

Electrical Specifications for Contractors and UNM Personnel Doing Work at the University of New Mexico. (As of 08.19.2015)

The following specifications are basic, general UNM specifications that should be adhered to by Electrical Contractors and UNM personnel doing small electrical projects on UNM property. These specifications are especially relevant to projects which are performed by on-call contractors, or other electrical contractors working on small projects without actual blueprints and/or specification books. While all work performed on UNM property must meet or exceed the New Mexico Electrical Code (National Electrical Code plus amendments), the following specifications are UNM standards that shall be adhered to and may be beyond the minimum allowed by the code(s).

All UNM personnel working on “Annual Permit” or “New Permit” projects, and all contractors working at UNM on work requiring CID permits are required to contact the applicable UNM Inspector(s) [Electrical (Larry Crum 277-7829 / 321-5627), Mechanical/Plumbing (Phred Dixon 228-4769)] at applicable project milestones (underground, distribution, rough-in, final) and prior to “Substantial Completion” to allow them the opportunity to inspect the work for “Code” and “UNM Specification” compliance either along with or prior to the CID inspector making the associated inspection. Inspections are completely at the discretion of the applicable UNM Inspector. All UNM Entities that engage in, manage, coordinate, or otherwise are involved with construction activities on the UNM campus are to adhere to the requirement above, and to advise their contractors of this requirement. ***Please be advised that failure to comply with the above may require the contractor, workmen, UNM personnel, and/or UNM Entity to expose any portion of the work that has been covered or concealed, if necessary, for the Inspector to inspect the work.***

Any defects found by the UNM Inspectors will be noted in a “Correction Notice” issued to the project, and is to be abated and re-inspected **PRIOR TO** the acceptance of the project by UNM.

During additions or alterations to existing facilities at UNM, all existing electrical work that is disturbed in any way, or that is deemed to be unsafe by the UNM or CID Inspector, must be corrected so as to conform to the New Mexico Administrative Code (NMAC) requirements for new buildings and to meet the specifications contained in this document.

- 1) Permits and inspections **MUST** be obtained (from CID) in order to perform any electrical work at UNM, and should be displayed on the jobsite for the job duration.
- 2) Metal-clad and non-metallic cables (including types: MI,AC,NM,MC,NMC,SNM,SE,USE,UF, or BX) should **NOT** be used on UNM property without the expressed consent of the Physical Plant Department’s Engineering and Energy Services Division (PPD-EESD). Flexible metallic conduit with the appropriate conductors should be used for; fixture whips, equipment whips, or raceways “fished” down walls. In no instance should fixture or equipment whips exceed 6 feet in length. Flexible raceways “fished” into walls should terminate into a junction box immediately above the ceiling, and convert to conduit at that point.
- 3) All panels installed at UNM:
 - a. Will be “Bolt-in” circuit breaker type.
 - b. Will have copper busses.
 - c. Will be provided with neutral and equipment ground lugs (bars).
 - d. Will have a permanent label affixed to the panel front cover, showing the panel designation, panel voltage, and where it is fed from.

- e. Will provide 30% unused (spare) capacity for future use.
 - f. NEMA 1 panels will be “Door in Door” construction.
 - g. Any recessed panel installed, in addition to the circuits for which it is being installed, will have 2 (ea) spare conduits (minimum ¾ trade size) stubbed from the panel into ceiling space above for future.
 - h. Bonding (grounding) bushings will be provided on all new panel feeders.
 - i. The “AIC” rating of all panels and circuit breakers should be approved by the PPD-EESD prior to installation.
 - j. Panel schedules must be completed (updated) and protected from dirt by a plastic sleeve on the inside cover of the panel. This applies to both new and modified existing panels.
 - k. All panels installed must meet the Code clearance requirements.
- 4) All exposed conduit should be run parallel and perpendicular to the structure. PVC pipe should NOT be used above grade (slab) except in special applications that have been re-approved by the PPD-EESD. In all PVC conduit runs, all bends over 30 degrees and all stub-ups should be in wrapped rigid conduit.
- 5) All fluorescent luminaires installed must be provided with high frequency, instant start, electronic ballasts and applicable (i.e. T-8 or compact fluorescent) lamps. Where lamps will be frequently switched or controlled by occupancy sensors, ballasts shall be high frequency, programmed rapid-start type. All fluorescent luminaires must be provided with a full coverage lens, or clear “tube protectors”. Open lamp strip fixtures will be accepted only after special permission of the PPD-EESD. All multi-lamp ballasts must be of the “Parallel circuit” type. Lamp color (CCT) shall be as approved by PPD-EESD and the UNM user. In general, lamps shall be 4100 degrees K, 28W, T-8. “U-lamp” luminaires shall NOT be installed. Exterior luminaires shall comply with the UNM lighting master plan.
- 6) All EMT fittings shall be of the compression type (gland & ring). Set-screw fittings will NOT be acceptable. All fittings shall be steel, not pot metal.
- 7) Conductors shall be copper. However, 600V feeder conductors in sizes #1/0 AWG to 750 kcmil may be copper or aluminum alloy. Aluminum alloy conductors shall be compact stranded conductors of a recognized Aluminum Association 8000 Series aluminum alloy conductor material (AA-8000 series alloy), with Type XHHW-2, temperature rating 90° C insulation.
- 8) Labels will be installed on all panels, disconnects, hardwired equipment, etc., identifying its use and where it is fed from. Labels will be installed on all switches and receptacles, identifying its circuit. Arc flash hazard labels shall be installed on all panels.
- 9) The ends of all conduits containing wires of any type, will be bushed.
- 10) All conduits must be adequately supported.
- 11) All persons performing electrical work at UNM must use and adhere to UNM’s Electrical Safety Program, including their “Lock-out/Tag-out” and “Energized Electrical Work” policies.
- 12) Exit signs shall be LED type with letter colors to match existing.
- 13) Standard tumbler switches shall be commercial specification grade, 20 amp, ivory. Duplex receptacles shall be commercial, specification grade, 15 amp (20 amp if on dedicated circuit) ivory. Receptacles in child care areas, waiting rooms, etc., shall be tamper-resistant type. All terminations must be made using

