




OGDCL PAKISTAN:
OIL & GAS DEVELOPMENT
COMPANY LIMITED

KPD-TAY COMPRESSION PROJECT

ISSUED FOR TENDER

0	07-JAN-2022	ISSUED FOR TENDER	JAB	ZHW	AIB	MPM	MAS		
REV	DATE	DESCRIPTION	ORIG	CHKD	LE	QA	PM	LPE/TA	
REVISIONS			APPROVAL					OWNER APPROVAL	
<div><p>ENAR Petrotech Services (Pvt.) Limited , 7-B , Sector 7-A , Korangi Industrial Area , Karachi Pakistan</p></div>		<div>TITLE:</div> <div>SPECIFICATION FOR BUILDING ELECTRIFICATION</div>							
<div>PROJECT NUMBER</div> <div>14-0258</div>		<div>DOCUMENT NO:</div> <div>0258 – ELA – 6509 – 0</div>							
PROJECT CODE			DOC. TYPE		SEQ. NO.		REV		



CLIENT : OIL & GAS DEVELOPMENT COMPANY LIMITED

PROJECT : KPD-TAY COMPRESSION PROJECT

SPECIFICATION FOR BUILDING ELECTRIFICATION



TABLE OF CONTENTS

1. PURPOSE	4
2. REFERENCE STANDARDS & CODES	6
3. SCOPE	6
4. DESIGN BASIS	8
5. LIGHTING	10
6. EARTHING AND LIGHTNING PROTECTION.....	14
7. TELECOMMUNICATIONS NETWORK.....	15
8. GUARANTEE	15
9. TESTS AND INSPECTION	16
10. DOCUMENTATION	16
APPENDIX - A.....	17

**SPECIFICATION FOR BUILDING ELECTRIFICATION**

1. PURPOSE

This specification covers the general requirements for design, engineering, procurement/supply, testing and commissioning of all equipment and materials and installation of electrical facilities in buildings for “**KPD-TAY Compression Project**”.

In case discrepancies are found between this specification and other documents, COMPANY/CONSULTANT shall be referred for correct interpretation.

1.1. Definition

Where used in this specification, the following terms shall have the meanings indicated below unless otherwise clearly indicated by context of their use.

COMPANY – Oil & Gas Development Company Limited (OGDCL)

CONCESSION REQUEST - A deviation requested by the CONTRACTOR or VENDOR, usually after receiving the contract package or purchase order. Often, it refers to an authorization to use, repair, recondition, reclaim, or release materials, components or equipment already in progress or completely manufactured but which does not meet or comply with COMPANY/CONSULTANT requirements. A Concession Request is subject to COMPANY/CONSULTANT approval.

CONTRACTOR - The party which carries out all or part of the design engineering, procurement, construction and commissioning or management of the project.

DRAWINGS - Drawings provided by the CONTRACTOR/VENDOR.

SUPPLIER/MANUFACTURER - The party which manufactures and/or supplies the material/equipment, and provides technical documents/drawings and services to perform the duties specified by the COMPANY/CONTRACTOR.

PROJECT –KPD-TAY Compression Project

1.2. Errors & Omissions

- The review and comment by COMPANY/CONSULTANT of any CONTRACTOR's/VENDOR's drawings, procedures or documents shall only indicate acceptance of general requirements and shall not relieve the CONTRACTOR/VENDOR of its obligations to comply with the requirements of this specification and other related parts of the Contract Documents.
- Any errors or omissions noted by the CONTRACTOR/VENDOR in this Specification shall be immediately brought to the attention of COMPANY/CONSULTANT.

1.3. Deviations

- All deviations to this Specification, other related specifications or attachments shall be brought to the knowledge of COMPANY/CONSULTANT as a section in the bid. All deviations made during the procurement, design, manufacturing, testing and inspection shall be with
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**SPECIFICATION FOR BUILDING ELECTRIFICATION**

written approval of COMPANY/CONSULTANT prior to execution of Work. Such deviations shall be shown in the documentation prepared by the CONTRACTOR/VENDOR.

