


JOB	5450	
REVISIONS	A FOR BIDS	
DATE	08/11/17	
DESIGNED	JIH	
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SHEET NO.		

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SCALE

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DIVISION 16 ELECTRICAL	
SECTION 16100 ELECTRICAL WORK	
16101	SCOPE
A.	Description of Work
The work covered by these specifications includes furnishing and installing all equipment, appliances, material, labor and all operations in connection with the general electrical work and in strict accordance with these specifications and all applicable drawings, and subject to the terms and conditions of the contract.	
B.	Related Work Specified Elsewhere
Electrical work specified under other sections of these specifications and/or on the drawings shall be in addition to that mentioned herein. Control of the work shall be in accordance with the General Conditions.	
16102	INTENT AND INTERPRETATION DRAWINGS AND SPECIFICATIONS
A.	The intent of the drawings and specifications associated with this contract is to provide a completed project that will function as intended and is ready for operation in accordance with the General Conditions.
B.	Should any bidder or Contractor observe any ambiguity, discrepancy, omission, or error in drawings and specifications, or in any other Contract Document, or be in doubt as to the intention and meaning thereof, he should, prior to bidding, report such to the Engineer without additional payment to the Contractor.
C.	Should conflict occur in or between drawings and specifications, the Contractor will be deemed to have estimated on the more expensive way of doing the work involved unless he shall have asked for and obtained the written decision of the Engineer before submission of his proposal. Resolution of conflicts shall be at the discretion of the Engineer without additional payment to the Contractor.
16103	RESPONSIBILITY OF THE CONTRACTOR
A.	It shall be the responsibility of the Contractor as a part of this work through careful quality control and coordination with the Engineer to avoid all conflicts occurring during construction such as available space, routing, mis-matched or otherwise incomplete component selection, incomplete systems, substitutions, etc.
B.	Where inter-system components, devices, adapters, etc., are not specified or noted in the design, but required to complete the system, it shall be the responsibility of the Contractor to provide such items and material as a part of this work.
C.	Drawings and specifications shall govern all work. Where the installation involves multiple subcontractors providing similar work including but not limited to electrical, mechanical, control, and special systems trades, it shall be the responsibility of the General Contractor to insure that all similar materials are the project of one manufacturer and that installation methods, supports, routing, etc., are equal, orderly, and uniform in appearance. Work that appears non-uniform or otherwise conflicting shall be reworked at the Contractor's expense accordingly and at the direction of the Engineer.
16104	SUBSTITUTIONS
A.	References
Unless otherwise noted, items specified herein by manufacturer or trade name shall be used as a guide to quality and inherent features and such reference shall not be intended to restrict the Project to such listing.	
B.	Substitutions
Request for substitutions shall be submitted three weeks prior to bid due date.	
On any proposed substitute to the specified items, it shall be the responsibility of the Contractor to show proof to the Engineer, that the proposed substitute is equal to the specified item by making written evaluation comparisons of material, performance, workmanship, maintenance features, energy use, durability, appearance and the effect of compatibility with the other elements of the system in which the item will be used. Samples of the specified item and the proposed substitute, when required by the Engineer for evaluation, shall be supplied by the Contractor.	
16105	OWNER FURNISHED EQUIPMENT
Where equipment, systems, material, etc., is to be furnished by the Owner and installed by the Contractor it shall be the responsibility of the Contractor to:	
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A.	Receive, load/unload, and transport Owner furnished items.
B.	Prior to acceptance of the items, the Contractor shall inspect for damage and other defects, and report any deficiencies to Owner.
C.	After inspection of the items and report thereof to the Owner, the Contractor shall accept responsibility and liability of the items.
D.	The Contractor shall provide adequate storage approved by the Owner to secure and protect received items.
E.	The Contractor shall install Owner furnished items complete with all auxiliary components, material, and hardware required to provide a fully complete installation in correct operational and functional condition.
16106	DEFINITION OF ACCEPTANCE
A.	Acceptance
1.	Electrical work acceptance shall be defined as the point in time in addition to the requirements of the General Conditions when all of the following requirements have been fulfilled:
a.	All submittals and documentation have been submitted, reviewed and approved, and
b.	The complete system has successfully completed all testing requirements, and
c.	All fees, permits and reports have been satisfactorily completed, and
d.	All Owner's staff personnel training programs have been completed, and
e.	Beneficial use by the Owner has occurred.
