

PART 2: EMPLOYER'S REQUIREMENTS
CHAPTER: EXPLANATORY NOTES-
ASS MAIN LINE

Bill No. C2 & C4 ASS: Auxiliary Mainline

The Explanatory Notes given hereunder are applicable to the Auxiliary Line

Item 27:**Item 27.1: 33kV/415V Transformers, 500 KVA**

The price shall cover the cost of supplying & installation a 33kV/415V, 500 KVA, 3 phase (cast resin dry type) transformer, as per specification, complete in all respects. This also includes the cost of all items deemed necessary for erection.

The price shall also include the cost of necessary arrangements for installing the transformer inside the ASS Room, in a metallic enclosure to be provided along with the transformer, by the contractor, complete with doors, locks, interlocking arrangements etc.

The price shall essentially include, but not limited to, the following:

- Winding Temperature Scanner (Digital) with 4-20mA output and alarm / Trip contacts for SCADA Interface.
- PT -100 Type RTD sensors per LV windings.
- Surge Arrester (LA: Phase to Phase, Phase to earth)/Snubber Circuit
- Limit Switch on doors of Enclosure.
- Aerosol based Fire protection for transformer as per specifications.
- The Tenderer shall ensure that all equipment, interlocks and interface equipment specified in the tender document are included under this item and detail of equipment etc., if any, other than those listed above, should be explicitly included hereunder, in the tender.
- Fire protection for transformer as per specifications.

Item 27.2: 33kV/415V Transformers, 630 KVA

The price shall cover the cost of supplying & installation a 33kV/415V, 630 KVA, 3 phase (cast resin dry type) transformer, as per specification, complete in all respects. This also includes the cost of all items deemed necessary for erection.

The price shall also include the cost of necessary arrangements for installing the transformer inside the ASS Room, in a metallic enclosure to be provided along with the transformer, by the contractor, complete with doors, locks, interlocking arrangements etc.

The price shall essentially include, but not limited to, the following:

- Winding Temperature Scanner (Digital) with 4-20mA output and alarm / Trip contacts for SCADA Interface.

- PT -100 Type RTD sensors per LV windings.
- Surge Arrestors
- Limit Switch on HT side doors of Enclosure.
- Aerosol based Fire protection for transformer as per specifications.
- Surge Arrester (LA: Phase to Phase, Phase to earth)/Snubber Circuit
- The Tenderer shall ensure that all equipment, interlocks, and interface equipment specified in the tender document are included under this item and detail of equipment etc., if any, other than those listed above, should be explicitly included hereunder, in the tender.

Item 28: 33kV AIS Switchgear

General applicable for each sub-item under item 28: The price shall essentially include, but not limited to, the following:

- Measurement and protection equipment: Under this item, the price of supplying all equipment, including all control and relay boards along with necessary control switches, indications, relay and meters and all associated components, terminals, and fittings, shall be included
- Digital Ammeter with Selector Switch wherever specified.
- Over-current and Earth fault relays, (directional / non-directional) with ports to synchronize the relay with RTU on IEC 61850, IEC 60870-5-103/104 protocol wherever specified.
- Control and relay panel
 - Interfaces with SCADA equipment,
 (All the protection to be as per PS)

The Tenderer shall ensure that all equipment, relays (excluding the Pilot wire equipment) and interface equipment for achieving the protection arrangement specified in the tender document, are included under this item and detail of equipment etc., if any, other than those listed above, should be explicitly included hereunder, in the tender.

Item 28.1: Protection Circuit Breaker Panel (1250A), with CT and PT, complete and associated assemblies

The price shall cover the cost of supply & installation 33kV Circuit Breakers including Earthing Switch Assembly, as per specification, for indoor installation in the ASS Room, complete in all respects. This also includes the cost of all items deemed necessary for erection.

The price shall also include the cost of

- Current transformer for measurement and protection, as per specifications
- Potential transformer, as per specifications.

The price shall cover the cost of padlocks/interlocks to be provided on these breakers, in accordance with specifications.

Item 28.2: Protection Circuit Breaker Panel (1250A), with CT, complete and associated assemblies

The price shall cover the cost of supply & installation 33kV Circuit Breakers including Earthing Switch Assembly, as per specification, for indoor installation in the ASS Room, complete in all respects. This all includes the cost of all items deemed necessary for erection.

The price shall also include the cost of current transformer, as per specifications.