1.4. Conflicting Requirement

- In the event of any conflict, inconsistency or ambiguity between CONTRACTOR's/VENDOR's scope of work, this Specification, National Codes and Standards, and referenced in the Project Specification or any other documents, the CONTRACTOR/VENDOR shall refer to COMPANY/CONSULTANT whose decision shall prevail.

1.5. Reporting Procedure

- A reporting and documentation system shall be agreed between the CONTRACTOR/VENDOR and COMPANY/CONSULTANT for the status of procurement, design, manufacturing, inspection, testing and shipment of the equipment/material to be supplied under this specification. The CONTRACTOR/VENDOR shall provide reports and summaries for production performance and testing operations in conformance with a manufacturing schedule approved by COMPANY/CONSULTANT.
- Daily, weekly, monthly and run summaries of all major aspects of the production process shall be provided as reports to COMPANY/CONSULTANT.

1.6. Unit Responsibility

- The CONTRACTOR / VENDOR shall be responsible for the complete design, engineering, procurement/supply, testing and commissioning of all equipment and materials and installation of electrical facilities in buildings; including full compliance with all applicable design codes and standards, including those listed in "Section-2" of this document and the requirements of the certifying authority, if applicable. The CONTRACTOR/VENDOR shall handle and expedite drawings and data, and supervise and coordinate all inspection and testing.
- The CONTRACTOR/VENDOR shall guarantee that all the equipment, material and parts included in building facilities shall be new, unused and of the required grade.

1.7. Documentation

- Documents, calculation sheets, drawings, etc., to be submitted to the COMPANY/CONSULTANT shall be in English Language.
 - Unless otherwise specified, the metric units shall be used in documents and drawings by the CONTRACTOR/VENDOR.
 - The form of drawings and documents may be as per the CONTRACTOR/VENDOR's Standards. However, the format of the data sheet will be submitted to COMPANY/CONSULTANT for approval.
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**SPECIFICATION FOR BUILDING ELECTRIFICATION**

- Variations from or additions to this specification shall be called to the attention of the COMPANY/CONSULTANT and approved in writing by the COMPANY/CONSULTANT prior to procurement.

2. REFERENCE STANDARDS & CODES

The equipment and material selection w.r.t building electrification design, testing and inspection supplied by the CONTRACTOR/VENDOR shall comply with this Specification, the latest edition of the General Specification for Electrical Installation Workmanship to be used in **KPD-TAY Compression Project**; and material selection shall confirm to the relevant and latest version of the following reference Standards and Codes.

It shall be manufacturer's responsibility to be, or to become, knowledgeable of the requirements of these reference Standards and Codes. Any changes, alteration and necessary re-certification of the equipment for compliance with the applicable Standards and Codes shall be at the expense of the CONTRACTOR.

- International Electro Technical Commission (IEC).
- British Standards (BS).
- Electricity Act 1910 (Govt. of Pakistan)
- Electricity Rules 1937 (Govt. of Pakistan)

In the event of conflict between Standards, the most stringent shall prevail.

All standards, regulations and codes of practices used shall be of latest current issues at the date of contract award.

The CONTRACTOR/VENDOR shall be responsible for the availability of the above mentioned specifications/publications, standards, and codes of practices and any other relevant documents and shall collect these documents on its own. The CONTRACTOR/VENDOR shall make sure that these documents are available all times and shall submit/present to COMPANY/CONSULTANT on request.

The design and installation shall also include the requirements of any applicable local laws, standards having jurisdiction over the site location following the principles and practices detailed in this document.

