1	Only High Mast and Street light included	NAME	GC	sd-	NAME	MS	sd-	NAME	VCO	sd-
		DATE	19/Jul/19		DATE	19/Jul/19		DATE	19/Jul/19	
0	For Tender	NAME	GC	sd-	NAME	MS	sd-	NAME	VCO	sd-
		DATE	22/May/19		DATE	22/May/19		DATE	22/May/19	
REV.	**DESCRIPTION**	**PREPARED BY**		**SIGN**	**CHECKED BY**		**SIGN**	**APPROVED BY**		**SIGN**

PROJECT TITLE:	**MPC9 for OCS, Nadua and GGS, East Khagorijan**
DOCUMENT TITLE:	**LIGHTING FIXTURES, LIGHTING MAST AND STREET LIGHT POLES**
ABB PROJECT NO:	**IN33419006**
ABB DOCUMENT NO:	**4JIN33419006-0015**
PR/PO NO:	**7909641/CPI**

PMC:

KAVIN™

M/S. KAVIN ENGINEERING AND SERVICES PRIVATE LIMITED
Coimbatore

CUSTOMER:

ऑयल इंडिया लिमिटेड
Oil India Limited

OIL INDIA LIMITED
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ABB Doc. No	Revision						Total Sheets	Description
	0	1	2	3	4	5		
	✓						1	Cover Sheet
	✓						1	Index Sheet
	✓						2	Section-1 Intent of Specification
	✓						3	Section-2 Scope of work
	✓						5	Section-3 Schedule 1 Price Schedule
	✓						1	Section- 3 Schedule 2 Technical deviations
	✓						28	Annexure-1 - Technical specification
	✓						1	Annexure-2 - Project Information

ABB

SECTION – I

INTENT OF SPECIFICATION

1 INTRODUCTION

OIL INDIA LIMITED (OIL) a Government of India Enterprise, proposes to construct two number of Surface Production facilities primarily for separation of Oil, Gas & Water and processing of non-associated & associated gas in its producing field at Nadua and East Khagorijan. As a part of this propose, OIL desires to procure Electrical facilities for constructing an Oil Collection Station (OCS) at Nadua and Group Gathering Station (GGS) at East Khagorijan in Upper Assam, India.

The detailed project information is furnished in **Annexure-2.**

The entire project will be implemented by OIL in different packages. ABB India Limited is the Electrical contractor (MPC9) for engineering, procurement, fabrication, assembly, wiring, factory testing, supply and installation of electrical systems required for OCS Nadua and GGS East Khagorijan including transportation and unloading of complete package/skid to respective site.

2 INTENT OF SPECIFICATION

2.1 This specification is intended to specify the technical requirements for Design, engineering, Manufacturing, factory testing and supply of Lighting system required for OCS Nadua and GGS East Khagorijan including insurance and transportation to respective site as specified in the scope of work.

2.2 The systems and equipment shall conform to the technical requirements specified in this section and also in various sections of the specification as under:

Section II : Scope of work
Section III : Schedules
Attachments : Annexure-1 to 2.

2.3 Supplies and services shall be rendered in conformity with proven design principles, taking into account the latest, suitable, appropriate & proven technology. The requirements of the contract must be fulfilled in its entirety. The supplies and services shall be rendered inclusive of all appliances and interconnecting arrangements with other supplies, necessary for installation of all accessories, needed for proper and reliable continuous operation and for satisfactory maintenance and repair of the plant.

2.4 It is not the intent to specify completely herein all details of design and construction of the equipment and / or structures / works covered under this Contract. However, all equipment and works shall conform in all respects to high standards of design, engineering, materials of construction, workmanship and be capable of performing in continuous commercial operation in a manner acceptable to the Purchaser.

2.5 In so far as data on the execution of supplies and services as contained in drawings / schedules, but none in specification and vice-verse, such data shall be deemed to be contained in both. Contradictions, if any, between drawings / schedules and specifications and within various sections of the specification shall be brought to the attention of the ABB by the Contractor and the correct requirement shall be obtained before submission of the bid.

2.6 The Contractor shall perform all the works specified or necessary to complete the works in accordance with this specification. Further, the Contractor's performance of the works under the Contract shall be in accordance with good engineering and construction practices, notwithstanding the fact that every item involved may not be specifically mentioned or the item mentioned may be inadequate for its intended purpose. Details and items, which are not specifically mentioned herein, shall also be adequately and properly performed by the Contractor at no extra cost if such details and / or items are reasonably necessary to complete the intent of this specification

2.7 All materials & equipment supplied under this contract shall be new and unused.

2.8 Compliance with this specification shall not relieve the Contractor of the responsibility of furnishing equipment, material and services to meet the specified conditions.

2.9 By signing the contract, the Contractor shall be deemed to have accepted the obligation of supplying with the exception of materials specifically described so as to be supplied by others and executing everything necessary to complete the work in all respects, stipulated, regardless of any omissions in this specifications or drawings.

SECTION – II

SCOPE OF WORK

1 SCOPE OF WORK

1.1 The scope of work covered under this tender document includes but not limited to:

Design, Engineering, Manufacturing, testing at manufacturers' works, packing, insurance, transportation to site and demonstration of performance guarantee test of the Lighting fixtures, Lighting Mast and Street light poles for OCS Nadua and GGS East Khagorijan required for successful operation and handing over to owner including submission of hard copy and soft copy of all drawings, O&M manuals, data sheet etc.

1.2 Scope of Supply:

1.2.1 **Nadua**

i. High mast lighting system with lighting fixture, High mast (30m height) of double sided arrangement with accessories.
ii. Swagged pole for street lighting with industrial type Normal lighting fixture.
iii. Start-up and commissioning spares.
iv. Two years operational spares.

1.2.2 **Khagorijan**

i. High mast lighting system with lighting fixture, High mast (30m height) of double sided arrangement with accessories.
ii. Swagged pole for street lighting with industrial type Normal lighting fixture.
iii. Start-up and commissioning spares.
iv. Two years operational spares.

1.2.3 List of Lighting system for the above locations refer **Section-III Schedule-I**.

1.2.4 Specification for the lighting system are as mentioned in the detailed **Annexure-1.**

1.2.5 Drawings, technical brochures & operation and maintenance manuals of all items, catalogue, test report etc. after final installation and commissioning, 06 (six) copies each.

