COMMON TECHNICAL SPECIFICATION AND TEST STANDARDS

Common Technical Requirements

1.1 General

In the following sections, this document describes equipment required for the tender. The common technical specifications are to mainly state the general requirements commonly applied for all the Packages. If there is any discrepancy in the requirements between the General Specifications and the Technical Specifications in this Section, the requirements mentioned in Technical Specifications shall prevail.

1.2 Scope of Work

The supply contract includes the design, manufacture, testing, insurance, delivery in complete form (assembly at warehouse if required) unloading and proper handing over the supplies to the Purchaser's Warehouse at Phuentsholing/Pasakha, Bhutan, of the Equipment as specified in the Price Schedule.

All necessary foundation bolts, rag bolts, nuts and washers, grouting packing and the like required for mounting and securing the equipment/assemblies should be included in the supply.

Bidders shall furnish guaranteed particulars in the Schedules enclosed. Drawings of all components shall be provided together with the equipment type and reference number to ensure their identification.

The unloading of the goods (items) in the purchaser's warehouse shall be in the scope of the suppliers.

1.3 Units of Measurement

Metric units of measurement (System International) shall be used on all Contract documentation. Angular measurement shall be in degrees with 90 degrees comprising one right angle.

1.4 Standards

The design material, construction, manufacture, inspection and testing of all equipment supplied under this Specification shall conform to the latest editions of the International Electro-technical Commission (IEC) Specifications, Indian Standards (IS) and other international standards where the material is not covered by IEC/IS. Other national or international standards are accepted if they promise to confer equal or superior quality and performance than IEC/IS or the specified standards.

The Supplier shall provide to the Purchaser, English language copies of any Standards and Codes of Practice, which the Supplier wishes to use. The Supplier shall provide English language translations of any Standards and Codes of Practice

which the Supplier wishes to use and which are in a language other than English as per Special Conditions of the Contract (SCC).

1.5 Language

The English language shall be used on all Contract documents, drawings and calculations and in all correspondence between the Supplier and the Purchaser. Any documents and drawings submitted by the Supplier in the language other than English to the Purchaser will be returned to the Supplier without review by the Purchaser.

1.6 Site Conditions

1.6.1 The conditions for the design of the equipment are as follow:

Basic Design Parameters	**Basic Design Value**
Altitude	200-5000 metres
Ambient Air Temperature • Minimum • Maximum	 40°C -20°C
Average Annual Isokeraunic Level	75 thunder days
Average Annual Rainfall & Period	1400 mm
Climate	From tropical to severe winter
Relative Humidity	20% – 100%
Seismic Acceleration • Horizontal • Vertical	 0.1 g 0.05 g
Snow Incidence and period	150 –300 mm
Wind Pressure • Conductors • Towers, Supports	 0.44 kPa (45 kg/m^2) 1.91 kPa (195 kg/m^2)

1.7 Electrical Design Parameters

The electrical parameters of the equipment in accordance with relevant IEC and IS standards for 33kV and below are shown in following tables.

Medium Voltage

Nominal System Voltage	**kV**	**33**	**11**	**6.6**
Nominal System Frequency	Hz	50	50	50
Maximum System Voltage	kV	36	12	7.2
Rated Impulse withstand voltage (Peak)	kV	170	75	60
Rated one minute power frequency withstand voltage (rms) kV		70	28	20
Rated one second short time current (rms) kA		16	20	20
Rated short circuit withstand current (peak) kA		40	50	50
Creepage Distance (mm/kV)		25	25	25

Low Voltage

Insulation parameters- Low Voltage

Nominal System Voltage	**V**	**400/230**
Nominal System Frequency	Hz	50
Maximum System Voltage	V	424/244[1]
Rated one minute power frequency withstand voltage (rms) V		3000
Rated impulse withstand voltage (peak)	kA	7500

Note 1: Phase to Phase / Phase to Neutral

System Variation

Parameters permissible at 75 °C		**Variation**
Voltage Regulation of MV System	33,11,6.6 kV	±10%
Voltage Regulation of LV System	400/230 V	±6%
System Frequency	50 Hz	-1%, +1% [1]

Note 1: Maintain the System frequency between 49.0-50.5Hz.

1.7.1 De-rating

Since various standards or recommendations enforce validity limits on device characteristics, therefore the values mentioned in this specification are for the normal condition of use i.e. below 1000 m. Beyond these limits, it is necessary to deduce certain values, in other words to de-rate the device. De-rating must be considered;

- For insulation level of external insulation.
- For electrical clearances of two conductive parts measured through air.

1.7.2 Basic Insulation Level (BIL) De-rating According to Altitude

For installation at an altitude higher than 1000 m, the correction method recommended in IEC 60694 is convenient to use for purpose of the determination of withstand test voltages.

1.7.3 Electrical Clearance De-rating According to Altitude

If the equipment is specified for operation at an altitude higher than 1000 m, the clearance requirements shall be as per the relevant standards.

