Company:	CNOOC IRAQ LIMITED
Project:	WATER INJECTION STATIONS EXPANSION PROJECT
Company's Doc. No.:	CMIT-230084-1-796-ELE-15.03-00-0002
Unit Name: `	GENERAL

ELE

Prepared by: Zheng X.W.

Checked by: Tian Fei

Approved by: Wan Chen

Rev.	Description		PRED.	CHKD.	APPR.	Date
0	ISSUED FOR CONSTRUCTION		Zheng X.W	Tian Fei	Wan Chen	20250317
A	ISSUED FOR REVIEW		Zheng X.W	Tian Fei	Wan Chen	20250125

DOCUMENT REVISION HISTORY SHEET

REV	DATE	REVISION DETAILS
A	25/01/2025	First issue
0	17/03/2025	Issued for Construction

TABLE OF CONTENTS

1. GENERAL

MISSAN Oil Field is located in the SE of Iraq, close to Iran's border, about 175 km N-NW of BASRA City, and 350 km SE of Baghdad – the capital of Iraq.

MISSAN Oil Field includes three producing fields namely Abu GHIRAB, BUZURGAN and FAUQI. Abu GHIRAB and FAUQI fields extend beyond the Iranian border.

Since MISSAN Oil Field was built in 1976, it has suffered from the Iran-Iraq War and the Iraq War, so a lot of facilities needs to be upgraded and revamped.

The intended project is mainly concerned for the Water Injection Station(s) Expansion in Three Locations namely (BUN, FQS and BUS3).

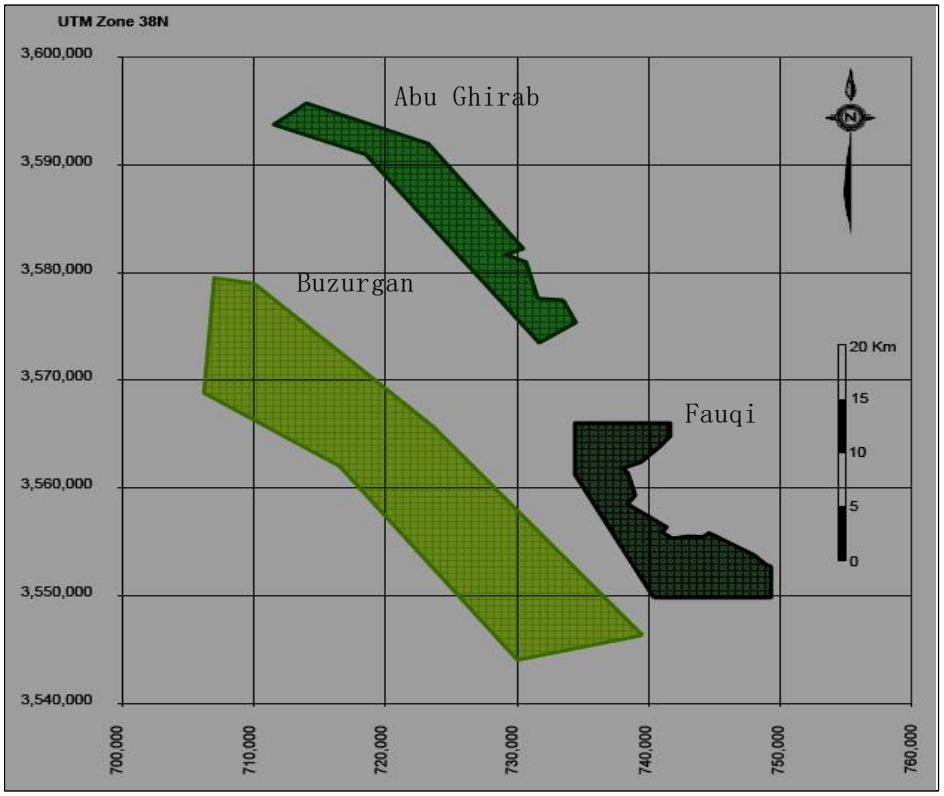

Figure 1.1-1 The overall MISSAN Oil Field

General Field Layout is shown in below figure:

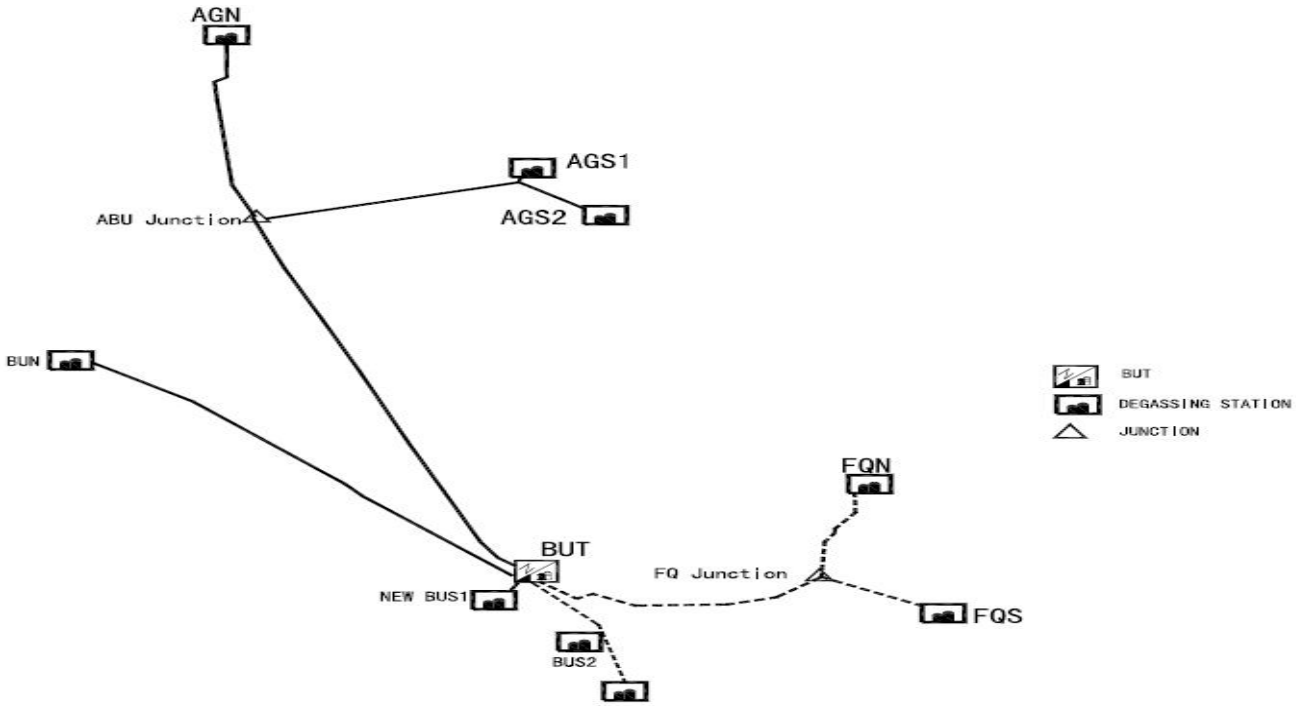

Figure 1.1-2 General Field Layout

1.1. Water Injection Stations (WIS):

A newly-established Water Injection Station are located at BUN, BUS3 and FQS areas adjacent to the newly-established Degassing Stations built therein.

On the three stations, the established Water Injection Stations and the Degassing Stations have been completed since 2021.

BUN Water Injection Stations (WIS) have been equipped with Two Water Storage Tanks, Three Water Feed Pumps, Three Water Injection Pumps, Water Injection Manifold that delivering the pressurized water to its intended manifold or/and well.

FQS Water Injection Station has been equipped with Two Water Storage Tanks, One Water Feed Pump, One Water Injection Pump, Water Injection Manifold that delivering the pressurized water to its intended manifold or/and well.

BUS3 Water Injection Station has been equipped with Two Water Storage Tanks, Two Water Feed Pumps, Two Water Injection Pumps, Water Injection Manifold that delivering the pressurized water to its intended manifold or/and well.

In this project, those three Water Injection Stations will be expanded.

1.2. Abbreviation and Acronyms

1.2.1 Project Definitions

The following definitions shall apply to this document:

COMPANY: CNOOC IRAQ LIMITED

PMC:Project Management Consultant

CONTRACTOR :CNOOC Petrochemical Engineering Co.,Ltd (COPCL or CNOOCPEC).

WIS:Water Injection Station

WTP:Water Treatment Plant (Oily Water Treatment)

WIP:Water Injection Pump

DGS or **DS**: Degassing Station

BUT: BUZURGAN CPF Terminal

CNOOC: China National Offshore Oil Corporation

1.2.2 Abbreviation

AC	Alternating Current
CRCA	Cold Rolled Cold Annealed
FEED	Front End Engineering Design
HSE	Health Safety & Environment
HV	High Voltage
IEC	International Electro-technical Commission
IP	Ingress Protection
ITP	Inspection and Test Plan
LV	Low Voltage
MMTPA	Million Metric Tonne Per Annum
MV	Medium Voltage
QA	Quality Assurance

SDRS VENDOR Documentation Requirements Schedule

SPIR Spare Parts Interchangeability Record

2. REFERENCE DOCUMENTS

The VENDOR shall comply with the requirements of Iraq laws, Project specifications, data sheets & drawings and the latest Revisions of the applicable portions of the Codes and Standards listed below.

Bare minimum relevant standards are listed below; however the equipment shall conform to the latest editions of all the applicable standards. It shall be the VENDOR' responsibility to be or to become knowledgeable of the requirements of applicable portions of these standards and codes. Any changes or alterations to the equipment to make it meet standards and codes requirements shall be at the expense of the VENDOR.