1.2.6 Sub vendor list shall be submitted for approval.

1.2.7 Client reserves the right to modify the quantity of each item before issue of manufacturing clearance.

1.2.8 Contractor to obtain written concurrence from client, before starting the manufacturing of the equipment. Any equipment / item manufactured without client concurrence, may get rejected, without any payment.

1.3 Scope of Services

Finalization of drawings/documents, submission of drawings/documents for approval / information to Purchaser/ Owner as per the drawing/documents submission schedule in proper shape and format. The contractor shall follow the drawing / document template as per the format provided by the MPC/EPCM consultant.

All the drawings, package engineering, documents have to be prepared by the contractor in a presentable manner with all texts in the English language. Drawings shall show all necessary dimensions and details required for interface information and installation. Drawings shall be in AUTOCAD format, other documentation shall be in Microsoft Office format (Excel / Word / Power Point / Access). PDF & Native file (AutoCAD & Word/Excel) shall be submitted for approval.

Approval of drawings and documents from Consultant/Client.

All statutory approval shall be done by contractor.

Contractor is responsible to comply with the total scope of work indicated in the package through hardware. Any Change, modification or addition necessary in the proposed BOM or scope of work necessary to achieve the functional requirements during detail engineering shall be carried out by contractor within the project schedule and without any time implications.

<u>The following to be submitted before award of contract:</u>

(i) High mast approximate dimensions & weight
(ii) BOM for lighting fixtures.
(iii) Lux calculation in Dialux for Nadua & East Khagorijan
(iv) Lighting layout and BOM for Nadua & East Khagorijan

<u>The following to be submitted after award of contract:</u>

(i) Lux calculation in Dialux for Nadua & East Khagorijan
(ii) Lighting layout and BOM for Nadua & East Khagorijan
(iii) GTP/Data sheet for Lighting fixtures.
(iv) GTP, GA, Schemes and BOM for High Mast and Street lighting poles.
(v) Civil design for High Mast and Street lighting poles.
(vi) Preparation and submission of all drawings in soft copies.
(vii) Quality plan, inspection and testing of equipment at works, submission of type test certificates.

1.4 General requirement:

1.4.1 The tenderer shall refer to General Specification, Tender specification and all other specifications/inputs as provided along with Tender document. This enquiry specification, Tender Specification (TS), General Specification and other attached documents considered, as a whole shall comprise the complete Tender Specification. These are complementary and anything laid down in one and not in other shall be deemed as binding, as though laid down in the Tender specification as a whole.

1.4.2 All equipment shall strictly conform to the Specification, except where any deviations have been explicitly spelt out in section-4 Schedule-2, specifically discussed and mutually agreed upon between the tenderer and the purchaser. Any hidden derivations are not considered.

SECTION – III

SCHEDULE – 2

SCHEDULE OF DEVIATIONS FROM TECHNICAL SPECIFICATIONS

Sl.No.	TENDER REFERENCES		DEVIATION
	SECTION NO /PAGE NO./ CLAUSE NO.	DESCRIPTION AS SPECIFIED	

NOTE:

1. Deviations to tender documents, if any, shall be indicated only in this schedule.
2. Deviations listed elsewhere will be summarily rejected and shall be ignored.
3. Attach more sheets in this format, if required.
4. Deviations to scope of supply, technical and commercial shall be indicated separately.

SIGNATURE : _____

NAME : _____

DESIGNATION : _____

COMPANY : _____

COMPANY SEAL DATE : _____

ANNEXURE-1

SPECIFICATION

1 TECHNICAL SPECIFICATIONS FOR NADUA AND KHAGORIJAN

1.1 Street lighting:

i. Street light pole shall be height of 8 mtr and mounted with Bolt & nut (i.e. like High mast).
ii. Normal lighting fixture with lamp, 240VAC PH-PH, 40 W LED street light of 8m height from FGL with Swagged Pole, Industrial type, weather proof, luminaries along with mounting brackets & fixing accessories.
iii. Street lighting fixture suitable for degree of protection of IP65 and all other electrical equipment which are necessary to make the system complete and safe in all respect.
iv. Lighting fixtures shall be suitable for loop-in/loop-out.
v. Fixture shall be suitable for 16 SWG G.I. earth-wire connections.
vi. The fixtures shall be provided with 2 numbers of M20 threaded entries having 2 numbers of M20 Brass Nickel Plated Cable Glands.

Detailed Customer technical specification attached in **Annexure-1**. Contractor to note that any discrepancies in design basis, Specification or any other document attached part of this tender the stringent one shall be considered.

Annexure-1

Section – II Specifications – Nadua

ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

KAVIN™

CREATION OF SURFACE PRODUCTION FACILITIES (OCS & GGS) AT NADUA & EAST KHAGORIJAN

Document Title : ELECTRICAL DESIGN BASIS

Kavin Document No. : 17039-ND-E-DB-9001

C	10 AUG 2018	ISSUED FOR REVIEW	MVL	AD	MSR/MSB
B	15 FEB 2018	ISSUED FOR BID	MVL	AD	MSR/MSB
A	07 DEC 2017	ISSUED FOR REVIEW	MVL	AD	MSR/MSB
REV.	**DATE**	**DESCRIPTION**	**BY**	**CHECKED**	**APPROVED**

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COMPANY:	**EPCM CONSULTANT:**
OIL INDIA LIMITED	**KAVIN ENGINEERING AND SERVICES PRIVATE LIMITED**

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7.17) UPS power is envisaged for critical instrumentation and control loads. Battery backup for UPS powered loads will be considered for 1 hour. UPS Power Supply will be derived from dual redundant UPS with static bypass, for feeding critical loads and Control Panels located at Control Room. The UPS will be fed from three sources of power, one charger unit from Normal Switchboard another from Emergency Switchboard and the static by pass transformer shall also be fed from Emergency Switchboard . UPS Power is distributed through UPS DBs which may be an integral part of UPS system.

415V AC UPS Power Supply System with 1 hour back up consists of the following equipments.

