

Eraring Energy

Requirements Specification for 11kV Fly Ash Australia 1250kVA Supply Upgrade

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1.0 General Information

1.1 Scope of Works

Eraring power station supplies electricity to Fly Ash Australia (FAA) from the Unit 3/4 station 11kV supply system.

It has become necessary to upgrade the FAA power supply. These works involve the replacement of:

- 11kV Underground to Overhead (UGOH) transition point (14F3) including surge arresters, drop out fuses and air break switch.
- FAA substation No1 transformer
- Substation 11kV cabling, air break switch (ABS), fuses, and 415V cabling

1.2 Location of Site

The Site is located within the grounds of Eraring Energy's Eraring Power Station.

The Eraring Power Station is located off the Sydney- Newcastle Expressway (F3), between Morisset and Toronto, near Dora Creek, approximately 150 km north of Sydney, New South Wales.

Eraring Energy's site staff hours of work are 7 am to 4 pm

The standard general requirements applicable to the Site are set out in Part 2a Contractor Standard General Site Requirements, and the ambient weather conditions likely to occur are indicated in Table D.

1.3 Tender Contact Officer

All enquires regarding this tender shall be directed to the Contact Officer:

Teresa Hudson

Email: teresa.hudson@eraring-energy.com.au

Phone: (02) 4973 0594

During the tender period and up to the time the contract is awarded, tenderers may not communicate in any way regarding this tender, with any Eraring Energy employees or agents other than the Contact Officer noted above. Failure to comply with this requirement will be considered a breach of the Code of Practice and may result in disqualification of a tender.

1.4 Design Concepts – Not Used

1.5 Competence and Experience

The Tenderer and/or the proposed consultative associates and subcontractors must be both competent and experienced in all aspects of the work covered by this Specification and be capable of advising on and implementing design changes within the broad scope of this Specification which may be required by Eraring Energy. Tenderers shall provide information with the Tender to support their competence and detail their experience.

1.6 Site Inspection

Site inspection is mandatory. A common Site Inspection will be held for all prospective Tenderers at **10am Wednesday 24th March 2010** departing from Eraring Power Station, Main Entrance. Any special access or other requirements to the Works shall be noted and shall be allowed for in the Tender. Further details regarding this Site Inspection shall be obtained by contacting the Contact Officer. Note Eraring Energy will not accept any costs pertaining to attendance of the site inspection. Pre-registration of attendees is recommended to ensure all attendees may be accommodated.

Site Inspection is mandatory. Names of those attending are to be forwarded to the Contact Officer at least 24 hours prior to the site inspection to ensure all attendees may be accommodated.

1.7 Contract Separable Portions – Not Used

1.8 General Description of Power Station Plant – Not Used

2.0 Major Requirements

2.1 Extent of works to be provided under the contract

- Disconnection, removal and transportation of existing 500kVA transformer to nominated location within power station site.
- Supply and installation of one 1250kVA 11kV/415V 3 phase ground mount transformer.
- Supply, installation and termination of 11kV 3 core insulated cables from the top of transformer yard landing structure to the transformer terminal box.
- Supply, install and terminate 415V cables from the transformer 415V terminals to the FAA Switchboard.
- Remove and replace nominated 11kV dropout fuses.
- Inspecting, testing and commissioning of the new transformer
- Supply and redesign of the existing pole apparatus at the 11kV cable to overhead transition point (pole 14F3) to cater for the installation of surge arresters drop out fuses and air break switch. Assessment of the integrity of the existing power pole.
- All civil works including plinth, bund, drains and piping and any clearing work.

A single line diagram has been provided in Appendix 1.2 to aid in the description of the extent of works. The diagram indicates the terminal points marking beginning and end of scope of works.

2.2 General Requirements

2.2.1 The Tenderer shall advise in the tender, the lead time between placement of an order and delivery to site for the transformer.

2.2.2 The Contractor shall make available, a commissioning engineer from the transformer manufacturer to assist with placing the equipment in service.

2.2.3 The transformers shall be supplied under an arrangement, in which they become the Principal's property when they are accepted at the destination. The Contractor shall deliver the Transformer to the Principal's Eraring Power Station site and the Contractor shall be responsible for any transit damage and obtaining proof that such damage has occurred during transit. The Contractor shall provide at least two working days notice of delivery.

2.2.4 The Contractor shall arrange for unloading of the transformers at site. The road over which the transformers will be transported is all weather gravel pavement. The Contractor shall supply as part of this Contract all special rigging equipment required for handling the transformer by a mobile crane such as spreader beams etc.

2.2.5 The Contractor shall obtain all required site information to ascertain the extent of work, timetables and spatial limitations involved in the delivery of the transformers. No claims for additional costs or delays due to a lack of familiarity with site conditions etc will be accepted.

2.3 Removal Requirements

2.3.1 The Contractor will liaise with the Principal to obtain electrical isolation of the 11kV circuit for a suitable outage time. A minimum of 2 weeks notification shall be given for electrical isolation.

2.3.2 The Contractor shall be responsible for the disconnection, removal, transportation, handling and storage of the existing transformer to a location specified by the principal.

2.4 11kV/415V Transformer Supply

2.4.1 General

2.4.1.1 This section is for the supply and delivery of one (1) 11kV/415V oil cooled transformer rated at 1250kVA.

The transformer shall be of the outdoor, weatherproof, oil immersed type, complying with the requirements of AS 2374 except where varied by this specification. Asbestos shall not be used, in any form in any part of the transformer.

2.4.1.2 The transformer shall be connected delta / star in accordance with the vector group Dyn1.

2.4.1.3 The service conditions shall be in accordance with AS 2374 with the exception that the maximum air temperature will be 43.3°C and the average daily temperature (averaged over the year) is 23.1°C (Table D refers).

2.4.1.4 Lugs shall be provided for lifting the transformer when filled with oil and ready for service. They shall be positioned such that any slings attached for lifting will not foul any part of the transformer and when suspended by them, the transformer shall hang without tilting.

2.4.1.5 All parts of the transformer including the main tank cover that must be removed for inspection or repairs, shall be fitted with lifting facilities suitable for use with slings and shackles.

2.4.1.6 Four suitably positioned jacking lugs shall be provided on the transformer for handling purposes. Four towing lugs shall be provided one on each side of the transformer to permit towing of the transformer on its wheels in any direction.

2.4.1.7 The transformer shall be capable of withstanding without significant distortion or electrical failure, the maximum fault conditions for three seconds, at any terminal or any tapping.

2.4.1.8 The design of the transformer shall be such that the noise level is kept as low as possible and in any case, it should not exceed the audible sound level stated in AS 2374. The transformer supplier shall provide noise level information with the tender.

2.4.1.9 The transformer shall not produce any emission likely to cause interference with communication equipment.

2.4.2 Cooling

2.4.2.1 The method of cooling the transformer shall be Oil Natural Air Natural (ONAN). The design shall allow for continuous operation in direct sunlight.

2.4.2.2 The transformer shall be supplied filled with high grade, non sludging, pure mineral insulating oil that meets the requirements of AS 1767.1-1999

2.4.2.3 The cold oil level shall not be below the top of all cooling tubes/fins and shall be such that all parts of the cable leads inside the tank are fully immersed.

2.4.3 Windings

2.4.3.1 The windings shall be supported and clamped in order to withstand the stresses imposed during normal service, short circuits and transport.

2.4.3.2 The insulation of the windings and tapping leads shall be suitably reinforced to withstand voltage surges. Tappings and coils shall be arranged so as to preserve the magnetic symmetry of the windings.

2.4.3.3 The conductors shall be free from scale, burrs and splinters and shall have suitable rounded corners to reduce electrostatic stress concentration. A sample of the conductor used shall be made available for inspection before winding commences. All joints between conductors shall be welded or brazed.

2.4.3.4 The insulation shall be applied to the conductors in a manner that will minimise the occlusion of air.

2.4.3.5 No spaces, blocks, strips, washers or barriers shall be affixed to the insulation on the conductors or turns by any adhesive material, composition or compound.