In the case of conflicting requirements, the following order of precedence shall apply (No. 1 is the top level governing document).

1. Iraq Laws and Regulations
2. Latest International Codes and Standards
3. Project referenced Codes Specifications and Standards

CONTRACTOR shall check HSE issues addressed in the Iraq regulations as part of the Regulatory review to ensure most stringent practices are adopted.

EUROPEAN DIRECTIVES, CODES AND STANDARDS

DOC NUMBER	TITLE
EN 60529	Protection given by enclosures
EN 60801	Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment Part 2: Electrostatic Discharge Requirements
EN 60947	Low-voltage switchgear and controlgear
EN 61000	Electromagnetic compatibility

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

DOC NUMBER	TITLE
NFPA 70	National Electrical Code

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

DOC NUMBER	TITLE
IEC 60027-1	Letter symbols to be used in electrical technology Part 1: General
IEC 60038	IEC standard voltages
IEC 60085	Electrical insulation – Thermal evaluation and designation
IEC 60439	Low Voltage Switchgear and Control gear Assemblies
IEC 60446	Basic and safety principles for man-machine interface, marking and identification – Identification of conductors by colours or alphanumerics
IEC 60466	AC Insulation –Enclosed Switchgear & Control Gear for Rated Voltages (Above 1kV up to and including 38kV)
IEC 60529	Degrees of Protection Provided by Enclosures (IP Code)
IEC 61000	Electromagnetic compatibility (EMC)

INTERNATIONAL STANDARDS ORGANISATION (ISO)

DOC NUMBER	TITLE
ISO 3740	Acoustics - Determination of Sound Power Levels of Noise Sources
ISO 9001	Quality Management Systems - Requirements

Electrical system design and equipment specification shall be in accordance with the following order of precedence:

1. International Electrotechnical Commission (IEC) publications.
2. European Standards published by CENELEC.

3. Standards and codes (UTE, BS, VDE, etc.) when I.E.C publications have not yet been issued

VENDOR shall advise COMPANY / CONTRACTOR, any conflict between the referenced documents and any project specification. Resolution of any conflict shall be obtained from the COMPANY / CONTRACTOR in writing before proceeding.

3. GENERAL REQUIREMENTS

3.1. Operation and Design Life

All bus ducts shall be designed for minimum life duration of 25 years in the environment and for the duty specified herein and on the Project Data Sheets.

3.2. Service Conditions

The VENDOR shall take note of the climatic data and comply with the design requirement stated in the Site Design Data Specification CMIT-230084-1-796-PCS-15.65-00-0001.

In addition to any requirement stated in this specification and related documents, appropriate operating conditions shall be used in the design and construction of this equipment.

3.3. Scope of Supply

The scope of supply shall include, but not limited to, the following equipment and requirements:

- MV (11kV and 6.6kV) and LV (0.4kV) bus ducts (both straight run and bends), complete with enclosures, copper bus bars, support insulators, support structures with erection hardware, wall frame assembly, seal-off bushings, expansion joints, flexible connections for termination at both ends, anti-condensation heaters with junction boxes, drain plugs, inspection cover, earth bus, phase cross over boxes, adaptor boxes etc as applicable
- Inspection and Testing
- Protective coating
- Packaging, shipping and storage
- Spare Parts
- Special Tools
- Documentation, drawings and certification

The following will be provided by others, unless otherwise specified in the data sheets:

- Foundations and other civil works for bus duct supports

- Cables, glands and termination for power supply up to junction box of anti-condensation heaters.

3.4. Proven Equipment Criteria

Only equipment of proven reliability in similar service conditions shall be included in the VENDOR's Bid proposal. Prototypes shall not be offered by the VENDOR. The VENDOR shall provide the related necessary evidence (reference lists with installation dates and run hours accumulated by date, etc.). The units shall have equivalent design features to the units proposed.

3.5. Language

All documentation and communications shall be in the English language.

3.6. Units of Measurement

The units of measurement on all documentation and equipment shall be in SI system, unless otherwise specified.

3.7. Plant Utility Voltages

The plant utility voltages are shown in the table below:

Service	Rated Voltage (kV)	Phase/Wire	Earthing
Medium voltage distribution	11	3 /3	400A Low Resistance
Motor > 5 MW	11through unit transformers (unless specified otherwise)	3 /3	Low Resistance
Low voltage distribution (power) (Miscellaneous)	0.4 0.23	3 /4 1 / 2 + PE	Solid Solid
Space Heaters up to 3 kW	0.23	1 / 2	Solid
Space Heaters above 3 kW	0.4	3/4	Solid

The supply variations at the feeding bus shall be limited under steady-state conditions to:

- supply voltage : +/- 10%
- supply frequency : +/- 3%
- combined voltage and frequency variation : 10% (absolute)

In addition to the above variations, the input voltage may be subject to transient comprising of voltage depressions up to 20% of the nominal voltage during motor starting, and to voltage interruptions during system short circuits. Transient, high frequency voltages of up to 2 kV may also be superimposed on the input voltage as a consequence of system switching operations etc.

