

**DIVISION 16**  
**ELECTRICAL SECTIONS**

## DIVISION 16

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## **Section 16010**

### **Electrical General Provisions**

**SECTION 16010****ELECTRICAL GENERAL PROVISIONS****PART 1 - GENERAL****1.1 Related Documents**

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

**1.2 Summary**

Provide labor, materials and equipment required for complete and functioning electrical systems as required by the contract documents.

New Work. The work includes, but is not limited to, the following principal systems and equipment:

1. 400/230 volt distribution.
2. Switchgear.
3. Panelboards.
4. Power – Factor – correction capacitors.
5. Lighting fixtures, poles, lamps and ballasts.
6. Dimming system.
7. Telephone system complete with PABX.
8. Communication and data – processing equipment.
9. Fire alarm system.
10. Public address system.
11. Security and CCTV Systems.
12. Lightning protection system.
13. Grounding System.

### **1.3 Applicable Provisions**

1. Provisions Specified Elsewhere: Unless modified in this section, General and Supplementary General Conditions, applicable provisions of Division 1 - General and other provisions of contract documents apply to work of Division 16 - Electrical.
2. Application: Provisions of this section apply to every section of Division 16 - Electrical, except where specifically modified.

### **1.4 Reference Codes and Standards**

Standards of the following organizations may be referenced in the specification. Unless noted otherwise, references are to standards or codes current at the time of bidding.

1. Association of Edison Illuminating Companies (AEIC).
2. American National Standards Institute (ANSI).
3. Institute of Electrical and Electronics Engineers (IEEE).
4. Insulated Cable Engineers Association (ICEA).
5. National Electrical Code (NEC).
6. National Electrical Manufacturers Association (NEMA).
7. National Electrical Safety Code (NESC).
8. National Fire Protection Association (NFPA).
9. Underwriters' Laboratories (UL).
10. British Code (BS)

### **1.5 Regulations and Codes**

- A. Regulations: Work, materials and equipment must comply with the latest rules and regulations of the following:
  1. National Electrical Code (NEC).
  2. National Electrical Safety Code (NESC).
  3. Occupational Safety and Health Act (OSHA).
  4. City of Amman, Jordan.

**1.5 Regulations and Codes (cont'd)**

- B. Discrepancies: The drawings and specifications are intended to comply with listed codes, ordinances, regulations and standards. Where discrepancies occur, immediately notify the Engineer in writing and ask for an interpretation. Should installed materials or workmanship fail to comply, the Contractor is responsible for correcting the improper installation. Additionally, where sizes, capacities, or other such features are required in excess of minimum code or standards requirements, provide those specified or shown.
- C. Permits: Obtain certificates of inspection and other permits required as a part of the work.

**1.7 Contract Drawings**

- A. Intent: The intent of the drawings is to establish the types of systems and functions, but not to set forth each item essential to the functioning of the system. Electrical drawings are generally diagrammatic and show approximate location and extent of work. Install the work complete, including minor details necessary to perform the function indicated. In case of doubt as to work intended, or if amplification or clarification is needed, request instructions from the Engineer.
- B. Discrepancies. Review pertinent drawings and adjust the work to conditions shown. Where discrepancies occur between drawings, specifications, and actual field conditions, immediately notify the Engineer for his interpretation.
- C. Outlet and Plant Locations: Coordinate the actual locations of electrical outlets and equipment with building features and equipment as indicated on Architectural, structural, mechanical and plumbing drawings. Review with the Engineer any proposed changes in outlet or equipment location. Relocation of outlets before installation, of up to 5 feet from the position indicated, may be directed without additional cost. Remove and relocate outlets placed in an unsuitable location, when so requested by the Engineer.

**1.8 Contractor Qualifications**

An acceptable Contractor for the work under this division must have personnel with experience, training and skill to provide a practical working system. The Contractor may be required to furnish acceptable evidence of having installed not less than three systems of size and type comparable to this project. The systems must have served satisfactorily for not less than 3 years. The superintendent must have had experience in installing not less than three such systems.

**PART 2 - PRODUCTS****2.1 Product Requirements**

- 1. Condition: Provide new products of manufacturers regularly engaged in production of such plant. Provide the manufacturer's latest standard design for the type of product specified.
- 2. NEC and UL: Products must conform to requirements of the National Electrical Code. Where Underwriters' Laboratories have set standards, listed products and issued labels, products used must be listed and labeled by UL.

**2.1 Product Requirements (cont'd)**

3. Space Limitations: Plant selected must conform to the building features and must be coordinated with them. Do not provide equipment, which will not suit arrangement and space limitations.
4. Factory Finish: Plant must be delivered with a hard surface, factory-applied finish so that no additional field painting is required except for touch-up as required.

**PART 3 - EXECUTION****3.1 Protection of Equipment**

1. Moisture: During construction, protect switchgear, transformers, motors, control equipment, and other items from insulation moisture absorption and metallic component corrosion by appropriate use of strip heaters, lamps or other suitable means. Apply protection immediately on receiving the products and maintain continually.
2. Clean: Keep products clean by elevating above ground or floor and by using suitable coverings.
3. Damage: Take such precautions as are necessary to protect apparatus and materials from damage. Failure to protect materials is sufficient cause for rejection of the apparatus or material in question.
4. Finish: Protect factory finish from damage during construction operations and until acceptance of the project. Satisfactorily restore any finishes that become stained or damaged.