(a) 2 x 50% Ni Cd Type Battery Bank

(b) 2 X 100% parallel Redundant with static by-pass, 1 – Phase UPS

(c) UPS Distribution Boards to feed DCS and Instrumentation Loads

7.18) 110V, 2 wire ungrounded DC Power Supply System 1 hour back up is planned for feeding electrical system protection loads & lighting loads, DC power supply system with Insulation monitoring device (IMD) consists of the following equipments:

(a) 110V 2x 50% Ni Cd Type Battery Bank

(b) 2 x 100% Float Chargers fed from emergency switchboard.

(c) DC Distribution Boards to feed Control Power Supply for Panels

7.19) Telecommunication system shall have a separate UPS system with 8 hours backup.

7.20) Main Lighting Distribution Board fed from Normal LV Switchgear will cater plant lighting loads, street lighting loads, area lighting loads and small power sockets (5A & 15A) through one number of k-rated 415V/240V 3 phase Lighting Transformer with sufficient capacity via Distribution Boards located at various building / structures in the Plant.

7.21) 30m High mast lighting with feeder pillar shall be fed from Normal LV Switchboard and shall be used to cover the entire plant lighting as per the lux values provided in OISD-RP-149. In areas where high mast lighting does not satisfy the lux requirement, street lighting shall be used.

7.22) Emergency Lighting Distribution Board fed from Emergency LV Switchgear will cater plant emergency lighting loads through one number of k-rated 415V/240V 3 phase Lighting Transformer with sufficient capacity via Distribution Boards located at various building / structures in the Plant.

7.23) Indoor & outdoor Lighting system for plant area comprising of LDBs, lighting transformers, Junction Boxes, Lighting Panels, lighting poles, light fixtures of various types,

fasteners and inserts.

7.33) MPC contractor for power distribution module has to carry out system study including load flow analysis and short circuit study, motor starting study for the electrical system and submit the report for the OWNER / EPCM approval.

7.34) Complete relay setting and relay coordination documentation with calculation for the Power Distribution System shall also be prepared by MPC contractor.

7.35) All power system studies shall be carried out with ETAP software.

7.36) All safety equipments required in the containerized electrical substation and other installations shall be as per the statutory requirement shall be provided by MPC contractor.

7.37) All the required approvals shall be in the scope of the MPC contractor and all the required statutory fee and any other required charges, coordination charges, professional charges, etc. shall be in the scope of the MPC contractor.

7.38) All components included in this specification are not explicitly identified and/or listed herein, these shall be supplied under this contract to ensure completeness of the system and facilitate proper operation and easy maintenance of the substation.

7.39) All equipment shall be suitable for smooth, efficient and trouble free operation for power supply variations.

7.40) All services necessary for the erection, testing and commissioning and all instruments / services required for carrying out performance testing of all items of the plant electrics covered under this specification shall be arranged by the MPC Contractor.

7.41) MPC contractor to submit filled up data sheet of the subsequent sections along with the offer.

7.42) MPC Contractor has to prepare and submit all design documents drawings / as-built drawings, calculations and vendor drawings for the approval to the OWNER.

8. GENERAL SAFETY

The electrical system shall incorporate safety margins to ensure that the installation is safe under all operating conditions, including those associated with the start-up and shut down of equipment and through intervening shut down periods. The emphasis in equipment specification shall be on operability, prevention of accident / fault and functionality for the intended design life. All insulating material specified for the equipment shall be non-toxic.

8.1. ELECTRICAL EQUIPMENT FOR CLASSIFIED AREAS

All the areas within the Battery limits shall be classified for degree and extent of hazard from

flammable materials. The basis for hazardous area classification recognizes the differing degrees of probability with which flammable atmosphere may arise in the installation, in terms of the frequency of occurrence and the probable duration of existence on each occasion.

Following factors shall be considered for proper selection of electrical apparatus and equipment for areas where flammable gas or vapor risks may arise:

(a) Area classification, i.e. Zone 0, 1 or 2

(b) Gas group classification, i.e. gas groups IIA, IIB or IIC.

(c) Temperature classification i.e. T3/T6.

(d) Environmental conditions in which apparatus is to be installed.

Wherever practicable, electrical apparatus in general and switch and control apparatus in particular shall be installed in safe area. Substation and control room shall be located in safe area. Electrical equipment intended for service in hazardous area shall be selected in accordance with IS : 5571 and these shall be certified by recognized testing/certifying authorities of country of origin (e.g. CIMFR, LCIE, UL, FM, PTB, Baseefa etc.).

For details on hazardous area classification, enclosure protection etc. OISD standard 113, National Electric Code, IS 5571, 5572, Petroleum Rules and Oil Mines Regulations shall be referred.

However, irrespective of area classification, all the electrical equipment which are located in hazardous areas, shall be of Ex'd' type, Flame proof enclosures. All indigenous flameproof equipment shall have valid BIS license as a mandatory.

8.2. FIRE INTEGRITY

All cable penetrations through switchgear room walls, control room walls and between safe and hazardous area shall be sealed by waterproof, weatherproof & fireproof sealing methods. Cable penetrations if any, between a safe area and a classified hazardous area, shall be sealed using multi cable transits (MCT) to maintain fire integrity and prevent gas migration. MCTs shall be with 120 minutes fire rating.

8.3. DEGREE OF PROTECTION

The degree of protection against dust and water ingress, necessary for individual electrical items is determined by the equipment duty, its environment, its location and the hazardous area classification. The equipment located outside or subject to deluge from fire water system/rains are to be of specified weather proof construction and protected against the most adverse conditions that are anticipated. These enclosures are to be classified to IP-55 as a minimum degree of protection, increased as necessary where the location/situation demands. Indoor equipment shall be a minimum of IP-52 protection and accessible equipment within enclosures will be a minimum of IP-22 degree of

- Temperature correction factor.
- Ageing factor as applicable.

10.10. LIGHTING SYSTEM

10.10.1. All areas which are normally accessible to personnel movement or where equipment is installed shall be sufficiently illuminated. Lighting system shall be designed as per standard industry practice and the illumination intensities shall comply to IS 3646 and OISD RP 149 guidelines.

10.10.2. Sufficient lighting shall be provided so as to enable plant operators to move safely within the accessible areas of plant and to perform routine operations. In the event of normal power failure, emergency lighting should be provided. Desired lux level shall be achieved considering that both the lighting fixtures, normal as well as emergency one are energized. In the event of normal power failure, emergency lighting shall remain energized through emergency power source.

