

ELECTRICAL SPECIFICATIONS

SPECIFICATIONS HAVE BEEN WRITTEN WITH THE INTENT OF VARIOUS EQUIPMENT BEING INSTALLED AND ALL EQUIPMENT SHALL BE APPROVED BY THE ARCHITECT/ENGINEER PRIOR TO THE REVIEW POWER LISTING PLANS AND DETAILS FOR REVIEW AND/OR EQUIPMENT THAT WILL APPLY TO THIS PROJECT.

REFERENCES

- UTILIZE THE FOLLOWING ABBREVIATIONS AND DEFINITIONS FOR DISCRESSION WITHIN THE DRAWINGS AND SPECIFICATIONS.
- NEC NATIONAL ELECTRICAL CODE 2005
 - OSHA OCCUPATIONAL SAFETY AND HEALTH ACT
 - ANSI AMERICAN NATIONAL STANDARDS INSTITUTE
 - NFPA NATIONAL FIRE PROTECTION ASSOCIATION
 - ASA AMERICAN STANDARDS ASSOCIATION
 - IEEE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
 - NECA NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION
 - UL UNDERWRITERS LABORATORIES, INC.
 - WHERE SHOWN AND NOT OTHERWISE SPECIFIED
 - IEA INSULATED CABLE ENGINEERS ASSOCIATION
 - ASTM AMERICAN SOCIETY OF TESTING MATERIALS
 - EL ELECTRICAL TESTING LABORATORIES, INC.
 - CBM CERTIFIED BALLAST MANUFACTURERS
 - EA ELECTRONIC INDUSTRIES ASSOCIATION
 - FBC FLORIDA BUILDING CODE

SECTION 16010 GENERAL PROVISIONS

THE INTENT OF THE DRAWINGS AND SPECIFICATIONS IS TO PROVIDE A COMPLETE WORKING SYSTEM READY FOR THE OWNER'S OPERATION. ANY ITEM NOT SPECIFICALLY SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPEC'S BUT IS NORMALLY REQUIRED TO CONFORM WITH THE INTENT, ARE TO BE CONSIDERED A PART OF THE CONTRACT.

THE INTENT OF THESE DRAWINGS IS NOT TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL ELECTRICAL EQUIPMENT AND ITEMS FOR A COMPLETE ELECTRICAL SYSTEM. IF THE CONTRACTOR HAS QUESTIONS, OR IN THEIR OPINION FINDS OMISSIONS OR ERRORS ON THE ELECTRICAL DRAWINGS, IT IS THEIR RESPONSIBILITY TO BRING IT TO THE ATTENTION OF THE ELECTRICAL ENGINEER/ARCHITECT IMMEDIATELY. IF CONTRACTOR PROCEEDS WITH ANY CHANGES TO THE CONTRACT DOCUMENTS WITHOUT WRITTEN APPROVAL FROM THE ELECTRICAL ENGINEER/ARCHITECT THE CONTRACTOR WILL NOT BE COMPENSATED.

ALL MATERIALS USED SHALL BEAR THE UNDERWRITER'S LABORATORY, OR LABEL PROVIDED A STANDARD HAS BEEN ESTABLISHED FOR THE MATERIAL BEING USED. INSTALLATION OF EQUIPMENT AND MATERIALS SHALL CONFORM WITH THE LATEST EDITIONS (O.C.N.) OF THE LOCAL CODES AND ORDINANCES OF THE BUILDING DEPARTMENT, THE SERVING UTILITY COMPANIES, N.E.P.A., NATIONAL ELECTRIC CODES AND ORDINANCES, INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

