


# **BALUCHISTAN ENERGY COMPANY LIMITED**

## **DEVELOPMENT OF LPG TESTING LABORATORY AT TAFTAN**

### **SPECIFICATION FOR ELECTRICAL INSTALLATION**



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# **SPECIFICATION FOR ELECTRICAL INSTALLATION**

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# **SPECIFICATION FOR ELECTRICAL INSTALLATION**

## **1.0 SCOPE**

1.1 This specifications covers minimum requirements for all electrical systems supplied and installed for the LPG Testing

1.2 All materials, equipment, installations, and workmanship shall fully conform to the following national codes and standards (latest edition):

IEEE Institute of Electrical and Electronic Engineers

OSHA Occupational Safety and Health Administration

NESC National Electrical Safety Code

D.G.M.S Director General Mines Safety

CMRI Central Mine Research Institute

Standards as per document ELE-SP-3012 and National Electric Code

1.2.1 Furnish all labor, supervision, and tools required for the erection, assembly, and installation of the complete electrical system as called for in the specifications and documents included in this contract.

1.2.2 Test and adjust all electrical equipment and material, in accordance with the Electrical Inspection and Testing Specification. Furnish labor to assist Manufacturer's field service engineers when requested.

1.2.3 Install mounting brackets and supports for all electrical items.

1.3 The electrical installation work for the project comprises of but not limited to,



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## **1.4 Provision of Power Supply Arrangement**

1.4.1 The scope includes the supply and installation of all equipment including the distribution boards, cables etc.

## **1.5 All Stations**

1.5.1 Adequate spare feeders will be provided in each L. T. main & sub-main distribution board.

## **1.6 Cabling**

1.6.1 The cabling scope includes the supply and installation of all cables and wiring requirements along with the accessories for the system at each location. It also includes providing cable trays in trenches/supported on walls, buried cable trenches for outdoor areas etc.

## **1.7 Lighting (if applicable)**

1.7.1 Supply and installation of lightings for the stations including necessary cabling / wiring.

1.7.2 Supply and installation of lighting for the receiver facility at all station.

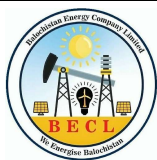
## **1.8 Earthing**

1.8.1 Supply and installation of earthing system for the including the necessary cabling/wiring at all station.

## **1.9 Auxiliary Equipment (if applicable for this project)**

1.9.1 Supply and installation of switch sockets:

a) Switch Sockets (P,E,N) – (for round / flat pins)



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- i. Control room min. - 6 Nos (min)
  - ii. Electrical room - Min 2 Nos (min)
  - iii. Battery room - 1No. (Flameproof and corrosion resistant)
  - iv. GG room - 1 No.
  - v. Guard room - 1 No.
- b) 16A, 230V AC (P, E, N) (for round / flat pins) weatherproof Industrial switch socket unit fully interlocked.
- i. Control room - 1 No
  - ii. Electrical room - 2 Nos.
  - iii. DG room - 1 No
- c) General: Safety equipment as per requirement of Electrical Inspector will be provided at each station.

### **1.10 Equipment Installation**

- 1.10.1 Installation of the uninterrupted power supply system in the control room (if applicable for this project).
- 1.10.2 Installation of all electrical equipment for the other systems of the project such as Cathodic Protection, Optical Fiber Cable (if applicable for this project), Distribution boards etc. are also included in the scope of contractor as per the requirements in the respective sections.
- 1.10.3 Metering, APFC, LT MCCB, power and control cabling, earthing, associated civil works etc (if applicable for this project).

### **2.0 CLASSIFICATION OF AREAS**

- 2.1 Areas of electrical work are to be classified as per the code IP-15. The hazardous area classification drawing (s) are to be prepared and submitted by the contractor



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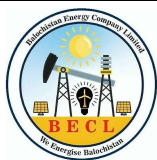
- 2.2 All electrical equipment and the instruments used for the installation shall be selected as per IEC-60079/ standard as per document ELE-SP-3011.
- 2.3 The equipment in classified area shall be as a minimum suitable for Zone-2, Gas group-IIA, Temperature class-T3.

