

PART 1 - GENERAL

- 1.1 This specification section covers common conduit systems, boxes, firestopping and sleeves. Where other methods are specified under separate sections for specific applications, the specific application requirements shall govern.
- 1.2 Refer to Section 26 05 05 Firestopping for firestopping requirements.

PART 2 - PRODUCTS

2.1 Conduit Type - Application (Use only conduit types listed)

- A. Conduit - Rigid or Intermediate Grade Galvanized Threaded.
Application - restrictions - (Not to be used in):
1. Direct buried in corrosive soils.
 2. Corrosive atmospheres.
- B. Conduit - Thinwall EMT.
Application - restrictions - (Not to be used in):
1. Poured concrete.
 2. Exposed to weather.
 3. Underground.
 4. Exposed in mechanical equipment or other equipment/process rooms below 48 inches.
 5. Hazardous or corrosive atmospheres.
 6. Not to be used for medium voltage (2001 volts or higher) cable.
 7. Not to be used in utility tunnels.
- C. Conduit - PVC Type 40 (Schedule 40) rigid, conforming to ANSI, NEMA specifications and each length UL labeled.
Application - use limited to:
1. In or under concrete slabs on grade where permitted by electric legend on the drawings.
 2. Exterior use when encased in 3 inch concrete.
 3. Direct buried, underground when indicated on drawings.
- D. Conduit - Flexible Metal (Greenfield type), galvanized steel or aluminum.
Application - use limited to:
1. Connection to lighting fixtures; not over 6 ft. in length.
 2. Narrow movable partitions where other raceways are not practicable, when approved by the Architect or Engineer.
 3. Connections to transformers, dynamic equipment and for motors only when in air streams or plenums.
 4. In existing walls for remodel projects, vertical drops to outlets and switches; no more than 3 ft. out the top of the wall.
- E. Conduit - Liquidtight Flexible Metal.
Application - use and limitations:
1. Connections to all motors, except in air stream or plenum.
 2. Connections to controls on dynamic equipment, transformers, etc., outdoors and indoors in wet locations.
 3. Use not permitted underground or where subject to physical damage.

- F. Plastic jacketed rigid steel conduit shall be ETL performance verified. Application – use in corrosive atmospheres including swimming pool areas, pool equipment rooms, chlorine storage areas, etc. and other areas as noted on the drawings.

2.2 Conduit sizes

- A. Conduits shall be 0.75 inch minimum size except 0.50 inch size may be used for switch legs and flexible connections to lighting fixtures.

2.3 Conduit Fittings

- A. Fittings and workmanship shall ensure electrical continuity. All conduit systems in poured concrete shall be concrete tight.
- B. Application of bushings, locknuts and insulated fittings shall comply with NEC requirements.
- C. Use conduit fittings as manufactured by Efcor, Steel City, Raco, Midwest, Appleton, ETP / O-Z / Gedney, American Fitting Corporation or T&B, equal to the following catalog numbers:
1. Rigid and intermediate conduit
 - all fittings, couplings and connectors shall be threaded type.
 - grounding bushings, malleable iron; insulated; Steel City BG-801; Midwest Series GLL.
 2. EMT
 - fittings shall be all steel, set screw or compression type, concrete tight.
 - set-screw type couplings; Midwest Series 460; Steel City TK 121; Appleton TW 50S.
 - compression type couplings; Midwest series 660S; Steel City TK111; Appleton TWC50CS.
 - set-screw type connectors; Midwest Series 450; Steel City TC 121; Appleton TWC 50S.
 - compression type connectors; Midwest Series 650; Steel City TC111; Appleton TW50CS.
 3. Flexible metal conduit
 - malleable iron, "squeeze" type, non-insulated; Midwest series 1708; Steel City XC 901; Appleton 7481V. (For lighting fixture whips only - all steel or die cast screw in connector; Midwest 771; Steel City XC 241; Appleton SGC 50DC).
 4. Liquid tight conduit
 - steel or malleable iron; Midwest Series LT; Steel City LT 100; Appleton ST.
 5. PVC Type 40 and Type TC-6
 - couplings and fittings socket type solvent weld, coupling and solvent by same manufacturer as conduit.
 6. RTRC
 - Coupling and fittings socket type adhesive jointing. Coupling and adhesive by same manufacturer as conduit. Gasketed jointing system may be used underground where encased in conduit.