- 1. ALL ELECTRICAL EQUIPMENT, AND WHERE APPLICABLE, WILL BE LISTED WITH THE UNDERWRITERS LABORATORIES INC., THE NATIONAL ELECTRICAL SAFETY CODE, LIFE SAFETY CODE, AND THE OCCUPATIONAL SAFETY AND HEALTH ACT. THE WORKMANSHIP AND QUALITY ESTABLISHED BY THESE DRAWINGS AND SPEC'S SHALL NOT BE REDUCED BY THE ABOVE MENTIONED CODES.
- 2. ALL EQUIPMENT SHALL BE EQUAL TO OR EXCEED THE MINIMUM REQUIREMENTS OF NEMA, IEEE, AND UL. SHOULD ANY CHANGE TO THE DRAWINGS OR SPECIFICATIONS BE REQUIRED TO COMPLY WITH GOVERNMENT REGULATIONS, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER PRIOR TO ANY SUCH WORK BEING EXECUTED.
- 3. ALL LOCAL FEES, PERMITS, AND REQUIRED INSURANCE FOR PROTECTION AGAINST PUBLIC LIABILITY OF PROPERTY DAMAGE OR THE DURATION OF THE WORK, AND SERVICES OF INSPECTION AND TESTING AUTHORITIES SHALL BE OBTAINED AND PAID FOR BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMITS TO BE INCURRED RELATIVE TO POWER SERVICE (PRIMARY AND/OR SECONDARY) AND TELEPHONE SERVICE. THE CONTRACTOR SHALL COOPERATE FULLY WITH THE LOCAL COMPANIES WITH RESPECT TO THEIR SERVICES.

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RACEWAY TYPES

1. STANDARD THREADED RIGID STEEL CONDUIT.
2. THREADED TYPE FITTINGS: ERICKSON COUPLINGS WHERE THREADED CANNOT BE USED.

INTERMEDIATE METALLIC CONDUIT

1. LIGHT WEIGHT RIGID STEEL CONDUIT.
2. THREADED TYPE FITTINGS: ERICKSON COUPLINGS WHERE THREADED CANNOT BE USED.

ELECTRICAL METALLIC TUBING

1. SAME AS FLEXIBLE STEEL CONDUIT EXCEPT WITH TIGHT, INSERT WATER-TIGHT PLASTIC OUTER JACKET.
2. CAST MALLEABLE IRON BODY AND GLAND NUT. CADMIUM PLATED WITH ONE-PIECE BRASS GROUNDING BUSHINGS WHICH TREAD TO INTERIOR OF CONDUIT. SPIRAL MOLDED VINYL SEALING RING BETWEEN GLAND NUT AND BUSHING AND NYLON INSULATED THROAT.

LIQUID TIGHT FLEXIBLE ELECTRICAL CONDUIT

1. SAME AS FLEXIBLE STEEL CONDUIT EXCEPT WITH TIGHT, INSERT WATER-TIGHT PLASTIC OUTER JACKET.
2. CAST MALLEABLE IRON BODY AND GLAND NUT. CADMIUM PLATED WITH ONE-PIECE BRASS GROUNDING BUSHINGS WHICH TREAD TO INTERIOR OF CONDUIT. SPIRAL MOLDED VINYL SEALING RING BETWEEN GLAND NUT AND BUSHING AND NYLON INSULATED THROAT.

NON-METALLIC RACEWAY

1. COMPOSED OF POLYVINYL CHLORIDE SUITABLE FOR 90 DEGREES C.
2. RACEWAY, FITTINGS, AND GENDENT MUST BE PRODUCED BY THE SAME MANUFACTURER WHO MUST HAVE HAD A MINIMUM OF TEN (10) YEARS EXPERIENCE IN MANUFACTURING THE PRODUCTS.
3. MATERIALS MUST HAVE A TENSILE STRENGTH OF 7,000-7,200 PSI AT 73.4 DEGREES F. FLEXURAL STRENGTH OF 12,000 PSI AND COMPRESSIVE STRENGTH OF 12,000 PSI.
4. ALL JOINTS SHALL BE SOLVENT CEMENTED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER.