3. SCOPE**3.1. General**

The building electrification works for the following minimum buildings/sheds (*to be finalized during the detail engineering*) as reflected on "Project Plot Plan" shall be carried out by the CONTRACTOR:

- CCR Building (KPD-GPP)
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- Switchgear/MCC Equipment Room Building (TAY-03 GGS)
- Switchgear/MCC Equipment Room Building (THORA DEEP-03 GGS)
- CCR Building (TAY-03 GGS)
- CCR Building (THORA DEEP-03 GGS)
- Gen-set Sheds (TAY-03 GGS)
- Gen-set Sheds (THORA DEEP-03 GGS)
- Workshop (TAY-03 GGS)
- Workshop (THORA DEEP-03 GGS)
- Mosque (TAY-03 GGS)
- Mosque (THORA DEEP-03 GGS)
- FC Living Facility (TAY-03 GGS)
- FC Living Facility (THORA DEEP-03 GGS)
- Security/Guard Room (TAY-03 GGS)
- Security/Guard Room (THORA DEEP-03 GGS)
- Watch Towers (TAY-03 GGS) (*If requirement exist during detail engineering*)
- Watch Towers (THORA DEEP-03 GGS) (*If requirement exist during detail engineering*)

The CONTRACTOR shall adopt unified policy for CCR Building as per standard living and essential utilities.

The main items of work as given below for supplying, installing, testing and commissioning along with the associated works are: -

- Internal complete electrification
- Lighting fixtures
- A/C splits
- Wiring & cabling
- Conducting
- Earthing & lightning protection system
- Distribution boards
- Telephone system

3.2. Rules & Regulations

The entire electrical building facilities works shall be carried out by the CONTRACTOR and shall be authorized to undertake such work under the provisions of the Electricity Act 1910 and The Electricity Rules 1937 as adopted and modified to-date by the Government of Pakistan.

**SPECIFICATION FOR BUILDING ELECTRIFICATION**

The CONTRACTOR shall be responsible for submitting the test certificates and have the installation passed by the Government Electric Inspector. All requirements of the Electric Inspector shall be complied by the CONTRACTOR.

The CONTRACTOR shall provide “Danger Boards” and “Shock Charts” wherever required to comply with the requirements of local Electricity Rules and according to normal industrial practice.

3.3. Equipment and Materials

In this specification, certain type and make of equipment/material have been specified are equipment/material shall be procured by original manufacturer or authorized dealer. For items differing from the type and make specified, herein or for any item which require COMPANY/CONSULTANT approval, the CONTRACTOR shall submit in duplicate complete data within 30 days after the award of Contract. Request for approval of substitute materials after 30 days will be considered by the COMPANY/CONSULTANT only if COMPANY/CONSULTANT is satisfied that due to circumstances beyond the control of the CONTRACTOR, the specified material could not be obtained in time to prevent unnecessary delay. No increase in price shall be admissible for items accepted as approved equivalent. The CONTRACTOR shall follow the procedure laid down in the contract for requesting approval of substitutes.

In case the CONTRACTOR's bid contains any deviations from the Specification, then a separate detailed list of alternates shall be submitted along with the bid.

4. DESIGN BASIS**4.1. Service Conditions****4.1.1. Site Conditions**

Equipment selection shall be based on the following environmental conditions:

PARAMETERS	VALUE/UNIT
MAXIMUM AMBIENT TEMPERATURE	118 °F
MINIMUM AMBIENT TEMPERATURE	36 °F
WET BULB TEMPERATURE (DESIGN)	88 °F
MAXIMUM RELATIVE HUMIDITY	77%
MINIMUM RELATIVE HUMIDITY	20%
DIRECTION OF PREVAILING WIND (ACROSS THE YEAR)	The prevailing wind directions are blowing from the North to the North-East
WIND VELOCITY (MAX. / NORMAL)	100mph Design velocity (mech. Design): 120mph Exposure factor C – flat open terrain, Importance factor 1.15 – essential facility
ELEVATION ABOVE MEAN SEA LEVEL (GPF)	21 m (69 ft.)
AIRBORNE DUST PARTICLES	Possible effect of airborne dust particles shall be considered when developing the design

**SPECIFICATION FOR BUILDING ELECTRIFICATION**

SEISMIC ZONE	Zone 2A of Uniform Building Code- UBC-1997.
MAXIMUM DAILY RAINFALL	251mm (recorded over 24 hours)
MAXIMUM MONTHLY RAINFALL	286mm

