PART 1 - GENERAL

1.01 SECTION INCLUDES

1. Metal Conduit
2. Flexible Metal Conduit
3. Liquid tight Flexible Metal Conduit
4. Electrical Metallic Tubing
5. Non-Metal Conduit
6. Fittings and Conduit Bodies

1.02 RELATED SECTIONS

1. Section 26 05 26 Grounding and Bonding
2. Section 26 05 29 Supporting Devices
3. Section 26 05 33.16 Boxes
4. Section 26 05 53 Electrical Identification

1.03 REFERENCES

1. ANSI C80.1—Rigid Steel Conduit, Zinc Coated
2. ANSI C80.3—Electrical Metallic Tubing, Zinc Coated
3. ANSI/NEMA FB 1—Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
4. ANSI/NFPA 70—National Electrical Code.
5. NECA "Standard of Installation"
6. NEMA TC 2—Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
7. NEMA TC 3—PVC Fittings for Use with Rigid PVC Conduit and Tubing
8. UL651A—Type EB and A Rigid PVC Conduit and HDPE Conduit
9. UL651B—Continuous Length HDPE Conduit

1.04 DESIGN REQUIREMENTS

Conduit Size: ANSI/NFPA 70.

1.05 PROJECT RECORD DOCUMENTS

1. Accurately record actual routing of conduits larger than 1-1/4 inches.

B. Accurately record actual routing of all underground conduits.

1.06 DELIVERY, STORAGE, AND HANDLING

1. Deliver, store, protect, and handle Products to site under provisions of Division 01.
2. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.07 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Homerun shall mean first outlet box or adjacent J-box for lighting branch circuits. Homeruns shall be a minimum size of three-quarter inch (¾"), unless otherwise specified.

B. Underground Installations:

1) Use thickwall nonmetallic conduit, Schedule 40 PVC.

2) In or Under Slab-on-Grade: Use Schedule 40 PVC or gray HDPE pipe, per NEC requirements. Use only UL listed and approved fittings for coupling and change-over to different type raceways.

3) Minimum Size: ¾".

4) Install rigid steel elbows for conduits larger than two inches (2"). Long radius for four inches (4") and larger.

5) Under slab metal conduit or poured-in concrete metal conduit shall be painted with a coat of bitumastic. The bitumastic shall be continuous and continue up through penetration of concrete slabs, up to 12" A.F.G. Corrosion tape is acceptable.

C. Outdoor Locations, Above Grade: Use rigid steel and liquidtight flexible metal conduit.

D. Wet and Damp Locations: Use rigid steel, aluminum, intermediate, and liquidtight flexible metal conduit.

E. Dry Locations:

1) Concealed: Use rigid steel, aluminum, intermediate metal conduit, and electrical metallic tubing.

2) Exposed:

a) Exterior—Rigid Steel or aluminum rigid

b) Interior—Electrical Metallic Tubing

F. Fire alarm systems raceways/conduits shall be RED its entire length as applied by the manufacturer.

2.02 METAL CONDUIT

1. Rigid Steel, Aluminum, and Intermediate Metal Conduit: ANSI C80.1
2. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings
3. Provide a minimum of half-inch (½") for flexible connections to equipment

2.03 FLEXIBLE METAL CONDUIT

1. Description: For exposed locations, interlocked steel construction. For concealed locations, interlocked steel construction or aluminum.

B. Fittings: ANSI/NEMA FB 1

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket

B. Fittings: ANSI/NEMA FB 1

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel set screw or steel compression coupling or connectors. All connectors shall be insulated throat, up to one inch.

2.06 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC

B. Fittings and Conduit Bodies: NEMA TC 3

2.07 HIGH DENSITY POLYETHYLENE (HDPE) CONDUIT

A. Description: UL651A; UL651B, extruded rigid, Schedule 40, high density polyethylene. Gray in color

B. Fittings: UL651A

PART 3 - EXECUTION

3.01 INSTALLATION

A. All work shall be done in a neat and workman like manner per NECA “Standard of Installation.”

B. PVC conduits and raceways are only permitted underground or under slabs. Exception: PVC is permitted within block walls to first outlet box A.F.F. if PVC raceway is one inch (1") trade size or smaller. All raceways and conduits installed underground shall have a minimum burial depth of 24" to the top of conduit (36" for service entrance).