The price shall cover the cost of padlocks/interlocks to be provided on these breakers, in accordance with specifications.

Item 28.3: Transformer Protection Circuit Breaker Panel (1250A), with CT complete and associated assemblies

The price shall cover the cost of supply & installation 33kV Circuit Breakers including Earthing Switch Assembly, as per specification, for indoor installation in the ASS Room, complete in all respects. The price shall also include the cost of

- Current transformers for measurement and protection, as per specifications

The price shall cover the cost of padlocks/interlocks to be provided on these breakers, in accordance with specifications.

Item 28.4: Coupling Motorised Circuit Breakers (1250A) panels complete with Bus Riser Panel and associated assemblies

The price shall cover the cost of supply & installation of 33kV coupling Circuit Breaker with Bus riser, as per specification, for indoor installation inside the ASS room, in order to couple the two 33kV feeders as required. This all includes the cost of all items deemed necessary for erection.

The price shall cover the cost of padlocks/interlocks to be provided on these Circuit Breaker, in accordance with specifications.

Item 28.5: Pilot Wire Relays and associated assemblies

The cost shall include the supply and erection of pilot wire relay and suitable modem if required and any other items required for completion of work Excluding CTs. This pilot wire relay shall be installed in 33KV panels as required. This all includes the cost of all items deemed necessary for erection.

Unit set corresponds to quantity required for one CB.

Item 28.6: Measuring and protection Equipment (Each ASS's)

Under this item, the price of supplying & erecting all equipment, including all control and relay boards along with necessary control switches, indications, relay and meters and all associated components, terminals and fittings, shall be included. The price of current transformers and potential transformers shall not be included under this item and shall be included in the relevant

sub-items 28.1 to 28.4. This shall include all other items, if any, which are apart from the as discussed in item-28 elsewhere.

Item 28.7: Bus PT Panel and associated assemblies

The price shall cover the cost of supplying 33kV Panel with a 33 kV Potential Transformer, as per specification, for being deployed at Loop-coupling ASS's or other locations as per SLD for indoor installation, complete in all respects.

The price shall cover the cost of padlocks/interlocks to be provided on these breakers, in accordance with specifications.

Item 28.8: Automatic Fire protection system for panels

All the 33kV Switchgear panels installed in the ASS shall be provided with an Automatic Fire Protection System Direct Low-Pressure Type. Depending upon the no. of 33kV Switchgear panels in the ASS and the total volume content, the quantity requirement of Fire Protection Fluid shall be calculated by the Contractor and submitted to the Employer's representative, for approval as per employer specifications.

Item 28.9: Automatic Fire protection system for Transformer

All the transformer installed in the ASS shall be provided with an Aerosol based Automatic Fire Protection System Direct Low-Pressure Type. Depending upon the no. of transformers in the ASS and the total volume content, the quantity requirement of Fire Protection Fluid shall be calculated by the Contractor and submitted to the Employer's representative, for approval as per employer specifications.

Item 29: Auxiliaries

Item 29.1: Aux. Feeding (DC-UPS, Protection) for elevated/ at grade stations Item

29.1.1&29.1.2: Battery and Battery Chargers (Type 1 System) 180AH

Type 1 includes: The price shall cover the cost of supplying 1 set of Battery and 2 sets of Battery chargers, as per specifications. The price shall also include the cost of automatic change-over system for the battery chargers and all other protective devices.

Item 29.1.2: All other Equipment's (ACDB, DCDB etc.)

The price shall cover all other equipment's required to make the 110 V DC and Low voltage Auxiliary AC Power Supply System complete and fit to deliver 110 V DC located in the ASS, as well as to equipment's located in Switching Stations, as required under Specifications.

The Price shall include all the equipment required to make AC distribution board in the Auxiliary for control and distribution of 415-volt three Phase/ 230-volt single phase AC supply within the substation, as well as to equipment's located in Switching Stations, as required under

Specifications.

The price shall cover all other equipments required to make battery and battery charger (Type -1, Items 29.1.1 above) Systems complete in all respect.

