

ELECTRICAL SPECIFICATIONS

GENERAL CONDITIONS

WORK UNDER THIS DIVISION SHALL BE SUBJECT TO THE AM. GENERAL AND SPECIAL CONDITIONS.

SCOPE

THE WORK REQUIRED FOR THIS SECTION INCLUDES LABOR, MATERIALS, EQUIPMENT, APPURTENANCES, SERVICE AND SUPERVISION TO PROVIDE COMPLETE ELECTRICAL SYSTEMS AS SHOWN ON THE DWGS.

THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO BID TO DETERMINE THE EXTENT OF THE WORK. LACK OF KNOWLEDGE OF EXISTING CONDITIONS WILL NOT BE CONSIDERED A BASIS FOR CHANGE ORDERS.

SPECIFICATIONS, CODES AND STANDARDS

THE LATEST EFFECTIVE PUBLICATIONS OF THE FOLLOWING STANDARDS, CODES, ETC. FORM A PART OF THESE SPECIFICATIONS.

- NATIONAL ELECTRICAL CODE (NEC).
- INTERNATIONAL RESIDENTIAL CODE (IRC).
- STANDARD RULES OF THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS.
- SERVICE RULES AND REGULATIONS OF THE LOCAL ELECTRIC UTILITY COMPANY AND TELEPHONE COMPANY.
- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION.
- VIRGINIA UNIFORM STATEWIDE BUILDING CODE.
- NATIONAL FIRE PROTECTION ASSOCIATION (NFPA).
- AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI).
- UNDERWRIEERS LABORATORIES, INC. (UL).

THIS CONTRACTOR SHALL GIVE REQUIRED NOTICES, OBTAIN NECESSARY PERMITS, AND PAY PERMIT FEES.

DRAWINGS

THE DRAWINGS INDICATE DIAGRAMMATICALLY THE EXTENT OF THE WORK. MINOR VARIATIONS IN LOCATION OF EQUIPMENT SHALL BE MADE UPON WRITTEN APPROVAL OF THE ENGINEER AT NO ADDITIONAL CHARGE. IT IS THE INTENTION OF THESE SPECIFICATIONS AND DRAWINGS TO FULLY COVER ALL WORK AND MATERIALS FOR A COMPLETE ELECTRICAL INSTALLATION, AND ANY DEVICES SUCH AS PULL BOXES AND DISCONNECT SWITCHES, USUALLY EMPLOYED IN THIS CLASS OF WORK, THOUGH NOT SPECIFICALLY MENTIONED OR SHOWN ON THE DRAWINGS OR IN THE SPECIFICATION, BUT WHICH MAY BE NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AS A PART OF HIS TOTAL WORK UNDER THIS DIVISION.

EQUIPMENT

STARTERS, CONTROLLERS, THERMOSTATS, FAN SWITCHES, INDICATING LIGHTS, ETC.; AND CONTROL WIRING AND WIRING FOR REMOTE STATIONS REGARDLESS OF VOLTAGE SHALL BE PROVIDED UNDER THE DIVISION PROVIDING THE RESPECTIVE MOTOR AND/OR EQUIPMENT UNLESS OTHERWISE INDICATED.

POWER WIRING AND POWER CONNECTIONS TO EQUIPMENT SHALL BE PROVIDED UNDER "ELECTRICAL," UNLESS OTHERWISE INDICATED ON THE ELECTRICAL DRAWINGS.

WHEN SUBSTITUTED MOTORS AND/OR EQUIPMENT REQUIRES ELECTRICAL MODIFICATIONS, THE COST OF THE ELECTRICAL MODIFICATIONS AND COORDINATION SHALL BE INCLUDED UNDER THE DIVISION PROVIDING THE MOTOR AND/OR EQUIPMENT.

COORDINATION

COORDINATE AND COORDINATE THE WORK OF THIS DIVISION WITH OTHER TRADES. THIS IS ESPECIALLY IMPORTANT IN DETERMINING EXACT LOCATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHTING FIXTURES. THIS VERIFICATION MUST BE EXECUTED REGARDLESS OF INFORMATION PLACED ON THE DRAWINGS. ANY COST INCURRED WHICH IN THE OPINION OF THE OWNER, COULD HAVE BEEN AVOIDED BY THIS STEP SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

THE SCHEDULE OF THE ELECTRICAL WORK SHALL BE ARRANGED TO SUIT THE PROGRESS OF WORK BY THE OTHER TRADES AND SHALL IN NO WAY RETARD PROGRESS OF CONSTRUCTION OF THE PROJECT.

