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KLM Technology Group #03-12 Block Aronia, Jalan Sri Perkasa 2 Taman Tampoi Utama 81200 Johor Bahru Malaysia	<b>OFF SHORE PIPELINE ELECTRICAL          DESIGN CRITERIA</b>  <b>(PROJECT STANDARDS AND SPECIFICATIONS)</b>	

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## SCOPE

This Project Standard and Specification specifies the minimum technical requirement for electrical systems of pipelines. The specified design criteria cover technical requirements, calculation methods, functional requirements, margins and any other minimum requirements.

## REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

1. IEC (International Electro Technical Commission)
2. NEMA (National Electrical Manufactures Association)
3. ASTM (American Society for Testing and Material)
4. NFPA (National Fire Protection Agency)
5. BSI (British Standards Institution)
6. ANSI (American National Standards Institute)
7. API (American Petroleum Institute)
8. NEC (National Electric Code)
9. SOLAS (Convention on safety of life at sea)
10. NESC (National Electric Safety Code)
11. BIS (Bureau of Indian Standards)
12. DNV (Dets Norske Veritas)
13. NACE (National Association of Corrosion Engineer)

## SYMBOLS AND ABBREVIATIONS

<b><u>SYMBOL/ABBREVIATION</u></b>	<b><u>DESCRIPTION</u></b>
DC	Direct Current
API	American Petroleum Institute
FRP	Fiber Glass Reinforced Plastic

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LV	Low Voltage
IEC	International Electrotechnical Commission
IPXX	Ingress Protection
NEMA	National Electrical Manufacturers Association
MCB	Miniature Circuit Breaker
MCCB	Moulded Case Circuit Breaker
SS	Stainless Steel

## **GENERAL REQUIREMENT**

### **Safety**

The electrical system shall employ safety margins to ensure that plant is safe under all operating conditions, including those associated with the start up and shut down of equipment and through out intervening shut down periods. The emphasis in equipment specification will be on operability, prevention of accident/fault and functionality for the design life.

All insulating materials specified for the equipment elsewhere in document shall be non toxic.

All cable penetrations through firewalls, blast walls, through switchgear room walls and between safe and hazardous area shall be sealed using multi cable transits to maintain the integrity of system and prevent gas migration. The sealed transit shall ensure that the fire integrity of the wall is maintained.

### **Materials Workmanship & Suitability**

All work shall be of the highest quality craftsmanship and shall conform to the applicable standards and best applicable engineering practices in order to achieve a neat, safe, substantial and functional installation. All the materials utilized in the construction of electrical equipment shall be as per the latest standards and specification. The materials and equipment used shall be new, unused and of current manufacture. Should any material prove unsatisfactory it will be rejected notwithstanding any previous satisfactory examination or test of similar material or of completed cables and equipment.

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## Design Life

The electrical system shall be designed for specified operating life of pipeline. Therefore equipment shall be specified by contractor for the design life considering maintenance requirement wherever applicable.

## Units and Information

All quantities and dimensions shall be expressed in metric units. All information, manuals, certificate data and inscriptions shall be in English language.

## ELECTRICAL SYSTEM DESIGN

### Cathodic Protection for submarine Pipelines

The Electrical requirements for the Cathodic Protection of all Pipelines, Risers, I/J Tubes and related facilities included in this document shall be as per this design criteria. The electrical requirements are to be read in conjunction with the description of work and specification for submarine pipelines and risers. The Design life of CP system shall be the specified life of pipeline.

#### 1. Electrical Requirements For Cathodic Protection of Submarine Rigid Pipelines

##### a. Cathodic Protection Design

All the details of Pipelines/Laterals and Risers are given in pipeline design criteria. These details shall be used for calculating surface area exposed to sea water for CP design anode spacing, etc.

All places of pipeline crossing, anode spacing shall be half of that as calculated using design parameters, upto a distance of 50 m on either side of the crossing and hence additional anodes shall be provided accordingly.

The proposed pipelines covered in this bid package shall not be provided with any insulation joint. The CP System for the pipelines shall be designed considering that pipelines are electrically connected to the platform structure. For the first 200 m (measured from the respective bottom of the monel sheathing in the riser pipe) pipeline length at the platform, anode spacing shall be half of that calculated using design parameters and hence additional anodes shall be provided accordingly.

##### b. Testing of Cathodic Protection System

Contractor shall carry out the close order potential survey for all the pipelines laid by him or his sub-contractor. The potential measurement for each pipeline shall be carried out by towed fish method along the entire