the screw terminals, not the “stab-in” provisions. Receptacles in restrooms, in kitchens, in lab tables, on building exteriors, or within six feet of any water source shall be of the GFCI type.

- 14) Device cover plates shall, in general, match the color and type of the existing plates in the immediate vicinity. Where there are no existing plates to be matched, provide brushed satin stainless steel plates. Exterior receptacles shall have a cast steel or aluminum cover that is weatherproof with the attachment plug cap inserted or removed. Exterior receptacles shall be “WR” rated.
- 15) Where feasible, all protective devices shall be circuit breaker type. In other words, an enclosed circuit breaker is to be used in preference to a fused safety switch. Non-fused, heavy duty, safety switches may be acceptable for local equipment maintenance disconnection.
- 16) Motor-operated equipment (i.e. fan coil units) must be supplied by a minimum of a local manual motor starter with thermal overloads. It should be mounted on the side of the control enclosure, or within 3 feet maximum of the unit. Code required working clearances must be maintained in front of disconnects and control enclosures.
- 17) All motor operated equipment and it’s associated electrical equipment must maintain the NEC required working clearances to facilitate safe access and maintenance. The PPD-EESD reserves the right to request equipment relocation if adequate working clearance is not provided.
- 18) Conductor splices/taps in gutters or large j-boxes shall be made using insulated, multi-cable connector blocks. Taped split-bolt connections are not acceptable.
- 19) All personnel shall be licensed for the work they are performing. A licensed Journeyman shall be present for ALL electrical work, and in no case will the Journeyman / Apprentice ratio exceed 2 Apprentices to 1 Journeyman. All personnel shall be trained for the hazards present in the tasks they are performing (e.g. confined spaces).
- 20) “Hot” electrical work (at greater than 50 volts) shall only be performed with the prior approval of the PPD-EESD. Any time “Hot” electrical work is performed, 2 qualified persons must be present at all times. An “Energized Electrical Work Permit” must be obtained.
- 21) Submittals may be required for some equipment, or as requested by the PPD-EESD. The contractor will provide submittals for all major equipment.
- 22) Remove completely all abandoned or unused electrical equipment. Removal of abandoned conduit that is underground, is at the discretion of the PPD-EESD. Existing oil-filled transformers may contain PCB’s and shall be disposed of properly, with the appropriate legally-required documentation submitted to UNM SRS.
- 23) All building power and utility outages must be coordinated and approved by the PPD-EESD. Only PPD Utilities Division will operate UNM utility power equipment.
- 24) All materials and workmanship by contractors shall be warranted for a period of 1 year after the date of “Final Acceptance”.
- 25) The phasing of all conductors (#8 and larger) shall be identified by color coding tape. Conductors sizes #10 and smaller shall have colored insulation. The grounded (neutral) conductor sizes #6 and smaller shall be white or light gray, or have 3 continuous white stripes on other than green insulation. Grounded (neutral) conductors larger than size #6 shall be color coded white with coding tape. Grounding conductors sizes #6 and smaller shall have green insulation or be bare the entire length. Grounding

conductors larger than size #6 shall be color coded green with coding tape. (Ref: NEC # 210.4, 200.6, 250.119.)