### **3.0 DRAWINGS AND SPECIFICATIONS**

- 3.1 The electrical installation shall be in accordance with the specifications, which covers the electrical work associated with the pipe line installation
- 3.2 Contractor shall prepare the drawings for installation, cabling, earthing and lightning layouts and all other equipment and installation work and also load calculations and submit the same for Employer / Consultant's approval.
- 3.3 The Contractor shall keep a record of all electrical changes as the work progresses and one up-to-date, marked-up set of drawings recording these conditions. Upon completion of the work, the contractor shall incorporate these records and marked-up drawings into 3 sets of complete, as-built drawings, two set to be left at the construction/installation site with the Employer / Consultant, the third set used to revise the original drawings prior to the originals being delivered to the Employer / Consultant. The as-built drawings shall include revised copies of the drawings on CD ROM discs in latest version of Autocad.
- 3.4 In case of discrepancies between electrical drawings or specifications, the governing codes and regulations shall take precedence. In all cases, such discrepancies shall be brought to the immediate attention of the Employer / Consultant for clarification and approval.

### **4.0 MATERIAL AND WORKMANSHIP**

- 4.1 All materials shall be new and free of defects and shall be the best quality of their respective kinds.



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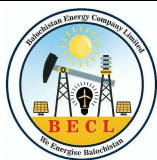
- 4.2 Typical installation details shall be shown on the drawings issued to the field. Such details shall be followed as to material and methods of installation.
- 4.3 Employer / Consultant prior to installation shall approve all materials, equipment, and methods of installation.
- 4.4 The Contractor shall furnish all material and equipment necessary to complete the electrical installation in accordance with this specification, material specifications, standard specifications, and all project drawings and details.
- 4.5 The Contractor shall furnish and install all consumable material and equipment which is not specifically mentioned or shown but which is necessary for a proper and to complete electrical system.
- 4.6 Concealed work shall be left open for inspection and test until approved by Employer / Consultant.
- 4.7 All work shall be performed by skilled craftsmen under qualified supervision and conform to good practice and workmanship.
- 4.8 Where "Equal" or "Approved Equal" is mentioned in the specifications or drawings, the contractor must demonstrate to the satisfaction of Employer / Consultant that the items proposed are equal to those specified and any such items used or installed without Employer / Consultant written approval are subject to rejection.
- 4.9 Equipment fittings and material approved for use in hazardous locations shall be applied and installed in accordance with the Manufacturer's instructions.
- 4.10 Cable laying and termination shall be as per established standard procedures and best engineering practices.



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### **5.0 WORK UNDER SPECIAL CONDITIONS**

- 5.1 Permits: The contractor shall apply and obtain for all necessary permits for the electrical work to be performed and the required inspection of all electrical work upon completion. The contractor shall secure all necessary certificates of approval
- 5.2 When work is to be done in an area where a fire or explosion hazard may exist, a permit in writing from the Employer / Consultant shall be obtained before flames of any kind, sparking tools, or any other means of possible ignition, are employed in the area. Facility operating conditions may preclude the issue of a permit immediately upon application, and the Employer / Consultant shall give reasonable notice of his requirements. Applications for permits shall be made during normal staff hours.
- 5.3 The contractor shall provide electrical safety equipment as required and in such a manner as to provide safety protection for all personnel in the area of work.
- 5.4 The contractor shall be responsible for the suitability and safety of the equipment used by him, and no equipment shall be used which may be unsafe or liable to cause injury or damage.
- 5.5 Certain low-voltage control circuits may require work to be performed while energized. Changes to or modification of energized power circuits shall be done only after clearance of the lines and equipment by the Employer / Consultant.
- 5.6 The contractor shall be responsible for selecting methods, personnel, equipment, and safety precautions to execute the work in full compliance with HS & E.
- 5.7 The contractor shall be required to comply with all Safety Rules and Regulations as established by Employer / Consultant of Facility for the work area involved.
- 5.8 The contractor shall keep a record of all permanent systems that have been energized.



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- 5.9 The contractor shall install brackets and steel supports required for installation of the power system.
- 5.10 All structural supports not covered under brackets and steel supports but necessary for mounting and support of equipment or other systems shown on the drawings shall be installed as the contractor scope.
- 5.11 Power receptacles shall be factory-sealed type.