4.1.2. Power Supply Characteristics

The rated characteristics of the power supplies are:

PARAMETERS	VALUE/UNIT
VOLTAGE	400 V ac \pm 10%, 3-PHASE 230 V ac 1-PHASE
FREQUENCY	50 Hz \pm 2Hz
NEUTRAL SYSTEM	SOLIDLY EARTHED

4.2. Design Considerations

The electrical system shall be designed to ensure safety of personnel, equipment and operations during all operating conditions, inspections and maintenance.

Reliability of the electrical supply is required to enable the building to be used continuously. The electrical system should be designed so that faults can be isolated with minimum disturbance to the system as well as providing maximum dependability.

The electrical system should be as simple as possible. This is a big factor with respect to safety and reliability of the electrical system.

The electrical equipment shall be, as much as possible simplified and interchangeable.

4.3. Area Classification

Area classification shall be in accordance with IEC.

All electrical equipment to be used in hazardous locations shall be in accordance with IEC-60079-14.

4.4. Allowable Voltage Drop

The maximum allowable voltage drop in cables, as a percentage of system nominal line to line voltage, at full load shall be as follows:

- Main power distribution : 2%
- Voltage drop between main distribution board in MCC Room and local lighting panel-board shall not exceed 2%.
- Voltage drop between lighting panel-board and farthest fixture shall not exceed 3%.

**SPECIFICATION FOR BUILDING ELECTRIFICATION**

4.5. Selection of Electrical Equipment/Materials

The equipment shall meet the requirements of this specification and shall be suitable for use in the location in which it shall be installed. Precautions shall be taken to ensure that vermin, dust and damp are excluded from the equipment.

In the selection of materials, special considerations shall be given to ensure conformity with equipment being used in other buildings and in plant areas.

Materials shall include all necessary items, small tools and expendable items (e.g bits, drills, cutting blades, etc.).

Materials shall include all small items not specifically detailed herein this specification (e.g insulating tapes, screws, connectors, saddles, etc.).

All items of electrical equipment within the package shall have nameplates made of stainless steel or non-corrodible material and shall not be aluminium or any high aluminium content alloy. Nameplates shall be positioned to clearly identify each device. Nameplate details shall be subject to approval by the COMPANY/CONSULTANT. Nameplate wording shall be in the English language.

4.6. Degree of Protection of Electrical Equipment

The following degree of protection for electrical equipment, as per IEC, will be the minimum:

- | | | |
|---|---|------|
| - Indoors (within buildings) | : | IP31 |
| - Outdoors (protected with e.g rain canopy) | : | IP65 |
| - Outdoors (unprotected) | : | IP65 |

4.7. Cabling/Wiring inside Buildings

Cables shall run on cable trays or in cable channels and / or conduits. Cable trays and cable channels shall be designed to carry the weight of the installed cables without exceeding the maximum weights as specified by their manufacturer.

Wiring shall be concealed type using rigid PVC pipe and fittings of approved make. Sizes of conduits shall be in accordance with IEE Regulations and shall be supplied in the longest possible lengths.

Cables/wires used shall be of approved make.

5. LIGHTING**5.1. Lighting System Design Consideration**

Lighting distribution boards for buildings shall be 3-phase, 4-wire, 400/230 V or single phase, 2-wire, 230 V system.

**SPECIFICATION FOR BUILDING ELECTRIFICATION**

The Lighting system shall be designed utilizing the minimum number of fixtures consistent with the required illumination levels. Refer to table of illumination level in “Doc. No. 0258-ELA-6500-Electrical Design Basis”.

Convenience outlet circuits shall be provided with earth leakage circuit breaker installed in the distribution board.

Minimum of two spare outgoing circuits shall be provided in the design for each lighting distribution board.

Loads connected in each branch circuit shall not exceed 80% of the branch breaker rating, and with a maximum loading of 1800 W per circuit.