2.4.3.6 A detailed description of the concentration of the windings shall be included in the Tender. Details on the following items in particular are required.

- The method of reinforcing the insulation to withstand voltage surges;
- The manner in which the arrangement of tappings and coils preserves the magnetic symmetry of the windings.
- The method adopted for the even distribution of impulse voltage stresses. This description shall indicate the location and function of any device employed and its effect on the fault detection methods used in the impulse withstand tests.
- The techniques used to eliminate corona discharge within the transformer under normal and test voltages.

2.4.4 Impedance

2.4.4.1 The impedance of the transformer shall not be less than $6\% \pm 0.2\%$. The transformer impedance shall be taken as the value measured at rated current and principal tap. The Tenderer shall state the temperature at which the transformer meets this impedance value.

2.4.4.2 The impedance value shall be guaranteed. If the impedance value of a particular transformer on test fails to meet the guaranteed figure including the allowable tolerance, then the transformer may be rejected.

2.4.5 Core Construction

2.4.5.1 The core shall be constructed to withstand without significant deterioration the stresses imposed by service conditions, transport and ordinary handling during installation, inspection and repair.

2.4.5.2 The core insulation shall not be affected significantly by heating, attack by insulating oil, or ageing. Insulated packets of the core shall be connected to minimise potential differences between them.

2.4.5.3 All nuts shall be securely locked in position by approved means.

2.4.5.4 The cores shall be equipped with lifting arrangements of approved design.

2.4.5.5 Core and frame earthing connections shall be accessible for testing by links mounted in a terminal box mounted on the top of the tank.

2.4.6 Tank

2.4.6.1 The tank shall be of electrically-welded construction suitably stiffened and braced to prevent distortion or damage under testing and service conditions or during lifting and handling and of sufficient strength to withstand transport shock. The tank shall be manufactured from steel. The tank shall be capable of withstanding a vacuum of 0.05 torr.

2.4.6.2 The tank shall be oil-tight to withstand, without leakage, the tests specified in this specification.

2.4.6.3 Burrs and sharp edges on plates and tank edges shall be removed.

2.4.6.4 Means shall be provided for locating the transformer core correctly within the tank.

2.4.6.5 Any pockets in the tank which may collect gas shall be connected to the gas accumulation relay.

2.4.6.6 An oil drain valve shall be provided on the lowest possible part of the tank and installed such that the inlet does not protrude above the tank internal surface. The valve shall be a brass gate type. A plug shall be supplied in the open end of the valve.

2.4.6.7 The filling hole shall be located at the top of the transformer. The filling hole shall be fitted with a sealing plug.

2.4.6.8 An earthing stud of 12mm diameter with at least 50mm of thread, for connecting an earthing conductor, shall be provided near the bottom of the tank as close as practicable to the secondary neutral terminal. The earth stud shall be welded directly to the tank or to a bracket which is welded to the tank. There shall be no bolted connections in the electrical path between the stud and the tank.

2.4.6.9 The earthing stud shall be of stainless steel. Painting and other non conductive coatings are not acceptable.

2.4.7 Lid

2.4.7.1 The lid shall be made from steel and preferably be fabricated with welded joints. No significant distortion shall occur whilst the lid is being lifted. It shall be so designed and constructed as to ensure the elimination of all air pockets during the oil filling process.

2.4.7.2 There shall be more than one access hole in the transformer lid to facilitate the removal and installation of bushings and current transformers and to provide access to the marshalling box without disturbing the leads. Access holes, if circular, shall be a minimum of 45cm in diameter. If rectangular or oval, they shall have minimum dimensions of 43 cm by 29 cm. All access hole covers shall be provided with lifting handles.

2.4.7.3 All covers and oil pipes shall be secured to the tank by bolts or studs and jointed with gaskets. Screwed joints shall not be used where oil tightness is required.

2.4.7.4 The transformer lid shall be bolted to the tank and gasketed.

2.4.7.5 The transformer lid shall be permanently indented to indicate the transformer centre lines.

2.4.8 Gaskets

2.4.8.1 The tenderer shall submit details of the proposed materials, surface treatment and method of location and compression control for the gaskets in all the oil joints including those between the tank and the lid. The design Principal shall be based on long term prevention of oil loss with a minimum of 10 years as the base.

2.4.8.2 All gaskets shall be impervious to, be unaffected by, and have no harmful effect on hot transformer oil. Natural rubber based materials will not be acceptable.

2.4.8.3 All gasket material shall be non-flammable and not subject to melting at temperatures likely to be experienced during an oil fire.

2.4.9 Pressure Relief Vent

2.4.9.1 A vent shall be provided for relieving the tank of excessive pressure in the event of a fault. The vent shall be as described below or a pressure relief device may also be provided. If such a device is provided the discharge side shall be cowled so that oil cannot be sprayed beyond the bund area. The Tenderer shall indicate release and reset pressures of the pressure relief device.

2.4.9.2 The free end of the vent shall be closed from atmosphere by a diaphragm and the air space between the oil and the diaphragm shall be connected to the conservator. The lifting pressure of the diaphragm shall be stated on a label adjacent to the diaphragm.

2.4.9.3 The vent shall direct the oil vertically downwards to discharge within the bund wall enclosure provided should the diaphragm lift. The inlet of the vent pipe shall be located in a position where it does not collect gas.

2.4.9.4 During the pre-tender inspection the Tenderer shall ensure that the size of the existing bund is adequate to contain the oil contents of the proposed transformer in the event of an oil spill. If the existing bund is found to be inadequate the Contractor shall include in their tender the scope of works required to extend the bund.

2.4.10 Tapchanger

2.4.10.1 An off-load type tap changer shall be provided on the primary (11kV) winding with a tapping range of +5% to -5% of the rated voltage in steps of 2.5%.

2.4.10.2 The tapchanger shall have an external adjustment handle which shall be capable of being padlocked in each position.

2.4.10.3 Each tapping position shall be identified by a number clearly and indelibly stamped into either the switch or the transformer tank. Tap position No 1 shall correspond to the full winding in circuit, i.e. maximum “plus” tapping.

2.4.10.4 The tapping switch operating spindle shall be arranged in such a manner so as to prevent oil leaking or the transformer breathing along the tapping switch operating shaft.

2.4.11 Instrumentation

2.4.11.1 Valves required for installation and maintenance shall be provided.

2.4.11.2 All valves used for the fitting of external hoses or for draining purposes shall be fitted with plugs.

2.4.11.3 At least two thermometer pockets shall be provided in the transformer lid for testing purposes. One pocket shall be placed near the edge and one close to the middle of the lid. The pockets shall be fitted with caps to prevent water or debris ingress.

2.4.11.4 Oil sampling points shall be provided to sample oil from important locations for condition monitoring purposes. Each sampling point and valve shall be brought to a point not greater than one metre above ground level. The oil sampling points shall be labelled to indicate the source from which the oil is taken. Screwed caps with captive chains shall be provided on sampling valves.

2.4.11.5 A compound pressure gauge shall be connected to the top of the tank to indicate the pressure present whilst vacuum filling of the transformer is underway, or if nitrogen sealing when the oil level has been lowered. The gauge shall be suitable for a range of 0 to 125 kPa absolute.

2.4.11.6 The gauge shall be mounted in position between 1.7 and 2 metres above ground level and the connecting pipe shall be fitted with a cock at its lower end for the connection of the gauge.

2.4.11.7 An indicating thermometer of an approved capillary tube type fitted with an adjustable pointer shall be provided in a thermometer pocket on each transformer to indicate top oil temperature.

2.4.11.8 The sensing element shall be mounted so that it can be removed from the tank without lowering the oil level.

2.4.11.9 Indicating devices on the transformer shall be mounted in such positions that they are visible to an observer approaching the transformer. Oil temperature indicators shall be mounted in a weatherproof cabinet supported by resilient mountings on the transformer tank.