ALL UNDERGROUND RACEWAYS SHALL BE A MINIMUM OF 3/4" GALVANIZED RIGID STEEL CONDUIT OR SCHEDULE 40 PVC. ALL OTHER RACEWAYS TO BE USED BY THE CONTRACTOR SHALL BE IDENTIFIED BY CLIPS AND FITTINGS DESIGNED FOR THAT PURPOSE. INSTALL AS HIGH AS POSSIBLE, BUT NOT LESS THAN 1'-0" ABOVE HUNG CEILING.

RACEWAYS IN HUNG CEILING SHALL BE RUN ON AND SECURED TO SLAB OR PRIMARY STRUCTURAL MEMBERS OF CEILING. NOT TO LATHING CHANNELS OR I-BARS, Z-BARS, OR OTHER ELEMENTS WHICH ARE THE DIRECT SUPPORTS OF THE CEILING. RACEWAYS SHALL BE RUN IN CONDUIT WITH CLIPS AND FITTINGS DESIGNED FOR THAT PURPOSE. INSTALL AS HIGH AS POSSIBLE, BUT NOT LESS THAN 1'-0" ABOVE HUNG CEILING.

SUPPORT RACEWAYS AT INTERVALS NO GREATER THAN TEN (10) FEET AND WITH ONE SUPPORT WITHIN THREE (3) FEET OF EACH COUPLING, BOX, FITTING, OR OUTLET BOX. PROVIDE ONE SUPPORT WITHIN THREE (3) FEET OF EACH END OR BEND.

OUTLET, JUNCTION, AND PULL BOXES

1. SURFACE MOUNTED OUTLET AND JUNCTION BOXES, IN INDOOR LOCATIONS, WHERE EXPOSED TO MOISTURE AND IN DRY LOCATIONS.
2. USE FERROUS ALLOY BOXES AND CONDUIT BOXES WITH RIGID STEEL OR IMC.
3. COVERS: CAST OR SHEET METAL UNLESS OTHERWISE REQUIRED.
4. TAPPED THREADS FOR NUTS.

GALVANIZED PRESSED STEEL OUTLET BOXES

1. GENERAL
 - a) PRESSED STEEL, GALVANIZED OR CADMIUM-PLATED, MINIMUM OF FOUR (4") INCHES, OCTAGONAL OR SQUARE, WITH GALVANIZED COVER OR EXTENSION RING AS REQUIRED.
2. SWITCH AND RECEPTACLE BOX, INDOORS
 - a) NOMINAL FOUR (4") INCH SQUARE, 1-1/2" OR 2-1/8" DEEP AS REQUIRED, WITH RAISED COVER UNLESS OTHERWISE INDICATED ON DRAWINGS. GANGLABLE BOXES SHALL NOT BE USED.
3. LIGHTING FIXTURE BOX
 - a) NOMINAL FOUR (4") INCH SQUARE, 2-1/8" DEEP, WITH RAISED COVER UNLESS OTHERWISE INDICATED ON DRAWINGS. GANGLABLE BOXES SHALL NOT BE USED.
4. LIGHTING FIXTURE BOX
 - a) FOUR (4") INCH OCTAGON WITH 3/8" FIXTURE STUD.
 - b) FOR SUSPENDED CEILING WORK FOUR (4") INCH OCTAGON WITH REMOVABLE BACKPLATE WHERE REQUIRED, AND TWO (2) PARALLEL BARS FOR SECURING TO THE CROSS-FURRING CHANNELS AND EXTEND FLEXIBLE CONDUIT TO EACH FIXTURE.
 - c) PLUG ANY OPEN KNOCKOUTS NOT UTILIZED.

BACK-TO-BACK OUTLETS IN THE SAME WALL, OR "THRU-WALL" TYPE BOXES ARE NOT PERMITTED, PROVIDE TWELVE (12) INCHES (MINIMUM) SPACING FOR OUTLETS SHOWN ON OPPOSITE SIDES OF A COMMON WALL TO MINIMIZE SOUND TRANSMISSION. PROVIDE TWENTY FOUR (24) INCH (MINIMUM) HORIZONTAL SPACING FOR OUTLETS SHOWN ON OPPOSITE SIDES OF A FIRE RATED WALL TO MAINTAIN FIRE RATING.