16107	CONTINUITY OF OPERATIONS
The Contractor as a part of this work shall provide all stand-by facilities, power system, etc., in order to maintain the operation of existing facilities throughout the construction phases of the new work. The Contractor shall schedule his work with that of the Owner in order to coordinate all interruptions of the existing facilities operations to suit the Owner's schedule. All temporary facilities and provisions shall be made after being submitted to the Owner and approved thereby.	
16108	SALVAGED MATERIAL
A.	All electrical items removed from service by the Contractor and deemed reusable in the Owner's opinion shall be protected from damage by the Contractor and delivered to an Owner designated salvage storage area by the Contractor.
B.	Unless otherwise indicated, all electrical material required to be removed from service and, in the Owner's opinion, deemed to be non-salvageable shall become the property of the Contractor and shall be promptly removed from the site.
16109	PAINTING AND TOUCH-UP
A.	General
1.	All electrical equipment, cabinets and items that require protective painting shall be painted in accordance with the item manufacturer's standards except that this shall not be less than a three coat system suitable for the exposure intended in this project. After installation, items including welded seams shall be thoroughly cleaned of grease, dirt, rust and foreign matter and repainted or touch-up as required with the same color paint supplied at the factory.
2.	Unless otherwise approved by the Engineer, and in addition to the normal approval action, all items with carbon steel enclosures installed out-of-doors, in corrosive areas, or in wet or damp areas shall be thoroughly cleaned of surface films after installation and given one coat of Sherwin-Williams "Krom-Korin Universal Metal Primer" and two final coats of Sherwin-Williams "Industrial Enamel B54" or approved equal in color approved by the Engineer.
B.	Preparation
1.	Surfaces to be painted shall be prepared by removal of all oil, grease, dust, rust and other contaminants deleterious to paint application.
a.	Wood surfaces shall be sanded smooth after cutting and drilling, sealed, and primed. Edges shall be smooth and free of splintering and fraying conditions.
b.	Prior painted metal surfaces requiring additional paint protection shall be sanded throughout in preparation for field applied painting.
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c.	Steel surfaces shall be sanded or blasted to near white metal prior to painting.
d.	Galvanized surfaces shall be neutralized with a phosphoric acid wash, rinsed with clean water, and thoroughly dried.
2.	The Contractor shall make a small test using painting products proposed to verify acceptance and compatibility for the item to be painted. Where the product is determined to be unacceptable by test, a substitute product or products shall be made as approved by the Engineer as a part of the work at the Contractor's expense. Unless otherwise noted or determined by test, the specifications herein shall be used as a general guide.
C.	Painting
1.	The following references are made to the Sherwin-Williams Company products as a guide to type, characteristics, and chemistry. Substitution therefore may be considered where submittal data defines the proposed product as being acceptable by the Engineer as equal.
2.	Exterior Wood
a.	One, 1.4 mils dry prime coat "A-100 Exterior Oil Wood Primer"
b.	Two, 2 mils dry, "ProMar Exterior Alkyd Flat Finish" (B38)
3.	Interior Wood
a.	One, 1.9 mils dry prime coat, "ProMar 200 Interior Alkyd Enamel Undercoat"
b.	Two, 1.8 mils dry, "ProMar 200 Interior Alkyd Glass Enamel" (B38)
4.	Metal Surface - General
a.	Steel - One, 4 mils dry prime coat, "Krom-Korin Universal Metal Primer"
b.	Aluminum - One, 3 mils dry prime coat, "Krom-Korin Universal Metal Primer"
c.	Two, 4 mils dry, "Industrial Enamel" (B54)
5.	Harsh Duty, Epoxy Noted, etc.
a.	One, 6 mils dry prime coat, "Recoating Epoxy Primer"
b.	Two, 7 mils dry, "Heavy Duty Epoxy" (B67)
6.	Encased, Buried, etc.
a.	One, 16 mils dry, "Coat-Tar Epoxy C-200" (B69)
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16112	CONSTRUCTION POWER
A.	Service
The Contractor, at his own expense, shall provide power and all necessary temporary wiring as required to perform his work. After completion of the permanent electrical conditions, the Contractor shall be required as part of this work to secure all utility services from the respective Utility Companies and shall pay all monthly bills until such time as acceptance of the equipment is made by the owner. Upon acceptance, the Contractor can have the respective Utility Companies transfer their billing to the Owner's name.	
B.	Additional Costs
Where there will be cost required by the Utility Company to provide power to the project site in addition to metering costs, the Contractor shall notify the Engineer of the Contractor's approval to request these services from the Utility Company and make arrangements for Utility Company to bill the Owner directly for the additional charges.	