2.4.12 Transformer Cable Boxes and Terminal Arrangement

2.4.12.1 11kV incoming and 415V outgoing terminations shall be via cable boxes. The cable boxes shall be suitable for use with 'Raychem' or equivalent heat shrink terminations. The cable boxes shall be suitable for termination of three core cables.

2.4.12.2 Phase to phase clearances of 11kV cable boxes shall be as recommended in section 3 of AS 2067. These clearances shall be obtainable with connecting lugs fitted and, preferably, without the use of barriers. Any special fittings or materials necessary to achieve satisfactory clearances shall be supplied and fitted by the transformer manufacturer. The cable boxes shall be of adequate size to accommodate the cable terminations, allowing adequate space for dressing and shaping of the cable cores.

2.4.12.3 The cable boxes shall be weatherproof, dust and vermin proof and supplied complete with flexible connectors, ferrules, compression type glands, armour clamps, etc. Metallic glands fitted to the box shall be insulated from the box and provided with removable earthing connectors.

2.4.12.4 Attention shall be paid to the cable box design so as to ensure that condensation does not allow the accumulation of water within the box. The correct terminal connections shall be marked on an engraved plate permanently fixed to the outside of the cable box

2.4.12.5 All cable boxes shall be designed for bottom cable entry.

2.4.13 Earthing

2.4.13.1 The neutral of the 1250kVA transformer secondary star point shall function as a protective earth neutral (PEN). The star point shall not be connected to earth.

2.4.13.2 The transformer tank shall be earthed directly to the earth grid via the earth connection stud detailed in 2.4.6.8. The earth cable shall be 1 single - core Green/Yellow PVC / PVC V90, 120 mm². The voltage grade shall be 0.6/1kV.

2.4.14 Fault Rating

2.4.14.1 The HV side of the 1250kVA transformer must be able to withstand a fuse-limited fault current of 10kA rms.

2.4.15 Energisation

2.4.15.1 At energisation, the transformer inrush current shall not exceed 12 times the transformer primary current.

2.4.15.2 Both the 1250kVA and the existing 500kVA transformer may be energised at the same time however only one transformer may be loaded at any one time.

2.4.16 Rating and Terminal Marking Plates

2.4.16.1 The rating and marking plates shall contain all the transformer information required by AS 2374. Additionally, the normal tank operating pressure shall be shown. All quantities shall be stated in metric units.

2.4.16.2 The terminal working plate shall show a diagram of internal connections, a legend stating which tapplings are connected at each of the tapping switch positions and a voltage vector diagram.

2.4.16.3 The rating and diagram plates shall be manufactured from stainless steel with the lettering etched or otherwise indelibly formed.

2.4.17 Painting

2.4.17.1 Internal surfaces shall be treated with a finish resistant to transformer oil or nitrogen as applicable.

2.4.17.2 All internal and external steel surfaces of the tank shall be thoroughly cleaned by shot or sand blasting to remove all rust and grease prior to the application of paint finishes.

2.4.17.3 External surfaces may be treated generally in accordance with manufacturer's standards provided that the manufacturer guarantees satisfactory trouble free life in the environment specified herein.

2.4.17.4 Accessories, fixings and all such equipment shall be of a material which will ensure satisfactory trouble free life in the environment specified herein.

2.4.18 Transport, Storage and Information to be provided

2.4.18.1 The Contractor shall arrange for the delivery of the transformers to the Principal's power station site. The Contractor shall ensure that the route the transformer will follow to site has been thoroughly cleared with the carrier and traffic authorities for both weight and dimensional clearances.

2.4.18.2 The Contractor shall liaise with the carrier company and utilise the correct method and equipment for transporting the transformers. The Transformer shall remain in a vertical position at all times during transport and handling. The tie down system shall allow for retightening in transit.

2.4.18.3 The Contractor shall ensure that the transformer, together with all associated parts and components, is suitably protected against the elements while in transit.

2.4.18.4 The Contractor shall provide written instructions for the transport, storage, installation, operation and maintenance of the transformer as part of this Contract as detailed below. The instructions for the transport, installation and storage shall be provided at least ten weeks before delivery and the instructions for the operation and maintenance shall be provided by the time of delivery at the latest.

2.4.18.5 Included in the instructions provided shall be information for unpacking and lifting safely, including details of any special lifting and positioning devices which are essential. The Contractor shall provide such devices if any, as part of this Contract.

2.4.18.6 Instructions of installation shall include sufficient details of dimensions, locations and foundations to enable site preparation. These instructions shall also indicate the mass of each transformer.

2.4.18.7 Instructions on installation shall include information on termination of conductors comprising the necessary advice to prevent overheating and unnecessary strain on the transformer terminals and to provide adequate clearance distances.

2.4.18.8 Instructions shall be provided for the final installation inspection and tests which should be made after the transformer has been installed and all connections completed. The instructions shall include a schedule of recommended tests, procedures for carrying out any adjustments and final inspection before placing into service.

2.4.19 Documentation

2.4.19.1 The operation instructions shall include but not be limited to the following:

- A general description of the transformer, 11kV disconnector, dropout fuses and surge arresters with particular attention to the technical description of the apparatus characteristics and operation.
- A description of the protection features.
- A description of the actions necessary for operation, isolation, maintenance and testing.
- A list of electrical data.

2.4.19.2 The maintenance instructions shall include but not be limited to the following:

- Extent and frequency of maintenance required.
- Detailed description of the maintenance work.
- Comprehensive drawings of the details of the apparatus and its connections.
- List of maintenance materials that will be required.
- Tests required after maintenance work.

2.4.19.3 The Contractor shall provide recommendations and detailed instructions for the short and long term storage of the transformer.

For all the instructions and drawings required above, the Contractor shall provide two hard copies plus one electronic version (PDF).

2.4.19.4 The Contractor shall provide details of Transformer testing results prior to the transformer being shipped /delivered from the manufacturer.

2.4.20 Alternative Offer

2.4.20.1 The Tenderer is invited to submit, as an alternative offer, a pressurised Nitrogen sealed type transformer. The design shall prevent air and moisture from coming in contact with insulating oil.

2.4.20.2 The Contractor shall provide the Nitrogen gas cylinders together with all pressure regulating equipment.

2.5 Electrical Works

2.5.1 11kV UGOH pole (14F3)

2.5.1.1 The Contractor is to inspect the pole, assess its condition (i.e. rot, termite or weather damage), and replace if necessary. If replacement of the pole is necessary then the schedule of rates provision of clause 3.9.2 shall apply.

2.5.1.2 The pole equipment on existing UGOH (14F3) shall be removed and returned to the power station store.

2.5.1.3 The existing 40A fuse and cross arm installed at the adjacent pole shall be removed and replaced with conductor.

2.5.1.4 The Contractor shall design a new pole arrangement with surge arresters, disconnector and drop out fuses as depicted in Appendix 1-1.1. The pole apparatus shall be installed and conductor re-tensioned.

2.5.1.5 The existing HV underground power cables are terminated at the top of the (UGOH) pole. The Contractor shall re-terminated using a termination kit of type 3M™ or of the equivalent type in Raychem manufacture. The Tenderer shall provide details of the proposed termination kit in their tender. The Contractor is to ensure that all fittings are compatible.

2.5.1.6 All clearances to be designed according to ENA C b(1) 2006.

2.5.2 Transformer Installation

2.5.2.1 The Contractor shall be responsible for transporting and handling the new 11kV/415V transformer from its storage place at site and installing it on its plinth. The Contractor shall consult with the transformer manufacturer regarding the correct handling procedure and lifting requirements, and provide all equipment necessary to move and install the transformers on its plinth.

2.5.2.2 Any special provisions applied for protecting the new 11kV/415V transformer during transport and storage shall be removed by the Contractor. The Contractor shall make a preliminary check before handling the transformer and any visible damage observed shall be immediately reported to the Principal.