1.8 Spare Parts, Tools and Appliances

The bidder shall supply the spares, special tools and/ or appliances which are recommended.

All spares shall be interchangeable with the original parts. They shall be treated and packed for long term storage under the climatic conditions of site.

Each item shall be clearly and permanently labeled on the outside of its container with its description and purpose. When several items are packed in one case, a general description of the contents shall be given on the outside of the case. Spare parts shall not be shipped in the same cases as components, which are used for erection. The cases shall be clearly labeled to indicate that they contain spare parts or tools and each tool or appliance shall be clearly marked with its size and purpose.

All case containers or other packages are liable to be opened for inspection and checking on site.

The cost of recommended spares, special tools (other than those specified in the BOQ) will not be taken into consideration when comparing bids and shall be deemed included with the main component.

1.9 Electrical Power Supplies

a) Power Supplies

Power supplies for plant and equipment shall be as per the technical Specification

b) Terminations and Ferrules

The ends of every wire and every cable tail shall be fitted with numbered ferrules of white with alpha numbers clearly engraved in black.

Moisture and oil resisting insulating material shall be used. The ferrules shall be of the interlocking type and shall grip the insulation firmly.

Wires and terminals associated with tripping circuits shall be distinctively marked.

c) Electrical Insulation

Insulating materials shall be finished to prevent deterioration of their qualities under the specified working conditions.

Plastics, elastomers, resin-bonded laminates and inorganic materials shall be of suitable quality selected from the grades or types in the appropriate IEC Standard.

All cut or machined surfaces and edges of resin-bonded laminates shall be cleaned and then sealed with an approved Varnish as soon as possible after cutting.

d) Electronic and Control Equipment

Equipment shall be capable of withstanding randomly phased transient over-voltages of either polarity on the power supply or interruptions of the power supply without damage or impairment to the equipment's subsequent performance. In the case of controls, no mal-operation shall occur.

Where manufacturers require that electronic equipment supplied under this Contract should not be subjected to insulation resistance tests ("Meggering"), suitable warning notices shall be provided and installed in appropriate locations.

No thermionic valves shall be used in the equipment. Wherever possible, integrated circuits shall be used.

It shall be possible to remove/replace card from/to electronic equipment without damage and without interfering with the operation of the rest of the equipment or system. If necessary, consideration should be given to

switching off the supplies locally to a card to prevent inadvertent interference to the equipment or system during removing/replacing a card.

e) Alternating Current Supply Practice

Double-pole switches shall be used to break single-phase ac mains supplies. For multi-phase supplies, each phase shall be switched simultaneously and the neutral should preferably not be switched. If it is switched, it shall be opened after and closed before the phase-lines.

All mains circuits shall be protected only in the phase-lines by MCBs of suitable rating or by other suitably approved protective devices. The neutral shall be connected by a removable link located near the protective devices.

All main transformers shall have an electrostatic screen, which shall be earthed.

f) Direct Current Supply Practice

Double pole switches shall be used to break dc supplies, one pole for the positive line and one pole for the negative.

DC circuits shall be protected by MCBs of suitable rating installed in both positive and negative lines.

Measures shall be taken to prevent arcing across switches or relay contacts which are required to break inductive circuits (e.g. bypass diodes or capacitors connected across coils).

Power supply bus bars in cubicles shall be shrouded.

The duplicate auxiliary power supply feeders shall be provided in Control panels. Auto-changeover facility in DC DB shall be provided so that in case of failure of one power source, other shall cut in automatically. The protective relays shall not give a trip signal for momentary loss of control Voltage or during changeover of control Voltage.

g) Earthing

Provision shall be made for earthing all equipment intended for connection in an ac mains supply.

All structural metal work and metal chassis shall be connected to earth. Earthing conductors shall be at least equal in cross-sectional area to the supply conductors and shall be capable of carrying the fault current for 1 second.

1.10 Materials and Finishes

1.10.1 General

Unless otherwise provided for in the Contract, all materials, fixtures, fittings, and supplies furnished (hereafter called "materials") shall be new and of standard first grade quality. All assembly and construction work shall be done in a neat and professional manner. Materials shall be free of defects. Materials shall be dispatched only after issuance of dispatch clearance by the Purchaser.

In choosing materials and their finishes, due regard shall be given to the harsh climatic conditions which can occur in the area. The equipment should be hermetically sealed and weatherproof materials should be used wherever possible.

1.11 Packing and Shipping

1.11.1 The goods/materials shall not be shipped/ dispatched unless dispatch clearance from Purchaser/Engineer is issued. The dispatch clearance will be issued by BPC.

1.11.2 Any items liable to be damaged in transit shall be effectively protected and securely fixed in their cases. All cases of over 2 tonnes shall be marked to show where slings should be placed.

1.11.3 All cases shall be clearly identified giving particulars of manufacturer's name and type of equipment. All identification marks on the outside of cases shall be waterproof and permanent. All electrical equipment shall be adequately sealed and desiccating agents used where necessary to prevent damage from condensation. All equipment shall be packed and protected, bearing in mind that it will be shipped to a harsh environment, that a considerable period may elapse between its delivery and it's unpacking and that covered storage may not always be possible.