ALL ELECTRICAL CONDUCTORS SHALL BE INSTALLED IN AN APPROVED RACEWAY, EMT, IMC, RIGID GALVANIZED CONDUIT OR SCHED. 40 P.V.C. THERE SHALL BE NO TYPE NON-ELECTRICAL NON-METALLIC TUBING, AND FLEXIBLE METAL CONDUIT USED FOR ANY PURPOSES. MINIMUM SIZE #12 FOR BRANCH CIRCUITS AND #14 FOR CONTROL WIRING. ALL USED CONDUIT SHALL STRICTLY CONFORM TO THE N.E.C. REQUIREMENTS OF DERATING FOR CONDUCTOR AMPACITY AND CONDUIT FILL. NO CONDUITS SHALL BE INSTALLED EXPOSED ON ROOF.

SECTION 16120 WIRE AND CABLE

1. ELECTRICAL GRADE ANNEALED COPPER, TINNED IF RUBBER INSULATED, AND FABRICATED IN ACCORDANCE WITH ASTM STANDARD. MINIMUM SIZE #12 FOR BRANCH CIRCUITS AND #14 FOR CONTROL WIRING.
2. THE CONDUCTORS ILLUSTRATED ON THE DRAWINGS ARE COPPER.
3. #12 AND #10 SOLID.
4. CABLES LARGER THAN #10, STRANDED IN ACCORDANCE WITH ASTM CLASS B STRANDING DESIGNATIONS.
5. CONTROL WIRES STRANDED IN ACCORDANCE WITH ASTM CLASS B STRANDING DESIGNATIONS.

INSULATED SINGLE CONDUCTORS

1. TYPE THIN/THIN - FLAME RETARDANT; HEAT-RESISTANT THERMOPLASTIC INSULATION, NYLON JACKET RATED FOR 90 C DRY/75C WET OPERATION; USE FOR BRANCH CIRCUIT WIRING.
2. USE TYPE THIN/THIN OR RHVH OR XHHW, RATED FOR 90 C, FOR FEEDER CIRCUITS.

COLOR CODING

1. PROVIDE CONSISTENT COLOR CODING OF ALL CIRCUITS AS FOLLOWS:
 - a) 120/208 VOLTS CODE
 - i) PHASE A - BLACK
 - ii) PHASE B - RED
 - iii) PHASE C - BLUE
 - iv) NEUTRAL - WHITE
 - v) GROUND - GREEN
 - b) 277/480 VOLTS CODE
 - i) PHASE A - BROWN
 - ii) PHASE B - ORANGE
 - iii) PHASE C - YELLOW
 - iv) NEUTRAL - WHITE
 - v) GROUND - GREEN
2. COLOR-CODE WIRING FOR CONTROL SYSTEMS INSTALLED IN CONJUNCTION WITH MECHANICAL AND/OR MISCELLANEOUS EQUIPMENT IN ACCORDANCE WITH THE WIRING DIAGRAMS FURNISHED WITH THE EQUIPMENT. FACTORY COLOR CODE WIRE NUMBER 6 AND SMALLER, WIRE NUMBER 4 AND LARGER MAY BE COLOR CODED BY COLOR TAPPING OF THE ENTIRE LENGTH OF THE EXPOSED ENDS.