2.5.2.3 The Contractor shall determine the correct position of the transformer on the plinth with regards to incoming and outgoing cabling directions and terminal relationships, and correctly position the transformer ensuring it is centrally located on the plinth and level. Any special provisions applied for protection during transport, such as packing or additional core clamping, shall be removed.

2.5.2.4 The transformer shall always be handled in the upright position. If the lifting lugs are to be used for placing the transformer on its plinth, then the lifting cables shall be of the appropriate length such that the transformer is lifted evenly. If lifting jacks are to be used, the jacks shall be placed under the transformer bottom plates at points designated by the manufacturer.

2.5.2.5 The Contractor shall install any components that may have been removed for transport. The Contractor shall ensure all components are intact on completion of the installation.

2.5.2.6 The Contractor shall be responsible for any clearing work required.

2.5.2.7 The Contractor shall design and construct the concrete plinth for the new transformer. The plinth shall be suitable for mounting the transformer and shall be large enough to allow maintenance operations to be carried out conveniently.

2.5.2.8 The Contractor shall design and construct suitable bunds around the transformer. The bund shall be large enough to contain all the oil in the transformer tank plus 20%. If a pressure relief device is provided, the Contractor shall ensure the oil discharge does not overshoot the bund wall.

2.5.2.9 The bund shall be constructed with a suitable drain and piping system. The Contractor shall install all drain pipework from the bund to the nearest drain.

2.5.3 Transformer Yard HV Cabling

2.5.3.1 The HV power cables terminating at pole (14F1) and running to the transformer terminals shall be 3-core Cross Linked Polyethylene 35mm² (XLPE) with stranded compacted copper cores and a 5kA/1sec copper screen with extruded black PVC oversheath of grade 5 V-90 compound. The voltage grade shall be 12.7/22kV.

2.5.3.2 The existing bare conductor shall be removed.

2.5.3.3 Stress relief of the cable shall be provided by the use of stress tape or other approved method. All materials for the dry type termination such as tapes, heat-shrink tubing, pre-moulded slip-ons etc. shall be approved by the Principal.

2.5.3.4 The cable end boxes and terminations complete with cables shall be submitted to the Principal for inspection before the stress tapes, the outer sleeving, are fitted.

2.5.3.5 Only after high voltage, phasing and other tests have been carried out, shall power cable joints and portions of the copper work left bare for making the cable connections, be taped or sleeved.

2.5.3.6 The HV cable at the cable to overhead transition (pole 14F1) shall be re-terminated using a termination kit of type 3M™ or of the equivalent type in Raychem manufacture. The Tenderer shall provide details of the proposed termination kit in their tender. The Contractor is to ensure that all fittings are compatible.

2.5.3.7 The HV cable will run down the terminating pole on 300mm x 37mm Uni tray (Ladder Support Cable Tray), maintaining a fixed bending radius of 660mm, along the ground and up to the transformer feeding the cables into the HV terminal box. Connections at the terminal box are to comply with clause 2.4.12. The cable tray is to be covered on top and bottom.

2.5.3.8 A chequer plate covered platform steel platform is to be built over the HV cable tray structure to give safe access to the front cover of the transformer terminal box. Contractor shall provide proposed detailed arrangement drawings.

2.5.4 LV Cabling

2.5.4.1 The LV power cables from the transformer terminals to the FAA switchboard shall be 3 single - core XLPE / PVC V90, 500mm² per phase (i.e. 9 cables in total). The voltage grade shall be 0.6/1kV.

2.5.4.2 The LV side of the transformer will have a neutral cable connected. This cable shall be 1 single - core XLPE / PVC V90, 500mm². The voltage grade shall be 0.6/1kV.

2.5.4.3 The LV cable shall be run in trefoil formation and fastened to the cable tray using trefoil clamps.

2.5.4.4 The LV cable will run down from the LV terminal box on 450mm x 37mm Uni tray (Ladder Support Cable Tray), maintaining a fixed bending radius of 222mm, along the ground, and feeding up into the new FAA Switchboard. The cable tray is to be covered on top and bottom.

2.5.4.5 A chequer plate covered steel platform is to be built over the LV cable tray structure to give safe access to the front cover of the transformer terminal box. Contractor shall provide proposed detailed arrangement drawings

2.5.5 Instrument Cabling

2.5.5.2 A separate cable tray shall be installed together with a new 4 core, 2.5mm² instrumentation cable between the temperature monitoring equipment on the transformer and the new FAA switchboard. The instrumentation cable shall be separated from the 415V cabling by 300mm.

2.5.6 HV Fuses

2.5.6.1 Fuses for high voltage service shall be of the drop out type complying with the requirements of AS 1033.2-1988. The fuses shall be suitable for interrupting the prospective fault current.

2.5.6.2 The fuse at the underground to overhead transition point shall be a current-limiting fuse with a rating of 125A able to withstand the in-rush current at the energisation of both the 1250kVA and the 500kVA transformers. The fuse must be able to safely limit a prospective RMS fault current of 30kA to a value less than 10kA.

2.5.6.5 The existing 40A dropout fuses at the termination pole, (pole 14F1) shall be removed and replaced with 100A dropout fuses.

2.5.6.7 The time-current and let-through (I^2t) characteristics of all fuse types shall be submitted for the approval of the Principal.

2.5.7 Air Break Switches and Surge Arresters

2.5.7.1 Ref drawing in Appendix 1-1.2 the Contractor shall replace the existing surge arrestors at pole 14F1 with units selected to protect the new transformer and XLPE cable.

2.5.7.2 The Contractor shall survey the existing air break switches at the transformer end of the overhead conductor (pole 14F1 and 14F2) and replace if necessary. If replacement of the pole is necessary then the schedule of rates provision of clause 3.9.2 shall apply. The new switches should be rated at 11kV. The switch at pole 14F1 should also be rated for a minimum 66A continuous current and 10kA (peak) fault current. The switch at pole 14F2 should also be rated for a minimum 26A continuous current and 5kA (peak) fault current.

2.5.8 3/4 Station Services Switchboard Protection Equipment

2.5.8.1 The Westinghouse CO-11, CAG 37, FAC14 relays and the 75/1 CT's of the 3/4 Station Services Switchboard the Fuel Oil Area Pad Mounted Substation, Weighbridge Area Substation and Fly Ash Substation shall be removed and returned to the power station store.

2.5.8.2 The functions of the above three relays, Instantaneous Over Current (IOC), Instantaneous Earth Fault (IEF), Extremely Inverse Time Over Current (EITOC) shall be achieved with a multi function relay. Alstom MiCOM p120/121/122/123, or an equivalent type will be acceptable.

2.5.8.3 The relay shall be connected to the existing 400/1 CT's on the 3/4 Station Services Switchboard.

2.5.8.4 The relay settings and testing shall be carried out by the Principal.

2.5.8.5 The Contractor shall mark up existing protection documentation and issue during design phase.

3.0 Additional Requirements

3.1 Contract Terminal Points

The terminal points for the plant are shown generally on EE-SLD001 located in Appendix 1-1.2 and shall be as follows:

- The 11kV cable termination at the underground to overhead transition point, (pole 14F3)
- Fly Ash Australia 415V Switchboard power and control terminals.

3.2 Contract Interfaces – Not Used

3.3 Guarantee of performance of Works – Not Used

3.4 Works Provided by Eraring Energy

The principal will liaise with the Contractor to provide isolation of the appropriate circuit for suitable outage time.

3.5 Maintenance Tools and Appliances

3.5.1 One complete set of all SPECIAL spanners, tools and appliances including special slings and lifting equipment necessary for maintaining the whole of the plant including that plant supplied by Subcontractors, shall be provided. The spanners and tools supplied under this Clause shall be new and shall not be used during the erection of the plant. A list of such spanners, tools and appliances shall be given in the appropriate Schedule in the Commercial and Technical Schedules.

