

**TERM TENDER FOR SUPPLY, INSTALLATION, REPAIR AND COMMISSIONING OF 12 KV INDOOR SWITCHGEAR AND ANCILLARY EQUIPMENT FOR NEW INTERNAL ARC RATED INSTALLATIONS
TENDER NO:321G/2024/25**

- 7.7.3 Switchgear shall have the enclosed gas ducting plenum fitted to the top of the switch-panels and running horizontally over the length of the switchboard. Switchgear internal arc pressure relief designs that in addition require the installation of a vertical gas ducting end-plenum to channel hot gasses from lower switchgear compartments into the top plenum shall be to the Engineer's approval.
- 7.7.4 The use of deflector plates or any other hot gas and overpressure control measures that provide for the release of such hot gasses and / or overpressures inside the switch room shall not be acceptable.
- 7.7.5 Exhaust ducting for standard switchgear installations shall be designed to exhaust to the rear of the switchboard, and through the rear wall of the switch room. The standard minimum clearance from the rear side of the switchgear to the switch room rear wall is 1 metre, as shown on drawing PRA 2300 (Proposed Standard Substation 11 Panel (Cement Tile – Pitched Roof) Compact Duct).
- 7.7.6 Exhaust ducts shall be tendered complete, based upon exhausting of hot gasses to the rear of the switchboard, and shall include the end unit and all ducts, joints, fasteners and other parts necessary to extend from the switchgear gas ducting plenum to outside of the switch-room.
- 7.7.7 Outdoor exhaust ducts shall have the end unit and all other components that will extend past the outside wall of the substation building constructed from 3CR12 stainless steel and powder coated. Indoor exhaust ducts may be constructed from galvanised mild steel or other material to the approval of the Engineer.
- 7.7.8 Exhaust designs providing for an alternative of exhaust ducting to the one side of the switchboard through the side wall of the switchroom are encouraged but such switchgear must also provide for the rear exhausting specified above as side exhausts can be utilised only in specific applications where substation layout permits.
- 7.7.9 Bolted gland plates shall be provided in the cable termination chamber and it shall be demonstrated that an internal arc occurring within any compartment of the switchgear will not result in the bolted gland plate being dislodged.
- 7.7.10 The gas ducting top plenum and exhaust ducting shall not encroach on the minimum clearance required above the switchgear in terms of SANS 62271-200 for the specified maximum substation ceiling height unless the tenderer provides type test certification verifying the specified Internal Arc Withstand with the reduced clearance.
- 7.7.11 The gas ducting top plenum and exhaust ducting shall not obstruct access to the control / relay compartment top entry for multi-core cables.
- 7.7.12 The circuit breaker compartment of AIS switchgear shall be designed and IAC tested for circuit breaker racking behind closed doors.
- 7.7.13 The tendered price per switch panel shall include all gas ducting that is to be assembled onto such switch panel as part of the gas ducting top plenum in the completed installation, irrespective of whether such gas ducting is supplied and delivered assembled on the switch panel, separately as a complete assembly, or separately in kit form. Costs of supply and of installation of end-covers for either end of the gas top plenum shall be separately itemised with the busbar end-covers and cosmetic end sheets where provided for in the price schedule.

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Contractor shall detail in the signed Works Project Document any outstanding issues prerequisite for commencement of the works.

23 TRANSPORT TO THE WORKS PROJECTS SITES

- 23.1 The Works Projects shall be for work to be executed at substation sites throughout the area of supply of the Employer, but specific Works Projects substation sites have not been determined at the time of going to tender.
- 23.2 The cost of collection of equipment at Ndabeni Stores and transport and delivery of the equipment to the Works Projects substation sites, and the cost of all other personnel and equipment transport to the Works Projects substation sites for the duration of the Works Project shall be tendered separately as a single item per installation, as indicated in the schedules.
- 23.3 Tendered prices shall be based upon a standard distance of 20 km from the Ndabeni Stores to the Works Projects substation site, and upon a standard switchboard size for the Works Projects of 9 panels. Additional costs incurred due to specific project requirements that exceed these standard figures shall be measured and claimed at Tendered Rates for Additional Measured Quantities, and shall be to the approval of the Engineer.