16113	ELECTRICAL SUBMITTALS AND TESTS
A.	Installation
The actual field installation shall reflect only that material and equipment submitted and approved by the Engineer. Any work perform without an approved submittal and considered not acceptable by the Engineer shall be removed in accordance with the General Conditions and reworked at the Contractor's expense.	
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B.	Submittals
1.	Prior to installation of any material equipment, the Contractor shall submit for approval of the Engineer, the 7 sets of submittal material or the number of sets required by the General Conditions, indicating item identification, manufacturer, type, size, ratings and other descriptive information required for adequate evaluation. Writing diagrams shall be submitted where item function description necessitates, and as required by the Engineer. Submittals shall be conspicuously marked to denote deletions from the design references shown on drawings or specified. Incomplete or otherwise indistinguishable submittals and general non-specific information submittal material will not be evaluated.
2.	Submittals shall bear a stamp or specific written indication that the Contractor has satisfied the Contractor's responsibilities under the contract with respect to the Contractor's review of the submittal.
3.	Omissions and/or design revisions made in submittals shall not relieve the Contractor from the responsibility of providing the critical item or required material as a part of this work. In accordance with the General Conditions, review by the Engineer shall not relieve the Contractor from responsibility for errors or omissions in shop drawings and submittals.
4.	The Contractor, at his option, may submit for evaluation 2 copies of electrical submittal material, one of which will be marked and returned. The required number of copies corrected as marked, will then be submitted for approval stamping to the Engineer.
a.	Material submittals shall be manufacturer's catalog sheets or similar published data marked to denote only the items covered by the submittal. Materials of unique production shall have special submittal attention to give complete identification of the materials being proposed.
b.	Equipment submittals shall present the equipment for evaluation as a unit piece including all component parts by manufacturer's designation. Submittals shall be marked to denote only the equipment being proposed and shall be complete including electrical, physical, and operational data. Additional supporting data shall be provided where necessary.
c.	Fabrications, assemblies and special production shall have submittals of unique preparation to present the finished item completely identified. Such shop drawings shall include all material, components and assembly work.
d.	Systems composed of multiple component parts or subsystems shall have submittals to denote the system as a completed composite. All component parts and subsystems shall be identified.
e.	As-built documentation of the finished installation shall be made as part of final acceptance and shall include "As Built" markings of the drawings, correct submittals, operation and maintenance publications, and other data necessary to accurately define the final field installation.
C.	Test, Instructions and Reports
1.	The following listed items shall be required in addition to other special requirements within these specifications:
a.	Written conductor insulation resistance test
b.	Written ground rod resistance test
c.	Local public electrical inspector's certificate
d.	Operational demonstration test
e.	Power factor correction capacitor calculation
2.	Contractor Conducted Tests
3.	Commissioning and Start-up and Instructions.
4.	Recommended Spare parts for warranted equipment.
16114	GENERAL
A.	General Requirements
1.	All electrical material and equipment provided by the Contractor shall be new and free of defects. The entire electrical installation shall be not less than that required by the latest edition of the National Electrical Code, the Occupational Safety and Health Act, and all electrical codes locally enforced in the project area.
2.	All Electrical work shall be performed by or performed under the direct supervision of an electrician holding an active certificate of competency as a "Master Electrician" recognized by all local authority agencies. If required by the Owner, The Engineer or the Enforcing agency, the Contractor shall show proof that the electrician(s) are operating in accordance with the requirements noted herein.
3.	The Contractor shall obtain all permits required by local ordinances and after completion of the work, shall give the Engineer a certificate of final inspection and approval from the local Electrical Inspection Office. Any expenses connected with such inspection and certificate shall be borne by the Contractor.
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B.	Standards	
Electrical material and equipment shall be designed in accordance with the latest requirements of applicable standards such as NEMA, ANSI, IEEE, and where listings are available for such items shall be approved by the Underwriters Laboratories, Inc. Equipment, components, material, etc., rated by other standards and agencies including but not limited to IEC, VDE, and DIN will not be considered equal to NEMA, ANSI, IEEE, and UL. Electrical items shall be standard catalogue products of manufacturers regularly engaged in the manufacture of such products, unless otherwise noted.		
C.	Miscellaneous	
All devices, equipment and materials not definitely specified or noted, that are required for complete installations shall be furnished, shall be manufactured for the purpose intended, and shall be installed in conformance with good accepted practice for the conditions encountered. All hardware such as straps, supports, bolts and nuts, shall be of rust or corrosion resistant material unless otherwise noted.		