Total harmonic voltage distortion shall not exceed 3% at any point in the system. Individual odd harmonics will be allowed up to 2% and individual even harmonics will be restricted less than 1.5%. Users which generate harmonic currents shall be provided with harmonic filtration equipment if it is determined that the total harmonic voltage distortion would otherwise be unacceptable.

3.8. Voltage Drops

The maximum voltage drops in various sections of the electrical system shall be within the limits stated in the following table:

Serial No.	System Element	Maximum Permissible Voltage Drop
1	Bus duct between transformer secondary and switchboard/MCC (MV / LV)	0.5 %

3.9. Materials

The materials of construction for the equipment shall be as specified in the equipment data sheets and this Specification. When materials are not specified, the materials proposed in the offer shall be suitable for the process fluid, operating / design conditions and salt laden marine environment.

All materials, equipment or supplies furnished under this specification shall be the product of a manufacturer who is experienced in the design and construction of such materials, equipment, or supplies, and who has furnished similar materials, equipment, or supplies that have been in satisfactory operation for a minimum of five years, preferably in similar environmental conditions, to establish its reliability.

In the case of materials which are specified in the Specification or reference documents, alternate materials may be offered. Any such alternatives shall be clearly indicated in the Bid, along with any cost adjustments and technical data supporting the alternative. Alternative materials shall be subject to COMPANY / CONTRACTOR's written approval.

All materials shall be new, free of defects and be identifiable against their certification.

Dissimilar metals shall not be coupled directly. Suitable insulation (for example: insulation washers/gaskets, fluorocarbon coated bolts and nuts) shall be used if dissimilar metal coupling can not be avoided.

Asbestos products shall not be used.

3.10. Noise Limits

The noise levels for each item of operating equipment (including drivers where applicable) shall be in accordance with Noise Control Philosophy and with any subsequent specific noise limitations to meet in plant and community noise limits as well as all the enquiry documentation including data sheets, specifications, codes and standards.

3.11. EMC Requirements

All equipment shall comply with the requirements for EMC as defined in IEC 61000, in order to ensure:

- Conducted emissions in both the power supply input and outputs are controlled within acceptable limits
- Any electromagnetic disturbance generated by the equipment and its individual components do not exceed a level which would affect the correct operation of both radio and telecommunications equipment
- The equipment has an adequate level of intrinsic immunity to external electromagnetic and conducted disturbance to enable it to operate as intended
- The design of the equipment should be of an adequate standard to maintain performance during its operational life in its installed environment.

3.12. Ingress Protection

The levels of ingress protection for all electrical equipment shall comply with the relevant IEC Standards and shall be in accordance with the following:

Bus duct to be installed in indoor areas : IP 31 (minimum)

Bus duct to be installed in outdoor areas : IP 55 (minimum).

3.13. COMPANY / CONTRACTOR Interfaces

The equipment package shall be required to fall within the parameters defined in Project Drawings. These parameters may include any or all of the following:

- Maximum overall package dimensions

- Structural hard points / fixing locations
- Electrical and Instrument junction box / tie-in locations
- Maximum allowable weight.

3.14. Deviations, Concessions and Change Control

VENDOR shall refer to the Bid documents for the procedure for raising deviations or concession requests to the technical content of this specification.

COMPANY / CONTRACTOR will consider all deviations and concession requests and approval may be granted at the discretion of the COMPANY / CONTRACTOR. No deviation or concession shall be implemented prior to approval being granted. Any deviations or concession implemented prior to approval shall be subject to rejection.

4. DESIGN REQUIREMENTS

The design shall be based on the specific requirements stated in this specification, Project Data Sheet(s) and other applicable documents inclusive of the applicable editions of codes and standards listed under clause 2.2.

Any deviations shall be submitted by the VENDOR together with the Bid in the format specified in the Material Requisition/Bid document. In the absence of this, it shall be construed that the VENDOR fully complies with this specification.

4.1. General Design Requirements

Bus duct shall be a metal enclosed assembly of rigid conductors with associated connections, joints and insulating supports within a grounded enclosure.

Bus ducts shall be traditional conductors supported on insulators in metal enclosure. Cast Resin Insulated bus bars can be used.

Unless otherwise specified, the bus ducts will normally serve as an interconnection between secondary terminals of the transformers and their respective Switchboard/MCC or as trunking connection between Switchboard/MCC bus sections, as specified in Project Data Sheets.

The MV (11kV and 6.6kV) bus ducts shall be the phase segregated type and natural air cooled while the LV (0.4kV) bus ducts shall be non-phase segregated type and natural air cooled. The bus bars and insulation shall be rated for the maximum load current, short circuit current and operating voltage as specified in Project Data Sheets.