24 WORKS PROJECT SITE WORKS

- 24.1 Substation building construction and / or floor modifications at the Works Project site will be carried out by others. The site layout and switch room for each installation will be detailed on specific PRA drawings provided by the Employer at the time for each substation. The typical indoor switchgear substation building layout is detailed in PRA 2300.
- 24.2 To provide a suitably level surface the Contractor shall provide, install and permanently affix galvanised steel floor frames, to which the switchgear shall be mounted and fixed.
- 24.3 The rates for the manufacture, supply and delivery of the floor frames (per switch-panel) shall be detailed where provided for in the Schedule of Rates. The cost of the installation and affixing of the floor frames is not separately itemised and shall be included in the installation cost tendered per switch-panel. Floor frames shall be delivered directly to site, and not to the Employer's Stores.
- 24.4 The trench cover boards shall be provided by others. The Contractor shall be responsible for providing dimensioned drawings within five working days of the approval of the Works Project Document that detail the floor frame design and layout for the particular Works Project in relation to the trench layout depicted on the specific PRA drawing. In the event that such floor frame design and layout drawings are not provided by the Contractor in time to inform the manufacture of the trench cover boards, the Contractor shall be responsible for the modification of the supplied trench cover boards to suit the floor frame layout.
- 24.5 The Contractor shall be responsible for site inspection and floor level measurements at the Works Project site prior to commencement of the installation work in order to confirm that the substation site and floor levels are suitable for the installation of the switchgear tendered.

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- 28.2.2 All control, relay and other ancillary equipment panels installed under this contract shall have a continuous earth bar of cross-sectional area not less than 95 mm² run along the bottom of the panels. One end of each panel earth bar shall be connected to the station earth bar. Earth bars shall be located internally where possible.
- 28.2.3 Metal cases of instruments and metal bases of relays on the panels shall be connected directly to the panel earth bar by braided conductors having a cross-sectional area not less than 2,5 mm². The earthing may not comprise conductors looped from panel to panel or relay to relay with a common conductor to the station earth bar. Any such arrangement will be rejected.
- 28.2.4 When apparatus or instruments are accommodated on panel or cubicle doors or swinging frames, flexible cable or braid shall be used for earthing items. The door hinges will not be accepted as a means of earthing this part of the equipment.
- 28.2.5 Except when otherwise approved a stud type terminal of diameter not less than 12 mm or a tapped boss of equivalent size shall be provided on the outside of each cabinet or structure for the purpose of making the connection to the switching station main earth bar.
- 28.2.6 All earthing shall be located internally as far as possible and shall be painted the same colour as that of the switch panels.
- 28.2.7 The Works shall include the connection of all apparatus to the switching station main earth bar which will be installed as part of this Contract.
- 28.2.8 The Contractor shall be responsible for providing, fixing and connecting all earth bars between all metal structures and the main earth bar.

29 INSTALLATION OF BATTERY TRIPPING UNITS AND POWER SUPPLY UNITS

- 29.1 Where specified in the Scope of Work of the Works Project Document the Contractor shall be responsible for the collection from Ndabeni Stores, delivery to Works Project sites and the installation, testing and commissioning of free-issue battery tripping units and /or power supply units at the rates tendered in the Schedules of Rates.
- 29.2 Battery tripping units and power supply units shall be supplied by others.
- 29.3 Battery tripping units will be either 30V_{dc} or 110V_{dc} supply, as specified in the Scope of Works of the particular Works Project Document.
- 29.4 Battery tripping units and power supply units shall be floor mounted over the trench provided on the interior side or front wall, as required for the specific project. Specific details shall be provided on the Employer's PRA drawing for that project. A typical installation position is detailed in the attached standard drawing PRA 2300.
- 29.5 The auxiliary power multi-core cable required to supply the switch board from the battery tripping unit is included in the cost of supply, installation and termination of multi-core and auxiliary cabling external to the switch board, which is tendered as a single separate item per switch board, as indicated in the schedules. Additional costs incurred due to specific project requirements over and above the specified standard length shall be measured and claimed at Tendered Rates for Additional Measured Quantities, and shall be to the approval of the Engineer.

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29.6 Additional auxiliary power multi-core cable required in the event that a power supply unit is required in addition to a battery tripping unit shall be measured and claimed at Tendered Rates for Additional Measured Quantities, and shall be to the approval of the Engineer.

30 INSTALLATION OF REMOTE TERMINAL UNITS (RTUs)

30.1 Where specified in the Scope of Work of the Works Project Document the Contractor shall be responsible for the collection from Ndabeni Stores, delivery to Works Project sites and the installation of free-issue Remote terminal Units (RTUs) at the rates tendered in the Schedule of Rates.