16115	GROUNDING AND BONDING	
A.	Grounding conductors shall be copper, sized per the National Electric Code or as noted.	
B.	Non-current carrying metal parts of electrical items such as conduit, cabinets, enclosures, frames, etc., and the neutral conductor shall be grounded and bonded in accordance with the National Electrical Code unless additional grounding requirements are indicated.	
C.	Special grounding system features shall be provided as indicated.	
D.	The Contractor, as a part of this work whether or not specifically noted on the plans, shall ground the main power service to the metal water piping system where required by electrical agencies in authority for the location and Article 250.50 of the National Electrical Code.	
E.	Transformers and separately derived systems shall be grounded in accordance with Article 250-30 of the National Electrical Code.	
F.	Conduit Runs	
Conduit shall not be considered as forming a ground current return path to earth; however, all metal conduit systems shall be bonded in accordance with the National Electrical Code. All conduit runs installed for lighting and power loads shall contain a grounding conductor throughout the entire length of the run forming a part of the grounding system. The grounding system shall be electrically continuous throughout the electrical system and shall be connected to earth ground at point of power service and as otherwise indicated.		
H.	Ground Rods	
Top of ground rods shall be driven to 1'-0" (minimum) below finished grade unless otherwise indicated and shall be electrically connected with suitable cast type ground clamps or exothermic welding.		
16116	CONDUCTORS	
A.	Single Conductors	
1.	Single conductors installed in raceways shall be copper with AWG sizes as noted, and shall have 600 volt rated, type THW, THWN, THHN, or XHHW, 75°C (minimum) insulation. Conductors requiring special consideration shall have insulation material and ratings noted on the drawings and as required by the National Electrical Code. Type TW insulation shall not be used for any purpose in this contract except ground wire identification only.	
2.	Lighting and receptacle conductors shall be minimum size number 12 AWG, with AWG number 8 and larger to be stranded, and AWG number 10 and smaller to be solid unless otherwise noted. Power and control conductors, feeding motors and motor control equipment, panelboards, etc., shall be stranded copper. Control conductors may be AWG number 14 stranded, unless otherwise noted.	
3.	Insulation colors shall be: Green for ground, white for neutral, black for single phase line conductor. Unless otherwise noted, and/or required by local code, an unusual insulation color scheme for all new three phase systems shall be established as:	
System Voltage	120/208V	277/480V
	3-Phase 4-Wire	3-Phase 4-Wire
a. Phase A	Black	Brown
b. Phase B	Red	Orange
c. Phase C	Blue	Yellow
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d. Neutral	White or Gray as per NEC 310 -
e. Ground Wire	Green
f. Control Circuits	Yellow
g. Cables	- as per NEC 310 -
4.	Conductors size AWG 10 and larger may be black with exposed ends taped with "Scotch 353" or equal by Plymouth, in accordance with color schemes mentioned herein.
B.	Cords and Cables
1.	Cords shall be flexible portable cords consisting of 600 volt rated copper conductors, and an overall jacket of heavy-duty polythene. Cords shall be type "SC" (unless specified otherwise) with number and size conductors as noted. Approved attachment plugs shall be provided where required.
2.	Multi-conductor control cables shall be 600 volt rated with stranded copper conductors sized as noted. Conductors shall have 15 (minimum) mils of polyvinyl chloride insulation with 4 mils of nylon sheath. The cable shall have an overall outer jacket of 48 (minimum) mils polyvinyl chloride, and shall be sunlight resistant and suitable for direct earth burial and shall carry UL approval for tray cable usage.
B.	Special Conductors and Cables
a.	Cables installed in plenum spaces shall be UL 910 approved and shall be installed in accordance with applicable portions of NEC Article 725
b.	Conductors installed in cable tray system shall be listed by UL for cable tray duty.
c.	Cables provided for control circuits, instrumentation, and other unique dedicated purpose duty shall be in accordance with the requirements and recommendations of the manufacturer of the equipment or equipment system involved and shall be installed with methods approved accordingly.
C.	Grounding Conductors
Direct buried grounding system conductors shall be bare copper, sized as noted.	
D.	Buried Cables
Direct buried power and control cables shall be 600V, Class B stranded soft drawn copper conductor, XHHW insulated, black PVC jacketed type MC interlocked armor. Direct buried type MC cables shall be identified for direct burial per NEC300 and installed in accordance to NEC300.5 and 300.20. Direct buried power cables shall be Chloride Lowsmear or approved equal.	
