TENDER TECHNICAL SPECIFICATION

33 kV Indoor Outgoing HT Panels and Retrofit Integration

SCI Guwahati

Scope: Design, manufacture, supply, factory testing, delivery, detailed interface engineering based on issued existing-panel data, retrofit integration, site testing and commissioning

EXISTING PANEL INTERFACE REQUIREMENT

Existing panel drawings and technical details shall be issued with the tender. The bidder shall review the available information and include all mechanical, electrical, busbar, protection, interlock and control requirements necessary for complete integration with the existing 33 kV switchboard.

1. General

This specification covers the design, engineering, manufacture, assembly, supply, factory testing, packing, forwarding, transportation, transit insurance, delivery at site, retrofit integration, site testing and commissioning of three 33 kV indoor outgoing switchgear panels to be coupled with the existing main HT switchboard at SCI Guwahati. One outgoing panel shall feed the 1600 kVA, 33/0.433 kV transformer associated with LT Panel-1 having a 2500 A incomer,one outgoing panel shall feed the 1250 kVA, 33/0.433 kV transformer associated with LT Panel-2 having a 2000 A incomer and connection to the existing HT panel near Admin block. The supply shall include all equipment, accessories, interface materials, modifications and services required for a complete and operational installation.

The bidder shall ensure compatibility with the existing switchboard and shall not treat the work as supply of standalone cubicles. Items essential for safe and reliable operation, even if not individually listed, shall be included.

2. Schedule of Equipment

Sl. No.	Description	Unit	Quantity
1	One set comprising three indoor 33 kV outgoing HT switchgear panels: (i) one feeder for the 1600 kVA, 33/0.433 kV transformer coordinated with LT Panel-1, 2500 A incomer; and (ii) one feeder for the 1250 kVA, 33/0.433 kV transformer coordinated with LT Panel-2, 2000 A incomer. Panels shall be complete with draw-out VCBs, busbars, CTs/PT, numerical protection, metering, control, annunciation, communication and retrofit integration with the existing main HT switchboard(ii)Connection to existing HT panel near Admin block	Set	1

3. Existing Panel Details and Interface Engineering

- The Employer shall provide the available existing HT switchboard drawings, technical particulars and interface details with tender documents.
- The bidder shall review the provided details covering the existing make, model, construction, dimensions, busbar material and rating, fault level, phase sequence, coupling arrangement, CT/PT ratios, relay scheme, auxiliary supplies, control wiring, interlocks, earthing and available space.
- The bidder shall identify any missing, inconsistent or insufficient interface information during the tender stage and shall submit its assumptions and clarifications with the bid. Requirements reasonably determinable from the issued documents shall be deemed included in the quoted price.
- Before manufacture, the successful bidder shall verify the issued information during detailed engineering and submit interface drawings confirming mechanical, electrical, busbar, protection, control, interlock and communication compatibility. Any physical verification required after award shall be coordinated as part of detailed engineering and shall not constitute a mandatory pre-bid visit.

4. System and Panel Ratings

Parameter	Tender Requirement
Nominal system voltage	33 kV
Frequency and phases	50 Hz, three-phase
Panel rated normal current	Not less than 630 A
VCB rated normal current	1250 A
Main busbar rated current	1250 A, subject to approved compatibility verification
Rated short-time withstand current	31.5 kA for 3 seconds

Parameter	Tender Requirement
Installation	Indoor, floor-mounted
Enclosure protection	Minimum IP4X
Panel construction	Metal-clad, compartmentalised, withdrawable breaker type
Internal arc classification	IAC AFLR at the specified fault level and duration, supported by valid type-test evidence

5. Panel Construction

- Indoor metal-clad switchgear with segregated busbar, breaker, cable and low-voltage control compartments.
- Robust sheet-steel construction with adequate thickness, stiffening, ventilation and vermin protection.
- Withdrawable breaker with service, test and isolated positions, safety shutters and mechanical/electrical interlocks.
- Front access for normal operation and safe maintenance access to cable and control compartments.
- Engraved labels, danger plates, feeder nameplates, rating plates, phase identification and a clear single-line mimic on the fascia.
- Base frame, cross channels, fixing bolts and all materials required for alignment and coupling to the existing switchboard.