The basic equipment design shall be the responsibility of the VENDOR.

Unless otherwise specified, all equipment shall be designed for continuous working under the service conditions stated in the relevant documents and the Project data sheet.

VENDOR shall submit full technical details of his standard equipment with the Bid proposal, which most nearly meets the requirements detailed herein. Aspects of the requirements, which cannot be met or for which the VENDOR proposes new or alternative technology, shall be identified and the variances explained.

The electrical apparatus shall be located in such a manner as to enable the apparatus to be easily maintained when in service. The location and installation shall also satisfy all relevant statutory and regulatory requirements applicable at the installation site.

LV Bus ducts for ratings greater than 3500A shall have interleaved construction to limit the temperature rise.

The bus ducts shall be suitable to take care of normal transformer vibrations where applicable.

Wherever expansion joints are required to take care of expansion and contraction, due to load changes and changes in the ambient temperature, neoprene rubber bellows / gaskets shall be provided for enclosure and flexible connectors for conductors. The bellows / gaskets shall be ultraviolet resistant when used for outdoor application.

Same phase disposition shall be maintained throughout the run of the Bus duct. If specified in Project data sheets, phase cross over units and/or adaptor boxes shall also be provided by the VENDOR.

4.2. Enclosure

The enclosure of the bus-duct shall be fabricated from CRCA sheet steel of minimum 2 mm thickness.

The bus enclosures shall be electrically continuous over their entire length.

The outdoor bus duct shall be weatherproof, totally enclosed non-ventilating type or weatherproof furnished with screened breathers gasketed covers, sloped to shed rain, and complete with a removable sun shield. Indoor bus duct shall be ventilated with louvered top and bottom covers.

Weather resistant circumferential type gaskets shall be provided for making the joints with adjacent enclosures to meet the IP protection specified.

The connection flanges shall be sufficiently stiffened so as not to bend while tightening the bolts. The outdoor flanges shall be provided with a suitable rain protection hood to prevent water entry.

Drains along with drain plugs shall be provided at all low points in the horizontal portions of the bus structure, to ensure the elimination of any condensation that might collect in the enclosures.

Suitable inspection openings with gaskets shall be provided for access to the support insulator, bus joints etc. The openings shall not be exposed to rain.

For continuous operation at the specified rating, the maximum temperature of the bus duct shall be limited to 85°C.

4.3. Bus bars

The bus bar shall be of corrosion-protected high conductivity Electrolytic Grade Copper sized for the rating of associated switchboard/MCC as per Project data sheets.

Joints made at the factory shall be the welded type and the joints to be made on site shall be the bolted type.

For bolted rigid / expansion joints, the necessary bolts, nuts, washers and other hardware shall be supplied.

Bus bars shall be colour coded as per relevant IEC Standards at regular intervals for easy identification. For each shipping section, the bus conductor shall be adequately supported. Shipping markings shall be adopted for easy identification of shipping at site. Matching faces of shipping sections shall be clearly identified.

A removable bolted disconnect link shall be provided as per the requirement. The bus on either side of the disconnecting link shall be suitably supported. The clearance between the disconnecting pieces shall be such that necessary working clearances are available after the removal of the link. Necessary mandatory clearances shall be maintained for this purpose by the VENDOR.

The clearance between the bus bars and that between the bus bars and the enclosures shall be as per the relevant IEC standards.

4.4. Bus bar Support Insulators

Insulators shall be of high grade cast resin, non-hygroscopic, dust and weatherproof, high resistance to thermal and mechanical shocks, high short circuit withstand capability and fire restraint. The bus bars shall be insulated with a flame retardant material which shall inherently inhibit any toxic fumes in high temperature or combustion conditions. The bus bar supporting insulators shall be a high strength tracking resistant type with an adequate creepage surface. The bus support insulators shall be mounted on resilient pads.

The insulation/insulator design shall meet the insulation requirements specified in the Project data sheet.

Fixing arrangements of bus ducts to the insulator shall be as per manufacturer's standard; however suitable precautions shall be taken to allow the expansion for the envisaged rated current flowing through the bus-bar.

The insulating material shall be treated for preventing fungus growth. Surface of insulators shall be highly glazed and treated to minimise accumulation of dust, condensation of moisture and tracking. The design of bus bar supports shall be such that free thermal expansion of bus bars shall be possible. In vertical run of the bus duct, suitable clamps/supports shall be provided to retain the bus bars in position and distribute loading evenly on supports.

The insulators shall be located so that they can be easily removed and replaced without dismantling the bus duct installation.

All bus bars shall be adequately supported and braced to successfully withstand normal operation, vibration, thermal expansion, short circuit forces, and design loads.