### **6.0 CABLING SYSTEM**

- 6.1 The cabling system scope includes:
- a) Supply and installation of all cables.
  - b) Supply and installation of cable trays including the tray supports. The cable trays shall be supported on wall as required.
- 6.2 The details of the cabling system are indicated in the attached specification no. ELE-SP-3014 system installation work. All the accessories for the cabling system installation shall be supplied by the Contractor.
- 6.3 All the materials for the installation such as excavation, preparation of trench bed for cable laying, installation of protection covers, back filling including the sand filling, providing cable markers etc. are included in the Contractor's scope

### **7.0 LIGHTING SYSTEM**

- 7.1 The scope of work for the lighting System is as follows:
- 7.2 Supply and installation of lighting fixture, wiring system, distribution board etc to make the system complete in all respects at all stations.
- 7.3 The lux level to be achieved and the type of fittings to be used are indicated in the



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design criteria. Flame proof well glass lightning fixtures are to be used in the valve stations launcher and receiver areas. The height of the street light poles shall be 10M.

- 7.4 Contractor shall locate and install lighting fixtures to avoid interferences with other items which could cause deep shadow areas. All accessories required for the installation of fixtures are included in contractor's scope.
- 7.5 Each circuit shall be labeled and identified with a typewritten circuit directory on indoor panels and panel circuit schedule to be submitted.
- 7.6 Lighting fixtures shall be supported and aligned properly for optimum distribution of light. The Contractor shall install all necessary support brackets, clamps, and hardware necessary for permanent, safe hanging of the light fixtures.

### **8.0 CONDUIT SYSTEMS**

- 8.1 Contractor shall furnish and install all conduits as required.
- 8.2 Minimum conduit size shall be 19mm (3/4 inch) unless otherwise indicated on the drawings. All metallic conduits shall be rigid, aluminum unless shown otherwise on the drawings or Conduit and Wire Schedule.
- 8.3 Cutting or burning structural members to make way for conduit is prohibited, except with the approval of the Employer / Consultant for a specific case.
- 8.4 The component parts of conduit systems shall, in general, be of like material. Where dissimilar metals are used together, suitable provisions as approved by the Employer / Consultant shall be made to prevent galvanic action.
- 8.5 Exposed conduit shall be run straight and true to structure lines and shall be rigidly supported between couplings, on either side of bends, at termination's and fittings.



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8.6 For usage of different size of conduit other than mentioned above will be done after approval from Engineer/Owner's Engineer.

### **9.0 EARTHING SYSTEM**

9.1 Contractor's scope for the earthing system is as follows:

- a) Supply and installation of the main Earthing grid.
- b) Supply and installation of the Earth electrodes (Rod electrodes).
- c) Supply and installation of the Earthing leads from the equipment to the Earthing grid.

9.2 The sizes of earthing conductors are indicated in the design criteria.

9.3 The resistance of earthing grid shall be less than 4 ohms.

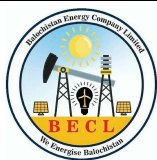
9.4 Earthing grid shall be laid buried in ground or embedded in concrete. It shall be laid at 750 mm depth from the ground level for buried conductors. Tap offs from the main Earth grid for equipment shall be provided. The Tap off conductor shall be welded to the main Earthing grid. Earthing connections on the equipment shall be a bolted connection. Earthing System shall comply with relevant standards as per document SP-ELE-3011.

9.5 Typical equipment earthing connection drawings are enclosed

### **10.0 MISCELLANEOUS SUPPORT FOR CONDUIT, JUNCTION BOXES, ETC.**

10.1 The Contractor shall fabricate supports for conduit, junction boxes, etc., as required to complete installation.

10.2 Any damage to the painting following field installation shall be repaired immediately following damage.



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### **11.0 EQUIPMENT TO BE SET**

- 11.1 Contractor shall use tools, equipment, methods, and procedures as required ensuring that the equipment is not damaged or distorted by Contractor's operations. Any distortion or damage shall be repaired or replaced at contractor's sole expense.
- 11.2 Contractor shall check all structures, etc., required to ensure that sufficient load bearing capacity and horizontal and vertical clearance exist when loading, hauling, and setting the equipment.
- 11.3 If not already provided, Contractor shall furnish any temporary reinforcement by; bridging, shoring, braces, clips, etc., required during loading, hauling, and setting operations. Contractor shall remove and legally dispose of all temporary items, whether furnished self or not, on completion of work.