**3.2 Installation**

1. Cooperation with Other Trades: Cooperation with trades of adjacent, related or affected materials or operations, and of trades performing continuations of this work under subsequent contracts, is considered a part of this work in order to effect timely and accurate placing of work and to bring together, in proper and correct sequence, the work of such trades.
2. Workmanship: Work must be performed by workmen skilled in their trade. The installation must be complete.
3. Concrete Equipment Pads: Install 88.9 mm (3-1/2 inch) -thick concrete foundation pads for indoor floor-mounted equipment, except where direct floor mounting is required. Pour pads on roughened floor slabs, sized so that outer edges extend a minimum of 76.2 mm (3 inches) beyond equipment. Trowel pads smooth and chamfer edges to a 1-inch bevel. Secure equipment to pads as recommended by the manufacturer.

**3.2 Installation (cont'd)**

4. **Setting of Equipment:** Equipment must be leveled and set plumb. Sheet metal enclosures mounted against a wall must be separated from the wall not less than 6.35 mm (1/4 inch) by means of corrosion-resistant spacers or by 76.2 mm (3 inches) of air for freestanding units. Use corrosion-resistant bolts, nuts and washers to anchor equipment. In sufficient time to be coordinated with work under other divisions, provide drawings and layout work showing exact size and location of sleeves, openings or inserts for electrical equipment in slabs, walls, partitions and chases.
5. **Sealing of Equipment:** Seal openings into equipment to prevent entrance of animals, birds and insects.
6. **Motors:**
  - A. Motors are specified under other sections of Division 16.
  - B. Electrical work includes the electrical connection of all motors, except those, which are wired as a part of equipment.
7. **Concealed Work:** Conceal all electrical work in walls, floors, chases, under floors, underground and above ceilings except:
  - A. Where shown or specified to be exposed: Exposed is understood to mean open to view.
  - B. Where exposure is necessary to the proper function.
  - C. Where size of materials and equipment preclude concealment.
8. **Application:** Unless otherwise indicated, power will be utilized as follows:
  - A. 230 volts, single phase: incandescent, fluorescent and high-intensity-discharge lighting.
  - B. 230 volts, single phase: convenience outlets.
  - C. 400 volts, three phase: special power and equipment.

**3.3 Equipment and Device Marking**

1. **Designations:** Identify all equipment, devices, feeders, branch circuits and similar items with the same designations as indicated on the contract documents.
2. **Nameplates:** Externally mark all electrical equipment with nameplates identifying each and the equipment served. Nameplates shall be black laminated rigid phenolic with white core. Nameplate minimum size shall be 1 inch high by 76.2 mm (3 inches) long with 4.76 mm (3/16-inch) -high engraved white letters. Supply blank nameplates for spare units and spaces.



### 3.3 Equipment and Device Marking (cont'd)

3. Nameplate Fasteners: Fasten nameplates to the front of equipment only by means of stainless steel self-taping screws. Stick-ons or adhesives will not be allowed unless the NEMA enclosure rating is compromised, then only epoxy adhesive shall be used to attach nameplates.
4. Nameplate Information: In general, the following information is to be provided for the types of electrical equipment as listed.
  - A. Switchboards and Motor Control Centers: On the mains identify the piece of equipment, the source and voltage characteristics (i.e., 480/277V 3PH 4W). For each branch circuit protective device, identify the load served.
  - B. Panelboards: Identify the source, panelboard designation and voltage characteristics.
5. Panelboards: Prepare a neatly typed circuit directory behind clear heat-resistant plastic in a metal frame attached to the inside of the door for each panelboard. Identify circuits by equipment served and by room numbers where room numbers exist. Indicate spares and spaces with light, erasable pencil marking. Adhesive mounted directory pocket is not acceptable.
6. Pull, Junction and Outlet Boxes: With 12.7 mm (1/2-inch) -high lettering, identify conduits connected to pull, junction and outlet boxes with the complete circuit number of the conductors contained therein. Where multiple circuits are contained in a box, identify the circuit conductors with permanent tags, which indicate circuit designation.
7. Equipment and Raceways Over 600 Volts: Provide "WARNING - HIGH VOLTAGE - KEEP OUT" signs on all equipment. With 50.8 mm (2-inch) -high lettering, mark all exposed raceways containing conductors operating in excess of 600 volts every 30.48 m (100 feet) with the words "WARNING - HIGH VOLTAGE."
8. Power Receptacles: Use nameplate or engrave device plate to identify power receptacles where the nominal voltage between any pair of contacts is greater than 150 volts with circuit number, voltage and phases. If nameplates are used, attach to wall directly above device plate.
9. Wall Switches: Where the equipment served is not in sight of the wall switch, provide an engraved switch plate or attach a nameplate to the wall directly above the switch.

### 3.4 Testing

1. Test Conditions: Place circuits and equipment into service under normal conditions, collectively and separately, as may be necessary to determine satisfactory operation. Perform specified tests in the presence of the Engineer. Furnish all instruments, wiring, equipment and personnel required for conducting tests. Demonstrate that the equipment operates in accordance with requirements of the drawings and specifications. Special tests on certain items are specified hereinafter. Where specified that the testing be performed by an independent testing company, an Employer approved NETA certified testing company shall be used.

**3.4 Testing (cont'd)**

2. **Test Dates:** Schedule final acceptance tests sufficiently in advance of the contract date to permit completion of any necessary adjustment or alterations within the number of days allotted for completion of the contract.
3. **Retests:** Conduct retests as directed by the Engineer of such time duration as may be necessary to assure proper functioning of adjusted or altered parts or items of equipment. Any resultant delay as a result of such necessary retests does not relieve the Contractor of his responsibility under this contract.

**END OF SECTION**