



CORRIGENDUM-II

BID IDENTIFICATION NO: AEGCL/MD/CGM(O&M)/LAR/Tech-241/Rangia Division(A)/Transformer Bay spares/Bid

TENDER DETAILS/NAME OF WORK: Supply of spares for Transformer Bay equipments for 132/33 kV, 50 MVA Transformer at 132/33 kV Grid Substation, Sipajhar, AEGCL

With reference to the above,

1. the unit in BOQ (**Schedule No. 1-Supply**) Points 2 and 3 is to be read as **SET** instead of **No.s**
2. The Technical specifications for Isolators & Surge Arrester is to be read as follows:

4.44 TECHNICAL SPECIFICATION FOR ISOLATORS

4.44.1 SCOPE

4.4.1.1 This section of the specification is intended to cover design specifications for manufacture and testing of 132kV and 33 kV gang operated Isolators with all fittings and accessories.

4.4.1.2 The Isolators are for outdoor installation suitable for horizontally mounting on mounting structures and for use at sub-stations.

4.4.1.3 Isolators shall be supplied with Earth Switch as and where specified.

4.4.1.4 The bidder shall offer ac motor operated Isolators and earth switches.

4.4.2 GENERAL

4.4.2.1 The Isolators and accessories shall conform in general to IS 9921 (or IEC: 62271-102) except to the extent explicitly modified in specification.

4.4.2.2 All isolating switches and earthing switches shall have rotating blades and pressure releasing contacts. All isolating and earth switches shall operate through 90° angle from closed position to fully open position.

4.4.2.3 Complete isolator with all the necessary items for successful operation shall be supplied including but not limited to the following:

- (i). Isolator assembled with complete base frame, linkages, operating mechanism, control cabinet, interlocks etc.
- (ii). All necessary parts to provide a complete and operable isolator installation, control parts and other devices whether specifically called for herein or not.
- (iii) The isolator shall be designed for use in the geographic and meteorological conditions as given in Section 1.

4.4.3 DUTY REQUIREMENTS

4.4.3.1 Isolators and earth switches shall be capable of withstanding the dynamic and thermal effects of the maximum possible short circuit current of the systems in their closed position. They shall be constructed such that they do not open under influence of short circuit current.

4.4.3.2 The earth switches, wherever provided, shall be constructionally interlocked so that the earth switches can be operated only when the isolator is open and vice versa. The constructional interlocks shall be built in construction of isolator and shall be in addition to the electrical and mechanical interlocks provided in the operating mechanism.

4.4.3.3 In addition to the constructional interlock, isolator and earth switches shall have provision to prevent their electrical and manual operation unless the associated and other interlocking conditions are met.

All these interlocks shall be of failsafe type. Suitable individual interlocking coil arrangements shall be provided. The interlocking coil shall be suitable for continuous operation from DC supply and within a variation range as stipulated elsewhere in this specification.

- 4.4.3.4 The earthing switches shall be capable of discharging trapped charges of the associated lines.
- 4.4.3.5 The isolator shall be capable of making/breaking normal currents when no significant change in voltage occurs across the terminals of each pole of isolator on account of make/break operation.
- 4.4.3.6 The isolator shall be capable of making/breaking magnetizing current of 0.7A at 0.15 power factor and capacitive current of 0.7A at 0.15 power factor at rated voltage.

4.4.4 CONSTRUCTIONAL DETAILS

4.4.4.1 All isolating switches and earthing switches shall have rotating blades and pressure releasing contacts. All isolating and earth switches shall operate through 90° angle from closed position to fully open position.

4.4.4.2 Contacts:

4.4.4.3 The contacts shall be self-aligning and self-cleaning and so designed that binding cannot occur after remaining closed for prolonged periods of time in a heavily polluted atmosphere.

4.4.4.4 No undue wear or scuffing shall be evident during the mechanical endurance tests. Contacts and spring shall be designed so that readjustments in contact pressure shall not be necessary throughout the life of the isolator or earthing switch. Each contact or pair of contacts shall be independently sprung so that full pressure is maintained on all contacts at all time.

4.4.4.5 Contact springs shall not carry any current and shall not lose their characteristics due to heating effects.

4.4.4.6 The moving contact of double break isolator shall have turn-and -twist type or other suitable type of locking arrangement to ensure adequate contact pressure.