Cables shall be PVC insulated, PVC sheathed type of 2-core (1P+1N) or 4-core (3P+1N), minimum 1.5 mm², with the following colour coding:

- L1-Red, L2-Yellow, L3-Blue, N-Black

5.2. Lighting Fixtures and Socket Outlets

Industrial decorative type rapid start LED lights (i-e flood light fixtures, down light fixtures, emergency exit lights, highbay light fixtures, batten light fixtures, light fixture panels etc.,) shall be used for all internal building (i-e Switchgear/MCC, CCR Building, Workshop, Mosque, FC Living Facility, Security/Guard Room, Gen-set sheds etc.,) lighting.

In the Control room/Rack room, flush mounted (concealed) non-glare LED light fixture panels shall be used. Used of exposed type fixtures should be limited. Explosion proof LED lights shall be used in UPS battery room.

Batten type LED lights shall be used in MCC room.

Minimum two (2) convenience socket outlets, 230 V, 2P + Grounding shall be provided in each room.

5.3. Emergency Lighting

Emergency lighting for buildings shall be required as follows:

- Control Room – approximately 20% of the lighting fixtures to enable monitoring of process instrumentation.
 - MCC Room – approximately 20% of the lighting fixtures to enable safe access and exit by personnel, monitoring of relays and instruments and switching operations.
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SPECIFICATION FOR BUILDING ELECTRIFICATION

- Emergency lighting fixtures for control rooms, corridor of control buildings, main access of floors of MCC room, mosque etc. shall have self-contained battery back-up for 30 minutes in addition to the emergency power supply.
- Exit lights with 30 minutes self-contained battery pack shall be furnished at exit doors in the manned buildings in accordance with fire regulations.

5.4. Lighting Distribution Boards

The low voltage lighting distribution board (LDB) shall comply with the design considerations as stipulated in "Section 5.1"; and shall be made of aluminum alloy/ stainless adequate gauge steel to make it corrosion-resistant, resistant to chemical attack, high impact with good tensile strength and scratch proof. The offered lighting distribution board shall be suitable for flush / surface mounting on wall; and shall be painted with moisture proof powder paint

The offered Lighting Distribution Board (LDB) shall be totally enclosed, dust, water and vermin proof, pre wired, designed for continuous operation at full rating under the specified conditions of installation. Lighting Distribution Board (LDB) shall be complete in all respects with material and accessories for protection, indication, etc., required for the safe and intended operation as specified herein.

The offered Lighting Distribution Board (LDB) shall be of an industrial type enclosure, ready for installation after manufacturing tests.

The Lighting Distribution Board (LDB) shall include the equipment specified on Single Line Diagram for Lighting Schedule (to be developed during detail engineering by the CONTRACTOR). Any modification in Single Line Diagram by the Manufacturer must be submitted to the COMPANY/CONSULTANT for approval and shall not affect the functional aspects of the equipment.

The Lighting Distribution Board (LDB) with all component and accessories shall be suitable for front operation only and shall:

- Be rated for 400/230 Volts, 3-phase, 4 wire, 50 Hz system
 - Have incoming and outgoing cable termination in bottom, and top respectively with terminal block/line-up terminals etc.
 - Be provided with adequate clearance from live parts.
 - Have dead front construction.
 - Have locking provision for the front door.
 - Be suitable for flush mounting of all instruments on the front side of the dead cover.
 - Have the components mounted so as to facilitate ease of maintenance from the front.
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SPECIFICATION FOR BUILDING ELECTRIFICATION

- Be provided with steel nameplate on the front side and easily accessible document case containing drawings and notices on the inside of the door.
- The DB shall have minimum of 20% extra physical space (minimum space of two breakers) including bus-bar extensions knock outs, covered with blank plates for installation of additional breaker of medium frame size used in the panels.
- All hardware shall be of metric sizes
- All doors shall be effectively double earthed.
- Have protection according to IP31 for indoor installation.

