

VAMC COATESVILLE, PA  
INSTALL BACKFLOW PREVENTER SOUTH PUMP BLDG 25  
PROJECT NUMBER: 542-15-121

SECTION 26 05 00.00 40

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Stds Dictionary (2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL CODE COUNCIL (ICC)

ICC/ANSI A117.1 (2009) Accessible and Usable Buildings and Facilities

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI Z535.1 (2006; R 2011) American National Standard for Safety--Color Code

NEMA FB 1 (2012) Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable

NEMA KS 1 (2001; R 2006) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)

NEMA RN 1 (2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NEMA WD 1 (1999; R 2005; R 2010) Standard for General Color Requirements for Wiring Devices

NEMA WD 6 (2012) Wiring Devices Dimensions Specifications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 6 (2007; reprint Nov 2010) Electrical Rigid  
Metal Conduit-Steel

1.2 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE Stds Dictionary.
- b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following:

SD-03 Product Data

Conduits and Raceways; G

Wire and Cable; G

1.3 QUALITY ASSURANCE

Submit certification required to install equipment components and system packages.

PART 2 PRODUCTS

Submit manufacturer's instructions including special provisions required to install equipment components and system packages. Special provisions detail impedances, hazards and safety precautions.

2.1 EQUIPMENT

Provide the standard cataloged materials and equipment of manufacturers regularly engaged in the manufacture of the products. For material, equipment, and fixture lists submittals, show manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site.

2.1.1 Conduits and Raceways

2.1.1.1 Rigid Steel Conduit

Ensure rigid steel conduit complies with UL 6 and is galvanized by the hot-dip process. Use polyvinylchloride (PVC) coated rigid steel conduit in accordance with NEMA RN 1, where underground and in corrosive areas, or painted with bitumastic.

Use threaded fittings for rigid steel conduit.

Use solid gaskets. Ensure conduit fittings with blank covers have gaskets, except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

Ensure covers have captive screws and are accessible after the work has been completed.

#### 2.1.2 Wire and Cable

Use copper 600-volt type [XHHW] for conductors installed in conduit. Ensure all conductors 3.15 millimeter diameter (AWG No. 8) and larger, are stranded. All conductors smaller than 3.15 millimeter diameter (AWG No. 8) are solid.

Ensure flexible cable is Type SO and contain a grounding conductor with green insulation.

Ensure conductors installed in plenums are marked plenum rated.

### PART 3 EXECUTION

#### 3.1 PREPARATION

Protect metallic materials against corrosion. Provide equipment enclosures with the standard finish by the manufacturer when used for most indoor installations. Provide hot-dip galvanized ferrous metals such as, but not limited to, anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and miscellaneous not of corrosion-resistant steel except where other equivalent protective treatment is specifically approved in writing.

#### 3.2 INSTALLATION

##### 3.2.1 Conduits, Raceways and Fittings

Conduit runs between outlet and outlet, between fitting and fitting, or between outlet and fitting cannot contain more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting.

Do not install crushed or deformed conduit. Avoid trapped conduit runs where possible. Take care to prevent the lodgment of foreign material in the conduit, boxes, fittings, and equipment during the course of construction. Clear any clogged conduit of obstructions or be replaced.

Conduit and raceway runs concealed in or behind walls, above ceilings, or exposed on walls and ceilings 1470 millimeter (5 feet) or more above

finished floors and not subject to mechanical damage may be electrical metallic tubing (EMT).

#### 3.2.1.1 Rigid Steel Conduit

Make field-made bends and offsets with approved hickey or conduit bending machine. Use long radius conduit for elbows larger than 65 millimeter (2-1/2 inches).

Provide all conduit stubbed-up through concrete floors for connections to free-standing equipment with the exception of motor-control centers, cubicles, and other such items of equipment, with a flush coupling when the floor slab is of sufficient thickness. Otherwise, provide a floor box set flush with the finished floor. For conduits installed for future use, terminate with a coupling and plug set flush with the floor.

#### 3.2.1.2 Splices and Connectors

Make all splices in 3.15 millimeter diameter (AWG No. 8) and smaller with approved indenter crimp-type connectors and compression tools.

Make all splices in 4.1 millimeter diameter (AWG No. 6) and larger with [bolted clamp-type connectors]. Wrap joints with an insulating tape that has an insulation and temperature rating equivalent to that of the conductor.

#### 3.2.2 Wiring

Color code feeder and branch circuit conductors as follows:

| CONDUCTOR         | COLOR AC                 |
|-------------------|--------------------------|
| Phase A           | Black                    |
| Phase B           | Red                      |
| Phase C           | Blue                     |
| Neutral           | White                    |
| Equipment Grounds | Green with Yellow Stripe |

Use conductors up to and including 6.5 millimeter diameter (AWG No. 2) that are manufactured with colored insulating materials. For conductors larger than 6.5 millimeter diameter (AWG No. 2), have ends identified with color plastic tape in outlet, pull, or junction boxes.

Splice in accordance with the NFPA 70. Provide conductor identification within each enclosure where a tap, splice, or termination is made and at the equipment terminal of each conductor. Match terminal and conductor identification as indicated.

Where several feeders pass through a common pullbox, tag the feeders to clearly indicate the electrical characteristics, circuit number, and panel designation.

### 3.3 FIELD QUALITY CONTROL

Submit Test Reports in accordance with referenced standards in this section.

After completion of the installation and splicing, and prior to energizing the conductors, perform wire and cable continuity and insulation tests as herein specified before the conductors are energized.

Provide all necessary test equipment, labor, and personnel to perform the tests, as herein specified.

Isolate completely all wire and cable from all extraneous electrical connections at cable terminations and joints. Use substation and switchboard feeder breakers, disconnects in combination motor starters, circuit breakers in panel boards, and other disconnecting devices to isolate the circuits under test.

Perform insulation-resistance test on each field-installed conductor with respect to ground and adjacent conductors. Applied potential is 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Take readings after 1 minute and until the reading is constant for 15 seconds. Minimum insulation-resistance values is not less than 25 Megohms for 300 volt rated cable and 100 Megohms for 600 volt rated cable. For circuits with conductor sizes 8AWG and smaller insulation resistance testing is not required.

Perform continuity test to insure correct cable connection (i.e correct phase conductor, grounded conductor, and grounding conductor wiring) end-to-end. Repair and re-verify any damages to existing or new electrical equipment resulting from mis-wiring. Receive approval for all repairs from the Contracting Officer prior to commencement of the repair.

Conduct phase-rotation tests on all three-phase circuits using a phase-rotation indicating instrument. Perform phase rotation of electrical connections to connected equipment clockwise, facing the source.

Final acceptance requires the successful performance of wire and cable under test. Do not energize any conductor until the final test reports are reviewed and approved by the Contracting Officer.

-- End of Section --

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