3.5.2 Grease guns, spanners and tools which are of a size and type which could be reasonably expected to be readily available to tradesmen in Australia are not required to be provided under this Clause.

3.5.3 Spanners, tools and appliances ordered with the plant shall be deemed to be part of the Separable Portion of the Works programmed to be the earliest to reach Practical Completion.

3.6 Spare Parts

3.6.1 The Tenderer shall list in the appropriate Schedule in the Commercial and Technical Schedules the individual prices of the spare parts (if any) included in the Tender Price together with the prices of all other spare parts that the manufacturer recommends should be held. Unit prices should be stated and the price given shall be valid for any reasonable quantity required under the Contract by Eraring Energy.

3.6.2 Eraring Energy may order all or any number of the parts at its discretion. The Contractor shall supply the parts selected at the individual prices stated in the Schedule.

3.6.3 All parts ordered shall be interchangeable and suitable for use in place of corresponding parts supplied with the plant. They shall comply with the Specification and shall be suitably marked or numbered for identification and prepared for storage in an approved manner to prevent deterioration.

3.6.4 Consumable spares such as mill grinding parts, liquid regulator electrodes, carbon brushes, gland packing's, instrument charts, inks, etc., which will require replacement at intervals of less than 12 months, shall be provided as part of the Contract and the price included in the Tender Price. The consumable spares shall be sufficient for one year's normal usage. Where an item is not listed in the appropriate schedule and requires replacement in less than 12 months from the date of Practical Completion, such replacement shall be deemed to be a defect under the provisions of Clause 35 of the General Conditions of Contract unless agreed otherwise by the Principal.

3.6.5 Spares ordered with the plant shall be deemed to be part of the Separable Portion of the Works programmed to be the earliest to reach Practical Completion as shown on Table A - Table of Key Dates.

3.6.6 In addition to the spare parts which may be ordered by Eraring Energy, the Contractor shall ensure that for the duration of the Contract, a reasonable stock of spare parts, which could be required for normal routine maintenance, be held in Australia by the Contractor or Subcontractors. The Contractor shall also ensure that spare parts are promptly supplied to enable the Contractor's obligations, under the terms of Clause 35 of the General Conditions of Contract, to be carried out expeditiously.

3.6.7 The Contractor shall not depend on the spares held by Eraring Energy to allow them to carry out their obligations under the Contract, particularly with regard to defects liability.

3.7 Temporary Interruptions of Works

Tenderers shall note that it may not be possible to proceed continuously with the work under the Contract covered by this Specification. Tenderers shall include in their offers for minor interruptions of work as may be reasonably required for any portion, or part thereof, of the work covered by this Specification.

3.8 Standard Requirements of Works

3.8.1 Eraring Energy's standard general requirements are set down in Part 2a Contractor Standard General Site Requirements and Tenderers shall note particularly the statements contained in Clause 4-1.

3.9 Particular Tender Pricing Requirements

3.9.1 In accordance with the provisions of the General Conditions of Contract this Contract will be part Schedule of Rates and part Lump Sum.

3.9.2 Where the Principal directs that work under the Contract will be carried out on a Schedule of Rates basis, the rates charged for hourly labour shall allow for all costs such as, but not limited to, profit, statutory allowances, small tools and consumables including welding consumables, plant and equipment (except where special plant and equipment is required and is specifically requested, in writing by the Principal), welding machines, scaffolding, cranes, lifting tackle, accommodation and supervision that is necessary to carry out the work.

3.9.3 The Tenderer shall complete all supplied Pricing Schedules by entering, opposite each labour category or work item listed or offered the Rate/Price and other relevant pricing information necessary to complete the Schedule. The labour rates shall apply to the Contractor's normal work hours.

The Tenderer shall note that any of Eraring Energy's estimated quantities shown for Schedule of Rates items are indicative only and are not guaranteed by Eraring Energy.

3.9.4 Where items of work are carried out on an hourly rate basis in accordance with Clause 3.9.2, timesheets, the format of which shall be approved by the Principal, are to be completed by the Contractor and presented daily to an officer nominated by the Principal for checking and certification. Claims for payment not supported by timesheets or accompanied by uncertified timesheets may be rejected.

3.9.5 Where, with the agreement of the Principal, materials or other ex-works expenditure not covered elsewhere under the Contract or specialist labour is used in a Subcontractor capacity, whether in the course of Schedule of Rates work or otherwise, then the Contractor shall be reimbursed at the Subcontractor GST exclusive invoiced cost to the Contractor, for supply and delivery of materials to Site or for provision of service, plus a handling fee, not to exceed 10% of the Subcontractors GST exclusive invoiced cost and which is to be nominated as a percentage in the Tender in Schedule 2.6. The handling fee shall include for all procurement and other overhead administrative costs, charges, expenses and profit.

In each case, the Contractor shall obtain at least three competitive quotations for the materials or services and shall accept the lowest quotation unless the Principal approves otherwise. The Contractor shall supply to Eraring Energy a certified copy of the Contractor's orders which shall show all pricing details for checking purposes. In addition, where the cost of an item exceeds \$10,000 the Contractor shall supply evidence of competitive quotations being obtained.

3.9.6 Where, with the agreement of the Principal, plant and/or equipment is used in accordance with Clause 3.2.5, the Contractor shall include daily records certified by the Principal of all such plant or equipment (with the exception of small tools) in the daily time-sheets.

Where such plant or equipment is being leased, the Contractor shall advise the Principal when the cumulative hire/lease cost of any single item exceeds 50% of the capital value of the item. The Principal shall have the option, after reviewing the expected further use of the item, to direct the Contractor to purchase it and hand it to Eraring Energy at Practical Completion. The Principal shall not be responsible for accumulated hire costs exceeding the capital value of the item unless the Contractor has been authorised in writing by the Principal to continue such hire.

3.9.7 Claims for payment shall include a clear indication of the work covered by the claim and shall be split into the items and columns listed in Schedule 2.4 - Tender Prices.

The Tenderer shall note that the required format of the Pricing Schedules for each Separable Portion shall be as shown in the following table:

Schedule	Purpose
Schedule 2.4	Design, Supply & Installation of a 1250 KVA Transformer & its associated equipment - Lump Sum Prices
Schedule 2.5	Site Facilities & Establishment - Lump Sum/Schedule of Rates Prices
Schedule 2.6	Schedule of Rates
Schedule 2.7	Summary of Prices

3.9.8 The Tenderer shall submit a separate lump sum price for each item listed in Schedule 2.4 - Tender Prices, in the Commercial and Technical Schedules. Site Facility and Establishment costs as stated in Clause 3.2.9 shall not be included in such Lump Sum Prices.

3.9.9 Due to the nature of Site Establishment/Disestablishment and Maintenance of the Contractor's site facilities, the Tenderer is to submit prices as follows:

- (a) Site Establishment and setting up of Contractor's site facilities.
- (b) Site vacating and removal of Contractor's facilities.

A lump sum price covering the above work is to be stated on Schedule 2.5.

This sum shall be applicable, irrespective of whether any item of work is added or deleted by Eraring Energy.

NOTE: Site Establishment and Disestablishment will not be paid for adjoining Portions of the Contract.

- (c) Maintenance of Site facilities.

The Tenderer shall submit a firm rate per week in Schedule 2.5 to cover maintenance of site facilities from the Date of Possession of Site to the Date for Practical Completion. Part weeks shall be calculated on a 7 day week pro rata basis.

This firm rate per week shall also be used in the event of the program being extended beyond the original Date for Practical Completion due to additional work.

NOTE: The Contractor shall only be entitled to claim for Site Facility Establishment, Disestablishment and Maintenance under one contract during any one period. As such should the Contractor currently be established within the Eraring Power Station Site under another Contract, no allowance should be made for Establishment or Disestablishment of Contractor site facility.

Weekly maintenance may be quoted but shall not commence until expiry of the existing contract.

3.9.10 Tenderers shall submit all Tender prices on the basis of at least an average 38-hour working week. If the Contractor intends to work shift work this shall be stated in the Tender.