(a) Normal / Emergency lighting shall be on 240 V AC (Phase - Phase), 50 Hz.

(b) Critical lighting shall be on 110 V DC UPS.

10.10.3. Lighting requirements provided during the failure of power supply for Normal lighting are intended broadly,

(a) To facilitate carrying out of specified operations, for safe shutdown of the plant.

(b) To gain access and permit ready identification of fire fighting facilities such as fire water pumps, fire alarm stations etc.

(c) Escape route for safe evacuation of operating personnel.

10.10.4. As a good engineering practice the AC emergency load is generally considered as 20-25% of Normal Lighting load.

10.10.5. A.C. lighting fixtures shall be fed from respective area lighting panels, which in turn shall be fed from main lighting distribution board. The main lighting distribution board shall be fed through one number of suitably rated 415V/240V Dyn11, 4% impedance OFTC +5% in steps of 2.5% lighting transformer, which forms a part of the MLDB. A.C. supply thus made available by the MLDB is 415V/240V-3ph-3W-50HZ effectively grounded.

10.10.6. Emergency Lighting Distribution Board fed from Emergency LV Switchgear will cater plant emergency lighting loads through one number of k-rated 415V/240V 3 phase Lighting Transformer with sufficient capacity via Distribution Boards located at various building / structures in the Plant.

10.10.7. 30m High mast lighting with feeder pillar shall be used to cover the entire plant lighting as per the lux values provided in OISD-RP-149. In areas where high mast lighting does not satisfy the lux requirement, street lighting shall be used.

10.10.8. Highmast lighting feeder pillar shall be rated for 415V, 3 Ph 3 wire supply and fed from

normal LV Switchboard.

10.10.9. The operational philosophy recommended is, under normal operation, both emergency and normal lighting shall be fed by Normal power source. On failure of normal supply, emergency lighting load will be transferred to emergency source after the start of EDG set within 60 seconds. Critical lighting (DC supply based) will be normally kept 'ON' and during Normal/emergency power failure, battery will provide power.

10.10.10. Besides, adequate number of self contained portable hand lamps and Battery emergency lighting units shall be provided for immediate use in emergency at remote stations and at other strategic places (safe areas), wherever required, for personnel safety.

10.10.11. HPMV / MLL / CFL / LED lamps shall generally be used for outdoor plant lighting. Keeping in view the re-strike time lag and to avoid complete darkness in case of a voltage dip/brown out conditions, necessary incandescent / CFL lamps should be judiciously distributed throughout the plant area. Fluorescent lamps may be used for indoor lighting in nonprocess buildings and control rooms. Safe area street lighting and yard lighting may employ sodium vapour lamps. Low pressure sodium vapor lamps shall not be installed in hazardous areas.

10.10.12. As per CEAR recommendations, Energy conservation measures shall be adopted while designing the lighting system. Illumination system shall be Energy Efficient/LED based as far as practicable. For battery backed emergency lighting, only Energy Efficient/ LED fixtures shall be used.

10.10.13. Outgoing circuits shall be protected by MCB + ELCB and incomer by MCCB. Arrangement shall be such that in case of earth leakage in one outgoing circuit, the entire DB need not be tripped. The total estimated load of each circuit shall not exceed 80% of circuit rating. Load on each circuit shall be limited to One (1) kW. Minimum 20% spare circuits shall be provided in each distribution board / panel.

10.10.14. Lighting methods and material used shall be suitable for the hazardous area classification in which they are to be installed.

10.10.15. Illumination intensities defined in IS 3646 and OISD RP 149 shall be considered as in-service values after applying a maintenance factor of minimum 0.8 and a utilization factor depending on the type of lighting fixture. These figures are the minimum vertical component values for the locations described on a horizontal plane being 0.75 m from the floor levels in buildings and the ground or platform levels in other areas.

10.10.16. As far as possible, the entire area shall be covered with High Mast lighting system (30 Meter). High mast shall be continuously tapered, polygonal cross section of atleast 20 sides, presenting a good and pleasing appearance which is based on proven intension design conforming to International/National standard. The structure is suitable for loading as per IS 875 (part 3) 1987. High mast shall be fabricated from steel plates and weld joints of different sections conforming to National or international standard. An adequate door opening shall be provided at the base of the mast. The opening shall permit clear access to equipments like

winch, cable, wire rope, plug & socket etc. and also facilitates easy removal of the winch for servicing. High mast structure shall be designed to sustain an assumed maximum reaction arising from wind speed as per IS 875 (Part 3) 1987. General requirements of Raising and Lowering system (R & L), trailing cable, power tool, feeder pillar for automatic switching operation of luminaries, lighting finial and aviation obstruction warning light shall also be included.

10.10.17. The Search Lighting with revolving facility shall be considered at the top of the watch towers along the entire periphery.

10.10.18. For hazardous area, suitable type of FLP luminaries along with accessories certified by CMRI for gas group IIA & IIB shall be provided.

10.10.19. STREET LIGHTING

- The Lighting panels used for street lighting shall be additionally provided with a timer device having twenty four hour hand set dial with a facility for setting ON & OFF times. There shall be a provision of selecting either the manual control or the automatic control. The selector switches shall be mounted on the front door of the switchboard.
- Street Lights shall be of solar powered LED type. Street Lights shall be suitable to operate on solar power as well as normal AC Power.
- Peripheral Lighting shall be provided using Single Pole structures of required heights.

10.10.20. DGMS GUIDELINES FOR LIGHTING SYSTEM

The oil and gas installations come under DGMS (OMR) jurisdiction; hence the lighting system shall be as per DGMS (OMR) requirements given below.

Oil mines regulations, 1984 state that the lighting systems installed in the mine shall comply with the provisions of the Central Electricity Authority Regulations 2010. Central Electricity Authority Regulations 2010 indicate additional precautions to be adopted in mines and all oil fields. Additional precautions for oil mines state that wherever electric lighting is used. The voltage between phases shall not exceed 250V if the neutral of the system is connected with earth.

Lighting system shall be maximum 250Volts, 3-phase and 3-wire system with lighting equipment connected between phases. It would also be essential to control all lighting circuits through two-pole switches.