Item 29.2: Safety Equipment

The price shall cover the cost of supplying all safety equipment, as per specification/statutory regulations, in the ASS room. The indicative list of Safety equipment to be provided is as follows:

- As per the list stipulated in Particular specification
- Tool Board with safety tools.
- Safety tools: first-aid kit, first-aid chart, insulated gloves, A-ladder/stool, and insulated mat for 33 kV, HV panels, transformers, ACDB, DCDB, chargers.
- Fire protection equipment, such as fire buckets, sand buckets, portable fire extinguishers, wall-mounted or wheel-type fire extinguishers etc.
- Keyboard with enclosure type with lockable arrangement.
- Gas Resuscitation Kit.
- Insulation Mat
- And any other item as required by statutory Regulation

Fire detection and hydrant system for the room is not to be considered as it is included in station buildings works (For Station).

Item 30: Wiring

Item 30.1: 33 kV Cables and Connections

Item 30.1.1: 33 kV Cables (with 120 sq. mm Aluminum) and connections (FRLS)

The price shall include the cost of supplying all medium voltage (33kV) cables, as per specifications. This all includes the cost of all items deemed necessary for erection.

Note:

The Unit rate for this item shall be for 1 km of 33 kV cables, consisting of 1 No. single core cables and the jointing, sheath earth connection materials (To existing earth terminal) **including EPDM cable sealing system required for each core for sheath bonding with** / without SVL.

Item 30.2: Low Voltage power cables and Connections for ASS

The price shall include the cost of supply & Erection low voltage cables, as per specification, including AC, DC control supply to all ASS equipment including RTU. This all includes the cost of all items deemed necessary for erection.

The price shall also include all the necessary termination and jointing kit to make the required

connections. It includes the cost of all LV cables except C&M (SCADA) Cables connected to RTU, power socket cables, Viaduct lighting point cables and pilot wire cables.

Item 30.3: Sheath Voltage Limiters

- Supply and installation of sheath voltage limiters along with all other associated accessories including Box.

NOTE for 30.3:

The Unit Rate of this item shall be 1 set per circuit of 33kV cables consisting of three runs of 1 Core Cable as required.

Item 30.4: Pilot wire cable (FRLS)

The price shall essentially include, but not limited to, the following:

- Cost of supply & Erection of pilot wire armoured cables as per specifications, the price shall also include shall be for 1 km of cable and the terminations/ jointing/splicing required for the same.

Item 30.5: Supply & erection of 33kV Indoor termination heat shrink type for 120 sq. mm Aluminium cable (FRLS)

The price shall include the cost of supply & erection of indoor termination heat shrink type suitable for 33kV 120 sq.mm Aluminium cables as per employer specifications.

Item 30.6: Supply & erection of 33kV Straight Through Joints heat shrink type for 120 sqmm Aluminum cable (FRLS).

The price shall include the cost of supply & erection of Straight Through Joints heat shrink type for 120 sqmm Aluminium cable (FRLS) as per employer specifications.

Item 30.7: 3 phase Surge arrestor with associated assembly for 33KV Panel The price shall cover the supply and installation of surge arrestor (phase to ground) as per the specification stipulated in PS of relevant chapter.

Each set comprises of 3 nos. phase to ground surge arrestor along with associated accessories.

Item 30.8: Surge arrestor with associated assembly for Transformer panel (phase - phase, phase - ground) 6 nos. in each Transformer

The price shall cover the supply and installation of surge arrestor (phase to ground) as per the specification stipulated in PS of relevant chapter.

Each set comprises of 6 nos. (3 Nos. phase to ground and 3 nos. phase to phase) surge arrestor along with associated accessories.

Item 30.9: 33kV Trefoil Clamps/cleat

The price shall cover the supply and installation of antitheft cable clamp/cleat as per the specification stipulated in PS of relevant chapter.

Item 31: Socket along the Viaduct

The price shall also cover all the necessary erection activities of Power Sockets, cables & associated fitting.

31.1 Viaduct sockets & associated fittings

The price shall cover the cost of supply of the following but not limited to:

1. 16A sockets in a lockable enclosure IP65 and suitable fixing arrangement, along on one side of the viaduct.

31.2 Cable for feeding the Viaduct Socket

The price shall cover the cost of supply of the following but not limited to:

Armoured cables and cable connection/termination from the appropriate station panel, suitable for carrying the current required by the 16A sockets, 3-phase. The cable should be designed for carrying a continuous rated current of 32A, after considering the de-rating factors, as applicable.

Item 32: Lighting on the Viaduct**Item 32.1: Lights, Lighting on Viaduct, Cables and associated Fitting**

The price shall cover the cost of supply of the following but not limited to:

LED lights with fixtures shall be as per specification stipulated in PS along with associated accessories in a lockable enclosure IP65 and suitable fixing arrangement, along on both side of the viaduct.