Where specified, direct buried cables shall have a 6 inch wide yellow plastic warning ribbon marked "Caution: Buried Electric Line Below", "TerraTape" by Griffolyn, or equal, installed 6 inch above the cable for the full length of the installation.	
F.	Instrumentation Cable
Unless otherwise required by the instrument manufacturer, signal cables shall consist of UL approved 600 volt 80°C rated arrangement of two, or three or more, twisted, 18 gage, 30 mils minimum polyethylene insulated stranded copper conductors; a 100 percent coverage aluminum-polyester sheath; an 18 gage, stranded copper drain wire; an outer extruded jacket of 30 mils minimum polyvinyl chloride. Cable shall be Belden 8719 or 8718, or approved equal. Cables designated a "Triple use", or similar designation that do not conform to the characteristics stated herein will not be considered satisfactory and are not acceptable.	
16117	THIS SECTION LEFT BLANK
16118	GROUND RODS
Unless otherwise noted, Ground rods shall be copper welded steel type, 3/4 inch diameter, 10'-0" length, (extendable) and shall be electrically connected with exothermic welding. Ground rods shall be driven to depths as required to establish required resistance to ground.	
16119	SPICES AND TERMINATIONS
600 volt system conductors shall be spliced with "Ideal Wire-Nuts", or equal by T&B, for AWG Number 10 and smaller for dry areas, and machine crimped or bolted connectors with "Scotch 88" or equal by Plymouth, full coverage tape for all other splices. Soldered and taped splices will not be acceptable. Terminations shall be made with mechanical lugs or other acceptable termination features of the equipment supplied. Control conductors shall terminate on box clamp, binding post screw, or air screw only. Soldered, taped and free-standing connectors will not be acceptable.	
16120	CONDUIT
A.	Steel Conduit
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Steel conduit shall be heavy-wall, rigid galvanized type bearing and Underwriters Laboratories, Inc., label of approval. Conduit minimum size shall be 1/2 inch. Fittings for rigid steel conduit shall be threaded types made up with conductive waterproof compound.	
B.	IMC
Intermediate metal conduit (IMC) may be installed in lieu of rigid conduit when concealed within finished walls and ceilings, and for exposed indoor installation. IMC shall be galvanized steel, minimum size 1/2 inch, bearing the Underwriters Laboratories, Inc. label of approval. Fittings for IMC shall be threaded types made up with conductive waterproof compound.	
C.	EMT
EMT shall be thin-wall, rigid galvanized steel, minimum size 1/2 inch, bearing the Underwriters Laboratories, Inc., label of approval. Fittings for EMT shall be wrench tightened compression or screw type, per NEC requirements and as approved by the Engineer.	
D.	Flexible Conduit
Flexible conduit shall be provided where equipment vibration may exist, and where noted, and shall be lightweight flexible metal conduit. Fittings shall be lightweight type. Non-lightweight flexible metal conduit shall be installed only as noted on the drawings.	
E.	PVC Conduit
Nonmetallic conduit shall be provided where indicated and shall be heavy-wall rigid type 40, manufactured from a non-burning, high impact polyvinyl chloride compound rated for 80°C "Carbon PV-Quat", or equal by Rohm. Fittings shall be manufactured from same type material as the conduit and shall be installed with cement as recommended by the manufacturer.	
F.	General
1.	All conduit shall be clean and free from dents, scars, or other deformities. Underground conduit shall be swabbed dry prior to cable installation.
2.	Connections shall be made up tight, and bushings shall be provided where smooth hubs are not encountered.
3.	Changes in direction shall be made with symmetrical bends or conduit boxes. Field made bends shall be made with an approved hickey or conduit bending apparatus. Conduit runs shall be installed parallel or perpendicular to structural members.
4.	Conduit hangers and supports shall be provided at intervals recommended by the manufacturer and the National Electrical Code.
5.	Underground conduit runs shall be installed at least 1'-0" below finished grade unless other depths are indicated. Plain earth used for backfill shall be free from objectional material such as rocks, glass, metal, wood, etc., and shall be tamped to surrounding earth density.
6.	Underground conduit runs not protected by concrete encasement shall have a plastic coated magnetic warning ribbon provided 1'-0" above the conduit installed full length of the conduit run.