4.4.4.7 Blades:

4.4.4.8 All metal parts shall be of non-rusting and non-corroding material. All current carrying parts shall be made from high conductivity electrolytic copper/aluminium. Bolts, screws and pins shall be provided with lock washers. Keys or equivalent locking facilities if provided on current carrying parts, shall be made of copper silicon alloy or stainless steel or equivalent. The bolts or pins used in current carrying parts shall be made of non-corroding material. All ferrous castings except current carrying parts shall be made of malleable cast iron or cast-steel. No grey iron shall be used in the manufacture of any part of the isolator.

4.4.4.9 The live parts shall be designed to eliminate sharp joints, edges and other corona producing surfaces, where this is impracticable adequate corona shield shall be provided. Corona shields/rings etc., shall be made up of aluminium/aluminium alloy.

4.4.4.10 Isolators and earthing switches including their operating parts shall be such that they cannot be dislodged from their open or closed positions by short circuit forces, gravity, wind pressure, vibrations, shocks, or accidental touching of the connecting rods of the operating mechanism.

4.4.4.11 The switch shall be designed such that no lubrication of any part is required except at very infrequent intervals i.e., after every 1000 operations or after 5 years whichever is earlier.

4.4.4.12 Insulators:

4.4.4.13 The insulator shall conform to IS: 2544 and/or IEC-60168. The insulators shall have a minimum cantilever strength of 600/400 Kgs. for 145/33 kV insulators respectively.

4.4.4.14 Pressure due to the contact shall not be transferred to the insulators after the main blades are fully closed.

4.4.4.15 Base:

Each isolator shall be provided with a complete galvanised steel base provided with holes and designed for mounting on a supporting structure.

4.4.5 EARTHING SWITCHES

4.4.5.1 Where earthing switches are specified, these shall include the complete operating mechanism and auxiliary contacts.

4.4.5.2 The earthing switches shall form an integral part of the isolator and shall be mounted on the base frame of the isolator.

- 4.4.5.3 The earthing switches shall be constructionally interlocked with the isolator so that the earthing switches can be operated only when the isolator is open and vice versa. The constructional interlocks shall be built in construction of isolator and shall be in addition to the electrical interlocks.
- 4.4.5.4 Suitable mechanical arrangement shall be provided for de-linking electrical drive for mechanical operation.
- 4.4.5.5 Each earth switch shall be provided with flexible copper/aluminium braids for connection to earth terminal. These braids shall have the same short time current carrying capacity as the earth blade. The transfer of fault current through swivel connection will not be accepted.
- 4.4.5.6 The frame of each isolator and earthing switches shall be provided with two reliable earth terminals for connection to the earth mat.
- 4.4.5.7 Isolator design shall be such as to permit addition of earth switches at a future date. It should be possible to interchange position of earth switch to either side.
- 4.4.5.8 The earth switch should be able to carry the same fault current as the main blades of the Isolators and shall withstand dynamic stresses.

4.4.6 OPERATING MECHANISM

- 4.4.6.1 The bidder shall offer motor operated Isolators and earth switches. Earth Switches of 36 kV shall only be motor operated.
- 4.4.6.2 Control cabinet/operating mechanism box shall be made of aluminium sheet of adequate thickness (minimum 3 mm).
- 4.4.6.3 A "Local/Remote" selector switch and a set of open/ close push buttons shall be provided on the control cabinet of the isolator to permit its operation through local or remote push buttons.
- 4.4.6.4 Provision shall be made in the control cabinet to disconnect power supply to prevent local/remote power operation.
- 4.4.6.5 Suitable reduction gearing shall be provided between the motor and the drive shaft of the isolator. The mechanism shall stop immediately when motor supply is switched off. If necessary, a quick electromechanical brake shall be fitted on the higher speed shaft to effect rapid braking.
- 4.4.6.6 Manual operation facility (with handle) should be provided with necessary interlock to disconnect motor.
- 4.4.6.7 Gear should be of forged material suitably chosen to avoid bending/jamming on operation after a prolonged period of non-operation. Also, all gear and connected material should be so chosen/surface treated to avoid rusting.

