SECTION 26 0544

UNDERGROUND DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Ducts in directly-buried duct banks.

1.2 REFERENCES

A. Society of Cable Telecommunications Engineers (SCTE):

1. SCTE 77: Specification for Underground Enclosure Integrity. Light duty and pedestrian traffic only. Includes Tiers for specific applications, and static vertical wheel load ratings:

a. Tier 5: Sidewalk applications with a safety factor for occasional nondeliberate vehicular traffic.
b. Tier 8: Sidewalk applications with a safety factor for nondeliberate vehicular traffic.
c. Tier 15: Driveway, parking lot, and off-roadway applications subject to occasional nondeliberate heavy vehicular traffic.

1.3 SUBMITTALS

A. Product data: For the following:

1. Conduit and ducts, including elbows, bell ends, bends, fittings, and solvent cement.
2. Underground warning tape.

1.4 QUALITY ASSURANCE

A. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with ANSI C2.

C. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver ducts to project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

1.6 PROJECT CONDITIONS

A. Existing utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Owner at least two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner’s written permission.

1.7 COORDINATION

A. Coordinate layout and installation of ducts with final arrangement of other utilities and site grading, as determined in the field.

B. Coordinate elevations of ducts with final profiles of conduits as determined by coordination with other utilities and underground obstructions. Revise locations and elevations from those indicated as required to suit field conditions.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

1. Nonmetallic ducts and accessories:

a. ARNCO Corp.
b. Beck Manufacturing Inc.
c. Cantex, Inc.
d. CertainTeed Corp.; Pipe & Plastics Group.
e. ElecSys, Inc.
f. Electri-Flex Co.
g. IPEX, Inc.
h. Lamson & Sessions; Carlon Electrical Products.
i. Manhattan/CDT
j. Spiraduct/AFC Cable Systems, Inc.

2.2 CONDUIT

A. Conduit and fittings are specified in Section 26 0533.

2.3 DUCTS

A. Rigid nonmetallic conduit: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by the same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Underground ducts for electrical branch circuits 600 V and below: Type EPC-40-PVC, directly-buried duct bank, except use Type EPC-80-PVC when crossing roads.

B. Underground ducts for telephone utility service: Type EPC-40-PVC, directly-buried duct bank, except use Type EPC-80-PVC when crossing roads.

C. Underground ducts for communication circuits: Type EPC-40-PVC, directly-buried duct bank.

3.2 EARTHWORK

A. Excavation and backfill: Comply with Section 26 0501, Excavation and Fill for Electrical Work but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

3.3 CONDUIT AND DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 and away from buildings and equipment.

B. Curves and bends: Use manufactured elbows for stub-ups at equipment and at building entrances. Use manufactured long sweep bends with a minimum radius of 25 feet (7.5 m), both horizontally and vertically, at other locations.

C. Use solvent-cement joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in the same plane.

D. Building entrances: Make a transition from underground duct to rigid steel conduit at least 10 feet (3 m) outside the building wall. Use fittings manufactured for this purpose. Follow the appropriate installation instructions below:

1. Concrete-encased ducts: Install reinforcement in duct banks passing through disturbed earth near buildings and other excavations. Coordinate duct bank with structural design to support duct bank at wall without reducing structural or watertight integrity of building wall.
2. Waterproofed wall and floor penetrations: Install a watertight entrance-sealing device with sealing gland assembly on the inside. Anchor device into masonry construction with one or more integral flanges. Secure membrane waterproofing to the device to make permanently watertight.

E. Directly-buried ducts: Support ducts on duct spacers, spaced as recommended by manufacturer and coordinated with duct size, duct spacing, and outdoor temperature. Install as follows:

1. Separator installation: Space separators close enough to prevent sagging and deforming of ducts.
2. Install expansion fittings as shown on shop drawings.
3. Trench bottom: Continuous, firm, and uniform support for duct bank. Prepare trench bottoms as specified in Section 26 0501, Excavation and Fill for Electrical Work.
4. Backfill: Install backfill as specified in 26 0501, Excavation and Fill for Electrical Work. After installing first tier of ducts, backfill and compact. Repeat backfilling after placing each tier. After placing last tier, hand-place backfill to 4 inches (100 mm) over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, complete backfilling normally.
5. Minimum clearances between ducts: 3 inches (75 mm) between ducts for like services and 6 inches (150 mm) between power and signal ducts.
6. Depth: Install top of duct bank at least 24 inches (600 mm) below finished grade, unless otherwise indicated.

F. Warning tape: Bury warning tape approximately 12 inches (300 mm) above all concrete-encased duct banks. Align tape parallel to and within 3 inches (75 mm) of the centerline of duct bank.

G. Stub-ups: Use rigid steel conduit for stub-ups to equipment. For equipment mounted on outdoor concrete bases, extend steel conduit a minimum of 5 feet (1.5 m) from edge of base. Install insulated grounding bushings on terminations. Couple steel conduits to ducts with adapters designed for this purpose and encase coupling with 3 inches (75 mm) of concrete.

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H. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.

I. Pull rope: Equal to Graybar Electric Co., Inc., “Pro-Pull”: Polypropylene, minimum 0.1875 inch (5 mm) thick, tensile strength 800 lbs (3559 N), work load 130 lbs (578 N).

3.4 FIELD QUALITY CONTROL

A. Testing: Demonstrate capability and compliance with requirements on completion of installation of underground ducts.

B. Duct integrity: Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of the duct. If obstructions are indicated, remove obstructions and retest.

C. Correct installations if possible and retest to demonstrate compliance. Remove and replace defective products and retest.

3.5 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

END OF SECTION

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