- 26) All penetrations in fire rated walls, shall be sealed with fire caulking or other approved method(s).
- 27) Subsurface Utilities. Owner will comply with NMSA 1978, Chapter 62, Article 14 (the New Mexico Excavation Law) by performing utility spotting activities or by employing a qualified utility spotting company, or both. The Owner will provide the latest and best underground utility information available regarding the campus in the form of Utility Mapping Drawings. In addition, the Contractor shall perform utility spotting work. The Contractor shall locate, spot and find all utilities within the project boundaries or affected by the project. The Contractor shall repair any and all damaged utilities caused by excavation and spotting activities. Costs for this work shall be included in the Contract Price. Owner will not recognize claims for spotting or repairing concealed or unknown subsurface utilities. The Owner will process an appropriate Change Order if concealed or unknown subsurface utilities must be relocated in order to construct the project as indicated in the Contract Documents.
- 28) Concrete paving and sidewalks shall be replaced in full panel sizes. Other paving (brick, pavers, etc.) shall be replaced to match the existing in every way.
- 29) No conductors shall be spliced within panelboards. Under no circumstances will "wire nuts" be accepted within any panelboard. Conductors may NOT be installed within any panel or device raceway unless those conductors terminate within that specific panel or device.
- 30) Under no circumstances will non metallic "Wiremold" (surface raceway) contain any conductors which carry more than 50 volts. In all cases where "self-adhesive" surface raceway is used, in addition to the raceway adhesive, at least 2 mechanical fasteners per ten foot length shall also be used (straps, screws, etc.).
- 31) At no time will a contractor leave any electrical switchgear, panels, or energized devices open or exposed in a public area without having qualified electrical personnel working on or guarding the exposed electrical components.
- 32) All bolted pressure connections shall be torqued to manufacturer specifications and display torque strike marks.
- 33) The contractor is responsible for supplying the appropriate signs, flagging, and /or fencing to identify the construction area and to restrict entry. It is the duty of the contractor to ensure a safe environment to its staff, sub-contractors, and any occupants in the vicinity.
- 34) In general and where practical, all conductors should be continuous (no splices) from their point of origin to their point of termination. In NO case should "Service Conductors" be spliced without the expressed consent of PPD-EESD, and then only in a manner approved by PPD-EESD.
- 35) In NO case should the wire designation in an existing circuit be changed without the expressed consent of PPD-EESD. Remodel work that requires converting an existing circuit from one voltage to another, should have the existing wires removed and correctly color coded wires re-installed. In the very rare instance where the existing wires are to be reused, wires that have had their designation changed (i.e. an existing "hot" converted to a "neutral") will have their entire exposed length taped with the new appropriate color. Additionally, the altered conductor will be taped with the new color not only at its source and end device, but at every accessible point along the circuit. This includes but is not limited to; pull boxes, conduits, device boxes, gutters, panels, and anywhere else that the altered circuit can be accessed.

- 36) All service disconnecting switches (fused or non-fused) for rooftop or remote equipment are to be mounted on the exterior of the equipment and shall be heavy duty, hand operated safety switches. Disconnects requiring screw in fuses or pull blocks are not acceptable. Equipment disconnect switches should be readily accessible, and should in no case require the removal of a panel or opening of a door to access the service disconnect. Furthermore, all service disconnect switches shall have an adequate number of poles to interrupt all current carrying conductors to the unit. Disconnect switches mounted to the equipment shall not impede maintenance access to the equipment.
- 37) Prior to working on any circuits that supply motorized equipment, the contractor shall verify the (clockwise or counterclockwise) rotation of the equipment, and ensure that when re-energized, the equipment maintains proper rotation.
- 38) In NO case should “Push-in Connectors” (e.g., WAGO Wall-Nuts, IDEAL In- Sure, etc.) be used in any manner on electrical work performed at the University of New Mexico, without the expressed consent of PPD-EESD. The splicing (or joining) together of wires, sizes #10 and smaller should be accomplished with industry standard twist-on wirenuts, butt-splices, or other NEC acceptable methods. The use of “Push-in Connectors” is prohibited for “pigtail” wires in junction and device boxes, as well as in lighting fixtures, or virtually any other application. Individual luminaire disconnects (as required by the NEC) are specifically exempt from this requirement.
- 39) All electrical equipment is required to be approved as defined in Article 100 of the “National Electrical Code”, and as such, to be acceptable to the Authority Having Jurisdiction (AHJ). While the listing and rating of most common electrical equipment and components is standard, the listing and rating of equipment derived by combining standard components **is not**. As an example, while all the relays and other components placed in a box or panel to create a complex device (i.e. a DDC Control Panel) may individually have a “UL” listing, it is relevant to the components only. The complete assembly would have to be evaluated and field certified by a “nationally recognized testing laboratory” as meeting the safety standards to operate together as a unit. Certification letter from the Engineer of Record may be considered in lieu of the above, if acceptable to the AHJ.
- 40) Use Belleville washers (in lieu of lock washers) for all bus connections in switchgear, busduct or standalone (e.g., ground bar). Properly torque all connections, using a calibrated torque wrench in accordance with manufacturer’s recommended values.
- 41) Lighting in ALL mechanical or electrical rooms/closets shall be operated with a standard light switch. Occupancy sensors are NOT acceptable in these locations.
- 42) Entrance to and Egress from Working Spaces:
When mounting equipment, several items relevant to “clearance” need to be considered. While adequate front and side-to-side clearance as defined by the National Electrical Code are essential, an additional key consideration should be personnel egress permitting workers to escape in an arc flash incident. When mounting the equipment, consideration must be given to situations wherein opening a side-hinged door on a panel or other equipment will impede the egress pathway. The same would be true of panel covers hinged at the top of equipment, or external handles or levers that would impede egress. Equipment should be mounted so that regardless of the condition of the equipment, a 28 inch clear opening is always available for egress.
- 43) Contractor’s Electrical Safety Plan:
Contractors doing work at UNM are expected to have and follow their associated company’s electrical safety plan. Submit the plan to the UNM Safety & Risk Services (SRS) for approval. The plan shall remain on file with SRS. Any changes/updates shall be submitted to the SRS.