6. Vacuum Circuit Breaker

- Three-pole, electrical draw-out vacuum circuit breaker rated 33 kV, 1250 A and 31.5 kA for 3 seconds.
- Motor-wound spring-charged operating mechanism suitable for 230 V AC, with manual charging provision.
- 110 V DC shunt trip coil, closing coil, anti-pumping arrangement and trip-free operation.
- Minimum 10 NO and 10 NC auxiliary contacts per breaker, in addition to contacts required for protection, indication, interlocking and communication.
- Local close/trip controls, ON/OFF/TRIP indication, spring-charged indication, service/test position indication and mechanical operation counter.
- All safety interlocks required to prevent unsafe racking, closing and access operations.

7. Busbars, Earth Bus and Interface

- Main busbars shall be high-conductivity electrolytic copper, rated 1250 A and 31.5 kA for 3 seconds.
- Busbar joints shall be insulated or shrouded, phase-identified, and supported for the specified thermal and dynamic duties.
- A continuous copper earth bus sized for the specified fault duty shall extend across the new panels and connect securely to the existing switchboard earth bus.
- All busbar extensions, adapter chamber, links, splices, supports, sleeves and jointing materials required for the existing-board connection shall be included.
- Phase sequence and busbar alignment shall be verified at site and through approved interface drawings before manufacture.

8. Cable Compartment and Termination

- Bottom-entry cable compartment suitable for one run of 33 kV (E) grade, 3-core x 300 sq.mm XLPE aluminium armoured cable per outgoing panel.
- Adequate cable bending radius, supports, clamps, termination height and electrical clearances shall be provided.

- The bidder shall explicitly state in the offer whether cable termination kits, glands and lugs are included. The panel-side termination provisions and cable box are mandatory.
- Where a busbar adapter chamber is required instead of cable termination, the complete adapter and connection materials shall be included.

9. Current and Voltage Transformers

- Three CTs per outgoing panel shall be provided. For the 1600 kVA transformer feeder, the nominal CT ratio shall be 30/5 A for metering and protection cores. For the 1250 kVA transformer feeder, the nominal CT ratio shall be 25/5 A for metering and protection cores. Final ratios shall be confirmed through the approved protection, metering and relay-coordination study.
- Metering core shall be Class 0.5, 15 VA. Protection core shall be Class 5P20, 15 VA, subject to final coordination requirements.
- Where restricted earth fault protection is applicable, appropriate matched or PS-class CT requirements and neutral CT/interface shall be included.
- One draw-out air-insulated cast-resin PT, $33/\sqrt{3}$ kV / $110/\sqrt{3}$ V, 50 VA, Class 0.5/3P or as required, complete with primary HT fuses and secondary MCBs. The bidder shall confirm whether the approved arrangement requires a common PT or one PT per cubicle.

10. Metering

- Each outgoing feeder shall have a multifunction or trivector meter with CT/PT inputs.
- The meter shall display current, voltage, frequency, power factor, kW, kVA, kvar and energy parameters.
- RS485 Modbus RTU communication shall be provided.
- A separate ammeter and selector switch need not be provided where all required current functions are available in the approved multifunction meter.

11. Protection and Control

- One numerical multifunction protection relay shall be provided for each outgoing panel, suitable for 110 V DC auxiliary supply.
- Minimum functions shall include 50/51 phase overcurrent, 50N/51N earth fault, high-set elements, 27 under-voltage, 59 over-voltage, trip circuit supervision and breaker failure/LBB 50BF.
- The relay shall provide event recording, fault recording and disturbance recording.
- Transformer protection, restricted earth fault functions and relay settings shall be provided as applicable to each feeder and coordinated separately for the 1600 kVA and 1250 kVA transformers, including the transformer neutral arrangement, CT scheme and corresponding LT incomer protection.
- Master trip/lockout relay 86, auxiliary trip relays, hand-reset indication, DC healthy supervision and all interposing relays required for a complete protection scheme shall be included.
- The bidder shall prepare and submit protection coordination, CT/PT selection and relay-setting calculations, coordinated with the existing panel, transformer protection and APDCL system requirements.

