
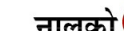






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## 1 INTRODUCTION

The intent of this document is to primarily provide information for physical Interfaces related to Electrical and define the split of responsibilities between LSTK Contractors and Owner during engineering, procurement, construction, pre-commissioning and commissioning phases of the project.

## 2 GENERAL

LSTK Contractor shall refer to the split of responsibility involved in the various interfaces with the systems supplied by Owner/ Other's.



LSTK Contractor shall refer to the following for the various battery limits, interfaces with existing facilities/ systems and the scope of work involved in the existing facilities/ systems. Attempt has been made to elaborate the scope of work required in the various existing facilities/ systems. However it shall be LSTK Contractor's responsibility to review all the existing facilities/ systems wherein there is work involved and hooking up is required. The scope of work indicated below is the minimum required. Any additional interface if required during detail engineering & for completion and safe operation of the plant shall be included in the scope of LSTK Contractor at no extra time and cost implication to Owner/Other.

The interfaces listed below are envisaged as a minimum. Any additional interface if comes during detail engineering/ Operation requirement shall be in the scope of LSTK Contractor. It shall be the responsibility of the LSTK Contractor to conduct survey at site to understand the extent of scope of work required in the existing facilities/ systems.

Wherever LSTK Contractor is expected to work in the existing facilities/ systems, the same shall be performed without damaging the existing facilities aboveground/ underground. It shall be the responsibility of LSTK Contractor to rectify any damage caused to any existing facilities aboveground/ underground during the course of work.

Interfaces in the following systems are envisaged as a minimum

- Normal, Emergency & other auxiliary supplies.
- Fire detection & Alarm system
- Public Address system ( Loudspeaker Intercommunication system)
- Telephone system
- SCADA
- Earthing

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### 3 ELECTRICAL INTERFACES BETWEEN LSTK CONTRACTOR AND OWNER/ OTHER'S



The following table define the requirements on the specific areas of interfaces. This shall however be read in conjunction with the document, Contractor Scope of work – Electrical 6695-ELT-556-CA-0001 available in Volume 02 Section 06 of this tender. LSTK Contractor shall also refer to General Engineering Specification – Electrical , Key SLD, Detail SLD, Design Guidelines for Electrical facilities and all other documents/ drawings attached in the various sections of the tender to understand the complete requirements.

LSTK Contractor shall refer to the document 6695-ELT-G00-FA-0001, key SLD to understand the PCC, MCC philosophy.

#### 3.1 **Normal, Emergency & other auxiliary supplies from various Switchgear's, Distribution Board's in Substation building (US-501) to Switchgear's, Distribution Board's in Substation room (US-556) of LSTK Contractor (Within ISBL).**

LSTK Contractor shall refer to the document 6695-ELT-556-FA-0001, Block Diagram to understand the interface and split of scope between LSTK Contractor's. Further downstream electrical equipment's/ facilities shall be in LSTK Contractor scope.

Srno.	DESCRIPTION	LSTK CONTRACTOR	OWNER/ OTHER'S
1.	Conducting site survey/cable route survey for finalization of cable route between US-501 and US-556 (within LSTK Contractor's ISBL) & checking strength/ feasibility of existing pipe/ cable rack for routing new cables.	YES	NO
2.	Supply and installation of cable trays including supports for the complete route (on existing/ new structure) between US-501 and US-556 of LSTK Contractor (within ISBL).	YES	NO
3.	Supply & laying of Power and control cables from Owner's/ Other's Switchgear's / Distribution Board's (In US-501) to LSTK Contractor's Substation (US-556) (within ISBL).	YES	NO
4.	Providing suitable termination arrangement in Owner's/ Other's Switchgear's / Distribution Board's (In US-501) for terminating LSTK Contractor's cables. (LSTK Contractor shall provide the cable details to Owner/Others during detail engineering).	NO	YES



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Srno.	DESCRIPTION	LSTK CONTRACTOR	OWNER/ OTHER'S
5.	Termination (at both the end's) of Power and control cables including supply of required termination kits, glands, lugs, etc. to make the installation complete.	YES	NO
6.	Providing cable trays/ trenches including cable tray support structure, sand and any other infrastructure required for laying cables from US-501 to US-556 of LSTK Contractor (within ISBL) on existing/ new structure.	YES	NO
7.	Testing & Commissioning of cables, switchgear (Owner & LSTK Contractor shall provide assistance to each other for this interface)	YES	YES