- 44) No electrical conduits shall be mounted to or supported from any sheet steel ductwork, unless it is specific to the ductwork or ductwork apparatus. Where conduit must be mounted to ductwork, the ductwork must be of adequate rigidity to firmly support the conduit. Furthermore, when conduit is mounted to ductwork, consideration must be given to ambient temperature and NEC Articles 310.10, 310.15.A2, and 310.16, regarding temperature limitation of conductors.
- 45) When mounting sheet steel 4 sq. and 4 11/16 sq. (trade standard) boxes in any fashion other than surface mounted (i.e. within walls or to the sides of an enclosure), the box must have the appropriate factory supplied brackets for mounting. Use of the factory drilled holes in the box sides to mount to wood or metal framing studs will not be accepted, as these are not listed as a means of box support.
- 46) Each 20 amp, single pole branch circuit is to have its own #12 awg neutral, regardless of type of load on the circuit. (Shared neutrals are not acceptable.)
- 47) Recessed fluorescent lighting shall be circuited using a conduit and j-box with flex whips (6' max) to each luminaire. Circuited done using flex or conduit between luminaries (and using luminaire ballast compartments as a raceway) is NOT acceptable.
- 48) New installations that involve pumps, blowers, motors, or any equipment subject to operational vibration, shall utilize insulated multi-tap connectors or insulated set screw wire connectors, to join/connect wires of the system. Standard wrenut connections are NOT acceptable.
- 49) Contractors installing electric/power quality meters are required to set up the meters, verify that the meters are properly connected (phasing of CTs and PTs), and use a laptop computer to verify that meters are operating correctly and the display is accurate. The EIG Shark meters currently used at UNM are provided with software to facilitate installation and verify that they are connected properly. If the contractor is installing a meter other than a "Shark" meter, it is the contractor's responsibility to assure that the meter is connected and operating properly.
- 50) Regardless of a luminaire's "Listing and Labeling", all luminaires installed on UNM property over a tub or within a shower enclosure (wet location) shall have an "approved" lens installed in the luminaire that covers the lamp.
- 51) Regardless of the "Listing and Labeling" on any clamp used for Grounding or Bonding purposes, none shall be allowed to connect a grounding or bonding conductor to a piece of rebar (for UFER ground connection). Connection of grounding and bonding conductors to rebar (for UFER ground connection) shall be accomplished solely by the use of exothermic welds.
- 52) Any conduit or raceway that penetrates the roof of a building, and utilizes a "Pitch-Pan" or "Roof-Jack" to protect the penetration, must be rigid in nature (i.e.; EMT, IMC, or GRC). In NO case should any type of flexible conduit or cable penetrate a roof utilizing a pitch-pan or roof-jack.
- 53) In general, colored conduit is not to be used at UNM, unless specifically authorized by both the UNM Electrical Inspector and PPD-EESD. Only "green" colored conduit is specifically authorized for use at UNM, which is used by the Energy Services division (or their contractors) of the Physical

Plant Department in conjunction with applicable labels that identify it as an “Energy Services” control wiring conduit. No other colored conduits should be installed on any project at/for UNM without the proper authorization.

NOTE: Any comments or questions regarding these specifications should be directed to one of the following:

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