MATERIALS AND EQUIPMENT

ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE NEW, LISTED, AND LABELED BY AN APPROVED TESTING AGENCY.

INSTALL MATERIALS AND EQUIPMENT SHALL BE PROPERLY STORED AND PROTECTED AT THE PROJECT SITE.

MAIN PANELBOARDS AND DISCONNECT SWITCHES, WHEN APPLICABLE, SHALL BE MANUFACTURED BY THE SAME MANUFACTURER. WIRING DEVICES SHALL BE MANUFACTURED BY ONE MANUFACTURER.

THREE COMPLETE SCHEDULES OF MATERIALS AND EQUIPMENT PROPOSED FOR INSTALLATION SHALL BE SUBMITTED TO THE ENGINEER WITHIN 30 DAYS AFTER AWARD OF THE CONTRACT. THE SCHEDULES SHALL INCLUDE CATALOG CUTS, DIAGRAMS AND SUCH OTHER DESCRIPTIVE DATA AND/OR SAMPLES AS MAY BE REQUIRED BY THE ENGINEER. LIGHTING FIXTURE SUBMITTALS SHALL INCLUDE PHOTOGRAPHIC REPORTS BY INDEPENDENT TESTING LABORATORIES FOR EACH FIXTURE INDICATED BASED ON ITS PUBLISHED PROCEDURES.

SUBMITTALS THAT DO NOT BEAR THE GENERAL CONTRACTOR'S STAMP OF APPROVAL THEREON WILL BE REJECTED WITHOUT REVIEW.

SUBSTITUTION OF MATERIAL AND EQUIPMENT

THE NAME OF A CERTAIN BRAND, MAKE, MANUFACTURER OR DEFINITE SPECIFICATION IS TO DENOTE THE QUALITY STANDARD OF ARTICLE DESIRED. SUBSTITUTION OF ANY OTHER BRAND, MAKE, OR MANUFACTURER, WHICH IN THE OPINION OF THE ENGINEER IS RECOGNIZED THE EQUAL OF THAT SPECIFIED, MAY BE ACCEPTED.

WHERE THREE OR MORE MANUFACTURERS ARE SPECIFIED, THERE WILL BE NO SUBSTITUTIONS.

RECORD DRAWINGS

DURING CONSTRUCTION, KEEP AN ACCURATE RECORD OF ALL DEVIATIONS BETWEEN THE WORK AS SHOWN ON THE CONTRACT DRAWINGS AND THAT WHICH IS ACTUALLY INSTALLED ON A SET OF BLUE LINE PRINTS OF THE ELECTRICAL DRAWINGS, AND NOTE CHANGES THEREON WITH RED MARKS IN A NEAT AND ACCURATE MANNER. UPON COMPLETION OF THE WORK, THE CONTRACTOR SHALL SUBMIT MARKED UP DRAWINGS AND SKETCHES TO THE ENGINEER.

ELECTRICAL AND TELEPHONE SERVICES

ELECTRICAL AND TELEPHONE SERVICE ARRANGEMENT SHALL BE AS INDICATED AND AS REQUIRED BY THE LOCAL UTILITY COMPANIES INCLUDING EXACT POINT OF SERVICE AND REQUIREMENTS OF METERING, ETC.

TEMPORARY ELECTRICAL SERVICE AT 120/240V, 1 PHASE WITH GROUND FAULT INTERRUPTER WITH SOLIDLY GROUNDED NEUTRAL SHALL BE PROVIDED. PROVIDE ALL NECESSARY TEMPORARY LIGHTING AND RECEPTACLES. GENERAL CONTRACTOR WILL PAY ALL CHARGES, WHICH MAY BE MADE BY THE POWER COMPANY FOR TEMPORARY SERVICES.

