TENDER DOCUMENT

NIT No.- DLI / C&E / WI-665 / 757

FOR

Tender for ‘Design, Engineering, Supply, Installation, Testing & Commissioning of ‘LOUD SPEAKER TALK BACK (LSTB) SYSTEM AND ASSOCIATED WORKS’ for the project of “Augmentation of Raw Material Receipt and Handling Facilities with new OHP Part- B (Package- 061) of Bhilai Steel Plant (SAIL)”.

VOLUME- 2B

(Scope of Work & Technical Specification)

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**Scope of work for LSTB system shall include but not limited to:**

Design, engineering, manufacture, shop fabrication, assembly, testing, inspection at manufacturer’s works, packing, supply, dispatch, transportation, delivery at site, loading/unloading/handling of Loud Speaker Talk Back (LSTB) equipments/materials and associated works, all type of cables for the system, required fabrication & assembly at site, completion of facilities, erection, testing & commissioning.

Submitting Basic engineering, detailed engineering and reference category of drawings, operating software and documents in requisite copies for approval of BSP / MECON. Further the successful bidder will furnish final basic & detailed engineering drawings, manufacturing drawings of fast wearing items and non-standard items, as built drawings, erection drawings/ documents, operating software, operation and maintenance manuals in soft editable format.

Receipt of material, loading / unloading, storage, watch & ward, complete erection, testing, commissioning, handing over to BSP, demonstration of performance guarantee. Preparation and approval of erection survey/ alignment schemes, grouting clearances, painting clearances, testing of welds, pressure testing protocols and other related site protocols as applicable.

Supply of all commissioning & start-up spares, special tools & tackles and insurance spares. A list of such commissioning & start-up spares and insurance spares shall be indicated separately in the offer. Bidder shall furnish unit price for two years operation & maintenance spares (Recommended Spares)

Specialized training to BSP’s/Consultant’s personnel for operation, maintenance, for smooth handing over shall be included in bidder’s scope.

Testing of systems/ sub - systems and integrated testing as per applicable standards, accuracy and performance testing shall be carried out by the successful bidder on continuous basis along with associated facilities followed by commissioning. On successful commissioning of the various sub-systems, Performance Guarantee test shall be carried out.

Getting BSP/ MECON approval of the drawings, documents to be submitted by the successful bidder, obtaining required approval from statutory authorities, providing adequate personnel, equipment, tools & tackles for timely completion of the project.

Providing all drawings and documents with operation & maintenance manuals.

The scope of bidder shall be deemed to include all such items which although are not specifically mentioned in the specifications but needed to make system complete in all respect with all mountings, fittings, fixtures and standard accessories.

240V +/-10%, 50Hz AC Power Supply shall be made available by purchaser at the following points:

1) LTSS-2 (Despatcher-4)
2) LTSS-3 (Despatcher-5)
3) Despatcher-1
4) Despatcher -2  
5) Despatcher-3

Further distribution of power for the LSTB System shall be in the scope of bidder. Minimum size of power cable shall be 2.5 sq mm, stranded copper conductor. All the cables shall be armoured and FRLS grade. Cables shall be confirming to relevant applicable IS and standards reference given in the tender. Bidder’s scope shall include supply and installation of all type of the cables (Power, signal and loudspeaker cables) as per requirement of the LSTB system with min. 20% spare cable pair in the connecting cable for future maintenance. Cable length shall be as per the Locations of subscriber station and other devices given in LSTB SUBSCRIBER STATION Layout Drawing (Drg No. BSP-EPI-01-061-01-013-29-BE-03156- R0) & routing distances (approx.) between consecutive subscriber stations (PA station) given therein and General Layout Drawing (Drg No. DLI-C&E-WI-665-002-R0). All the cables shall be laid on purchaser’s cable route. Bidder to offer cables as per the system design requirement acceptable to BSP/MECON.

**Drawings /Documents Submission:**

(1) **Documents/Information to be submitted by bidder with offer:**
- List of commissioning spares and start up spares
- List of special tools and tackles,
- List of recommended spare parts for 2 (Two) years trouble free operation and maintenance.
- Technical specifications and Catalogues/ Leaflets
- Reference list of customers for similar supply of items.
- Unpriced copy of price bid.
- No deviation declaration to NIT technical and commercial terms and conditions and duly signed with date and stamped copy of NIT Vol-1, Vol-2 (2A, 2B & 2C) and Vol-3.