The cable entry shall be through threaded cable glands. Each unused entry shall be plugged. Also, spare cable entries plugged as well shall be provided.

The door shall be fully gasketed with hinges on the left hand side and locking handle on the right hand side for fastening the door. The locking handle shall be detachable. All the components shall be mounted on a common component mounting plate, fixed inside the enclosure; whereas dead cover shall be provided also inside the main door with complete flush mounted assemblies/accessories i-e incoming/outgoing circuit breakers, indications, switch etc.

The Lighting Distribution Board (LDB) shall be supplied complete with all installation materials as recommended by the Manufacturer. The incoming and outgoing cable connections shall be according to the wiring requirements.

The cabling inside the LDB shall be suitably harnessed by means of straps or cords.

All holes, cut outs, etc., shall be tool or jib manufactured and free from burrs and rough edges. Removable gland plates shall be provided at the bottom.

All exterior hardware (handles, hinges, nuts, bolts etc.) shall be of stainless steel unless otherwise specified.

COMPANY/CONSULTANT approval shall be sought by the CONTRACTOR before going to manufacturing / procurement of material. All the comments furnished by COMPANY/CONSULTANT shall be incorporated by the CONTRACTOR in latter & spirit.

The lighting distribution board major components like earth leakage circuit breakers, power terminals, selector switches shall be of highest quality and standard as per approved manufacturer's list.

The circuit breakers shall be triple pole/single manual reset type, with temperature compensated thermal overload release and instantaneous magnetic short-circuit release. The main incoming circuit breaker shall be ELCB type with 30 milliamp sensitivity.



SPECIFICATION FOR BUILDING ELECTRIFICATION

Selection of various components of incoming & outgoing feeder circuits shall be according to circuit ratings.

All incoming & outgoing MCCBs /MCBs shall be fixed type.

The main incoming MCCB shall have minimum breaking capacity of 10kA.

All MCCBs, MCBs shall be equipped with built-in thermal & magnetic protection along with "Earth Leakage Protection" (where required).

All meters shall be flush mounting, moving, iron, and spring controlled. The front dimensions shall be 96 x 96mm. The ammeter shall be suitable for connection to 5 amps. Secondary of current transformers. The ammeters and voltmeter shall have measuring range as indicated on the drawings.

Ammeter and voltmeter selector switches shall be complete with front plate grip handle, and R-Y-B and OFF positions for ammeters and RY-YB-BR-RN and OFF positions for voltmeter.

Indicating lamps and selector switches shall be suitable for flush mounting complete with bases, 230-volt incandescent lamps and shall have rosettes of red colour for on condition.

A master nameplate shall be provided which shows the minimum following information, and shall be Stick-On, not to be riveted.

- Product Type
- Rated Voltage
- Rated Current
- Frequency
- Rated 1s Short-Term Current
- Year of Manufacturer

6. EARTHING AND LIGHTNING PROTECTION

The buildings shall be provided with an earthing system according to the Pakistan laws and regulations, and where required, with lightning protection.

All building steel, metal enclosures of electrical equipment, false floor frames, etc., shall be bonded to the earthing system.

All circuit wiring, point wiring, power wiring, universal sockets must have ECC (earth continuity/connecting conductor). Size of ECC for point wiring and power point shall be 1.5 mm² and 2.5 mm² respectively.

ECC of all circuits shall terminate at earth bus of distribution boards which shall subsequently terminate at ECP (Earth Connecting Point) and finally at designated earth pits.



SPECIFICATION FOR BUILDING ELECTRIFICATION

Each building shall have independent earth pits which are to be made as per standard practice.

The Control room(s), its auxiliary rooms and buildings which house main computers shall be provided with a separate earthing system for the connection of computer system.

The communication cabling system shall be connected to a telecommunication earth. The maximum resistance to earth shall be as required by the local laws and regulations.

The building earthing, lightning protection and telecommunications earthing shall be connected to the main plant earthing grid.