4.4.7 OPERATION

- 4.4.7.1 The main Isolator and earth switches shall be gang operated.
- 4.4.7.2 The design shall be such as to provide maximum reliability under all service conditions. All operating linkages carrying mechanical loads shall be designed for negligible deflection. The length of inter insulator and interpole operating rods shall be capable of adjustments, by means of screw thread which can be locked with a lock nut after an adjustment has been made. The isolator and earth switches shall be provided with "over center" device in the operating mechanism to prevent accidental opening by wind, vibration, short circuit forces or movement of the support structures.
- 4.4.7.3 Each isolator and earth switch shall be provided with a manual operating handle enabling one man to open or close the isolator with ease in one movement while standing at ground level. Detachable type manual operating handle shall be provided. Suitable provision shall be made inside the operating mechanism box for parking the detached handles. The provision of manual operation shall be located at a height of 1000 mm from the base of isolator support structure.
- 4.4.7.4 The isolator shall be provided with positive continuous control throughout the entire cycle of operation. The operating pipes and rods shall be sufficiently rigid to maintain positive control under the most adverse conditions and when operated in tension or compression for isolator closing. They shall also be capable of withstanding all torsional and bending stresses due to operation of the isolator. Wherever supported the operating rods shall be provided with bearings on either ends. The operating rods/ pipes shall be provided with suitable universal couplings to account for any angular misalignment.
- 4.4.7.5 All rotating parts shall be provided with grease packed roller or ball bearings in sealed housings designed to prevent the ingress of moisture, dirt or other foreign matter. Bearings pressure shall be kept low to ensure long life and ease of operation. Locking pins wherever used shall be rustproof.
- 4.4.7.6 Signaling of closed position shall not take current, peak withstand current and short time withstand reached a position in which rated normal current, peak withstand current and short time withstand

- current can be carried safely. Signaling of open position shall not take place unless movable contacts have reached a position such that clearance between contacts is at least 80% of the isolating distance.
- 4.4.7.7** The position of movable contact system (main blades) of each of the Isolators and earthing switches shall be indicated by a mechanical indicator at the lower end of the vertical rod of shaft for the Isolators and earthing switch. The indicator shall be of metal and shall be visible from operating level.
- 4.4.7.8** The Supplier shall furnish the following details along with quality norms, during detailed engineering stage.
- (i) Current transfer arrangement from main blades of isolator along with milli volt drop immediately across transfer point.
 - (ii) Details to demonstrate smooth transfer of rotary motion from motor shaft to the insulator along with stoppers to prevent over travel.

4.4.8 TEST AND INSPECTION

- 4.4.8.1** The switches shall be subjected to the following type test in accordance to with IS: 9920.
- i. Dielectric test (impulse and one minute) power frequency withstands voltage.
 - ii. Temperature rise test
 - iii. Rated off load breaking current capacity
 - iv. Rated active load breaking capacity
 - v. Rated line charging breaking capacity
 - vi. Rated short time current
 - vii. Rated peak withstand current
 - viii. Mechanical and Electrical Endurance
- 4.4.8.2** The equipment shall be subjected to the following routine test.
- (i) Power frequency voltage dry test
 - (ii) Measurement of resistance of the main circuit
 - (iii) Operating test.

The porcelain will have pull out test for embedded component and beam strength of porcelain base.

4.4.9 AUXILIARY SWITCHES

- 4.4.9.1** All isolators and earth switches shall be provided with 220/110 volts, 6 Ampere auxiliary switches for their remote position indication on the control board and for electrical interlocking with other equipment. In addition to the auxiliary switches required for remote position indications and for their operation. There shall be six pairs of NO and six pairs of NC contacts for each isolating switch and three pairs of NO and three pairs of NC contacts for each earthing switch. All contacts shall be brought out to terminal blocks

4.4.10 CONNECTORS

- 4.4.10.1** Each isolator shall be provided with appropriate number of bimetallic clamping type connectors as detailed in the schedule of requirement. The maximum length of jumper that may be safely connected or any special instruction considered necessary to avoid under loads on the post isolators should be stated by the bidder.

4.4.11 MOUNTING STRUCTURES

- 4.4.11.1** All isolators and earthing switches shall be rigidly mounted in an upright position on their own supporting structures. Details of the supporting structures shall be furnished by the successful tenderer. The isolators should have requisite fixing details ready for mounting them on structures.

4.4.12 PRE-COMMISSIONING TESTS

Contractor shall carry out following tests as pre-commissioning tests. Contractor shall also perform any additional test based on specialties of the items as per the field instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests along with calibration certificates and shall furnish the list of instruments to the Employer for approval.

- i. Insulation resistance of each pole.
- ii. Manual and electrical operation and interlocks.
- iii. Insulation resistance of control circuits and motors
- iv. Ground connections.
- v. Contact resistance.

- vi. Proper alignment so as to minimise to the extreme possible the vibration during operation.
- vii. Measurement of operating Torque for isolator and Earth switch.
- viii. Resistance of operating and interlocks coils.
- ix. Functional check of the control schematic and electrical & mechanical interlocks.
- x. 50 operations test on isolator and earth switch.