#### NOTES:

- LSTK Contractor to note that following quantity and rating of feeder's have been considered in the various switchgear's/ Distribution boards of US-501
  - 2nos. 630A ACB feeders in PCC for feeding MCC.
  - 2nos. 63A feeders in MLDB for feeding SLDB (normal lighting load).
  - 1no. 63A feeder in EMLDB for feeding ESLDB (emergency lighting load)
  - 2nos. 32A feeders in 110V DCDB for feeding MCC.
  - 2nos. 63A feeders in Auxiliary Service Board for feeding welding sockets, field PDB's.
  - 1no. 32A feeder in UPS ACDB for feeding VFDs, Transducer panel
  - 2nos. 32A feeders in UPS ACDB for feeding DCS/ Instrumentation loads.
- LSTK Contractor to note that feeders as stated above only shall be made available to them. LSTK Contractor shall make suitable arrangement of further distribution in case of any additional requirement of feeders.
- Cables from US-556 Substation to US-501 Substation
  - Power cables, control cables, FO cables from US-556 Substation to US-501 Substations of 5th Stream Alumina Refinery are in the scope of the LSTK Contractor. Refer to the document Overall Plot plan doc. No: 6695-LAY-G00-LD-0001 attached elsewhere in the tender for the location of the unit substations.
  - It shall be the responsibility of the LSTK Contractor to conduct site survey/ cable route survey for finalization of cable route between US-556 Substation (within ISBL) to US-501 after checking strength/ feasibility of existing pipe/cable rack.
  - In case existing pipe rack/ cable rack is used for installation of cables trays, new supports for installation of the cable trays shall be in the scope of LSTK Contractor.
  - Wherever existing pipe/ cable rack are not available, LSTK Contractor shall consider new cable tray supporting structure and supports for installation of cable trays. All the necessary civil, structural works including material supply shall be in the scope of LSTK Contractor.



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- e. Supply and installation of cable trays for the complete route (on existing/ new structure) shall be in the scope of LSTK Contractor.
- f. In case of road crossings, cables shall be routed either in RCC duct banks below road crossing or in overhead cable trays on pipe/cable structure as per site conditions.
- g. LSTK CONTRACTOR shall supply, lay ,gland & terminate with suitable termination kits the Power cables, control cables, FO cables from US-556 Substation (within ISBL) to US-501.
- h. LSTK Contractor shall be responsible for estimating the cable length (power, control, FO) based on the route finalised. Appropriate derating factors for sizing of the cables shall be considered based on the method of laying & site conditions.
- i. LSTK Contractor to note that the drawing 6695-ELT-526-LH-7001Substation Arrangement layout for Bauxite Storage & Handling US-501 attached in the tender is preliminary and only for conceptual purpose. Final layout shall be furnished during detail engineering.

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### 3.2 FIRE DETECTION AND ALARM SYSTEM (FDA system)



Srno.	DESCRIPTION	LSTK CONTRACTOR	OWNER/ OTHER'S
1.	FA system design, engineering within LSTK Contractor's ISBL including estimation of quantities of all FA system equipments, layout engineering, cable routing, PDMS modelling, etc.	YES	NO
2.	Supply of fire alarm equipment i.e. Smoke detectors, linear beam detectors, manual call point, fault isolators, hooters, exit signs, siren/ siren starter power pack, DC back up supply, fire alarm panel, repeater panel, etc. based on the quantities furnished by LSTK Contractor.	NO	YES
3.	Installation of Fire alarm system equipments complete with installation supports, fixing hardware, accessories including all labour work and material	YES	NO
4.	Supply, installation, termination, testing and commissioning of fire alarm cables, power supply cables to FA panel/ repeater panel, junction boxes, cable glands, lugs, cable trays, fixing hardware, conduits, installation materials, structural supports etc. including all labour work and material within LSTK Contractor's battery limits	YES	NO
5.	Providing Input power supply (415V/240V) to Fire Alarm Panel including providing feeders in emergency board/ UPS DBs / non-UPS boards.	YES	NO
6.	Supply, laying, termination, testing and commissioning of FA cables from US-556 to US-501.	YES	NO
7.	Interface of fire alarm system with fire protection/ fire fighting systems, interlocking with HVAC systems, etc. within LSTK contractor battery limits.	YES	NO
8.	Co-ordination, assistance and interface support to vendor of the fire alarm system for testing and successful commissioning of the system (testing and commissioning shall be done by fire alarm system vendor)	YES	NO