In order to comply with the above statutory requirements, the lighting system for the installation in oil mines under the jurisdiction of DGMS shall be designed on the following basis:

i. Phase to phase voltage in the lighting system shall be limited to the maximum of 250V.

ii. Distribution from lighting transformers to MLDB and LDBs shall be at the voltage of 240V, 3-phase (3-wire systems without neutral).

iii. All Lighting distribution boards and lighting panels shall have three phases rated for 240V, 3-phase and shall be without neutral bus.

iv. All lighting fixtures and equipment shall be connected between two phases at a voltage 240V phase to phase.

v. In case of lighting of building within the plant premises, double pole switches or 2-pole MCBs shall be used in lighting circuits instead of conventional single pole switches.

10.10.21. SOCKET OUTLETS

i. Small power loads shall be powered from plant lighting panel.

ii. Each receptacle circuit shall be protected by MCB + ELCB. Not more than two socket outlets shall be supplied by one circuit.

iii. Convenience socket outlets shall have necessary mechanical interlocks and earthing facilities. The enclosure shall have suitable protection for site conditions specified (flame proof, weather proof, dust proof, corrosion resistant, etc.).

iv. Adequate number of three-pin sockets of rating 15A, 240 V ph to ph with earth connection shall be provided for lamps and portable tools at suitable locations Hand lamps and portable tools shall be earthed through flexible cords. In hazardous areas, flame proof hand lamps shall be rated for 24V.

v. Welding socket shall be rated for 415 V, 3 Phase, 63 A, 4 Pin (3P+E), installed to ensure accessibility with a 50 m length of trailing cable to any point in the process area. Welding receptacles shall be fed from MPDB. Welding receptacles shall be of outdoor, weatherproof, flameproof construction, shall have mechanically interlocked switch.

10.11. EARTHING & LIGHTNING PROTECTION SYSTEM

10.11.1. Earthing system in general, shall cover the following

- Equipment earthing for personnel safety,
- System neutral earthing, and
- Static and lightning protection.

10.11.2. The earthing system envisages an earthing network with designed number of earth electrodes attached to it. The following shall be earthed:

- System Neutral
- Current and potential transformer secondary neutral

CREATION OF SURFACE PRODUCTION FACILITIES (OCS & GGS) AT NADUA & EAST KHAGORIJAN

Document Title : ELECTRICAL DESIGN BASIS

Kavin Document No. : 17039-EK-E-DB-9001

C	18 JULY 2018	ISSUED FOR REVIEW	DS	AD	MSR/MSB
B	15 FEB 2018	ISSUED FOR BID	MVL	AD	MSR/MSB
A	07 DEC 2017	ISSUED FOR REVIEW	MVL	AD	MSR/MSB
REV.	**DATE**	**DESCRIPTION**	**BY**	**CHECKED**	**APPROVED**

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COMPANY:	**EPCM CONSULTANT:**
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penetrations if any, between a safe area and a classified hazardous area, shall be sealed using multi cable transits (MCT) to maintain fire integrity and prevent gas migration. MCTs shall be with 120 minutes fire rating.

8.3. DEGREE OF PROTECTION

The degree of protection against dust and water ingress, necessary for individual electrical items is determined by the equipment duty, its environment, its location and the hazardous area classification. The equipment located outside or subject to deluge from fire water system/rains are to be of specified weather proof construction and protected against the most adverse conditions that are anticipated. These enclosures are to be classified to IP-55 as a minimum degree of protection, increased as necessary where the location/situation demands. Indoor equipment shall be a minimum of IP-52 protection and accessible equipment within enclosures will be a minimum of IP-22 degree of protection. Ingress protection of IP-42 shall be considered for only indoor equipment with specific ventilation requirements.

9. SYSTEM DESIGN STANDARDS

9.1. SHORT CIRCUIT LEVELS

Switchboards and distribution boards shall be designed to meet the following short circuit levels:

415 V Systems: 50 kA (rms) for 1 sec

240 V Systems: 16 kA (rms) for 1 sec

(UPS) System: 10 kA (rms) for 1 sec

System protective devices (relays, fuses, breaker trip units, etc.) shall be selected and coordinated to ensure that the closest interrupter to the point of short circuit (or high overload) shall open first and minimize disturbances on the rest of the system.

9.2. VOLTAGE LEVELS

LV Switchgear	415 V +6/-10%%, 50 Hz ± 3%, 3 Phase, 3 Wire
Lighting & Small Power Distribution	240 V +6/-10%%, 50 Hz ± 3%, between Phase to Phase, 2 Wire
Heat tracing power distribution	240 V +6/-10%%, 50 Hz ± 3%, between Phase to Phase, 2 Wire and Earth
UPS system (for control & protection circuits, PLC, instrumentation)	240 V ± 1%, 50 Hz ± 3%, 1 Phase, 2 Wire

10.9. BATTERIES AND BATTERY ACCESSORIES

10.9.1. Batteries shall be indoor stationary type with adequate capacity to meet the backup requirements as envisaged in the duty cycle. Accessories shall generally be as follows:

- Battery stand made of solid polymer or epoxy/ powder coated mild steel (MS).
- Inter-cell, inter row and interbank connectors and end take offs.
- Porcelain cell insulators, stand insulators. (As applicable)
- Hydrometers suitable for specific gravity readings.(As applicable)
- Cell number plates as required.
- Thermometer with specific gravity correction scale. (As applicable)
- Cell testing voltmeter (3V-0-3V) complete with 1 m long leads.
- Rubber gloves
- Rubber aprons
- Spanner Set.

10.9.2. While sizing the battery following factors shall be taken into consideration, in addition to envisaged duty cycle:

- Maintenance Factor
- Temperature correction factor.
- Ageing factor as applicable.

10.10. LIGHTING SYSTEM

10.10.1. All areas which are normally accessible to personnel movement or where equipment is installed shall be sufficiently illuminated. Lighting system shall be designed as per standard industry practice and the illumination intensities shall comply to IS 3646 and OISD RP 149 guidelines.

10.10.2. Sufficient lighting shall be provided so as to enable plant operators to move safely within the accessible areas of plant and to perform routine operations. In the event of normal power failure, emergency lighting should be provided. Desired lux level shall be achieved considering that both the lighting fixtures, normal as well as emergency one are energized. In the event of normal power failure, emergency lighting shall remain energized through emergency power source.