C. All underground conduits and raceways, not under building slabs, shall have a yellow marker tape for communication or a red marker tape for power installed above its entire length and placed approximately 12" below finished grade. Exception: Raceway installation by directional boring.

D. Provide a yellow marker ribbon for communication conduits and a red marker ribbon for power conduits installed underground. Exception: Raceway installation by directional boring.

E. Contractor shall provide a one-inch (1") conduit from the nearest mechanical room to the electrical service meter. Provide a 'FD' type cast junction box and cover at the electrical meter and a 4" x 4" square box and cover in the mechanical room. Provide a nylon pull string. Locate box adjacent to controls equipment cabinet. Coordinate with Mechanical Engineer/Mechanical Contractor.

F. All thru-slab conduits and raceways larger than one inch (1") installed into block masonry walls and through slabs shall be rigid galvanized conduit to the first enclosure, cabinet, panelboard/switchboard, or box/outlet. All exposed/surface mounted raceways thru slabs to panelboards/switchboards, enclosures, cabinets, conduits and boxes shall be rigid galvanized conduits entering into same enclosures with no junction boxes. All 90° ells and sweeps larger than 1" shall be rigid galvanized conduit.

G. All raceways and conduits within concrete second floor and above slabs shall be intermediate metal conduit, rigid galvanized conduit, or PVC. EMT is not acceptable. EMT conduits may be used in tilt-wall construction using approved fittings and methods and coated with an asphalt trim paint, corrosive tape or other approved coating.

H. All raceway and conduits installed under-slabs and under-buildings shall be installed under the slab and not within the concrete pour or slab.

1. All exterior conduits and raceways shall be rigid galvanized steel or aluminum conduit, or intermediate metal conduit. EMT and PVC shall not be used. Exterior conduits that transition to underground shall be rigid galvanized steel or aluminum rigid.

J. All conduit shall be concealed whenever possible. Concealed conduit run above the ceiling shall be supported independent of ceiling supports. When a lay-in type ceiling is utilized, the conduit must be installed high enough to permit removal of ceiling tile.

K. Exposed and surface mounted raceway systems shall have two approved supporting devices per 10' length as equally spaced as practical.

L. Route exposed conduit parallel and perpendicular to walls. Exposed conduits shall only be run in mechanical and electrical rooms unless otherwise specified.

M. Conduit/raceway chases to above-ceiling spaces for all cable drops communication, data, CATV and telephone shall have a bushing at the top of the conduit/raceway for protection or terminated in an approved box.

N. All above ceiling and within partition wall raceways and conduits shall be EMT, intermediate metal conduit or rigid galvanized conduit. PVC is not permitted above the ceiling spaces.

O. All conduit and raceway systems shall have UL approved supports (equal to Erico Caddy® SK-I Clamp) within three feet (3') of boxes or enclosures and couplings/fittings/condulets. Bar Joist spacing exceeding three feet (3') shall meet the N.E.C. 5' exception to the rule for support.

P. Tie-wire, tie-wrap, duct tape, etc. shall not be permitted as a means of support for any conduit or raceway system. All conduits and raceways shall be adequately supported with U.L. approved supporting devices. Tie wire or tie wraps shall not be permitted for support and/or securing of electrical raceways, boxes, or equipment.

Q. Conduit systems shall be racked and run in parallel and perpendicular from its point or origin (i.e., panelboard/panel/switchboard, systems cabinet, etc.) to its destination or first termination. Authority having jurisdiction shall approve any deviation or conflicts with this rule. All conduits after the first point of termination shall be run parallel with or at right angles to building walls or building structure.

R. Arrange supports to prevent misalignment during wiring installation.

S. Horizontal runs of conduit in masonry walls is not permissible.

T. Home-Run conduits are to be a minimum of ¾" trade size to first point of use box/enclosure. Branch circuit conduits for lighting and receptacles shall be filled a maximum of three (3) phase/hot conductors.

U. A minimum of three spare ¾" and two empty 1” conduits shall be stubbed out of each panelboard or panel to building structure above and terminated in a J-box with cover. Conduits stubs shall also be capped at top with approved fittings where not terminating in a box.

V. Conduit shall be continuous from outlet to outlet, from outlet to cabinet, junction box to pull box in such a manner that each system shall be electrically continuous from point of service to all outlets.