4.5. Supporting Structures

All supporting structures required for hanging and/or supporting the complete bus duct shall be included in the scope. This includes all members, indoor / outdoor posts, columns, bolts & nuts, shims, base plates, beams, hangers, brackets, bracings and hardware. All support steel members shall be hot dip galvanized after fabrication. All hardware shall be of high strength steel with suitable treatment against corrosion. The bus duct supports shall be fabricated from standard steel sections.

The enclosure supporting arrangement shall be such that the bus duct load is not transmitted onto the terminations.

The insert plate required to be embedded in concrete shall be provided and further anchor bolts, plates and members required to support the bus duct shall be included by the VENDOR as part of the structural material.

Bus directly supported on switchboard/MCC enclosures or at transformers, shall have provisions to prevent undue strain on the switchboard/MCC terminations and transformer bushings.

4.6. Connections and Terminations

All matching flanges, seal-off bushings, gaskets, fittings, hardware, and supports required for the termination of the bus ducts to the switchboard/MCC or transformer shall be supplied by the VENDOR.

Flanged ends shall be provided to facilitate connection of bus ducts both at the transformer and switchboard/MCC ends. All hardware such as bolts, nuts, spring and plain washers shall be supplied along with bus duct to connect it at both ends.

Flexible connections for both the conductor and enclosure shall be provided for the following:

- At all equipment terminations (transformer and switchboard/MCC)
- On either side of seal off bushings
- At expansion joints

The connectors shall be laminated to cater for linear expansion of bus bars. The material of flexible connection shall be same as bus bars.

Seal off bushing with wall frame assembly shall be provided wherever the bus duct penetrates the building wall from outdoor to indoor to prevent condensation due to air temperature variation between indoor and outdoor portion. Wall frame assembly shall be fabricated out of aluminium angles and sheets.

Equipment terminal connections shall be readily accessible and shall provide a sufficient air gap for the isolation of equipment during testing.

If the material of bus conductor and that of the equipment terminal connectors are different, suitable bi-metallic connectors shall be provided.

4.7. Requirements for External Bus Duct

The outdoor portion of the bus duct, when it is of bolted construction, shall be provided with a continuous rain hood of non-magnetic material suitably supported from the bus duct support structure.

Wall penetration fittings shall be provided and shall meet the following requirements:

- The wall connector and the section that penetrates the wall shall be weather resistant and watertight to wind driven rain.
- The bus duct system sleeve shall be seal-welded to a flanged penetration plate supplied with a neoprene gasket.

The VENDOR shall provide seals for equipment passing through floors and walls.

Self-cooled metal-enclosed bus sections that pass through the exterior wall of a building, shall be provided with vapour barrier.

Fire barriers shall be installed if the self-cooling design would permit the spread of smoke and fire from one part of a building to another.

Fire barriers shall be provided to prevent the passage of both fire and smoke between floors if vertical buses pass through floor lines.

Fire barriers shall be provided in horizontal bus bars if the buses pass through walls designated as fire walls.

Fire barriers shall be subjected to required fire resistance tests in accordance with relevant codes and standards.

4.8. Earth Bus

An earth bus rated to carry the maximum fault current as specified in Project data sheet shall be provided. The earth bus shall run throughout the entire length of the bus duct, grounding all parts of the supporting structure and each enclosure section.

The earth bus shall be provided with two bolt drilling with Brass bolts and nuts at each end to receive minimum 70 sq.mm copper earthing cable for connecting to the earth grid.

4.9. Anti-Condensation Heater

The enclosure shall be equipped with self regulating anti-condensation heaters. The heaters shall have sufficient capacity to prevent the formation of condensation within the enclosure

under the stated service conditions. Space heaters shall be completely factory wired with no exposed wiring inside the bus housing. Space heaters shall be thermostatically controlled. Space-heater circuit shall be suitable for 230 V single phase supply. The space-heater shall be located at a suitable location to maintain temperature of air 5ºC above ambient throughout the length of the bus duct.

The number and wattage of space heaters shall be decided by the VENDOR. Size of wires shall be not less than 2.5 sq.mm, 600 / 1000 V insulated stranded copper conductor. For all external connection the same shall be brought to a terminal box and terminal box shall be provided with a suitable terminal block graded at 600 V. Spare terminals shall be provided for looping the connection.

5. QUALITY ASSURANCE, INSPECTION & TESTING

For the activities listed below, VENDOR shall comply with the requirements specified in relevant clauses of the Material Requisition/ Bid Document, in addition to the following:

5.1. Quality Assurance

The VENDOR shall demonstrate that they operate a quality system in accordance with an internationally recognized standard. The effectiveness of the quality system and the VENDOR's compliance with it shall be subject to monitoring by COMPANY / CONTRACTOR and in addition, may be audited following an agreed period of notice.

The VENDOR shall submit a quality control program for COMPANY / CONTRACTOR review at the time of Bid.

The VENDOR shall provide facilities for, and cooperate with, COMPANY / CONTRACTOR and Inspectors during manufacturing, assembly and testing.