2.4 Boxes

- A. Junction boxes and pull boxes shall be code gauge galvanized steel with multiple screw fasteners and galvanized steel covers.
- B. Outlet boxes all steel construction with galvanized or plated finish or otherwise all metal, by Steel City, Appleton, Crouse Hinds, R&S or Raco.
1. Lighting fixture outlet boxes 4 inches square or octagonal, 2.125 inches deep, with 0.375 inch fixture studs. Equal to Steel City Series 54171; Series 52171 with FE 421 stud. Fixtures weighing more than 50 lbs. shall be supported independently of the outlet box.

2. Flush mounted device outlet boxes shall be minimum 4 inches square. Provide extension rings as required. Use Erico Caddy No. H2-3 mounting support plate where metal studs are used.
 3. Device rings in finished masonry or tile walls shall be square corner masonry type with no extended ears, to allow flush mounting of plates.
 4. Surface mounted device boxes shall be cast "FS" type or special surface mounted boxes for use with surface raceway systems.
- C. Floor boxes shall be UL listed for its application as manufactured by Hubbell, Steel City, Walker, Raco or Wiremold. Drawings identify material type.
- D. Provide water tight boxes, slip expansions and bonding jumpers where dictated by construction conditions.
- E. Terminations at boxes shall be secured by locknuts or approved bushings.

2.5 Surface Metal Raceways

- A. Snap on cover types by Mono-Systems, Panduit or Wiremold / Walkermold with prime gray finish (enamel finish coat to match room finishes in remodel areas). Application - permitted only when specifically shown on the drawings.
1. Fittings, boxes and extension rings: Furnish manufacturer's standard accessories; match finish of raceway.

2.6 Sleeves and Openings

- A. Sleeves and formed openings shall be placed in walls, partitions, floor slabs and poured concrete roof decks for the passage of conduit, cable, wireway, cable tray and bus duct. Sleeves and formed openings are not required:
1. In floor slabs on grade.
 2. Where conduit is installed before the wall, partition or slab is constructed.
 3. Openings are cut for conduit passage and patched with equal or comparable material to close the space around the conduit.
 4. In stud and gypsum board or plaster walls and partitions which are not fire rated.
 5. For conduit passing thru masonry walls and partitions and stud and gypsum board or plaster walls and partitions. Sleeves are required however, for which expansion, contraction and other movement can be expected.
 6. In core drilled openings in solid concrete not requiring water protection. Sleeves are required, however, at core drilling thru hollow pre-cast slabs and concrete block walls, to facilitate containment of required firestopping material.
 7. In large floor openings for multiple pipe and duct risers which are within a fire rated shaft, unless the opening is to be closed off with concrete or other material after conduits are set.
 8. Sleeves for passage of conduit and cables shall be schedule 40 black steel pipe or galvanized rigid conduit. Rectangular sleeves for cables, wireway, cable tray and bus duct shall be 18 gauge galvanized steel in poured concrete floors, walls and roof decks; 26 gauge galvanized sheet steel in other than poured concrete.
 9. Sleeves shall be sized to afford 0.25 inch to 0.75 inch clearance space.

- 2.7 In areas having special membrane waterproofing in or on the floor slab, a Josam 26420, or equal approved by the Architect, riser sleeve with clamping ring and auxiliary conduit sleeve extending 4 inches above finished floor or 8 inches above finished roof shall be used. Waterproofing membrane for roof and floor construction shall be secured by the clamping ring. These are to be used in areas having special membrane water-proofing in or on the floor slab and at roof decks.

- 2.8 Multiple conduits extending through the roof may be fitted with a manufactured pipe curb weatherproofing assembly equal to Pate # pca, lpca and mpca as an alternative to that specified in paragraph 2.7 above.
- 2.9 Escutcheon plates shall be split-ring chromium plated pressed steel. Plates shall be sized to cover the surface penetration and sleeve. Plates shall be installed on exposed piping in finished rooms and areas where conduits penetrate walls, floors, ceilings or overhead structure.
- 2.10 Anchors and Fasteners
- A. Anchors and fasteners shall be of a type designed and intended for use in the base material to which the material support is to be attached and shall be capable of supporting the intended load and withstanding any associated stresses and vibrations.
 - B. In general, screws shall be used in wood, masonry anchors on concrete or brick, toggle bolts in hollow walls, and machine screws, bolts or welded studs on steel.
 - C. Nails shall not be used except for temporary support or for light loads in wood frame construction.
 - D. In outdoor locations or other corrosive atmospheres, the anchors and fasteners shall be non-corrosive or have suitable corrosion resisting coatings.