3.9.11 For additional work carried out after Practical Completion at the direction of the Principal under Schedule 2.6 - Schedule of Rates, the program dates, for the purposes of the Price Adjustment Provisions, shall be deemed to be the actual dates during which the work is carried out.

3.10 Warranty Transfer

3.10.1 The Contractor will, if required by Eraring Energy, assign or transfer to Eraring Energy the benefit of any manufacturer's warranty applying to new plant or equipment supplied by the Contractor to Eraring Energy. Any such assignment or transfer shall, however, be without prejudice to the Contractor's obligations under Clause 35 of the General Conditions of Contract.

3.11 Defects Liability Period

3.11.1 Subject to Clause 35 of the General Conditions, and with reference to Clause 6.10 of the Contractor Standard General Site Requirements the Defects Liability Period for the Works shall commence on the Date of Practical Completion and shall end on the expiration of 24 calendar months of "operation on load". For the purpose of the foregoing, the Works shall be deemed to be "operating on load" when the Transformer is first successfully energised.

3.11.2 The Defects Liability Period shall be extended by one day for each day on which the works cannot be operated (when Eraring Energy would otherwise have required it to operate) for any period in excess of one continuous hour for a reason for which the Contractor is responsible.

3.11.3 Where, for a reason for which the Contractor is not responsible, the expiration of 24 calendar months of "operation on load" is delayed, Eraring Energy shall be liable to the Contractor for any additional expense to which the Contractor may be put in rectifying its defects.

3.11.4 Not Used.

3.12 Approval to Proceed

3.12.1 During the course of the Contract, the Contractor may be requested to carry out additional work not the subject of a work item in Schedule 2.4 Tender Prices of the Contract. Such work may be carried out under provisions of the Contract but work shall not commence until the Principal has approved the proposal in writing.

3.12.2 No item of work shall commence on the Site (including surveys) until approval is obtained from the Principal.

Where additional work pursuant to Clause 36 of the General Conditions is to be carried out at the approved Schedule of Rates, the hours of work shall be to the Principal's approval. Overtime shall not be worked unless specific approval has been granted by the Principal for both the Contractor and his Subcontractors.

3.13 Insurance of Plant

3.13.1 Eraring Energy's property is insured by Eraring Energy whilst under the Contractor's care and control. Work performed on it by the Contractor is to be insured by the Contractor as work under the Contract.

If Eraring Energy's Plant and Equipment needs to leave the Site for the purpose of work under the Contract, the Contractor will arrange transit insurance. The Contractor is required to give the Principal five working days' notice of its intention to transport Eraring Energy's plant and equipment to and from the Contractor's store or that of a Subcontractor.

However, the Contractor remains liable for the safe keeping of Eraring Energy's plant and equipment.

3.14 Inspections and Tests

3.14.1 The issue of a Release Certificate by the Principal for plant following inspections and tests at the Contractors/Subcontractors Works shall not prejudice the right of the Principal to reject the whole or part of the plant if it does not comply with the Contract when erected on the Site.

3.14.2 In so far as is practicable, all rotating plant shall be assembled with its associated motor in the manufacturer's works and run at normal speed to check the balance, alignment of parts and the performance of bearings and other parts.

3.14.3 All stages of transformer manufacture and testing shall be subject to inspection by the Principal. The Contractor shall provide at least two days notice prior to a particular manufacturing stage commencing.

3.14.4 The following minimum tests, as specified in AS 2374, shall be carried out at the factory:

- Measurement of Winding Resistance.
- Ratio and Phase Relationship Checks.
- Impulse test.
- Impedance Voltage, Short Circuit Impedance and Load Losses.
- No-load Loss and Currents.
- Induced Over-voltage Withstand.
- Separate - Source Voltage Withstand.
- Insulation Resistance.
- Temperature rise.
- Dielectric Strength of Oil

3.14.5 Certified evidence of type tests previously carried out on equipment, which in essential detail is representative of that required under the following clause, may be accepted as applicable under the Contract.

3.14.6 Three certified copies of all test results shall be supplied to site upon completion of the factory test, and thereafter upon completion of the site tests. No item of plant shall be despatched from the transformer supplier's works until the test certificates have been approved.

3.14.7 Prior to commissioning, the Contractor shall provide for the Principal's approval ITPs that list each category of tests mentioned above. These test sheets shall list all the tests and methods of testing.

3.14.8 The Contractor shall commission, record all settings and verify the satisfactory operation of all the electrical equipment in the Contractor's scope of supply. These details shall be recorded on the Contractor's commissioning check sheets. Two copies of all commissioning check sheets shall be submitted to the Principal prior to the equipment being placed into service. The Principal shall carry out the placing into service of the equipment, however, where final adjustments are required either during or after placement into service, such adjustments are to be carried out by the Contractor.

4.0 Quality System Requirements

4.1 Quality System Standard

The applicable quality system Standards for the Works or components thereof shall be as follows, AS/NZS ISO 9001.

Implementation of the quality system requirements of the Contract shall be as far as practicable in accordance with AS3905.2 (1997).

Unless otherwise approved by the Principal, painting /surface protection shall be carried out by contractor/subcontractor(s) who operate under a quality system that is certified to AS/NZS ISO 9001, as a minimum and/or who are certified under the applicable category of the Painting Contractor Certification Program (PCCP).

4.2 Audit and Surveillance

4.2.1 Prior to the award of a Contract, Eraring Energy may carry out appropriate assessment of the Tenderer's ability to meet the Quality System Standards requirements.

4.2.2 Subsequent to the award of the Contract and until Final Completion, the Contractor's quality system will be subject to audit and surveillance by the Principal. The frequency and depth of such audit and surveillance will depend on the adequacy of the Contractor's performance during the contract. The minimum notice to be given by the Principal to the Contractor will be 5 working days for an audit and 24 hours for surveillance.

4.2.3 In response to an assessment during tender evaluation, the Tenderer if selected as the Preferred Tenderer, shall develop and submit for review and acceptance by Eraring Energy a program for corrective action at tender consolidation stage.

In response to audit or surveillance during the life of a Contract, the Contractor shall develop and submit a program of corrective action no later than one week after the date of issue of the relevant report.

All programs for corrective action when accepted by the Principal shall form part of the Contract. Such corrective action shall not entitle the Contractor to an extension of time for Practical Completion nor shall it entitle the Contractor to a claim for additional costs.

4.3 Training in Contractor's Quality System

Prior to the commencement of any work under the Contract, the Contractor shall provide to the Principal's nominee(s), at no additional cost to Eraring Energy, appropriate induction and training in the implementation of the Contract Specific Quality Plan including explanation of the purpose and use of appropriate forms and check sheets.

4.4 Quality Documentation

4.4.1 The Tenderer and Contractor shall submit for review and acceptance by the Principal, appropriate documentation in accordance with Table F.

4.4.2 Where documentation supplied by the Contractor is considered to be inadequate or incomplete, the Contractor shall carry out, at no cost to Eraring Energy, appropriate revision of this documentation within two weeks of formal notification of such inadequacy or incompleteness by the Principal.

4.5 Inspection and Test Plans

4.5.1 The Contractor prepares Inspection and Test Plan(s) (ITP's) generally in accordance with AS/NZS 3905.2 (1997) Appendix F.

4.5.2 ITP's shall nominate the witness, hold, and release points proposed by the Contractor or Subcontractors. Such plan(s) shall identify the records to be maintained under the Contract and shall also indicate the manner of formal acceptance and release. Subcontractor's ITP's shall be referenced on the Contractor's Master Controlling ITP and shall be checked and endorsed by the Contractor prior to submission to the Principal.