12. Annunciation and Indication

- Minimum 12-window annunciator with hooter, accept, reset and lamp-test functions shall be provided, unless an equivalent integrated relay/HMI arrangement is approved.
- Breaker status, protection operation, DC healthy, spring charged, common alarm and common trip indications shall be provided.
- All alarm and trip circuits shall be wired to labelled terminal blocks.

13. Auxiliary Power and Internal Wiring

- One coordinated 110 V DC power pack with battery backup sufficient for a minimum of three breaker trips shall be provided. The bidder shall state battery type, autonomy, charger rating and supervision features.
- 230 V AC supply shall be used for spring-charging motors, space heaters, thermostats, panel lamps and service sockets. Where no external auxiliary supply is available, the bidder shall include the necessary power arrangement and clearly state the source.
- Each relevant compartment shall have a space heater with thermostat. Panel illumination and a 230 V service socket shall be provided.
- Internal control wiring shall be FRLS copper, ferruled and numbered, with control MCBs/fuses, wiring ducts, labelled terminal blocks and at least 20% spare terminals.
- Protection, metering, control and communication wiring shall be properly segregated.

14. BMS / SCADA Interface

- Numerical relays and multifunction meters shall have isolated RS485 communication using Modbus RTU. Ethernet or IEC 61850 may be offered where compatible with the existing system and approved.
- Potential-free contacts and communication points shall include VCB ON/OFF, VCB trip, spring charged, service/test position, relay healthy, DC healthy, protection operation, common alarm and common trip.
- All metered electrical parameters shall be available through communication.
- Protocol documents, register maps and a complete point list shall be submitted before FAT.

15. Retrofit Integration with Existing HT Panel

- Shutdown planning and coordination with the Employer and APDCL.
- Opening or dismantling the required portions of the existing switchboard.
- Busbar extension, adaptation, cutting, drilling, jointing and coupling to the new cubicles.
- Secondary wiring modifications, interlock extensions, relay integration and control-supply integration.
- Earthing continuity, labelling, touch-up painting and restoration of affected portions.
- Functional testing and recommissioning of the complete affected HT switchboard, not only the newly supplied cubicles.
- Retrofitting and busbar work shall be executed or supervised by the original panel manufacturer or an authorised and competent switchgear service agency acceptable to the Employer.

16. Site Safety and Method Statement

- Before site work, the bidder shall submit a detailed method statement, risk assessment, shutdown programme and lock-out/tag-out plan.
- Temporary barriers, earthing, warning signs, PPE and all safety arrangements required for work on or adjacent to existing HT equipment shall be included.
- Work shall proceed only after approval and confirmed isolation of the affected equipment.

17. Factory Acceptance Test

Factory inspection and FAT are mandatory. One engineer from ACCF and authorised PMC representative(s) shall visit the manufacturer’s works. The bidder shall bear the costs of travel from Guwahati, local conveyance, boarding, lodging and all inspection arrangements. No panel shall be dispatched without written FAT clearance.

- Minimum 15 calendar days written notice of readiness shall be provided.
- Approved drawings, test procedures and formats shall be available before inspection.

- FAT shall include visual and dimensional checks, mechanical operation, racking and interlocks, wiring continuity, insulation resistance, applicable power-frequency withstand tests, CT/PT ratio and polarity checks, secondary injection, relay logic and trip tests, annunciation, metering, power pack, communication and BMS/SCADA signal simulation.
- Breaker timing and contact resistance shall be demonstrated where applicable.
- Waiver of inspection shall not relieve the bidder of contractual responsibility.

18. Standards and Type-Test Requirements

- IEC 62271-200 for metal-enclosed switchgear and controlgear.
- IEC 62271-100 for alternating-current circuit breakers.
- IEC 62271-102 for disconnectors and earthing switches, where applicable.
- IEC 61869 series for instrument transformers.
- Other applicable IS/IEC standards and APDCL, CEIG/Electrical Inspectorate and statutory requirements.