5.2. Inspection

The COMPANY / CONTRACTOR or its authorised representatives shall be permitted at all times free access to all parts of VENDOR's workshops that concern the construction and testing of the MV & LV bus ducts.

5.3. Testing

All testing shall be carried out at the manufacturer's test facility (except for type tests to be done in other premises). Test equipment shall be supplied by the manufacturer and shall be calibrated within six months of the test date. The minimum scope of testing is summarised below. The VENDOR shall supply an ITP with the Bid.

The VENDOR shall provide the COMPANY / CONTRACTOR with advance notice as per the provisions of the Material Requisition, to witness tests performed in either the VENDOR's shop or his sub- VENDOR's shops.

5.4. Type Tests

Type Tests shall be carried out with supervision and certification by a recognized testing authority.

The tests shall comply with the requirements of the relevant IEC standards.

On completion of tests and before dispatch of the bus ducts from the VENDOR's works, the VENDOR shall supply a full set of test documents to the CONTRACTOR. The test documents shall include, but not be limited to, all of the test data for the following Type Tests:

- Impulse voltage withstand test
- Heat run test
- Short circuit test
- Ingress Protection test
- Temperature rise test including joints

Where previous type testing has been completed on equipment of identical design, type test documentation may be submitted in lieu of performing each of the listed type tests.

5.4.1 Routine Tests

Prior to delivery, each bus duct shall undergo the following routine tests and checks. Tests shall comply with the requirements of the relevant IEC standards. All tests may be witnessed by an Inspection Agency and/or COMPANY / CONTRACTOR. Full written test reports shall be submitted to the COMPANY / CONTRACTOR on completion of the tests.

- Visual inspection and verification of dimensions
- Dry power frequency voltage withstand test for 1 minute
- Insulation resistance measurement

5.5. Inspection and Test Plan (ITP)

The VENDOR shall submit Inspection and Test Plan, in accordance with the Material Requisition, along with the Bid documents. The ITP shall list all inspections and tests proposed for the equipment by the VENDOR, between the date of ordering and the date of delivery.

The VENDOR shall be responsible for the planning and execution of all inspections and tests, but the COMPANY / CONTRACTOR's representative shall have the right to witness any or all of the manufacturing, inspection or tests.

The COMPANY / CONTRACTOR and the VENDOR shall sign off the final version of the ITP, which, thereafter, shall form part of the contract documents.

The VENDOR shall provide the COMPANY / CONTRACTOR with advance notice as per the provisions of the Material Requisition, of the date on which any of the inspections or tests nominated as Hold or Witness points on the ITP are due to be carried out.

Certificates of Test shall be provided for each item of equipment to prove it has been satisfactorily tested to meet all requirements of its appropriate manufacturing standards, whether or not witnessed by the COMPANY / CONTRACTOR.

Where appropriate, test certificates shall state values for all test results. Tests for which the results are indicated as pass or fail shall be qualified by the relevant acceptance criteria.

5.6. Commissioning and Start-Up

The VENDOR, in their Bid, shall identify any special requirements or recommendations for VENDOR support during commissioning and start up of the equipment supplied. The COMPANY / CONTRACTOR's final acceptance of the equipment will be subject to a performance test once the equipment has been installed and commissioned.

5.7. Training and After Sales Support

The VENDOR shall comply with the relevant provisions of the Material requisition / Bid document for training and other activities.

The VENDOR, in their Bid, shall provide details of their after sales support capability. VENDOR shall advise their nearest service representative and nearest service facility to the project fabrication yard and the facility location.

6. PROTECTIVE COATINGS

All surface preparation, painting and protective coatings shall be in accordance with the document CMIT-230084-1-796-PAI-15.03-00-2001, titled SPECIFICATION FOR PAINTING.

Where the manufacturer's standard painting is offered, the VENDOR shall submit the standard paint specification with the Bid for COMPANY/CONTRACTOR's approval. Where the COMPANY/CONTRACTOR deems the standard painting specification as insufficient, alternative requirements will be negotiated during the Bid evaluation.

Exterior surfaces of bus ducts shall be finish coated to the colours specified in Project data sheets.

All electrical equipment in contact with the atmosphere shall be suitably protected to prevent deterioration in the adverse environmental conditions utilising suitable plating, encapsulation and materials with anti-fungal and anti-tracking properties.

VENDOR shall supply paint for the field touch-up after installation of equipment.

7. NAMEPLATE DETAILS

All nameplates shall be in English.

7.1. Primary Nameplate

In addition to the International Code rating plate requirements, each MV & LV bus duct shall be equipped with a permanently attached primary nameplate. The name plate shall be engraved with equipment tag number as given in the Project data sheets. Text and numbering shall be clearly engraved, paint filled and a minimum of 6 mm high. The primary nameplate shall be mounted in a prominent location secured by stainless steel screws or rivets.