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### 3.3 PUBLIC ADDRESS SYSTEM (LOUDSPEAKER INTERCOMMUNICATION SYSTEM)



Srno.	DESCRIPTION	LSTK CONTRACTOR	OWNER/ OTHER'S
1.	PA system design, engineering within LSTK Contractor's ISBL including estimation of quantities of all PA equipments, layout engineering, cable routing, PDMS modelling, etc.	YES	NO
2.	Supply of PA system equipment e.g FCS rack, Amplifier rack, MCS, FCS (Field call stations), Loud speakers, beacon, power supply units, acoustic hoods (for FCS in noisy areas), etc. based on the quantities furnished by LSTK Contractor.	NO	YES
3.	Installation of Public address system equipments complete with installation supports, fixing hardware, accessories including all labour work and material	YES	NO
4.	Supply, installation, termination, testing and commissioning of PA system cables, power supply cables, junction boxes, cable glands, lugs, cable trays, fixing hardware, conduits, installation materials, structural supports etc. including all labour work and material within LSTK contractor battery limits.	YES	NO
5.	Providing feeders & Input power supply (emergency / UPS/ non-UPS) to power pack of FCS rack, etc.	YES	NO
6.	Supply, laying, termination, testing and commissioning of PA system cables from FCS-rack, Amplifier rack (located in US-501) to PA Panel within LSTK Contractor ISBL.	YES	NO
7.	Co-ordination, assistance and interface support to vendor of the PA system for testing and successful commissioning of the system (testing and commissioning shall be done by PA system vendor)	YES	NO



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### 3.4 TELEPHONE SYSTEM (EPABX)

Srno.	DESCRIPTION	LSTK CONTRACTOR	OWNER/ OTHER'S
1.	Telephone system design, engineering within LSTK Contractor's ISBL including estimation of quantities of all telephone equipments, layout engineering, cable routing, PDMS modelling, etc.	YES	NO
2.	Supply of telephone system equipment e.g telephone distribution cabinets, cable termination box, telephone sets, etc. based on the quantities furnished by LSTK Contractor.	NO	YES
3.	Installation of telephone system equipments complete with installation supports, fixing hardware, accessories including all labour work and material	YES	NO
4.	Supply, installation, termination, testing and commissioning of telephone system cables, power supply cables, junction boxes, cable glands, lugs, cable trays, fixing hardware, conduits, installation materials, structural supports etc. including all labour work and material within LSTK Contractor's battery limit.	YES	NO
5.	Providing feeders & Input power supply (emergency / UPS/ non-UPS) as per requirement.	YES	NO
6.	Supply, laying, termination, testing and commissioning of telephone system cables from telephone distribution cabinet/ cable termination box (located in US-501) to telephone distribution cabinet/ cable termination box within LSTK Contractor ISBL.	YES	NO
7.	Co-ordination, assistance and interface support to vendor of the telephone system for testing and successful commissioning of the system (testing and commissioning shall be done by Telephone system vendor)	YES	NO



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### 3.5 SCADA



LSTK Contractor shall refer to the document Typical SCADA block diagram for Unit Substation level networking (Doc. No. 6695-ELT-G00-FA-0004) available in Volume 4 Section 6.