Valid type-test reports from CPRI, ERDA, NABL-accredited or internationally recognised laboratories shall be submitted for the offered or demonstrably equivalent design. Reports shall cover short-time and peak withstand, temperature rise, dielectric tests, internal arc classification, degree of protection and relevant circuit-breaker duties.

19. Site Testing and Commissioning

- Visual and dimensional inspection after installation and coupling.
- Insulation resistance, wiring continuity and earthing continuity tests.
- Breaker mechanical operation, racking and interlock checks.
- CT/PT ratio, polarity and secondary-circuit checks.
- Secondary injection and end-to-end trip verification of protection functions.
- Metering, annunciation, power pack and auxiliary-supply checks.
- BMS/SCADA point-to-point and communication testing.
- Busbar joint inspection/torque verification and phase-sequence confirmation.
- Controlled energisation and commissioning of the complete affected HT switchboard.
- Submission of signed test and commissioning reports.

20. Drawings and Documents

- General arrangement, panel dimensions, weights and foundation/channel plan.
- Single-line diagram, busbar/interface drawings and coupling details.
- Schematic and wiring diagrams, terminal schedules and interlock logic.
- CT/PT details, relay configuration, protection study and approved settings.
- Cable termination details and BMS/SCADA point list with Modbus register maps.
- Routine and type-test reports, FAT report and calibration certificates.
- Relay setting/configuration files and communication files in editable format.
- O&M manuals, recommended spares list, commissioning records and as-built drawings in hard copy and editable soft copy.

21. Mandatory Bid Submissions

Sl. No.	Mandatory Submission	Bidder Compliance
1	Review confirmation of issued existing-panel details and compatibility statement	
2	Clause-by-clause compliance statement and deviation schedule	
3	Preliminary GA and interface arrangement	

Sl. No.	Mandatory Submission	Bidder Compliance
4	Confirmed panel, VCB and busbar ratings	
5	Type-test reports including IAC AFLR evidence	
6	CT/PT details and preliminary protection philosophy	
7	Numerical relay and meter technical data	
8	DC power pack configuration and autonomy	
9	BMS/SCADA communication details and point list	
10	Detailed retrofit scope and proposed authorised execution agency	
11	FAT plan and confirmation of ACCF/APDCL visit costs	
12	Warranty, commissioning support and recommended spares	

22. Warranty, Training and Service Support

- The complete panels, retrofit modifications and commissioning work shall be covered by the warranty stated in the tender conditions. The bidder shall clearly state the offered warranty period.
- Defects attributable to design, material, manufacture, interface engineering or workmanship shall be rectified without cost to the Employer during warranty.
- On-site training shall be provided for breaker operation and racking, numerical relay, alarms, power pack, emergency operation and safe maintenance.
- The bidder shall confirm availability of OEM service support and critical spares.

23. Consolidated BOQ Scope Statement

Design, manufacture, supply, factory testing, packing, forwarding, transportation, transit insurance, delivery at site, retrofit integration, testing and commissioning of one set comprising three 33 kV indoor outgoing switchgear panels: one panel for the 1600 kVA, 33/0.433 kV transformer coordinated with LT Panel-1 having a 2500 A incomer, and one panel for the 1250 kVA, 33/0.433 kV transformer coordinated with LT Panel-2 having a 2000 A incomer. Each panel shall be complete with draw-out 1250 A vacuum circuit breaker, copper busbars, earth bus, feeder-specific CTs (30/5 A for the 1600 kVA feeder,25/5 A for the 1250 kVA feeder and another feeder for Admin block HT panel, subject to approved protection study), PT, numerical multifunction protection, metering, annunciation, 110 V DC power pack, internal wiring, BMS/SCADA interface, cable/busbar interface provisions and all accessories. The scope shall include review of the existing-panel drawings and technical details issued with the tender, detailed interface engineering, coupling with the existing HT switchboard, busbar and secondary wiring modifications, interlocks, protection coordination, shutdown planning, FAT and all travel, boarding, lodging and local conveyance costs for one ACCF engineer and authorised PMC representative(s), site tests and recommissioning of the complete affected HT switchboard.