CONDUIT

CONDUIT AND FITTINGS SHALL CONFORM TO THE FOLLOWING

- RIGID STEEL – ANSI C80.1
- INTERMEDIATE METAL CONDUIT – UL 1242
- ELECTRICAL METALLIC TUBING (EMT) – ANSI C80.3
- FLEXIBLE METAL CONDUIT –UL-1
- PLASTIC CONDUIT (PVC) – NEMA TC-2 AND TC-3

CONDUIT SHALL BE RUN CONCEALED, EXCEPT CONDUIT MAY BE EXPOSED ABOVE JOIST IN MECHANICAL ROOMS AND SPACES WITH EXPOSED CONSTRUCTION AS APPROVED BY THE ARCHITECT. CONDUIT INDICATED CONCEALED IN WALLS AND ABOVE CEILINGS SHALL BE THIN-WALL TYPE. ELECTRICAL METALLIC TUBING FOR SIZES UP TO TWO INCHES, PANEL FEEDER CONDUITS AND CONDUITS LARGER THAN TWO INCHES SHALL BE RIGID STEEL. CONDUITS INDICATED TO BE RUN IN FLOOR SHALL BE RIGID STEEL AND WITHIN THE SLAB FOR SIZES UP TO THREE-QUARTER INCH WITH A MINIMUM SPACING OF TWO INCHES BETWEEN PARALLEL RUNS; LARGER SIZES SHALL BE RUN BELOW THE SLAB. CONDUITS RUN BELOW THE FIRST FLOOR SLAB SHALL BE ADEQUATELY SUPPORTED BY APPROVED HANGERS SUPPORTED ENTIRELY FROM THE BUILDING STRUCTURAL SYSTEM IF THE BUILDING HAS A CRAWL SPACE OR IF THE BUILDING HAS A PILE FOUNDATION. CONDUITS RUN IN CONCRETE SHALL BE RIGID STEEL.

CONDUIT RUN OUTSIDE OF THE BUILDING PERIMETER SHALL BE BURIED A MINIMUM OF 30 INCHES BELOW FINISHED GRADE. CONDUITS RUN BELOW SLAB ON GRADE SHALL BE BURIED A MINIMUM OF 12 INCHES BELOW SLAB. THESE CONDUITS SHALL BE RIGID HOT DIPPED GALVANIZED STEEL CONDUIT PAINTED WITH TWO COATS OF BITUMASTIC PAINT, OR RIGID NON-METALLIC POLYVINYLCHLORIDE CONDUIT, MINIMUM SCHEDULE 40, AT THE OPTION OF THE CONTRACTOR, UNLESS A SPECIFIC TYPE OF CONDUIT IS SPECIFIED OR INDICATED ON THE DRAWINGS.

MINIMUM SIZE CONDUIT SHALL BE ONE-HALF INCH WITH LARGER SIZES AS REQUIRED BY THE NATIONAL ELECTRICAL CODE FOR NUMBER OF WIRES CONTAINED THEREIN.

RIGID CONDUIT FITTINGS SHALL BE THREADED, EXCEPT WHERE RIGID CHANGES TO EXT ABOVE SLAB, FITTINGS MAY BE THREADED TYPE. ELECTRICAL METALLIC TUBING FITTINGS SHALL BE GALVANIZED STEEL, CAST METAL NOT ACCEPTABLE.

FLEXIBLE CONDUIT SHALL BE GALVANIZED, SINGLE STRIP TYPE. IN AREAS SUBJECT TO MOISTURE, OR WHERE CALLED FOR IN THE DRAWINGS, FLEXIBLE CONDUIT SHALL HAVE PLASTIC COVERING IN ACCORDANCE WITH NEC, ARTICLE 351-A. FITTINGS SHALL BE STANDARD UL APPROVED WITH GROUND CONNECTOR. WATERRIGHT CONNECTORS SHALL BE USED WITH PLASTIC COVERED CONDUIT. FLEXIBLE CONDUIT, MINIMUM 18 INCHES IN LENGTH, SHALL BE USED FOR CONNECTIONS TO MOTORS, DRY TYPE TRANSFORMERS AND OTHER EQUIPMENT SUBJECT TO VIBRATION AND FOR CONNECTIONS TO RECESSED OR SEM-RECESSED FIXTURES.

EXPOSED CONDUITS SHALL BE RUN PARALLEL AND PERPENDICULAR TO BUILDING CONSTRUCTION AND SHALL BE SUPPORTED AS HEREINAFTER SPECIFIED AND IN ACCORDANCE WITH NEC. THE METHODS OF INSTALLATION SHALL BE REVIEWED BY THE ARCHITECT PRIOR TO INSTALLATION.