CONNECTORS

1. MAKE CONNECTIONS, SPLICES, AND TAPS AND JOINTS WITH SOLDERLESS DEVICES, MECHANICALLY AND ELECTRICALLY SECURE. PROTECT EXPOSED WIRES AND CONNECTING DEVICES WITH ELECTRICAL TAPE OR INSULATION TO PROVIDE PROTECTION NOT LESS THAN THAT OF THE CONDUCTOR.
2. ELECTRICAL TAPE SHALL BE SPECIFICALLY DESIGNED FOR USE AS INSULATING TAPE. SUPER 33+ SCOTCH WYNYL ELECTRICAL TAPE AS MANUFACTURED BY 3M SHALL BE EQUAL TO THAT OF THE CONDUCTOR. PROVIDE UNDERWRITERS LABORATORIES LISTED CONNECTORS RATED TO 600 VOLTS FOR GENERAL USE AND 1,000 VOLTS FOR USE BETWEEN BALLASTS AND LAMPS OR GASEOUS DISCHARGE FIXTURES.
3. USE TERMINATING FITTINGS, CONNECTORS, ETC., OF A TYPE SUITABLE FOR THE SPECIFIED CABLE FURNISHED. MAKE BENDS IN CABLE AT TERMINATION POINT TO INSTALLING COMPRESSION DEVICE. MAKE FITTINGS TIGHT.
4. EXTEND WIRE SIZING FOR THE ENTIRE LENGTH OF A CIRCUIT, FEEDER, ETC. UNLESS SPECIFICALLY NOTED OTHERWISE.

GENERAL INSTALLATION

1. PROVIDE TOOLS, EQUIPMENT, AND MATERIALS TO PULL ALL WIRE AND CABLE INTO PLACE AND TO MAKE REQUIRED SPLICES AND TERMINATION.
2. WIRE AND CABLE IN CONDUIT, DUCT OR WREWYAY
 - a) UTILIZE ROLLER BEARING SWIVEL TO PREVENT TWISTING OF CABLE ENTERING CONDUIT OR DUCT.
 - b) TAKE PRECAUTIONS TO PREVENT ENTRANCE OF DIRT AND WATER INTO CONDUIT AND DUCTS.
 - c) CLEAN EXISTING CONDUITS AND DUCTS TO REMOVE ANY PULLING COMPOUND PRIOR TO PULLING NEW CABLES.
 - d) DO NOT DAMAGE CONDUIT INSULATION, BRAD JACKET OR SHEATH.
 - e) DO NOT BEND CONDUCTOR TO LESS THAN MANUFACTURER'S RECOMMENDED RADIUS.
 - f) MAKE SPLICES ONLY IN PULL BOXES, JUNCTION BOXES AND OUTLET BOXES.
 - g) UTILIZE CABLE REELS OR JACKS FOR PULLING THROUGH FULL BOXES, NUTS AND CONDUITS SO BENDS WILL NOT BE EXCESSIVE AND CONDUCTORS WILL NOT TOUCH SHARP EDGES. USE FEEDING TUBE WHERE REQUIRED.
 - h) FOR LARGE DIAMETER CABLES UTILIZE PROPERLY SIZED PULLING GRIPS.
 - i) DO NOT EXCEED MAXIMUM RECOMMENDED PULLING TENSION OF WIRE AND CABLE.

FIELD QUALITY CONTROL

1. TEST SYSTEM WIRING FOR CONTINUITY, GROUNDS AND SHORT CIRCUITS PRIOR TO CONNECTION OF ANY EQUIPMENT.
2. TEST FINAL EQUIPMENT CONNECTIONS FOR CONTINUITY OF GROUNDS AND SHORT CIRCUITS.
3. INSULATION RESISTANCE OF FEEDERS AND SUBFEEDERS
 - a) TEST WITH MEGGER FOR INSULATION RESISTANCE.
 - b) CORRECT FAILURES AND REPLACE SECTIONS WITH FAULTY INSULATION.
 - c) DEMONSTRATE INSTALLATION IS FREE OF GROUNDS AND SHORT CIRCUITS AND THAT INSULATION RESISTANCE COMPLES WITH IEA VALUES.
4. TEST DIRECT BURIAL CABLES AFTER COMPLETION OF BACKFILLING.

