electrode be used. Of course, if you install a made electrode it would have to be bonded to any other electrodes that are available and present in the structure as required by 250-50. Note: Most of the larger buildings in Anchorage have structural steel, however, not all are effectively grounded. What we are looking for is steel connected to rebar in a concrete foundation or steel encased in concrete. Anchor bolts in concrete or even J bolts in concrete without connection to rebar are not suitable. Have the as built plans available.

There was a change from the NEC 96 concerning the use of the metal water pipe as an electrode. The 1996 NEC allowed you to connect anywhere on the pipe if it was effectively grounded. It now requires connection within 5' of where it enters the building. The reason for the change is plastic piping that may interrupt the grounding path which, by the way can now be used in Anchorage. The exception for exposed lengths in commercial and industrial buildings was deleted by local amendment.

There is another water pipe bonding requirement often overlooked. 250-104(4) requires the grounded conductor of the derived system to be bonded to the nearest available point of the interior metal water piping system in the area served by the transformer. What this means is if you use the structural steel as the electrode you still have to bond to the water pipe in the area or, for another example, If you run 2 floors down in order to use the first 5 feet of water pipe into the building as the electrode you still have to connect to the water pipe in the area being served by the transformer. **June 2001**

**Uffers (concrete encased electrodes).** The structural inspectors are looking at the Uffers on the one and two family residential structures, the electrical inspectors are looking at the Uffers on

the triplex and larger. The easy way to know if you need to call for an electrical inspection is the permit number. If the permit number is less than 5000 (such as 04-0123) it is inspected as part of the rebar inspection. If it's 5000 or higher (such as 04-5678) it's a commercial project and you need to call for an electrical inspection. An electrical permit does not have to be issued to get a Uffer inspection. Just use the building permit number. **April 2004**

**UL 2200, standard for stationary engine generator assemblies** was published September 1, 1998. All standby generators installed in the state should be listed to this standard. It covers assemblies rated 600 volts or less that are intended for installation and use in ordinary locations in accordance with the NEC. Generators listed to this standard are suitable for use with emergency and standby systems, including in health care facilities. Resold used generators built after September 1, 1998 will have to be field evaluated to this standard when installed at the new location. **June 2003**

**Undersized meter enclosures in ML&P area.** This is an excerpt from a draft sent over by MLP concerning meter enclosures we've been running into recently. Greg Eidem (ML&P) has said a formal letter is almost ready to send out, probably next week.

"In recent weeks a number of service installations have had meter mains (meter sockets) installed that do not comply with ML&P's 2004 Electric Service Requirements. There appears to be some confusion in the interpretation of Section 304 b). Meter mains recently installed that do not comply are the Square D "CQRB-100" type.

Section 304 b), gives specific and detailed requirements for meter sockets used in residential application. Point #4 specifies the minimum overall dimensions for the service cable entry and termination section. This section and its respective dimensions are based on a two piece configuration where the meter socket jaw assembly has a separate cover plate with the hole for the meter, and the cable entry/termination section has its own separate cover plate and sealing means. In a case involving a Square D "CQRB-100", there is a single cover plate for both the meter socket jaw assembly and the cable entry/termination section. In all cases where there is a single cover plate for both the meter socket jaw assembly and the cable entry/termination section, ML&P considers the height dimension to be that distance measured from where the utility conductors enter the compartment to where the energized conductor terminating lugs are located (the terminating height). In all cases the minimum distance is 8 inches. The Square D "CQRB-100" has a terminating height of 6-1/2 inches which falls 1-1/2 inches short of ML&P's minimum requirements. ML&P also requires that all meter sockets used in residential applications have a minimum depth of 4-5/8 inches. The Square D "CQRB-100" has a depth of 4-1/4 inches which is 3/8 inches short of ML&P's minimum requirements." **October 2004**

**Unfinished areas in one- and two-family dwelling units,** policy R-01 has been reworked and is now in effect. The complete policy is on the Muni website; the parts of concern to electricians are noted below:

1. One smoke detector in basement (or unfinished area) per Building Code.
2. At least one wall switch-controlled light;
3. One GFCI protected receptacle in basement;
4. One 110 volt-battery back-up smoke detector;
5. In general, NM cables installed parallel to framing members as per NEC Section 300-4(d) will not require physical protection other than that provided by its location;
6. Spare raceways, wiring, or wiring pathways must be provided from the panel location to these unfinished areas for future electrical installations.