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Srno.	DESCRIPTION	LSTK CONTRACTOR	OWNER/ OTHER'S
1.	SCADA system design, engineering within LSTK Contractor's ISBL only to the extent of substation (US-556) level networking of numerical relays, multifunction meters and hardwired I/O's.	YES	NO
2.	Supply & Installation SCADA equipment's i.e. Ethernet switch, Protocol convertor, etc in LSTK Contractor's Substation (US-556) (refer battery limit block diagram) complete with installation supports, fixing hardware, accessories including all labour work and material.	YES	NO
3.	Supply, installation, termination, testing and commissioning of SCADA cables (refer block battery limit diagram), power supply cables, junction boxes, cable glands, lugs, cable trays, fixing hardware, conduits, installation materials, structural supports etc. including all labour work and material within LSTK Contractor's battery limit.	YES	NO
4.	Supply, installation, termination, testing and commissioning of Marshalling boxes (for hardware termination of SCADA Cables from Switchgear / UPS/Battery chargers to RTU), fixing hardware, installation materials, structural supports etc. including all labour work and material within LSTK Contractor's battery limit.	YES	NO
5.	Providing required no. of feeders & Input power supply (emergency/ UPS/ non-UPS) for the SCADA equipment's, etc. including all associated works.	YES	NO
6.	Assignment of relay names, assignment of IP addresses, Mapping of protection & metering functions, downloading of CID files to respective relays	YES	NO
7.	Supply, laying, termination, SCADA system cables for redundant connectivity from SCADA Panel / switchgears (located in US-501) to Ethernet switches (in SCADA panel / switchgear) located within LSTK Contractor's ISBL Substation (US-556).	YES	NO

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8.	Co-ordination, assistance and interface support to vendor of the SCADA system for testing and successful commissioning of the system (testing and commissioning shall be done by SCADA system vendor.	YES	NO
9.	<p>Interface requirement for Factory Acceptance Test (FAT) at SCADA vendors works –</p> <p>Apart from the installed equipments within various switchgears, LSTK Contractor shall supply additional following equipments for FAT which shall then be handed over to the Owner as spare.</p> <p>Supply of 1no. of each type (make &amp; model) of numerical relay.  Supply of 1no. of each type of MFM.  Supply of 2nos. of each type of Ethernet switch.  Supply of 1no. of each type of Protocol converter.  Supply of 1no. of each type of any other hardware (within LSTK Contractor scope of supply) connected to SCADA system.</p> <p>All the above shall be completely programmed by LSTK Contractor as per actual project requirement.</p> <p>LSTK Contractor shall supply and deliver all the above to SCADA vendors works as per the schedule of FAT. Location of SCADA vendors works and the schedule of FAT shall be intimated later during detail engineering.</p> <p>LSTK Contractor shall ensure that their representative shall be present at SCADA vendors works at the time of FAT</p>	YES	NO



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### 3.6 EARTHING

Sr. No.	DESCRIPTION	LSTK CONTRACTOR	OWNER/ OTHER'S
1.	Provision of earthing grid for ISBL plant and its connection to overall plant grid at a number of locations, to be decided during detailed engineering.	YES	NO

## 4 SPECIFIC INSTRUCTIONS

- 4.1 The LSTK Contractor shall ensure that full and safe access inside their Switchgear Room & plant battery limit is provided to Owner/ Other Contractor to undertake their cable laying (if applicable).
- 4.2 The LSTK Contractor shall also ensure that full access inside their battery limit is provided to Owner/ System vendors to undertake their testing work in accordance with the project schedule.
- 4.3 Supply of Fire Alarm system equipments, PA system equipments, & telephone system equipments shall be in Owner's scope in order to avoid different makes, models in the various units of the 5<sup>th</sup> Stream Alumina Refinery.
- 4.4 LSTK Contractor shall generally be responsible for handling of the free-issue items that shall be given to the LSTK Contractor by the Owner. LSTK Contractor shall be responsible for receiving & shifting from Owner's stores (location of the stores shall be intimated to the LSTK Contractor during detail engineering) the free-issue material. Further responsibility of installation, testing, commissioning shall be as per the various interfaces elaborated above. It shall be the responsibility of the LSTK Contractor to check and verify that the material given is as per the estimated quantities furnished by LSTK Contractor. Detailed procedure for handling of free issue material shall be furnished during detail engineering. LSTK Contractor shall comply to the same without any additional time and cost implications to the Owner.
- 4.5 Attempt is made to elaborate detail scope in each interface to the extent possible. However any additional work required in any of the interfaces during detail engineering shall be performed by the LSTK Contractor without any implications to the Owner.

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## Annexure-I

Following drawing(s)/document(s) is/are enclosed:

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1.	6695-ELT-556-FA-0001	BATTERY LIMIT & INTERFACE-ELECTRICAL, BAUXITE STORAGE HANDLING & CRUSHER (US-501)/ LIME STORAGE PREPARATION (SLAKING) (US-556)	A3	01