4.4.12 TECHNICAL DATA SHEET FOR ISOLATORS

No.	Technical Particulars	Isolators class	
		132 kV	33 kV
1	Nominal system voltage, kV	132	33
2	Highest system voltage, kV	145	36
3	Rated frequency, Hz.	50	50
4.	Type of Isolator	Single Centre Break	Double Break, centre pole rotating
5	Rated continuous current, A	1250	1250
6	Rated short time current, kA	31.5	25
7	Rated duration of short time current, (second)	1	1
8	Rated lightning impulse withstand voltage, kV (peak)		
	i) To earth & between poles	650	170
	ii) Across isolating distance	750	195
9	Rated 1 minute power frequency withstand voltage, kV (rms)		
	i) To earth & between poles	275	70
	ii) Across isolating distance	460	80
10	Minimum Creepage distance of insulators, mm	3625	900
11	Temperature rise	As per relevant IEC 62271 -102/ IS 9921	

4.5 TECHNICAL SPECIFICATION FOR SURGE ARRESTERS

4.5.1 SCOPE

4.5.1.1 This Section covers the specifications for design, manufacture, shop & laboratory testing before dispatch of 220kV, 132 kV and 33 kV 10 kA, Station class heavy duty, gapless metal (zinc) oxide Surge Arresters complete with fittings & accessories.

4.5.2 STANDARDS

4.5.2.1 The design, manufacture and performance of Surge Arresters shall comply with IS: 3070 Part-3 unless otherwise specifically specified in this Specification

4.5.3 GENERAL REQUIREMENT

4.5.3.1 The surge arrester shall draw negligible current at operating voltage and at the same time offer least resistance during the flow of surge current.

4.5.3.2 The surge arrester shall consist of non-linear resistor elements placed in series and housed in electrical grade porcelain housing/silicon polymeric of specified creepage distance.

4.5.3.3 The assembly shall be hermetically sealed with suitable rubber gaskets with effective sealing system arrangement to prevent ingress of moisture.

4.5.3.4 The surge arrester shall be provided with line and earth terminals of suitable size. The ground side terminal of surge arrester shall be connected with 25x6 mm galvanized strip, one end connected to the

- surge arrester and second end to a separate ground electrode. The bidder shall also recommend the procedure which shall be followed in providing the earthing/system to the Surge Arrester.
- 4.5.3.5** The surge arrester shall not operate under power frequency and temporary over voltage conditions but under surge conditions, the surge arrester shall change over to the conducting mode.
- 4.5.3.6** The surge arrester shall be suitable for circuit breaker performing 0-0.3sec.-CO-3min-CO- duty in the system.
- 4.5.3.7** Surge arresters shall have a suitable pressure relief system to avoid damage to the porcelain/ silicon polymeric housing and providing path for flow of rated fault currents in the event of arrester failure.
- 4.5.3.8** The reference current of the arrester shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltage.
- 4.5.3.9** The Surge Arrester shall be thermally stable and the bidder shall furnish a copy of thermal stability test with the bid.
- 4.5.3.10** The arrester shall be capable of handling terminal energy for high surges, external pollution and transient over voltage and have low losses at operating voltages.

4.5.4 ARRESTER HOUSING

- 4.5.4.1** The arrester housing shall be made up of polymer and shall be homogenous, free from laminations, cavities and other flaws of imperfections that might affect the mechanical and dielectric quality. The housing shall be of uniform brown colour, free from blisters, burrs and other similar defects.
- 4.5.4.2** Arresters shall be complete with insulating bases, fasteners for stacking units together, surge counters with leakage current meters and terminal connectors.
- 4.5.4.3** The housing shall be so coordinated that external flashover shall not occur due to application of any impulse or switching surge voltage up to the maximum design value for arrester. The arresters shall not fail due to contamination. The arrester housings shall be designed for pressure relief class as given in Technical Parameters of the specification.
- 4.5.4.4** Sealed housings shall exhibit no measurable leakage.

4.5.5 FITTINGS & ACCESSORIES

- 4.5.5.1** The surge arrester shall be complete with insulating bases, fasteners for stacking units together, surge counters with leakage current meters and terminal connectors.
- 4.5.5.2** The terminals shall be non-magnetic, corrosion proof, robust and of adequate size and shall be so located that incoming and outgoing connections are made with minimum possible bends. The top metal cap and base of surge arrester shall be galvanized. The line terminal shall have a built-in clamping device which can be adjusted for both horizontal and vertical take-off
- 4.5.5.3** Grading corona control rings, if necessary, shall be provided on each complete arrester pole for proper stress distribution.