7.2. Tag Plates

Unit minor sub-components such as heaters shall be fitted with a tag plate identifying their individual tag number only.

Tag plates shall be manufactured from 316 stainless steel. Text and numbering shall be clearly engraved, paint filled and a minimum of 6 mm high.

Tag plates shall be secured by stainless steel screws or rivets.

7.3. Rating Plates

Individual apparatus items shall be provided with stainless steel rating plates as required by the relevant equipment codes and standards defined in clause 2.2.

The rating plate shall be fitted in a visible position. Entries on the rating plate shall be indelibly marked, by etching, stamping or engraving. The following information shall be given in all cases:

- Manufacturers name plate and trade mark
- Type, Model and Serial Number
- Standard to which apparatus is manufactured
- All technical details required by the relevant standards.

8. PACKING, SHIPPING AND STORAGE

The VENDOR shall ensure that detailed and specific instructions for the preservation and maintenance of equipment while stored at the construction site, from receipt at site to operational start-up, shall be delivered to construction site with the equipment. Such instructions shall include as a minimum the preservation and maintenance schedule, preservative materials, lubricants to be used etc.

Preparation for shipment and storage, as well as handling of equipment shall be in accordance with the VENDOR‘s standard procedures, which shall be subject to approval. However, the following are the minimum requirements.

a. Each shipping container shall be clearly identified with the contents, purchase order number and item number.

b. Any exposed equipment that may be damaged by slings and lifting equipment during transportation and installation shall be removed and protected. All temporary supports and bracings required for transporting or lifting condition shall be provided by the VENDOR and shall be painted red. Where it is necessary to employ spreader beams to lift and handle large equipment packages, the VENDOR shall quote this equipment as an option to the basic package scope of supply.

c. Equipment and materials shall be preserved and protected to withstand road and sea transit and an extended period of storage on the job site of 12 months. Equipment shall be protected to safeguard against all adverse environment conditions that may be encountered during shipment, storage and installation.

d. All parts shall be properly marked and conditioned for shipment and thoroughly cleaned of loose scale, dirt and other foreign material before shipment.

e. All liquids used for cleaning or testing shall be completely drained and all units dried inside prior to shipping.

f. Exposed bolted connections shall be protected by wooden cover plates and threaded connection shall be protected by steel plugs or caps.

g. All items subject to internal preservation shall be tagged and marked, so to be identified. Tagging shall indicate the type of preservation used.

h. All exposed unpainted surfaces shall be coated with approved preservatives either wrapped with Denso tape or equivalent.

i. Location of lifting points, the weight and the centre of gravity shall be clearly marked on all shipping containers.

j. Where items are required to be dismantled for shipping, instructions shall be provided for reassembly of sections in the field.

k. The VENDOR shall separate pack any miscellaneous equipment that must be removed for shipment.

l. All cable entries shall be sealed to IP55 for shipping.

m. Load test certificates shall be shipped with all lifting equipment, spreader bars, slings and shackles.

The equipment shall have been fully tested and inspected prior to packaging. No packaging activities shall commence without the prior consent of the COMPANY / CONTRACTOR. The COMPANY / CONTRACTOR shall be notified of the dates of packaging with sufficient notice to allow attendance for completion of inspection and release certificates without affecting the required delivery schedule.

No equipment shall be allowed to leave the VENDOR's premises without such certificate being signed, or a written waiver issued.

9. SPARE PARTS & SPECIAL TOOLS

9.1. Spares

The VENDOR shall comply with the requirements stipulated in the applicable Bid document.

The VENDOR shall identify the following spares:

- Pre-commissioning, commissioning and start-up spares
- Recommended spares list for two years trouble free operation

Spares shall be itemised and priced with the Bid.

The COMPANY / CONTRACTOR shall agree Spares to be included in Purchase Order.

The VENDOR shall complete the Spare Parts interchangeability Record (SPIR) Form to be supplied by the COMPANY / CONTRACTOR.

The VENDOR shall clearly state location of factory which manufactures quoted spares.

9.2. Special Tools

The VENDOR shall identify all necessary special tools required to perform routine maintenance and any other recommended tools for specialised procedures.

Special tools shall be itemised and priced with the Bid.

The COMPANY / CONTRACTOR shall agree the Special Tools to be included in Purchase Order.

The equipment Operation and Maintenance Manuals shall include a list of special tools and instructions how to use them.

10. DOCUMENTATION

The VENDOR shall be responsible for providing all documentation in accordance with Material requisition and the applicable documents like VENDOR Data Requirements Schedule (SDRS) provided by the COMPANY / CONTRACTOR.

All documentation shall be forwarded to COMPANY / CONTRACTOR’s nominated address.

Fabrication of any equipment shall not commence until the COMPANY / CONTRACTOR has reviewed and approved calculations, drawings and any other design documentation.

As part of his Bid the VENDOR shall include the information requested with Bid and as instructed in the SDRS.