7.	Conduit entering areas where a forced or drafted ventilation system is used shall be sealed with a fire retardant silicone foam sealant ("Chase-Foam" CTC-PH-405, or equal) after final conductor installation to prevent transmission of air, vapor or gas into the area or equipment from sources beyond the limits of the area addressed hereby.
8.	Conduit installed in exterior location, corrosive area, and as otherwise noted on the drawings shall be supported with stainless steel "Monorails Series 2000" hangers and stainless steel fasteners.
9.	Underground conduit bends and conduit sub-ups shall be rigid galvanized steel conduit.
16121	BOXES
A.	Conduit Boxes
Unless otherwise noted, concealed conduit boxes shall be galvanized sheet steel, and exposed conduit boxes shall be cast iron alloy type where metal conduit is installed. Boxes provided in non-metallic conduit systems shall be high-impact molded polyvinyl chloride type rated at least 80°C ambient. Boxes installed in exterior or damp locations shall be equipped with full neoprene gaskets. Boxes shall be sized in accordance with the National Electrical Code unless otherwise noted, with lighting fixture outlets being not smaller than 4 inches.	
B.	Sheet Metal Boxes
Sheet metal pull and junction boxes shall be galvanized or stainless steel for exposed conduit work unless otherwise noted. Exterior boxes shall be watertight gasketed types. Non-metallic boxes shall be provided where indicated.	
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C.	Switch and Outlet Boxes
Switch and Outlet Boxes shall be as specified for surface or flush mounting. Outlet boxes housing both receptacle and telecomm circuitry shall be provided with a barrier per NEC requirements.	
In the manufacturing area, switch and outlet box mounting height shall be as specified on the drawings.	
D.	Wet Locations
Wall switch boxes shall be installed 4'-0" above finished floor, and convenience receptacle outlet boxes shall be installed 1'-0" above finished floor unless otherwise noted or as required by the manufacturer's system. Mounting heights may be adjusted to suit special structural features as approved by the Engineer.	
Boxes installed out-of-doors or in otherwise wet areas for switches and receptacles shall be raintight type with hinged cover Teymac "Safety Outlet" or approved equal for in-service use.	
16122	DEVICES AND PLATES
Devices and plates shall be as specified on the drawings.	
Where installed in exterior or damp locations, device plates shall be weatherproof types. Device plates installed on non-metallic boxes shall be of the same type material as the box.	
16123	RECEPTACLES
A.	Duplex Type
Duplex convenience receptacles shall be rated 20 amps, 125 volts, 2 pole, 3 wire, grounding type, specification grade, NEMA configuration 5-20R unless otherwise noted.	
Receptacles shall be as specified for surface or flush mounting.	
Where installed in damp locations, receptacles shall be installed in weatherproof enclosures with Teymac "Safety Outlet" hinged covers.	
B.	Single Type
Single convenience receptacles shall be provided as special purpose small load disconnecting means and shall be otherwise similar to duplex convenience receptacles.	
C.	Ground Fault Interrupting Type
Receptacles shown as "GFI" shall be listed by UL for ground fault interrupting duty, shall be duplex 20 amp NEMA 5-20R configuration, shall be indicating type with manual "Test/Reset" features, and shall trip at 5 milliamps in 1/30 second.	
D.	Special Receptacles
1.	Special receptacles shall be provided as noted and shall have electrical ratings, pole configuration and number of poles as shown or required. Enclosures, receptacle types and other special features shall be suitable for the duty and conditions encountered.
2.	Special Systems Receptacles where specified and requiring isolated ground shall have a visible icon denoting special duty assignment and shall be specification grade, blue in color, NEMA 5-20R configuration, Duplex type, with internal surge suppression, equal to Hubbell IQSS5S.
16124	SWITCHES
A.	Wall Switches
When not otherwise specified or shown on the drawings, wall switches shall be toggle type, specification grade, and shall be SPST, DPST, or 3-way types as noted. Switches shall be rated for 20 amperes unless otherwise noted. Switches shall be rated at 120-277V. Where installed in damp locations, switches shall be installed in weatherproof enclosures specified herein under "Boxes".	
B.	Safety Switches
1.	Safety switches shall be provided where indicated and elsewhere as required by the National Electrical Code. Safety switches shall be heavy-duty type, with voltage, current, fuses, number of poles, and enclosure types as noted. All conductor components including switching, fuse holders, terminals shall be copper. All switches requiring security including main power service, and switches installed out-of-doors, shall be provided with approved padlocks. NEMA 3R
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ELECTRICAL - SPECIFICATIONS