SECTION 16140 WIRING DEVICES

- ### EXECUTION
- SWITCHES
1. PROVIDE SPECIFICATION GRADE, FLUSH MOUNTING, QUART-OPERATING ACT. WITH TOGGLE OPERATOR, HEAT-RESISTANT PLASTIC HOUSING AND SELF-GRINDING METAL STRAP, SILVER OR SILVER ALLOY CONTACT. DESIGN FOR TOP OR BACK WIRING WITH UP TO NUMBER 10 WIRE, VENTRIED BY UL TO MEET OR EXCEED FEDERAL SPECIFICATION WS-8966. USE CONTINUOUS SEAMLESS DOUBLE-POLY-3-WAY, 4-WAY, 6-WAY, 8-WAY, 10-WAY, 12-WAY, 14-WAY, 16-WAY, 18-WAY, 20-WAY, 22-WAY, 24-WAY, 26-WAY, 28-WAY, 30-WAY, 32-WAY, 34-WAY, 36-WAY, 38-WAY, 40-WAY, 42-WAY, 44-WAY, 46-WAY, 48-WAY, 50-WAY, 52-WAY, 54-WAY, 56-WAY, 58-WAY, 60-WAY, 62-WAY, 64-WAY, 66-WAY, 68-WAY, 70-WAY, 72-WAY, 74-WAY, 76-WAY, 78-WAY, 80-WAY, 82-WAY, 84-WAY, 86-WAY, 88-WAY, 90-WAY, 92-WAY, 94-WAY, 96-WAY, 98-WAY, 100-WAY. PROVIDE IVORY COLOR UNLESS OTHERWISE NOTED.
 2. COUPLERS SWITCHES ARE INDICATED TO BE INSTALLED NEAR DOORS, CORNER WALLS, ETC. MOUNT SAME NOT LESS THAN 2" AND MORE THAN 18" FROM TRIM. VERIFY EXACT LOCATION WITH THE ARCHITECT.
 3. CAREFULLY COORDINATE THE LOCATION OF SWITCHES TO INSURE LOCATIONS AT THE STRIKE SIDE OF DOORS.
 4. FURNISH AND INSTALL AN ENGRAVED LEGEND FOR EACH SWITCH THAT CONTROLS EXHAUST FANS, MOTORS, EQUIPMENT SYSTEMS, ETC., NOT LOCATED WITHIN SIGHT OF THE CONTROLLING SWITCH.

RECEPTACLES

1. UNLESS OTHERWISE NOTED, MOUNT RECEPTACLE VERTICALLY WITH U-SHAPED GROUND POSITION ON BOTTOM.
2. ALL GENERAL PURPOSE SWITCHES AND RECEPTACLES SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER. CATALOG NUMBERS LISTED ARE LEVITON; HOWEVER, COMPARABLE DEVICES BY PASS & SEWOUR, BRYANT, OR ARROW HART WILL BE ACCEPTED. COLOR OF DEVICES AND PLATES SHALL BE DICTATED BY ARCHITECT/OWNER.

A. SWITCHES: LEVITON #CSB1-201

B. RECEPTACLES: LEVITON #R20-1

C. COVER PLATES: SMOOTH PLASTIC

NOTE: ALL OTHER REQUIRED DEVICES SHALL MATCH IN COLOR AND STYLE.

GROUND FAULT INTERRUPTERS

1. SWAB ALL CONDUITS CLEAR OF MOISTURE
2. DO NOT COMBINE G.F.I. PROTECTED CIRCUITS WITH OTHER CIRCUITS IN SAME RACEWAY.
3. LIMIT MAXIMUM NUMBER OF G.F.I. PROTECTED CIRCUITS IN ANY ONE RACEWAY TO A MAXIMUM OF ONE CIRCUIT.
4. GFI DEVICES SHALL BE ARRANGED TO BE EASILY ACCESSIBLE TO THE USER.
 - a) LABEL DOWNSTREAM RECEPTACLES TO INDICATE THE GFCI LOCATION WHERE RECEPTACLES ARE MORE THAN 20' FROM GFCI DEVICES.
 - b) GFCI DEVICES LOCATED IN RESTROOMS SHALL NOT FEED THROUGH TO PROTECT DEVICES IN OTHER ROOMS.