(a) Normal / Emergency lighting shall be on 240 V AC (Phase - Phase), 50 Hz.

(b) Critical lighting shall be on 110 V DC UPS.

10.10.3. Lighting requirements provided during the failure of power supply for Normal lighting are intended broadly,

(a) To facilitate carrying out of specified operations, for safe shutdown of the plant.

10.10.13. Outgoing circuits shall be protected by MCB + ELCB and incomer by MCCB. Arrangement shall be such that in case of earth leakage in one outgoing circuit, the entire DB need not be tripped. The total estimated load of each circuit shall not exceed 80% of circuit rating. Load on each circuit shall be limited to One (1) kW. Minimum 20% spare circuits shall be provided in each distribution board / panel.

10.10.14. Lighting methods and material used shall be suitable for the hazardous area classification in which they are to be installed.

10.10.15. Illumination intensities defined in IS 3646 and OISD RP 149 shall be considered as in-service values after applying a maintenance factor of minimum 0.8 and a utilization factor depending on the type of lighting fixture. These figures are the minimum vertical component values for the locations described on a horizontal plane being 0.75 m from the floor levels in buildings and the ground or platform levels in other areas.

10.10.16. As far as possible, the entire area shall be covered with High Mast lighting system (30 Meter). High mast shall be continuously tapered, polygonal cross section of atleast 20 sides, presenting a good and pleasing appearance which is based on proven intension design conforming to International/National standard. The structure is suitable for loading as per IS 875 (part 3) 1987. High mast shall be fabricated from steel plates and weld joints of different sections conforming to National or international standard. An adequate door opening shall be provided at the base of the mast. The opening shall permit clear access to equipments like winch, cable, wire rope, plug & socket etc. and also facilitates easy removal of the winch for servicing. High mast structure shall be designed to sustain an assumed maximum reaction arising from wind speed as per IS 875 (Part 3) 1987. General requirements of Raising and Lowering system (R & L), trailing cable, power tool, feeder pillar for automatic switching operation of luminaries, lighting finial and aviation obstruction warning light shall also be included.

10.10.17. The Search Lighting with revolving facility shall be considered at the top of the watch towers along the entire periphery.

10.10.18. For hazardous area, suitable type of FLP luminaries along with accessories certified by CMRI for gas group IIA & IIB shall be provided.

10.10.19. STREET LIGHTING

- The Lighting panels used for street lighting shall be additionally provided with a timer device having twenty four hour hand set dial with a facility for setting ON & OFF times. There shall be a provision of selecting either the manual control or the automatic control. The selector switches shall be mounted on the front door of the switchboard.
- Street Lights shall be of solar powered LED type. Street Lights shall be suitable to operate on solar power as well as normal AC Power.
- Peripheral Lighting shall be provided using Single Pole structures of required heights.

connection shall be provided for lamps and portable tools at suitable locations Hand lamps and portable tools shall be earthed through flexible cords. In hazardous areas, flame proof hand lamps shall be rated for 24V.

v. Welding socket shall be rated for 415 V, 3 Phase, 63 A, 4 Pin (3P+E), installed to ensure accessibility with a 50 m length of trailing cable to any point in the process area. Welding receptacles shall be fed from MPDB. Welding receptacles shall be of outdoor, weatherproof, flameproof construction, shall have mechanically interlocked switch.

10.11. EARTHING & LIGHTNING PROTECTION SYSTEM

10.11.1. Earthing system in general, shall cover the following

- Equipment earthing for personnel safety,
- System neutral earthing, and
- Static and lightning protection.

10.11.2. The earthing system envisages an earthing network with designed number of earth electrodes attached to it. The following shall be earthed:

- System Neutral
- Current and potential transformer secondary neutral
- Metallic non-current carrying parts of all electrical apparatus such as transformers, switchgears, motors, lighting/power panels, terminal boxes, control stations, lighting fixtures, receptacles etc.
- Steel structures, loading platform etc.
- Cable trays and racks, lighting mast and poles.
- Storage tanks, spheres, vessels, columns and all other process equipment.
- Electrical equipment fencing (e.g. transformer, yard etc.)
- Cable shields and armor
- Flexible earth provision for Wagon, Truck

10.11.3. Plant earthing design shall generally be carried out in accordance with the requirements of OISD-RP-149, CEA Regulations 2010 and code of practice for earthing IS 3043.

10.11.4. As far as possible, all earth connections shall be visible for inspection.

10.11.5. All connections shall be carefully made and adequately locked against loosening. Normally earthing system shall comprise of Aluminium strip as main earth grid along with suitably located Aluminium disconnecting plates to provide multiple earth connections between earth grid and equipment and for connections between main earth grid and electrodes.

10.11.6. Connections between Aluminium earth electrode and the disconnecting plates shall be done

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Oil India Limited
(A Government of India Enterprise)

KAVIN™

CREATION OF SURFACE PRODUCTION FACILITIES (OCS & GGS) AT NADUA & EAST KHAGORIJAN

Document Title : Specification for Lighting Fixtures and Distribution Board

Kavin Document No. : 17039-ND-E-SP-9009

A	30 NOV 2018	ISSUED FOR REVIEW	DS	AD	MSR/MSB
REV.	**DATE**	**DESCRIPTION**	**BY**	**CHECKED**	**APPROVED**

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COMPANY: **OIL INDIA LIMITED**	**EPCM CONSULTANT:** **KAVIN ENGINEERING AND SERVICES PRIVATE LIMITED**

1. INTRODUCTION

OIL INDIA LIMITED (OIL) a Government of India Enterprise, proposes to construct two number of Surface Production facilities primarily for separation of Oil, Gas & Water and processing of non-associated & associated gas in its producing field at Nadua and East Khagorijan. The installation will be constructed on Modular design concept with emphasis on skid mounted prefabricated facilities minimizing construction work at site to the extent possible as per functional specifications of various process/utility packages. Instead of permanent civil buildings, containerized offices/structures will be preferred.