7. TELECOMMUNICATIONS NETWORK

Telecommunications network refers to installation of telephone outlets, conduits and wiring inside each building up to the telephone board (requirement to be evaluated by the CONTRACTOR during the detail engineering with the sole approval of COMPANY/Consultant).

Telecommunication network shall be designed in accordance with the "Block Diagram" to be developed by the CONTRACTOR during detail engineering.

Telephone sets and speaker shall be wired with the PVC insulated telephone cables.

Each telephone set shall be connected with two (2) conductors, but cables between telephone terminal boards and the terminal blocks in each telephone outlet shall contain one spare.

Conductors shall be solid copper more than 0.65mm in diameter.

Conductor shall be at least 50 mm away from conductors of any light and power circuits and, placed in conduits and/or raceways, separated from them by a partition.

Telephone outlets shall be provided near the locations of the telephone sets.

Telephone terminal blocks for connection of the telephone sets shall be provided in each telephone outlet.

At least one telephone terminal board shall be provided in each building.

Telephone terminal boards shall be of sheet steel, IP31 to IEC 60529 or equivalent.

8. GUARANTEE

The CONTRACTOR shall furnish written guarantee with respect to satisfactory performance of each of the equipment, which may be found defective in material or workmanship. The guarantee shall cover a minimum period of 12 months after commissioning of the system and issuance of Completion Certificate.



SPECIFICATION FOR BUILDING ELECTRIFICATION

9. TESTS AND INSPECTION

Tests and inspections for electrical materials and equipment used in buildings shall be conducted in accordance with released IEC standards and manufacturer's QA/QC program.

10. DOCUMENTATION

The following technical documentation shall be prepared and submitted to COMPANY/CONSULTANT for review and approval.

- Detailed lighting level calculations for all buildings as stipulated in "Section 4.1 - General"
- Lighting panels schematic diagrams
- Lighting circuit with load connected an wires or cable sizes
- Material list with technical specification
- Plot plan drawings, showing lighting panels, normal lighting fixtures, emergency fixtures, exit lighting, sockets location plus electrical circuit number with phase and sequential number of fixtures or sockets., small power distribution, telecommunication networks.
- Plot plan showing the building earthing system.
- Drawings showing the lightning protection (if any).

The CONTRACTOR shall check and ensure that the electrical symbols being used in all documents/drawings as cited above shall comply with IEC recommendations.

The CONTRACTOR shall also be responsible to submit the following document/drawings with respect to offered lighting fixtures/fittings and lighting distribution boards.

- General Arrangement Drawing of each Building DB's
 - Mounting and Installation Details of each Building DB's
 - Wiring Diagram of each Building DB's
 - Detailed Building Lighting & Small Power Layouts
 - Complete Lighting Circuit Schedules for each Building/Shed
 - Test certificates of offered equipments
 - Manuals / Catalogues of offered DB's, Lighting Fixture and other auxiliary equipments etc.
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SPECIFICATION FOR BUILDING ELECTRIFICATION

APPENDIX - A

LIST OF APPROVED MANUFACTURERS

APPROVED MANUFACTURERS LIST (AVL)			
WIRES & CABLES	PAKISTAN CABLES LTD.	PVC PIPE	DADEX
	FAST CABLES		SHAVYLE
	NEWAGE CABLES		GALCO
	PIONEER CABLES		PAK ARAB
PANEL & DISTRIBUTION BOARDS	SIEMENS	SWITCHES & SOCKETS	CLIPSAL
	ABB		LEGRAND
	SCHNEIDER ELECTRIC		BOSCH
	ALSTOM		MK ELECTRIC
	CLIPSAL		SWITCH KID
CIRCUIT BREAKERS	MERLIN GERIN (Germany)	LIGHTING FIXTURES	PHILIPS
	HAGER (France)		CHALMIT
	SIEMENS		VICTOR
	ABB		CROUSE HINDS
	SCHNEIDER		CLIPSAL
	TERASAKI (Japan)		
A/C SPLITS	MITSUBISHI		
	GENERAL		