SECTION 16195 ELECTRICAL IDENTIFICATION

- ### NAMETABLES
1. UNLESS OTHERWISE NOTED, NAMEPLATES SHALL BE BLACK LAMACOD PLATES WITH WHITE ENGRAVED UPPER CASE LETTERS ENCLOSED BY WHITE BORDER ON BEVELD EDGES.
 2. NAMEPLATES FOR EQUIPMENT, SUPPLIED BY THE EMERGENCY SYSTEM, SHALL BE RED LAMACOD WITH WHITE LETTERING.
 3. ALL NAMEPLATES SHALL BE ENGRAVED AND MUST BE SECURED WITH RIVETS, BRASS OR CADMIUM PLATE SCREWS. THE USE OF DYMO TAPE OR THE LIKE IS UNACCEPTABLE.

CABLE TAGS AND WIRE IDENTIFICATION LABELS

1. CABLE TAGS SHALL BE FLAMEPROOF SECURED WITH NYLON TIES.
2. LETTERS ENCLOSED BY WHITE BORDER ON BEVELD EDGES.
3. LABEL DESIGNATIONS, NOMINAL SYSTEM VOLTAGES APPLIED TO THE COVERS OF ALL MEDIUM AND LOW VOLTAGE PULL, SPLICE AND JUNCTION BOXES.

EXECUTION

- ### SWITCHBOARDS
1. FURNISH AND INSTALL A MASTER NAMEPLATE FOR EACH SWITCHBOARD, ENGRAVED WITH THE EQUIPMENT IDENTIFICATION INDICATED ON THE DRAWINGS, MOUNT AT TOP OF INCOMING SECTION.
 2. PROVIDE ON EACH MAIN SWITCH AN IDENTIFYING NAMEPLATE.

PANELBOARDS

1. FURNISH AND INSTALL A NAMEPLATE FOR EACH PANELBOARD AND LOAD CENTER ENGRAVED WITH THE IDENTIFICATION INDICATED ON THE DRAWINGS. MOUNT AT TOP OF PANEL.

DISCONNECT SWITCHES

1. FURNISH AND INSTALL A NAMEPLATE FOR EACH DISCONNECT SWITCH ENGRAVED WITH EQUIPMENT DESIGNATION WHICH THE DISCONNECT SERVES.

SECTION 16431 SWITCHBOARDS

- ### APPROVED MANUFACTURERS
1. ALL SWITCHBOARDS ARE TO BE OF THE SAME MANUFACTURER AS THE PANELBOARDS
 2. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING MANUFACTURERS:
 - a) SQUARE D
 - b) CUTLER-HAMMER
 - c) GENERAL ELECTRIC
 - d) SIEMENS ITE

RATINGS

1. THE ASSEMBLY SHALL BE RATED TO WITHSTAND MECHANICAL FORCES EXERTED DURING SHORT CIRCUIT CONDITIONS WHEN CONNECTED DIRECTLY TO A POWER SOURCE HAVING AVAILABLE FAULT CURRENT AS SHOWN ON THE DRAWINGS.

ENCLOSURES

1. PROVIDE NEMA 1 ENCLOSURES WHERE LOCATED INDOORS IN DRY LOCATIONS.
2. PROVIDE NEMA 3R ENCLOSURES WHERE LOCATED OUTDOORS AND LOCATIONS SUBJECT TO THE ELEMENTS.

FINISH

1. ALL EXTERIOR AND INTERIOR STEEL SURFACES OF THE SWITCHBOARD SHALL BE PROPERLY CLEANED AND PROVIDED WITH A RUST-INHIBITING PHOSPHATIZED COATING. COLOR AND FINISH OF INDOOR SWITCHBOARDS SHALL BE ANSI 61 LIGHT GRAY.
2. OUTDOOR SWITCHBOARD SHALL BE PAINTED TO MATCH THE BUILDING.