Note: IP-65 is for fixtures and IP-67 is for luminaires.

Item 32.2: Cable for feeding the viaduct Lights

Armored cables and cable connection/termination from the appropriate station panel, suitable for carrying the current required by the LED lights & fixtures specification stipulated in PS. The cable should be designed after considering the de-rating factors, as applicable. The price shall also cover all the necessary erection activities for lighting fixture & associated fittings.

Item 33: Earthing & Cable trays inside ASS**Item 33.1: Earth bus inside ASS and Earthing Connections**

The price shall cover the cost of providing the necessary earthing materials for:

- Laying Earth BUS inside the room
- Connecting the metallic parts of Power Supply equipments and cable path in the ASS to the ASS Earth bus/MET (Main Earth Terminal).
- Connecting the neutral of the transformers to the Transformers Earth bus/MET.

- In elevated/grade stations ASS: Provision for earthing of body & Neutral of one Nos future transformer & body earthing of one no. future MVCB for PD shall also be made by providing embedded GI flats connected to the Earth BUS.

The price shall cover all necessary materials to provide an effective earthing system, as per specifications.

Item 33.2: Cable path/ trays and associated fittings inside ASS room

The price shall cover the cost of providing GI cable trays and GI supports, inside the ASS Room, from viaduct to ASS room to carry all Medium Voltage, low voltage and control cables, in appropriate arrangement, as per specifications.

Note: Unit corresponds to one ASS.

Item 34: Erection

The cost of erection includes:

- The cost for the erection of antitheft clamp in each bracket of 33 kV cable as per specification.
- The cost of Supply and Erection of polyamide strip on each 33 kV cable bracket as per specification.

Item 34.1: Laying of 33KV 1Cx120 sq. mm cable Aluminium cable(FRLS)

The price shall include the cost of laying of 33kV 1CX 120 sq. mm Aluminium cables from AMS right up to the ASS, and for 33kV Network in between the ASS'S.

Item 35: Testing and Commissioning ASS's

The price shall include the cost of testing and commissioning, as per employer's requirement of the entire ASS equipment and systems, in all ASS's and in between the ASS's and between ASS and AMS in the designated section.

Item 36: Manning of Commissioned ASS's, Manpower and design cost (Sub items 36.1, 36.2 & 36.3)

The Contractor shall, if required by the Employer, provide Manpower in the ASS's / AMS already commissioned and handed over to the Employer, for manning the installations, before commencement of the Revenue operation of the line. The staff team deployed at the ASS's shall be thoroughly conversant and competent to operate the various switchgear and systems and shall be able to provide auxiliary power, if so desired by Kride, to other Agencies working in the Station area or elsewhere and to provide power shutdown of the commissioned systems, if so, directed by Kride. The all-inclusive man- day charges shall be included against the relevant sub-item under this Item. For measurement purposes, a period of 8 hours of deployment of one staff should be considered as 1 man-day. Three shifts per day should be considered.

Compensation shall include for the approval of the supervisors and replacement as required by the Employer, employment of approved staff including salaries, overtime etc., as applicable.

Sub items 36.4: Item 36.4.1 Design of ASS

The Price shall includes but not limited to cost of design work of ASS including preparation and submission for approval of employer and revisions

- Location plan and schematic diagram of ASSs
- Layout drawings of ASSs
- Power and Control cable run layout diagram
- Structural assemble and structural drawings
- Foundation of equipment in ASS layout drawings
- Control protection scheme and metering arrangement drawings
- Relay settings
- Any other design documents and drawings required for proper execution of work.

The Contractor shall produce drawings for approval of Engineer and those required for construction works at site and the modifications suggested by the employer. The review shall also ensure uniform systems for all the ASS. This will also include calculations sheets & justifications for any design changes and improvements to the satisfaction and convincing the Employer's representative.

36.4.2 Schedule of Materials

The Price shall includes but not limited to the calculation of schedule of material of ASS items as per approved detail design for approval of employer and revisions.

36.4.3 As built Drawings

The Price shall includes but not limited to the preparation of as built drawings and submission of basis prior to the issuance of the certificate of completion for the respective corridors. The contractor shall prepare the relevant calculation reconciled with as-built condition, and information necessary for the maintenance of the works.