30.2 RTUs shall be supplied by others.

30.3 RTUs shall be wall mounted above the trench provided on the interior side or front wall, as required for the specific project. Specific details shall be provided on the Employer's PRA drawing for that project. A typical installation position is detailed in the attached standard drawing PRA 2300.

30.4 The cost of supply and installation of the auxiliary power multi-core cable required to supply the RTU from the battery tripping unit is to be measured and priced at the approved Tendered Rates for Additional Measured Quantities, and shall be to the approval of the Engineer.

30.5 The costs of supply and installation of ruggedized Ethernet Fibre from the Ethernet Switch in the Busbar Earth panel (or of 12 twisted-pair, Aluminium/Polyester tape screened, stranded 0,22 mm² data cable required between switch-panel(s) and the RTU, if applicable) shall be measured and priced at the approved Tendered Rates for Additional Measured Quantities.

31 INSTALLATION OF SUPERVISORY MARSHALLING KIOSKS

31.1 Where specified in the Scope of Work of the Works Project Document the Contractor shall be responsible for the collection from Ndabeni Stores, delivery to Works Project sites and the installation, connection, testing and cold-commissioning, at the tendered rates, of free-issue Supervisory Marshalling Kiosks (SMKs). (This is expected to be applicable in the case of Installation of existing ABB Unigear ZACB switch-panels with hard-wired SCADA facilities that are currently held in stock, as per Item A of the specification).

31.2 SMKs will be 10-way, 14-way or 25-way, as specified in the Scope of Works of the particular Works Project Document. The SMKs will be supplied by others.

31.3 SMKs shall be floor mounted over the trench provided in the position indicated by the Engineer or detailed on the Employer's specific PRA drawing for the Works Project. A typical installation position is detailed in the attached standard drawing PRA 2300.

31.4 The Contractor shall supply, install and terminate the 12 twisted-pair, Aluminium/Polyester tape screened, stranded 0,22 mm² data cable required between each switch-panel and the SMK at the approved Tendered Rates for Additional Measured Quantities. Termination of the data cable shall utilise boot-lace ferrules to the Engineer's approval.

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TENDER NO:321G/2024/25**

- 31.5 Data cable between the Switch-panels and the SMK shall be installed on cable racks and cable ladders which, where specified in the Scope of Work of the Works Project Document, shall be supplied and installed by the Contractor at the Tendered Rates for Additional Measured Quantities.
- 31.6 The Contractor shall be responsible for providing redline drawings of the SCADA facilities as installed on handover, and detailed as-built drawings of the SCADA facilities as installed in the Works Project Manual within two weeks of the Handover of the Works Project.

32 INSTALLATION OF METERING CUBICLES

- 32.1 Where specified in the Scope of Work of the Works Project Document the Contractor shall be responsible for the collection from Ndabeni Stores, delivery to Works Project sites and the installation of free-issue Metering Cubicles at the rates tendered in the Schedule of Rates.
- 32.2 Metering Cubicles shall be supplied by others.
- 32.3 Metering Cubicles shall be wall mounted above the trench provided on the interior side or front wall, as required for the specific project. Specific details shall be provided on the Employer's PRA drawing for that project. A typical installation position is detailed in the attached standard drawing PRA 2300.

33 AFTER-HOURS WORK

- 33.1 After-hours work necessary as a consequence of specific requirements of the particular Works Project shall be identified and approved at the time of acceptance of the Work Project Document, and only the nett additional cost of the after-hours work over and above the rate for normal working hours shall be covered, at the approved rates.
- 33.2 All labour costs for the installation work during normal working hours shall be included in the tendered installation rates per equipment item.
- 33.3 In order to provide the basis for determination of the personnel costs for after-hours work the hourly labour rates for normal-time work shall be detailed in the Pricing Schedule.
- 33.4 The additional costs for after-hours work (over and above the normal-hours rates already included in the tendered installation rates per equipment item) shall be calculated from these rates on the basis of the nature and expected duration of the actual after-hours work planned for the specific Works Project.
- 33.5 Overtime costs for Saturdays and after-hours work on Weekdays shall be at 50% of the normal time rate and overtime costs for Sundays and Public Holidays shall be at 100% of the normal time rate.

34 CONTRACTOR'S SUPERINTENDENCE

- 34.1 The Contractor shall until the end of the defects notification period make such arrangements as to ensure the attendance on the Site within 24 h of being called upon by the Engineer of a competent Supervising Engineer for the purpose of