PART 3 - EXECUTION

- 3.1 Conduit shall be run concealed in all finished areas of new construction and elsewhere unless specifically indicated or upon specific permission by the Architect. All conduit shall parallel building lines.
- 3.2 Conduit shall be run overhead and shall not be run in or below concrete slabs unless specifically indicated on the drawings and in the legend on the drawings.
- 3.3 Where feeders are permitted to be run below floor slab on grade, they shall be installed in non-metallic conduit encased in 3 inch concrete using galvanized rigid steel or RTRC (equal to Champion Fiberglass) elbows with all necessary fittings and couplers. (NOTE: Where not required to be run overhead, branch circuits may be installed in 1 inch or smaller Schedule 40 PVC conduit below the vapor barrier, shall have a minimum of 6-inch fill over the conduit below the vapor barrier without concrete encasing the PVC. The 90 degree elbow and stub up shall be galvanized rigid steel).
- 3.4 All conduits installed below concrete slab on grade shall have a minimum of 6-inches fill over the conduits in order to prevent accidental damage to conduits should the floor be saw-cut in the future.
- 3.5 Conduits shall not be installed above the vapor barrier in concrete floors poured on grade.
- 3.6 Conduit crossing building expansion joints shall have expansion provisions with grounding continuity; use special expansion fittings or other NEC approved method. Refer to the Architectural and Structural floor plans and details for locations of expansion joints.
- 3.7 Do not install wall-mounted boxes back-to-back in opposite sides of wall; in stud walls, boxes shall be on opposite side of studs. In acoustic rated and fire rated walls boxes shall be separated a minimum of 24 inches.
- 3.8 Boxes not otherwise accessible in ceilings and walls shall be made accessible by installation of hinged door access panels. Refer to Section 26 05 04 - Basic Electrical Materials and Methods.

- 3.9 Use cast floor boxes for installation in slab on grade; formed steel boxes are acceptable for other installations.
- 3.10 Work shall be so planned as to:
- A. Minimize the number of offsets and junction boxes. For feeder conduits, use all long radius conduit bends or accessibly located large junction boxes with screw covers.
 - B. Generally run conduit and conductors as high as practicable against underside of floor slab in concrete construction or immediately below the top chord of bar joist construction unless otherwise shown. This high level zone shall be used for running electrical raceways. Running conduits promiscuously at various levels and directions will not be acceptable. Runs at bottom chord level or ceiling grid level will not be acceptable.
 - C. Where spray on fireproofing is used, coordinate with the General Contractor about installing supports, panel feeders and larger conduits before fireproofing is applied. Branch circuit conduits and smaller size conduits may be run as high as possible on stud walls that go all the way up to the structure; this will minimize damage to spray on fireproofing. Patch and repair damaged spray on fireproofing caused by electrical installation; conduits shall not be fully covered with fireproofing.
 - D. Coordinate activity in advance to avoid interference with other trades.
 - E. Provide access to all junction and pull boxes.
 - F. Maintain 6 inches from conduit to paralleled hot water piping and 4 inches from cross piping and 12 inches from generator exhaust piping.
- 3.11 Secure feeder conduit to basic structural elements with galvanized strap hangers and clamps; use of trapeze type hangers is encouraged for multiple conduits where space will permit. Galvanized metal clamps and screws may be used for attaching and supporting branch circuit conduit. Non-metallic fasteners shall not be used except plastic inserts may be used in concrete for small conduits. Vertical conduits shall be supported at each floor by clamps.
- 3.12 Surface mounted horizontal and vertical conduit supports on walls up to a height of 7 feet-0 inches above the floor shall be one or two hole sheet metal pipe straps. Pinch type hangers similar to Minerallac type may only be used at heights greater than 8 feet-0 inches. The use of pinch type hangers similar to Minerallac type are expressly prohibited on ductwork, air handling units and other mechanical equipment below 8 feet-0 inches.
- 3.13 During construction temporarily cap open ends of conduit. Caution trades to take special care of runs in concrete slabs during pouring.
- 3.14 Empty conduit installed for communications use or for future systems shall have an insulated pull wire or heavy nylon cord inserted for use in pulling wires.
- 3.15 Pull mandrel or large swab thru conduit to ensure freedom from debris before pulling wires. Use pulling lubricants sparingly.
- 3.16 Sleeves for passage of conduit, cables, wireway, cable tray and bus duct shall be placed in the initial stages of construction before concrete, masonry and other general construction activity. Means shall be taken to ensure that the sleeve will not move during or after construction. Beams, columns and other structural members shall not be sleeved except upon approval of the Architect.
- 3.17 Length of wall sleeves shall be such that the sleeve ends are substantially flush with both sides of the wall or partition. Floor sleeves shall be flush with the bottom and top of the floor slab except, in mechanical rooms and other areas which might have water on the floor, sleeves shall project a