4.5.6 SURGE MONITOR

- 4.5.6.1** A self-contained discharge counter suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit. Leakage current meter with suitable scale range to measure leakage current of surge arrester shall also be supplied within the same enclosure. The number of operations performed by the arrester shall be recorded by a suitable cyclometric counter and surge monitor shall be provided with an inspection window. There shall be a provision for putting ammeter to record the current/alarm contacts in the control room if the leakage current exceeds the permitted value. Similar provision shall be considered for surge counter also.
- 4.5.6.2** Surge monitor shall be mounted on the support structure at a suitable height so that the reading can be taken from ground level through the inspection window and length of connecting leads up to grounding point and bends are minimum.
- 4.5.6.3** The surge counter shall be provided with a potential free contact rated for 220/110 Volt (DC) which shall close whenever a surge is recorded by the surge monitor. Necessary arrangement shall be provided for extending the contact information to Substation Automation System/RTU.

4.5.7 TESTS

4.5.7.1 Test on Surge Arresters

The Surge Arresters offered shall be type tested and shall be subjected to routine and acceptance tests in accordance with IS: 3070 (Part-3). In addition, the suitability of the Surge Arresters shall also be established for the following:

- i. Residual voltage test
- ii. Reference voltage test

- iii. Leakage current at M.C.O.V
- iv. P.D. test
- v. Sealing test
- vi. Thermal stability test
- vii. Aging and Energy capability test
- viii. Watt loss test
- ix. Each metal oxide block shall be tested for guaranteed specific energy capability in addition to routine/acceptance test as per IEC/IS.

4.5.7.2 The surge arrester housing shall also be type tested and shall be subjected to routine and acceptance tests in accordance with IS: 2071.

4.5.7.3 Galvanization Test

All Ferrous parts exposed to atmospheric condition shall have passed the type tests and be subjected to routine and acceptance tests in accordance with IS: 2633 & IS 6745.

4.5.8 NAME PLATE

The name plate attached to the arrester shall carry the following information:

- i. Rated Voltage
- ii. Continuous Operation Voltage
- iii. Normal discharge current
- iv. Pressure relief rated current
- v. Manufacturers Trade Mark
- vi. Name of Sub-station
- vii. Year of Manufacturer
- viii. Name of the manufacture
- ix. Purchase Order Number along with date

4.5.9 PRE-COMMISSIONING TESTS

4.5.9.1 Contractor shall carry out following tests as pre-commissioning tests. Contractor shall also perform any additional test based on specialties of the items as per the field instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

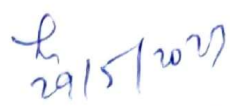
- (a) Operation check of LA counters.
- (b) Insulation resistance measurement.
- (c) Capacitance and Tan delta measurement of individual stacks.
- (d) Third harmonic resistive current measurement (to be conducted after energisation.)

4.5.10 TECHNICAL DATA SHEET FOR SURGE ARRESTER

Particulars	Voltage class	
	132kV	33 kV
Rated voltage of arrester, kV	120	30
Rated frequency, Hz	50 Hz	50 Hz
Nominal discharge current of arrester, kA	10	10
Maximum residual voltage at nominal discharge current, kV (peak)	395	108
Maximum steep current impulse residual voltage at kV (kVP)	440	120
One minute power frequency withstand voltage of arrester insulation, kV (rms)	275	70
1.2 / 50 μ second impulse withstand voltage of arrester insulation, kV (peak)	350	170
Line discharge class	3	2

Insulator Housing		
Power frequency withstand test voltage(wet) (kV rms)	275	70
Lightning impulse withstand tests voltage(KVp)	650	170
Pressure Relief Class	40	40
Creepage distance not less than (mm)	3625	900

All other terms and conditions of the bid document shall remain same.

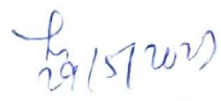

 Chief General Manager (PP&D)
 Assam Electricity Grid Corporation Limited

Memo No: AEGCL/MD/CGM(O&M)/LAR/Tech-241/Rangia Division(A)/10(a)

Date: 29.05.2023

Copy to:

1. IT Cell, O/o the MD, AEGCL, for publication of the corrigendum in AEGCL's Website (Soft copy enclosed)


 Chief General Manager (PP&D)
 Assam Electricity Grid Corporation Limited