The East Khagorijan (GGS) field is located near Dibrugarh town in Assam at a location approximately 200m south (aerial distance) of LOC# at 27°32'N 95°09'E approx. elevation 121 M MSL. The field is presently producing from 02 Nos. of wells through a QPS (Quick Production Setup). Considering the potential of the field it is envisaged that Oil production is expected to rise to a level of 1000 KLPD from 06 HP wells (02 wells + 04 future wells), 06 LP wells and 06 Non Associated Gas wells. Associated Gas is expected to be around 0.1 MMSCMD. The East Khagorijan oil field also having the huge amount of non-associated gas potential and it is expected to produce about 1 MMSCMD of non-associated natural gas from this area. It is also expected that the field will produce about 800 KLPD of water along with the 1000 KLPD of crude, so the plant design will be for handling 1800KLPD of total well fluid Oil India Limited proposes to construct a Group Gathering Station at East Khagorijan to cater to the production in that area.

Pipelines from Oil & Gas wells to the proposed plant and transfer lines for transporting Dry Crude, treated Gas, treated water from the proposed plant to outside are not in the Project scope. Procurement of LAND and construction of boundary wall in the land is not in the project scope and will be done/ arranged by OIL separately.

KAVIN ENGINEERING AND SERVICES PRIVATE LIMITED is awarded a contract for Engineering Procurement Construction Management to conceptualize / finalize the requirements needed for the Oil Collection Station (OCS) at Nadua and Group Gathering Station (GGS) at East Khagorijan.

2. OBJECTIVE

This specification defines the minimum technical requirements for the design, materials, supply, Installation, painting, testing, inspection and commissioning of LIGHTING FIXTURE AND LIGHTING FIXTURE DISTRIBUTION BOARD system in Oil Collection Station (OCS) at Nadua and Group Gathering Station (GGS) at East Khagorijan. VENDOR's scope of supply shall include the furnishing of LIGHTING FIXTURE as complete and functional unit, as described by the requisition.

HRC	High Rupturing Capacity
HVAC	Heating Ventilation Air Conditioning
IEC	International Electro Technical Council
IEEE	Institution of Electrical and Electronics Engineers
IP	Ingress Protection
IRP	Interposing Relay Panel
ITP	Inspection and Test Plan
LV	Low Voltage
MCB	Miniature Circuit Breaker
MCC	Motor Control Centre
MCCB	Moulded Case Circuit Breaker
NEC	National Electric Code (USA)
NFPA	National Fire Protection Association
OISD	Oil Industry Safety Directorate (Elect. Std.)
OMR	Oil Mines Regulations, 2014
UPS	Uninterrupted Power Supply

4. CODES AND STANDARDS

i. The equipment shall comply with the requirements of the latest revision of the following standards issued by BIS unless otherwise specified.

CODES	STANDARDS
IS 5	Colors for ready mixed paints and enamels
IS -772 (Part-1) (2nd rev.)	AC electricity meters-general requirements
IS -1248 (1st rev.)	Direct acting electrical indicating instruments
IS-1646	Code of practice for the fire safety of buildings – Electrical Installations
IS-1897	Copper strip for electrical purposes
IS-2189	Code of practice for selection: installation and maintenance of automatic fire detection and alarm system
IS-2705	Current transformers
IS 2854	Method for determining the proof and the comparative tracking indices of solid insulating materials.

IS-7752	Guide for improvement of power factor- consumer installations
IS-8478	Application guide for on load tap changers
IS-8623	Factory built assemblies of switchgear & control gear for voltages up to and including 1000V AC and 1200V DC; particular requirements for bus-bar trunking systems.
IS-9676	Reference ambient temperature for electrical equipment
IS-10028	Code of practice for selection, installation and maintenance for transformer
IS-10118	Code of practice for selection, installation and maintenance for switchgear and control gear
IS 10810	Methods of test for cables
IS-11353	Guide for uniform system marking & identification of conductors and apparatus terminals.
IS-12360	Voltage bands for electrical installations including preferred voltages and frequencies
IS-13234	Guide for short circuit calculations in the three phase AC system
IS- 13235	Calculation of the effects of Short- Circuit Currents
IS-13408-1	Code of practices for the selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres
IS-13947 (Part 4 – Part 5)	LV switchgear and control gear
IS-15142	Guide to the use of electrical apparatus for potentially explosive atmospheres in the presence of combustible dusts
IS-16102	Self Ballasted LED Lamps for General Lighting Services
IS-16103	DC or AC Supplied Electronic Controlgear for LED Modules – Performance Requirement
IS-16104	LED Modules for General Lighting
IS / IEC 60529	Degree of protection provided by enclosures (IP Code)
IS/IEC- 60947	Low voltage switchgear and controlgear : All parts
IS/IEC 60079-0	Electrical Apparatus for explosive gas atmospheres –

OISD-RP-148	Inspection & Safe Practices during overhauling Electrical Equipment
OISD-RP-149	Design Aspects for Safety in Electrical System
OISD-STD-163	Process Control Room Safety
OISD STD-173	Fire Protection System for Electrical Installations
OISD-STD-180	Lightning Protection (OISD - GDN – 180)
OISD-STD-189	Standard on Fire Fighting Equipment for Drilling Rigs, Work Over Rigs and production Installations.

ii. In case of imported equipment standards of the country of origin shall be applicable if these standards are equivalent or stringent than the applicable Indian standards.

iii. The equipment shall also conform to the provisions of Indian Electricity rules and other statutory regulations currently in force in the country.

iv. In case Indian standards are not available for any equipment, standards issued by IEC / BS / VDE / IEEE / NEMA or equivalent agency shall be applicable.

v. In case of any contradiction between various referred standards specifications and statutory regulations the following order of priority shall govern:

- Statutory regulations
- Design Basis
- Equipment specification
- Codes and standards

vi. STATUTORY REQUIREMENTS & APPROVALS

The designed electrical system shall confirm to latest version of statutory and government regulations. As a minimum need to meet and fulfil the requirement of following statutory Acts/regulations, necessary for obtaining all statutory approvals/ certificates, as required from concerned authorities:

- Indian Electricity Act.
- Central Electrical Authority Regulations 2010.
- The Petroleum Rules.
- Petroleum and Explosives Safety Organisation.
- Central Pollution Control Board Norms.