minimum of 1 inch above finished floor. Refer to the following paragraph for qualifications and exceptions relating to firestopping.

- 3.18 Refer to 26 05 05 Firestopping. Sleeves which are a part of firestopping assemblies shall conform to the requirements of the assembly with particular emphasis regarding size, annular space, length, passage or non-passage of insulation and the installation of the sleeves.
- 3.19 Where firestopping is not required, the annular space between the sleeve, core drilling or opening and the conduit, cable, cable tray, bus duct and raceway shall be closed with caulking to retard the passage of smoke.
- 3.20 Where permitted by OBC Section 712 Penetrations, metallic conduits requiring no pipe sleeves in passing thru concrete floors or concrete or masonry walls and partitions, the annular space shall be closed full depth of the penetration with materials and methods compatible with the floor, wall or partition material (concrete, grout or mortar).
- 3.21 Conduits, wire and cables entering from outside the building shall be sealed water and moisture tight. Seal between conduit and sleeves, conduits and core drilled holes and around conductors inside conduits.
- 3.22 Conduits extending through the roof shall be made watertight by means compatible with the roofing system and as directed by the Roofing Contractor (the company who presently holds the warranty on the roof) and approved by the Architect.
- 3.23 Conduit, wire and cable, where exposed to different temperatures, shall have raceway or sleeve filled with approved material to prevent circulation of warm air to cold.
- 3.24 Power actuated fasteners of any type are prohibited in occupied buildings. This includes anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant.
- 3.25 Provide four (4) 1 inch diameter spare conduits for each flush mounted branch circuit panelboard; extend from top of panelboard to above an accessible ceiling for future use.
- 3.26 All conduit terminations to be equipped with locknuts and bushings. Conduits 1-1/2 inches and larger shall have insulating bushings, grounding lug and shall have locknuts inside and outside the enclosure.
- 3.27 Outlet Box Installation
 - A. Set box square and true with finished building surfaces and trim.
 - B. Secure boxes firmly to building structure.
 - C. Verify location of outlets and switches in finished rooms with Architectural Drawings of interior details and finish. In centering outlets and locating boxes, allow for overhead pipes, ducts and mechanical equipment, variations in fireproofing and plastering, window and like, and correct any inaccuracy from failure to do so without expense to the Owner.
 - D. Maintain symmetry of all outlets as closely as possible contained within Architectural Elevation. For example, the Contractor shall center light fixture over doorway or receptacle in section of masonry wall, if shown in that approximate position. If receptacle is shown in same location as counter or bench, determine countertop height and set receptacle to clear top and trim of counter and render outlet easily accessible.

- E. In the event of conflict between locations of electrical outlets as shown on the Electrical Drawings and on the Architectural Drawings, outlets shall be installed in accordance with the latter.
 - F. Locate light switches on latch side of door and verify door hinge location in field prior to switch outlet installation.
 - G. The Owner reserves the right to relocate any device as much as 10 feet-0 inches (measured horizontally) from its indicated location at no additional cost, provided the contractor is notified prior to roughing that device in.
- 3.28 Contractor shall record carefully on a set of "as built" prints the exact location of all feeder conduits.
- 3.29 Unless noted otherwise on the drawings, a maximum of 8 conductors shall be installed in a branch circuit conduit. This maximum is a count of all phase and neutral conductors only - ground conductors are not counted when determining maximum fill for this purpose.

END OF SECTION