4.5.3 Inspection and Test Plan(s) shall be submitted to the Principal at least 2 weeks prior to the programmed commencement date of work covered by each Plan to allow the Principal to assess their suitability for use on the Contract and to insert the witness, hold and release points required by Earing Energy. Unless otherwise agreed, the programmed commencement dates for work covered by ITPs will be those in the latest approved manufacture, construction, commissioning, and testing program(s). The Contractor shall be deemed to have made due allowance in its program(s) for the Principal's consideration of the Plan(s). The insertion of witness, hold and release points by the Principal shall not be the basis of claims for additional costs or extension of time by the Contractor.

4.5.4 The Contractor shall ensure that all prior inspections and tests have been carried out in accordance with the approved Inspection and Test Plans and the necessary records are available before requesting attendance by the Principal at a witness or hold point.

4.5.5 When inspection and test hold points or witness points as specified in the Inspection and Test Plans require the presence of the Principal, a minimum notice, as stated below, (unless otherwise agreed in writing by the Principal), shall be given in writing (letter or facsimile) by the Contractor to the Principal:

7 working days for inspections and testing within NSW;

14 working days for inspection and testing interstate;

45 working days for inspection and testing overseas.

Witness or Hold Point inspections shall be at times agreed with the Principal, normally in standard business hours.

4.5.6 During construction and commissioning phases at Site, the minimum notice required shall be agreed between the Contractor and Principal. Until the site agreement is reached, the notice period shall be seven working days.

4.5.7 Work may proceed past a witness point if the Principal elects not to attend at the mutually agreed time and place of inspection.

Work shall not proceed past a hold point unless:

- (a) The Principal or nominated representative is present; or
- (b) Written approval has been received from the Principal for the work to proceed.

4.6 Subcontract Requirements

4.6.1 The Principal may, at any time, audit the Contractor's surveillance of a subcontractor's quality system.

4.6.2 In addition, the Principal shall have the right to audit a subcontractor's quality system. A representative of the Contractor will be invited to attend such an audit. The

Contractor shall arrange access to the subcontractor's works and the provision of appropriate audit facilities. Time taken by the Contractor to organise such an audit shall not be more than 10 working days from the date on which the Principal has formally notified the Contractor of the intention to carry out the audit.

4.7 Product Release

4.7.1 Release shall be on the basis of a Certificate of Compliance from the Contractor stating that the product or service complies with the specified requirements and all approved inspection and test requirements have been successfully completed. Objective evidence shall be available to support the Certificate of Compliance.

A Release Certificate issued by the Principal after review of inspection and test records shall form part of the release documentation.

The issue of a Release Certificate by the Principal for plant following inspections and tests at the Contractors/Subcontractors Works shall not prejudice the right of the Principal's Representative to reject the whole or part of the plant if it does not comply with the Contract when erected on the Site.

A Certificate of Compliance issued by a Subcontractor shall be endorsed by the Contractor to be considered as valid release documentation. Release documentation shall also include copies of approval records by Statutory Regulatory Authorities where applicable.

4.7.2 Items of plant or equipment to be incorporated into the Works shall be dispatched to Site only after formal release. A copy of the release documentation shall be forwarded to Site with the goods.

4.7.3 Items of plant or equipment incorrectly identified or not accompanied by the valid release documentation shall be confined by the Contractor to a Site quarantine area designated by the Contractor and shall be treated as nonconforming items.

4.7.4 The release of items from quarantine for further work on the Site shall only be permitted when evidence of the acceptability of the item is provided to the satisfaction of the Principal.

Delay as a consequence of such corrective action shall not constitute a basis for an extension of time for Practical Completion.

4.8 Quality Records

4.8.1 The Contractor shall establish and maintain a system of records which provide objective evidence that the requirements of the Contract are satisfied – refer Table F. The Contractor shall ensure that Subcontractor records, pertinent to the Contract are covered by this system.

4.8.2 All applicable records shall be available for audit and review by the Principal prior to the release of goods and services.

4.8.3 Records shall be retained by the Contractor and Subcontractors for a period of seven years from the last date of Practical Completion of the Contract unless stipulated for a longer period by the Contract or by the appropriate Statutory or Regulatory requirements.

5.0 Business Continuity

5.1 The Works must continue despite unforeseen interruptions arising. Tenderers shall submit a business continuity plan which includes the arrangements for suitable replacement of key personnel who become unavailable at short notice due to illness, injury or similar circumstances.

6.0 Administrative Procedures – Not Used

Table A – Table Of Key Dates

Item No.	Description	Refer Clause No.	Period from Date of Acceptance of Tender or Date
1.	<p><u>DRAWINGS AND INFORMATION</u> Contractor to supply:</p> <p>(a) Detailed Programs</p> <p style="padding-left: 40px;">(i) Electrical plant manufacture delivery and erection 4 weeks</p> <p style="padding-left: 40px;">(ii) Commissioning and testing 12 weeks</p> <p>(b) Quality Documentation Refer times set out in Table F</p> <p>(c) Design</p> <p style="padding-left: 40px;">(i) Plan and Program 4 weeks</p> <p style="padding-left: 40px;">(ii) 14F3 UGOH pole arrangement</p> <p style="padding-left: 40px;">(iii) Transformer foundation and bund details 6 weeks</p> <p style="padding-left: 40px;">(iv) Transformer General Arrangements</p> <p style="padding-left: 40px;">(v) Single Line Diagram</p> <p style="padding-left: 40px;">(vi) Mark up existing protection documentation (refer CI 2.5.8)</p> <p>(d) Operating and Maintenance Manuals and Drawings</p> <p style="padding-left: 40px;">(i) Preliminary</p> <p style="padding-left: 40px;">(ii) Final (including as-built drawings)</p>		
2.	<p><u>SITE WORKS</u></p> <p>(a) Possession of Site for 14F3 pole modifications 1/6/2010</p> <p>(b) Completion of remaining work to be subject to co-ordinated outage arrangements and transformer delivery 10 months</p> <p>(c) Practical Completion 10 months</p> <p>(d) Defects Liability Period 104 Weeks</p>		

Table A - Table Of Key Dates

NOTES:

1. Dates shown in the Table of Key Dates are based on an anticipated Date of Acceptance of Tender no later than 31st May 2010, however Eraring Energy cannot guarantee this date. Four weeks written notice of the Date of Possession of Site will be forwarded to the Contractor.
2. If the Principal grants Possession of Site prior to the Possession of Site Date shown in the Table of Key Dates, any happenings occurring during the period between the date possession was granted and the nominated Possession of Site Date, will not be considered as grounds for an extension of time for Practical Completion.
3. Completion to a stage of Practical Completion prior to the Date for Practical Completion fixed under or pursuant to the Contract shall not be effected without the prior approval in writing of the Principal.

Table B - Drawings For Tendering Purposes

Following is a list of drawings included in this Specification. These drawings do not cover all work included in the Specification.

Drawing No.	Title
APPENDIX 1-1.1	11kV pole arrangement with surge arresters, drop out fuses & air break switch
APPENDIX 1-1.2	Fly ash substation single line diagram
ER 627316 sheet 2 Rev 9	$\frac{3}{4}$ Station 11kV switchboard Single Line Diagram

Table C - Drawings To Be Provided By The Contractor

(Refer to Eraring Energy Contract Standard General Site Requirements)

The following drawings are to be provided by the Contractor within the periods stated in Table `A'.

Drawing No. & Title

Foundation Drawings - Transformer and oil bunding

Arrangement Drawings - Transformer

- 14F3 11kV UGOH pole top arrangement
- 11kV cable route, enclosure, platform and cross section details
- 415V and instrument cable route, enclosure, platform and cross section details

Drawings for Supportive Services

Electrical System and Circuit Diagram - Single Line Diagram

- Protection documentation mark ups

Table D - Ambient Weather Conditions

The climatic conditions likely to be encountered at the Eraring Power Station are summarised below. The climatic data has been collected by the climatic station located in the area.