1.11.4 All wood and other materials used in packing cases shall be insect free. Adequate protection and precautions are to be taken to exclude termites and other vermin, noxious insects, larvae or fungus from the packing materials or plant. All contents are to be clearly marked for easy identification against the packing list.

1.11.5 The Supplier shall protect all steelwork before shipment, to prevent corrosion and/ or damage. Bundles of steel sections shall be properly tied together by an approved method and care shall be taken to ensure that they are robust and that they can be handled easily during shipment.

1.11.6 Bolts and nuts shall be double bagged and crated for shipment. Crating of dissimilar metals is not acceptable.

1.11.7 Packing cases where used, shall be strongly constructed and in no case shall timber less than 25 mm in thickness be used. The contents of packing cases shall be securely bolted or fastened in position with struts or cross battens. Cross battens supporting weight in any direction shall not rely for their support on nails or screws driven lengthwise into the grain of the wood, but shall be supported by cleats secured from inside.

1.11.8 The following information shall be marked on the containers/cartons as well as boxes:

a) Supplier's name and Contract reference
b) Material Description
c) Quantity
d) Net/Gross weight
e) Identification number
f) Purchaser's name with other despatch particulars such as destination

1.12 Supplier Documents and Drawings

1.12.1 General

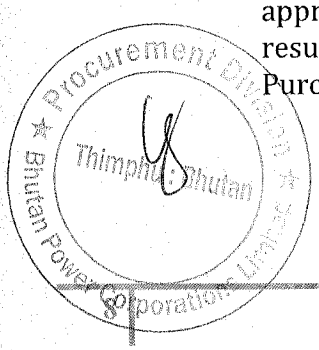
The Supplier shall be responsible for submission, re-submission and obtaining approval as required of all the documents and drawings listed below (but not limited to), so that there shall be no delay to the work due to the absence of such documents and drawings. Any approval by the Purchaser will not relieve the Supplier of any obligations under the Contract.

Any alterations to the documents and drawings which may be required by the Purchaser for approval shall be made by the Supplier at his own expense. All materials and work involved in their manufacture shall be as indicated in such drawings.

No work shall be done on any part of the Goods, the design or construction of which is dependent on the approval of such drawings or data, until such approval has been given.

1.12.2 Manner of Submission and Approval of Drawings

The Supplier shall submit drawing or document (including all the drawings, documents, calculations, manuals required under the Contract) for approval. The Drawings or documents will be returned to the Supplier marked up with approval or any proposed alterations or conditions. The Supplier shall resubmit until 'Approved' or 'Approved with conditions' is given by the Purchaser.



1.12.3 Manuals

The Supplier shall submit the instruction manual for all the goods supplied under the contract. The Supplier shall follow the requirements as mentioned in the relevant clauses in the Technical Specifications.

1.13 Quality Assurance

1.13.1 The manufacturer must operate a quality assurance system that complies with ISO 9000. The Supplier shall provide current certification showing the manufacturers' compliance with ISO 9000 or equivalent national standard. The certificate must be issued by an independent, accredited issuing authority.

1.13.2 In compliance with the proposed quality assurance system of ISO 9000 or equivalent, Bidder shall submit with Bid the quality assurance plan for manufacturing the Goods. Especially, if the Bidder proposes to form a joint-venture or consortium, such a Bidder shall submit with Bid a quality assurance plan, including explanation how to manage the same quality of Goods by the joint-venture partners.

1.14 Inspection and Testing

The materials will be inspected at the Manufacturer's premises by the Purchaser's representative. Tests shall be performed in accordance with the relevant IEC /IS standards. In the absence of IEC/IS recommendations, the tests must be equivalent at least to the conditions, provisions and definitions of the above-mentioned standards. The supplier shall give advance notice for readiness of goods for testing at the manufacturer's premises. The tests shall be divided into the categories described below.

1.14.1 Routine Tests

All the routine tests specified by the standards shall be carried out. If the tests are not witnessed by the Purchaser's representative, test certificates shall be submitted to the Purchaser for approval. Despatch clearance will be given only if the test results are approved.

1.14.2 Type Tests

Bidder shall include with its valid Type Test Certificates, issued by an approved, reputed, independent testing laboratory.

1.15 Dispatch Clearance

1.15.1 The inspector shall issue a "Dispatch Clearance" to the Supplier when the tests and inspection has successfully completed in compliance with the Technical Specifications.
If the tests are not witnessed by the purchaser, the dispatch clearance shall be issued upon the approval of the routine test reports.

1.15.2 The goods have to reach to the delivery warehouse within Twenty (20) days from the date of issuance of dispatch clearance (if the goods are supplied/manufactured from India & Nepal).

1.15.3 The goods have to reach to the delivery warehouse within Forty-Five (45) days from the date of issuance of dispatch clearance (if the goods are supplied/manufactured from Third Countries).