7. When an unfinished room is prewired, all outlets (receptacles) required for that area when finished shall be provided. Please note the last requirement. Other than the required receptacle in the basement; don't install any unless you intend to do all receptacles required for that room. Installing outlets in exterior walls would cause the rest of the room to be wired. This does not include ceiling outlets for lights. **March 2001**

**Use of antioxidant compounds** (penetrox, nolox and such) is not a mandatory requirement of the NEC unless it is required by installation instructions from the connector manufacturer. However, use of antioxidants is a good workmanship practice and is encouraged. Is there a **Listed/Recognized compound for pipe threads**? Answer from Paul Pastel at the local U L office, there is a compound that is Listed/Recognized for this application. The Recognized category DTOV2, "Coatings, Organic, For Steel Enclosures of Outdoor Use Electrical Equipment" contains a product called "Z.R.C. Galvillite" made by "ZRC Worldwide" out of Marshfield, MA. It is a brushable compound that would meet the criteria of Article 300.6(A)". **April 2002**

**Utility/MOA requirements.** The NEC Local Amendments include a provision that the service installation shall also conform to the service requirements of the utility serving the area. That means the MOA electrical inspector is inspecting to the utility standard in addition to the NEC. If there is a problem with a requirement inserted by the utility, contact the utility to obtain their agreement and ask them to send me an e-mail to document the waiver. **April 2004**

**Warning! Light fixture may not be suitable for use with wiring installed before 1985.** Prior to the 1984 code Types NM and NMC cables could have conductors rated 60 degree C (140 °F), 75°C (167°F) or 90°C (194°F) for use in different ambient temperatures. Cables with conductors rated at 75°C (167°F) were designated Type NMA or NMC-A and those with conductors rated 90°C (194°F) were designated Type NMB or NMC-B. Residential installations were usually done with 60°C NM. The story goes that as the light fixture designs changed from the old style long stems to the modern "up against the ceiling" type with more glass enclosure the heat trapped inside began to **bake the insulation** inside the junction boxes, causing the insulation to fail. The electrical industry's answer was to require all NM cable conductors to be rated for 90°C and to put notices on the fixtures for the temperature rating required on the supply conductors. Besides being a bad idea, you can be sure an electrical inspector isn't going to accept a 90°C fixture on 60°C wire; so what can be done? Outside of getting the right fixture or replacing the conductors in the fixture box I haven't heard of an easy fix. We have checked the UL standard and found that the fixture doesn't have to be marked with a high temperature rating if the supply connections to fixture conductors are located at least 1 foot away from the light fixture. A j-box could be used as long as it is accessible. Shrink tubing or an insulation pad wouldn't be acceptable. Note: a new device is available. See 60 degree conductors and 90 degree fixtures topic, February 2007. **December 2000**

**Where are the electrical fires occurring in a structure?** Fire statistics provided by a major insurance company show the following percentages of electrical fires associated with specific zones as follows:

Zone 0- Meter, meter socket and service cable	2%
Zone 1- Load center and fixed premises wiring	36%
Zone 2- Wiring between the receptacles and loads	12%
Zone 3- Appliances and other loads	50%

**December 2001**

**Wireway or auxiliary gutter.** Does it matter? Auxiliary gutters must be sized as per 373-6 the same as a wireway but wireways have the additional requirement of "Where insulated conductors No. 4 or larger enter a wireway through a raceway or cable, the distance between those raceway and cable entries shall not be less than six times the trade diameter of the larger raceway or cable connector.

It's the same piece of material; the difference is how it's used. An auxiliary gutter cannot extend more than 30 feet beyond the equipment it supplements. It's common to set a gutter adjacent to a panel and connect with conduit. That's fine except now we have to decide if this is still supplementing wiring space or is it a junction box or wireway. The MOA inspector is going to say it's an auxiliary gutter if the connecting conduits are less than 2 feet and the gutter goes no more than 30 feet from the panel. **March 2000**

**Wiring for ceiling lights in patient care areas** has become a hot topic especially on "office to health care" remodels. A contractor that is bidding on a tenant remodel involving a health care facility needs to take a very careful look at the wiring serving the patient care areas, including the lighting system. The problem is the sheath of the interlocked metal tape MC in common use around town is not approved for grounding. The NEC requirement for wiring methods in patient care is found in 517-13-(b) as follows: "(b) Methods. In addition to the requirements of Section 517-13(a), all branch circuits serving patient care areas shall be provided with a ground path for fault current by installation in a metal raceway system or cable assembly. The metal raceway system, or cable armor or sheath assembly, shall itself qualify as equipment grounding return path in accordance with Section 250-118. Type MC cable and Type MI cable shall have an outer metal armor or sheath that is identified as an acceptable grounding return path". So if you want to use MC, use a type that is listed as a grounding means such as the smooth or corrugated solid tube type. **March 2001**