Maximum ambient dry bulb experienced	43.3°C
Minimum ambient dry bulb experienced	-0.6°C
Average daily minimum dry bulb temperature	
for month of July (coldest)	7.1°C
for month of February (hottest)	18.8°C
for year	13.0°C
Average daily maximum dry bulb temperature	
for month of July (coldest)	17.8°C
for month of February (hottest)	27.2°C
for year	23.1°C

Rainfall

Average yearly rainfall	1129 mm
Highest average monthly rainfall	142 mm
Lowest average monthly rainfall	51 mm

The Site will be subject to occasional heavy rain falling at the rate of up to 160 mm/h, occasional fog with seasonal hot and cold winds.

The expected average temperature variation
in a 24-hour period is: 10.0°C

Unless specified otherwise elsewhere under the Contract, the Contractor may assume for the purposes of determining the design rating of items of equipment that:

The maximum ambient dry bulb temperature is 40.0°C
The corresponding wet bulb temperature is 30.0°C
The minimum ambient dry bulb temperature is 0.0°C

Solar Effect

The maximum intensity of solar radiation 0.1 W/cm²
The maximum temp of black bodies in the sun 76.0°C

It is emphasised that the above temperatures are all ambient temperatures and are not operating temperatures of plant and equipment.

Altitude

The Eraring Power Station location is effectively at 15 to 30 m above sea level.

Thunderstorm Activity Level

Isoceraunic level 20 - 30

Winds

The wind may reach gust speeds of >120< km/h at ground level.

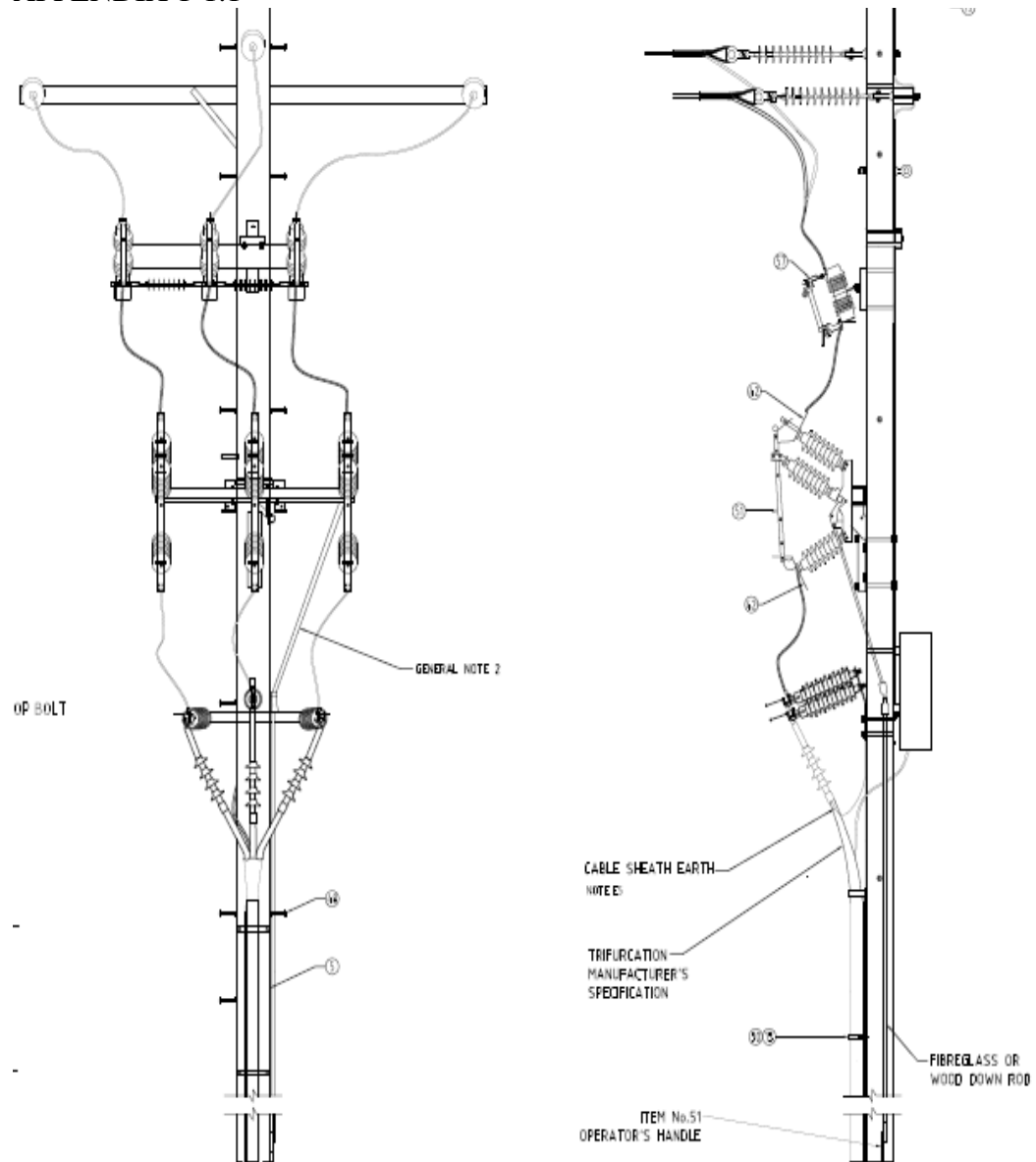
Table E - Fire Fighting Equipment

1. The fire fighting equipment to be provided shall be extinguishers and hoses within the areas allocated to the Contractor on Site for erection, storage and any other purposes. The type, number and location of the extinguishers and hoses shall be nominated from time to time by Eraring Energy.
2. In addition to 1. Above, the following fire fighting equipment shall be provided:
 - (a) Two off portable water type fire extinguisher(s) of 9 L capacity for use in Site accommodation;
 - (b) Two off portable foam type fire extinguisher(s) each of 9 L capacity for use on erection Site;
 - (c) Two off portable foam type fire extinguisher(s) of 9 L capacity for use in the Site storage area.

Table F - Document Submission Matrix

DOCUMENT	BY TENDERER (with the Tender)	BY CONTRACTOR (within specified time)
Schedules	Completed Schedules.	
Company Quality Manual	One copy.	
Contract Specific Quality Plan for manufacture	One copy of a Contract Specific Quality Plan for a similar project.	1 controlled copy within 4 weeks of start of manufacture to requirements of Appendix E in AS/NZS 3905.2:1997 – medium to large projects.
Design Plans		1 controlled copy within four weeks of the commencement of design work.
Inspection & Test Plans for manufacture	Sample Manufacturing Inspection & Test Plans used on a similar project.	Controlled ITP's for Contractor and Subcontractors to be submitted 4 weeks before the commencement of the relevant phase of the work.
Contract Specific Site Quality Plan (incl installation & commissioning.	One copy of a Site Works Quality Plan for a similar project.	1 controlled copy within 4 weeks of Site Establishment to requirements of Appendix E in AS/NZS 3905.2:1997 – medium to large projects.
Site Inspection & Test Plans	Sample Site Works Inspection & Test Plans used on a similar project	Controlled ITP's for Contractor and Subcontractors to be submitted 4 weeks before the commencement of the relevant phase of the work.
Quality System Procedures		To be available for review/audit/surveillance/ inspection.
Technical Procedures, Inspection and Test procedures		Procedures covering each relevant process to be available for review/audit/surveillance/inspection.
Schedule of Quality Records		A Schedule of Records to be generated and maintained to be submitted within 2 weeks of the award of the Contract. Agreed records to be available for review/audit/ surveillance/ inspection.
Schedule of Subcontractors	Completed Schedule "Proposed Subcontractors" and completed form "Request for Approval of Subcontractor" for each proposed Subcontractor.	For each Subcontractor, completed Form "Request for Approval of Subcontractor" and Schedule for approval prior to the placing of an order on the Subcontractor.
Schedule and procedures for Special Processes		Schedule to be submitted within 2 weeks of the award of the Contract. Process and operator qualification procedures and records to be available for review/audit/ surveillance/ inspection.

APPENDIX 1-1.1



APPENDIX 1-1.2