CONDUIT SUPPORTS SHALL BE APPROVED WALL BRACKETS, TRAPEZE, STRAP HANGER OR PIPE STRAPS SECURED TO HOLLOW MASONRY WITH TOGGLE BOLTS; TO BRICK AND CONCRETE WITH EXPANSION BOLTS; TO METAL SURFACES WITH MACHINE SCREWS, AND TO WOOD WITH WOOD SCREWS. ANY FORM OF THE WIRE IS UNACCEPTABLE.

PROVIDE 0.2, TYPE "X", EXPANSION FITTINGS WHERE CONDUITS CROSS EXPANSION JOINTS.

PROVIDE 0.2, TYPE "W" CABLE SUPPORTS AS REQUIRED BY NEC.

CONDUIT TERMINATIONS ONE AND ONE-QUARTER IN`

IN "UL" CLASSIFIED FIRE RATING.

METAL CONDUITS INSTALLED IN EARTH SHALL BE PAINTED WITH TWO COATS OF BITUMASTIC PAINT.

CONDUITS PASSING THROUGH EXTERIOR CONCRETE WALLS, FLOORS OR FOOTINGS BELOW GRADE AND SLAB ON GRADE SHALL BE MADE WATERRIGHT. PROVIDE PIPE SLEEVES IN THE CONCRETE WITH ONE-HALF INCH MINIMUM CLEARANCE AROUND THE CONDUIT AND CAULK WITH ASKUM AND SEALANT.

OUTLET BOXES

OUTLET BOXES SHALL BE HOT DIPPED GALVANIZED STEEL TYPE WITH STANDARD KNOCKOUTS AS REQUIRED FOR NM CABLE OR CONDUIT TERMINATION. MINIMUM SIZE OF OUTLET BOX SHALL BE FOUR INCHES SQUARE, ONE AND ONE-HALF INCHES DEEP. OUTLET BOXES FOR EXPOSED TILE AND BLOCK SHALL BE PROVIDED WITH SQUARE CORNERED TILE RING, SIZE AS REQUIRED.

OUTLET BOXES OCCURRING IN FINISHED OUTSIDE WALLS AND WET AREAS SHALL BE CAST AND PROVIDED WITH GASKETS BETWEEN BOX AND WATERPROOF COVER.

WHERE SEVERAL FEEDERS PASS THROUGH A COMMON PULL BOX OR JUNCTION BOX, THE FEEDERS SHALL BE TAGGED TO INDICATE CLEARLY THEIR ELECTRICAL CHARACTERISTICS, CIRCUIT NUMBER, AND PANEL DESIGNATION. PAINT SAME INFORMATION ON COVER OF THE BOX.

WIRING DEVICES

WIRING DEVICES SHALL BE AS MANUFACTURED BY LEWTON, ARROW HART, BRYANT, CIRCLE F, GENERAL ELECTRIC, OR HUBBEL (CATALOG NUMBERS ARE BRANT).

DEVICE PLATES SHALL BE SATIN STAINLESS STEEL FOR ALL DEVICES, NO. 93000 SERIES AS REQUIRED.

DISCONNECT SWITCHES

SWITCHES SHALL BE NEMA TYPE "90D" OR "40D" AS REQUIRED. FUSED SWITCHES SHALL BE NEMA TYPE "40D" UNLESS OTHERWISE INDICATED. WITH CLASS "R" FUSE CLIPS. MAIN DISCONNECT SWITCHES AND SWITCHES RATED 600 VOLTS SHALL BE TYPE "40D" AND HAVE FULL COVER INTERLOCKS AND QUICK-MAKE, QUICK-BREAK MECHANISM.

FUSED SWITCHES SHALL BE PROVIDED COMPLETE WITH FUSES.

SWITCHES SHALL BE SQUARE D, GENERAL ELECTRIC, I.T.E., CUTLER HAMMER OR SIEMENS.

SWITCHES SHALL BE SECURELY MOUNTED TO WALL, STRUCTURE, OR EQUIPMENT. PROVIDE MISCELLANEOUS ACCESSORIES FOR MOUNTING SWITCHES, INCLUDING STEEL ANGLES WHERE REQUIRED.

FUSES

SERVICE DISCONNECT FUSES SHALL BE TIME DELAY CURRENT LIMITING TYPE AS MANUFACTURED BY BUSSMAN OR APPROVED EQUAL AND HAVE AN INTERRUPTING RATING OF 200,000 AMPERES RMS SYMMETRICAL AT 600 VOLTS OR LESS.