SECTION 16450 GROUNDING

- ### SUBMITTALS
1. SUBMIT TEST REPORTS CERTIFYING RESISTANCE VALUES FOR BURIED OR DRIVEN GROUNDS AND WATER PIPE GROUNDS.

PRODUCTS

- ### MATERIALS
1. GROUND CABLES: GREEN COLOR CODED, INSULATED, ANNEALED STRANDED TINNED COPPER WIRE AS INDICATED ON DRAWINGS.
 2. GROUND RODS:
 - a) COPPER-CLAD STEEL FABRICATED BY MOLTEN WELDING PROCESS.
 - b) DIAMETER: 5/8 INCH, USE 3/4 INCH FOR ROCKY SOIL.
 - c) LENGTH: 10 FEET.

GENERAL

1. ALL GROUND WIRES AND BONDING JUMPERS SHALL BE STRANDED COPPER INSTALLED IN CONDUIT. ALL GROUND WIRES SHALL BE WITHOUT JOINTS AND SPLICES OVER ITS ENTIRE LENGTH.
2. THE SYSTEM NEUTRAL SHALL BE GROUNDED AT THE SERVICE ENTRANCE ONLY, AND KEPT ISOLATED FOR GROUNDING SYSTEMS THROUGHOUT THE BUILDING.
3. EACH SYSTEM OF CONTINUOUS METALLIC PIPING AND DUCTWORK SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE.
4. MECHANICAL EQUIPMENT SHALL BE BONDED TO THE BUILDING EQUIPMENT GROUNDING SYSTEM. THIS SHALL INCLUDE BUT IS NOT LIMITED TO, FANS, PUMPS, CHILLERS, ETC.
5. PVC CONDUITS AND PORTIONS OF METALLIC PIPING AND DUCT SYSTEMS WHICH ARE ISOLATED BY FLEXIBLE CONNECTIONS, INSULATED COUPLINGS, ETC. SHALL BE BONDED TO THE EQUIPMENT GROUND WITH A FLEXIBLE BONDING JUMPER, OR SEPARATE GROUNDING CONDUCTOR.

SEPARATELY DERIVED SYSTEMS

1. EQUIPMENT GROUNDING CONDUCTORS SHALL BE PROVIDED FOR SEPARATELY DERIVED SYSTEMS AND SHALL BE GROUNDED TO BUILDING STEEL, COLD WATER PIPES, ETC., OR AN ALTERNATE GROUNDING MEANS.
2. A SEPARATE, GREEN TYPE RHV COPPER GROUND CONDUCTOR SHALL BE RUN FROM GROUND LUG OF EACH GROUNDED RECEPTACLE TO AN APPROVED CONNECTION INSIDE THE ENCLOSING STEEL OUTLET BOX. DEVENT MOUNTING SCREWS SHALL NOT BE CONSIDERED APPROVED CONNECTIONS.
3. A SEPARATE GROUND CONDUCTOR SHALL BE INSTALLED IN EVERY CONDUIT AND RACEWAY AND SECURELY BONDED IN AS APPROVED GROUNDED THROUGHOUT AT BOTH ENDS. THE GROUNDING CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH TABLE 250 OF THE N.E.C. CONTRACTOR SHALL SIZE CONDUIT TO ACCOMMODATE ADDITIONAL CONDUCTOR.

ISOLATED GROUND RECEPTACLES

1. ISOLATED GROUND RECEPTABLES GROUND LUG SHALL NOT BE CONNECTED TO THE RESPECTIVE OUTLET BOXES.
2. PROVIDE INSULATED GROUND WIRE FOR EACH ISOLATED GROUND RECEPTABLE. GROUND WIRE SHALL SERVE ONLY THOSE RECEPTABLES WHICH ARE ISOLATED. ROUTE GROUND CONDUCTOR TOGETHER WITH PHASE AND NEUTRAL CONDUCTORS IN A COMMON RACEWAY.
3. TERMINATE ISOLATED GROUND WIRE AT THE GROUND FROM THE SEPARATELY DERIVED SYSTEM