Any other applicable Rules / Regulation of central/ state/ local statutory body.

both ends of each wire.

c) All wiring shall be terminated on terminal blocks. Terminal blocks shall be one piece moulded, 650 V, of reputed make, preferably stud type for higher current ratings such that wires are connected by cable lugs and complete with nuts and washers. Terminals shall be adequately rated for the circuit current, the minimum rating shall be 20 A.

d) Terminals for circuits with voltage exceeding 125 V shall be shrouded.

e) Terminals shall be numbered and provided with identification strip for identification of the circuit and additional 20% spares shall be provided.

7.1.6. Labels & Diagram Plate

a) All door mounted equipment as well as equipment mounted inside the boards/panels shall be provided with individual labels with equipment designation/rating. Also the boards/panels shall be provided on the front with a label engraved with the designation of the board/panel as furnished by the OWNER.

b) Labels shall be made of non rusting metal, 3 ply lamicoid or engraved PVC.

c) Inside the door of lighting panels a circuit diagram/description shall be fixed for reference and identification

7.1.7. RECEPTACLE UNITS

a) The indoor type receptacles units shall consist of socket outlet with associated switch, neon indicating lamp and plug. The socket outlet and switch or MCB shall be flush mounted within a stove enamelled/ galvanised 1.2 mm thick CRCA sheet steel enclosure with perspex/insulating cover. The box may be recessed into or mounted on a wall as per requirements of project layouts.

b) The outdoor type receptacles shall be housed in a 2 mm thick CRCA sheet steel epoxy painted enclosure with gasketed, hinged door having locking arrangement. The enclosure shall be with rain canopy and removable gland plate entry from bottom. Composite receptacle with switch modules housed in a box shall be with degree of protection IP 66.

c) The receptacle units shall be suitable for 240 V, 2 phase, 50Hz supply.

d) Convenient receptacles shall be associated with a switch/MCB of same current rating and the receptacle shall become live only when the associated switch/MCB is in “ON” position.

e) The plugs shall be provided with cord grips to prevent strain and damage to conductors/wires at connection and entry points.

f) The types and current ratings of receptacle units shall be as indicated in the Project layout drawing/price schedule and they shall conform to the applicable standards.

8. LIGHTING FIXTURES (LUMINAIRES)

8.1 TECHNICAL REQUIREMENTS

8.1.1. General

a) All the light fixtures and junction boxes along with accessories to be used in hazardous area shall be certified by BASEEFA, UL, FM, CMRI, PESO or an Internationally Recognised Certification Agency for the area and service in which they could be used.

b) All the light fixtures and junction boxes along with accessories shall have weatherproof enclosures (IP-55/NEMA-4 or equivalent) and suitable for the hazard in which they are installed. The temperature class shall be at least T3 as per IEC, unless otherwise specified.

c) The glass/ polycarbonate used shall be clear and toughened type suitable for use under conditions involving exceptional risk of mechanical damage. The light fixtures shall have glass sealed into retaining ring, which, in turn, shall be secured to the body.

d) The lighting fixtures shall be suitable for mounting on poles/ceilings/columns. Suitable fastening devices such as Clamps/brackets etc required for installation, shall also be supplied.

e) All the lighting fixtures/junction boxes shall be provided with an internal earthing terminal.

f) Special tools, if required, shall also be provided.

g) All the fixture nameplates shall bear the stamp of certifying agency.

The LED fixtures shall be high efficiency, durable, rugged, with minimum lumen depreciation and designed for ambient temperature of 41 deg C. The fixtures shall have been type tested in a NVLAP (National Voluntary Laboratory Accreditation Program, USA) accredited laboratory

LM-79 (IESNA) for Total Luminous Flux

– Luminous Intensity Distribution

– Electrical Power Characteristics

– Luminous Efficacy (calculated)

– Color Characteristics

Minimum power factor of LED fixtures shall be 0.9. Light colour shall be white and CRI shall be minimum 75.

8.2 Normal Light fixtures

These shall be suitable for operation on 240V, 2-Phase, 50 Hz, supply and shall be suitable for the classified area in which they are installed. Fixture shall have double side entry suitable for armoured copper cable complete with termination accessories. Spare plug shall be provided to block the unused entry. The terminals shall be anti-loosening non sparking type and in adequate numbers to terminate two cables.

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c) All wiring shall be terminated on terminal blocks. Terminal blocks shall be one piece moulded, 650 V, of reputed make, preferably stud type for higher current ratings such that wires are connected by cable lugs and complete with nuts and washers. Terminals shall be adequately rated for the circuit current, the minimum rating shall be 20 A.

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b) All the light fixtures and junction boxes along with accessories shall have weatherproof enclosures (IP-55/NEMA-4 or equivalent) and suitable for the hazard in which they are installed. The temperature class shall be at least T3 as per IEC, unless otherwise specified.

c) The glass/ polycarbonate used shall be clear and toughened type suitable for use under conditions involving exceptional risk of mechanical damage. The light fixtures shall have glass sealed into retaining ring, which, in turn, shall be secured to the body.

d) The lighting fixtures shall be suitable for mounting on poles/ceilings/columns. Suitable fastening devices such as Clamps/brackets etc required for installation, shall also be supplied.

e) All the lighting fixtures/junction boxes shall be provided with an internal earthing terminal.

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ANNEXURE –2

PROJRCT INFORMATION

1 SITE DETAILS

1.1 Location:

Nadua:

Nadua is a village in Panitola Tehsil in Dibrugarh District of Assam State, India. It is located 20 KM towards East from District headquarters Dibrugarh and 426 KM from State capital Dispur.

East Khagorijan:

East Khagorijan is close to Chauba town, located 11km from Chabua Railway station.

Dibrugarh Town Rail Way Station is major railway station 23 KM near to Nadua

Airport : Nearest airport Dibrugarh.

1.2 Site Data

Site information shall specify the environmental condition of the Project site. All information specified herein shall be used for reference for the MPC Contractor's sound Engineering and Design.

All equipment shall be suitable for mounting and operation in the ambient
conditions specified below.

Design Ambient Temperature - 45ºC
Ambient Temperature: 41ºC (Max) and 2ºC (Min)
Relative Humidity: 98% (Max) and 36% (Min)
Maximum Rainfall for 24 hr. period: 1600mm.