CARTRIDGE FUSES UP TO AND INCLUDING 600 AMPERES SHALL BE "LOW PEAK" UL CLASS "RK1", UNLESS OTHERWISE INDICATED.

CARTRIDGE FUSES ABOVE 600 AMPERES SHALL BE "H-CAP" UL CLASS "L", UNLESS OTHERWISE INDICATED.

FUSES FOR PROTECTION OF MECHANICAL AND PLUMBING EQUIPMENT SHALL BE "FUSETRON" UL CLASS "RK5" SIZED PER MANUFACTURER'S RECOMMENDATION, UNLESS OTHERWISE INDICATED.

WIRE AND CABLE

WIRE AND CABLE SHALL BE INSTALLED IN NM CABLE, EXCEPT WHERE CONDUIT IS REQUIRED PER NEC.

WIRE AND CABLE SHALL BE GENERAL ELECTRIC, AMCONDA, ROME, GENERAL CABLE OR PHELPS DODGE.

WIRE AND CABLE SHALL BE COPPER 600 VOLT INSULATION, MINIMUM SIZE NO. 12, TYPE "TW", "THW", "THWN" OR "THHN" AS APPLICABLE, UNLESS OTHERWISE INDICATED ON DRAWINGS.

BRANCH CIRCUIT WIRING FOR AND WIRING IN FLUORESCENT FIXTURES SHALL BY TYPE "THHN".

WIRES NO. 10 AND 12 AWG SHALL BE CONNECTED WITH COIL SPRING INSERT "WIRE-NUT" OR "WING-NUT" CONNECTORS MANUFACTURED BY IDEAL INDUSTRIES OR APPROVED EQUAL. CONNECTORS TERMINATED WITH PRESSURE TYPE COPPER CONNECTORS.

WIRE SHALL BE COLOR CODED AS FOLLOWS:

- 208/120 VOLT SYSTEM
- PHASE A--BLACK
- PHASE B--RED
- PHASE C--BLUE
- NEUTRAL--WHITE
- GROUND--GREEN

ELECTRICAL DESIGNS ARE BASED ON COPPER WIRE AND CABLE.

PANELBOARDS

PANELBOARDS SHALL BE CIRCUIT BREAKER TYPE AS INDICATED. PANELS SHALL BE KEVED ALIKE AND SHALL HAVE A MINIMUM 20 INCH WIDE ENCLOSURE. A DIRECTORY, COMPLETELY TYPED TO IDENTIFY CIRCUITS, WITH TRANSPARENT PROTECTOR SHALL BE PROVIDED IN EACH PANEL.

PANELBOARDS SHALL BE PROVIDED WITH A GROUND BUS WHEN APPLICABLE.

SUB-FEED BREAKER SHALL BE AS DETAILED ON THE PLANS.

PANELBOARDS SHALL BE SQUARE "D", TYPE "N90B", NEMB" OR "I-LINE" AS REQUIRED.

MAIN DISTRIBUTION PANEL SHALL BE SQUARE "D" TYPE "QMB" FUSIBLE SWITCH PANELBOARD.

PANELBOARDS MANUFACTURED BY I.T.E. GENERAL ELECTRIC, CUTLER HAMMER OR SIEMENS SHALL BE CONSIDERED EQUAL TO SQUARE "D".

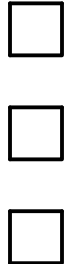
FUSIBLE SWITCHES IN PANELBOARDS SHALL BE FURNISHED WITH CLASS "R" FUSE CLIPS AND COMPLETE WITH FUSES UNLESS OTHERWISE NOTED.

SURFACE MOUNTED PANELS SHALL HAVE 14 GAUGE GALVANIZED SHEET METAL, SCREW COVER ENCLOSURE, SAME WIDTH AND DEPTH AS PANEL CABINET, PROVIDED FROM BOTTOM OF PANELBOARD TO FLOOR TO PROVIDE ENCLOSURE FOR CONDUIT LEAVING BOTTOM OF PANELS. SHOP DRAWINGS SHALL BE SUBMITTED WITH PANELBOARDS SHOP DRAWINGS.

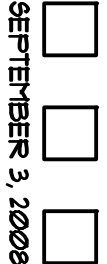


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