

# **PART 2: EMPLOYER'S REQUIREMENTS**

## **CHAPTER: EXPLANATORY NOTES-**

### **ASS DEPOT**

**Bill No. C2 & C4 ASS: Depot ASS**

The Explanatory Notes given hereunder are applicable to the Auxiliary Line

**Item 37: 33 kV / 415 V Transformers****Item 37.1: 33kV/415V Transformers, 2500 KVA**

The price shall cover the cost of supplying & installation a 33kV/415V, 2500 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 37.2: Deleted****Item 38: 33kV AIS Switchgear**

General applicable for each sub-item under item 38: 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 38.1: 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 38.2: Deleted**

**Item 38.3: 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 38.4: 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 38.5: 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 38.6: Measuring and protection Equipment (Depot 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 2.1 to 2.4. This shall include all other items, if any, which are apart from the as discussed in item-2.0 elsewhere.

**Item 38.7: 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 38.8: 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 PS.

**Item 38.9: 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 PS.

**Item 38.10: Distance relay**

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.

**Item 38.11: Overcurrent relay**

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.

**Item 38.12: LV Bus duct for depot**

Under this item, the price of supplying & erecting all equipment, including all associated components, terminals and fittings, shall be included from ASS Transformer secondary to E&M MDB panel.

**Item 39: Auxiliaries****Item 39.1: Auxiliary Feeding (DC-UPS, Protection) for elevated/at grade stations****Item 39.1.1: Deleted****Item 39.1.2: Battery and Battery Chargers (Type II)**

Type I 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.

Type II includes: The price shall cover the cost of supplying 2 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 39.1.3: 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 the deliver 110 V DC and Low voltage Auxiliary AC Power Supply to the equipment's located in the ASS, 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 (Both Type -1 & Type-2, Items 3.1.1 above) Systems complete in all respect.

### **Item 39.2: 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 40: Wiring**

#### **Item 40.1: 33 kV Cables and Connections**

##### **Item 40.1.1: 33 kV Cables (With 120 sq. mm Aluminium) and connections (FRLS)**

The price shall include the cost of supplying all medium voltage (33kV) cables, as per specifications, the price shall also include all the necessary jointing kit to make all connections. 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) required for each core for sheath bonding without SVL.

#### **Item 40.2: Low Voltage 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 40.3: Sheath Voltage Limiters**

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

**NOTE for 40.3:**

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 40.4: 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 40.5: Supply & erection of 33kV Indoor termination heat shrink type for 120 sq. mm Aluminum cables**

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

**Item 40.6: 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).

**Item 40.7: 3 phase Surge arrester with associated assembly for 33KV Panel** The price shall cover the supply and installation of surge arrester (phase to ground) as per the specification stipulated in PS of relevant chapter.

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

**Item 40.8: Surge arrester 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 arrester (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 arrester along with associated accessories.

**Item 40.9: 33kV Trefoil Clamp/cleat**

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

**Item 41: Socket along the viaduct**

**41.1 : Deleted**

**41.2 Deleted**

**Item 42: Lighting on the Viaduct Item**

**42.1: Deleted**

**Item 42.2: Deleted**

**Item 43: Earthing & Cable trays inside ASS****Item 43.1: 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 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 43.2: Cable path/Cable 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 44: Erection**

The cost of erection includes:

- i. The cost for the antitheft clamp in each bracket of 33 kV cable as per specification.

- ii. The cost of polyamide strip on each 33 kV cable bracket as per specification.

**Item 44.1: 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 45: 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 46: Manning of Commissioned ASS's (Sub items 46.1 & 46.2)**

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 DMRC, to other Agencies working in the Station area or elsewhere and to provide power shutdown of the commissioned systems, if so, directed by DMRC. 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.