W. Any conduit that penetrates a firewall shall be sealed with a fire barrier caulk or similar compound to preserve the fire rating of the wall. Fire-rated foam spray is acceptable.

X. Conduits not terminating in boxes and unused shall be capped.

Y. All empty conduits and raceways shall have a pull-string installed capable of pulling conductors typical of conduit size.

Z. Arrange conduit to maintain headroom and present neat appearance. Minimum headroom for equipment suspended from ceiling or building structure shall be 6’8” unless otherwise specified.

AA. Maintain 12" clearance between conduit and surfaces with temperatures exceeding 104°F (40°C) unless otherwise specified.

BB. Cut conduit square using saw or pipe cutter; de-burr cut ends. Bring conduit to shoulder of fittings; fasten securely.

CC. Install no more than equivalent of four (4) 90° bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one- shot bender or factory elbows for bends in metal conduit larger than 2" size.

DD. Provide fittings designed to accommodate expansion and deflection where conduit crosses, control, and expansion joints.

EE. Threadless connectors and couplings for intermediate metal conduit and rigid galvanized conduits are not permitted. Exception: By approval of the “Authority Having Jurisdiction” for special conditions.

FF. EMT Fittings (connectors/couplings) shall be steel set screw or steel compression type. Fittings in wet locations shall be compression type.

GG. When hot dipped rigid galvanized steel conduit is installed below grade, it shall be coated with an asphalt trim paint or approved corrosion tape.

HH. PVC sweeps into utility transformers shall be permitted.

II. Install nonmetallic conduit in accordance with manufacturer's instructions.

JJ. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting.

KK. Corrosive environments/pool pump houses:

1) PVC conduits, fitting, conduit fittings, boxes, and enclosures shall be permitted.

2) Additional conduit supports shall be provided if PVC conduit is exposed.

3) Walk-in coolers and freezers—PVC conduit with stainless steel hardware.

LL. HDPE conduit shall not be installed above grade per NEC.

MM. All flexible conduits in exposed areas shall be steel or metal seal-tite. All flexible raceways in damp or wet locations shall be metal seal-tite. All flexible conduits above suspended lay-in ceilings shall be aluminum or steel. Flexible conduits are not permitted above drywall, plaster or hard ceilings where not accessible. Minimum size flexible conduits for all installations shall be ½" trade size and shall not exceed 6' in length. Flexible metal conduit fittings and connectors shall be clamp-type. Set screw type fittings and connectors are not permitted. Exceptions as approved by Project Architect.

NN. Equipment in mechanical rooms shall include by not be limited to, circulating pumps, air handlers, compressors, chillers, etc. Use ½” minimum liquid tight flexible metal conduit, not flexible metal conduit. Liquid tight metal conduit shall not exceed 2’ in length when connecting to the above equipment.

OO. Seal tight or flexible conduit shall NOT be installed through walls.

PP. Flexible metal conduit shall be used for a flexible connection only, not raceways.

QQ. All raceway terminations at boxes and enclosures one inch (1") and smaller shall be made with insulated throat connectors. RMC, aluminum, intermediate metal conduit to comply with NEC.

RR. All raceway terminations at boxes and enclosures larger than one inch (1") shall be made with insulated throat connectors or metallic insulated bushings. Plastic bushings are not acceptable. Conduits/raceways enclosing #3 or larger conductors shall have connectors with insulated throat or use metal insulated bushings.

SS. Install metallic insulated grounding bushings with lug on all mains, sub-feeders, switchboards, panelboards, transformers, chillers, disconnects, and equipment rated at 100 amps and above.

TT. No conduit system or raceway system will be installed on or under walkway roofs. Only raceways required for walkway lighting will be permissible. Walkway raceways shall be aluminum and installed under walkway roof decks with approved aluminum or stainless steel supports and hardware. Also see walkway roof specifications, Section 26 56 33 (walkway lighting).

UU. Install and seal boxes and conduit in acoustical treated walls and ceilings per architectural acoustics specifications.

VV. All fixture whips shall be supported to fixture support wire/cable with an approved fastener equal to an Erico “KX” flexible conduit hanger or other UL listed supports and fasteners.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods that are UL listed and tested.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified under Division 07.

**END OF SECTION**