(2) **Documents/Information to be submitted by successful for Approval/Reference in requisite sets.**
- General arrangement and layout drawings for LSTB Schematic Drawing
- Mounting arrangement Drawings
- Bill of materials
- Technical specifications,
- Operation & Maintenance manuals
- Pre requirements for Installation of LSTB system
- Cable and conduit layout drawings
- Earthing layout drawing
- Cable schedule
- Wiring Diagram and termination drawings.
- Technical data sheet of all components, cables; electronic devices etc. for LSTB
- Total power consumption details
- Approximate weight of the equipment
- Internal test reports and certificates
- Accuracy / Performance check reports
- Test reports for degree of protection on enclosure of sensing element.
- Quality assurance for LSTB
- Operation and maintenance manuals
- Other drawings/ documents as per BSP/ MECON requirements for the system and drgs as per the recommendation of manufacturer.

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Loudspeaker talk back system shall be provided for facilitating reliable two-way intercommunication between various strategic points of the plant complex i.e. Junction houses, Conveyor galleries, tunnels, Wagon tippler building, Control room, Storage yard etc. The subscriber stations shall be provided at locations having very high ambient noise level. The receiving point to the last discharge point of the raw materials is widely covered here; therefore, the LSTB system has to be provided in groups with overlapping of the subscriber stations. Power supply for LSTB subscriber stations will be taken from nearby local power supply source by suitable rating MCB. 240V +/-10%, 50Hz AC Power Supply shall be made available by purchaser at the Despatcher-1, Despatcher-2, Despatcher-3, Despatcher-4 and Despatcher-5. Further distribution of power for the LSTB System shall be in the scope of bidder. Minimum one number Desktop PC for programming will be provided. The Central Control Units will be provided in Air conditioned environment.

No. of subscribers = 50.  
No. of groups = min 5.

List of subscriber stations and locations has been indicated in the enclosed subscriber station layout drawing (LSTB Subscriber Station Layout Drg No. EPI-BSP-061-03-BE-03156-R0). All despatchers (Despatcher 1 to 5) will be able to communicate with LSTB subscriber through Exchange interface (EPABX).

Other technical details of system, equipment and cables shall be as per General Technical Specification as given below.

GENERAL TECHNICAL SPECIFICATION (GTS)

01. General:

Loudspeaker talk back system shall be provided for facilitating reliable two-way intercommunication between various strategic points of the plant complex. The subscriber stations shall be provided at locations having very high ambient noise level.

The system having the requisite number of subscribers shall be provided in various units of the plant complex for smooth flow of information between process points.

02 System features:

02.01 The system shall be of distributed amplifier type using latest state-of-art technology.
02.02 The system shall be designed for perfectly clear and intelligible speech communication and shall have high operational reliability under adverse environmental conditions including high noise levels (90 to 110 db).

02.03 The system shall be designed for two channels of communication ie; in paging and private modes. In paging mode the announcement from any station shall be heard at all other stations through respective loudspeakers while in private mode close-talk communication shall be possible between two or more stations.

02.04 The proposed systems shall be configured as an open line system.

02.05 The system shall be provided with call attention tone facility preceding all paging / announcement calls.

02.06 Each communication station shall be provided with indication such as power ON, channel busy, volume control etc.

02.07 The system shall have provision for automatic muting of the associated loudspeaker in the paging / announcement mode to avoid acoustic feedback.

02.08 The system shall have the facility to have interconnection with the telephone exchange for speech communication in private mode and paging mode.

02.09 The system shall be of modular construction for easy expansion of subscriber stations as and when required without affecting the installed equipment.

02.10 The system shall be designed for continuous reliable operation and of rugged construction to withstand shock and vibration.

02.11 The system shall be suitable for operation from a centralised 240 V +/-10%, 50Hz +/-5%, single phase AC mains power supply. Power supply cable shall be drawn to each subscriber location from this centralised source.

02.12 The communication equipment shall be designed to work effectively to provide clear speech communication between the subscribers under the following ambient condition:

- Temperature -0 deg.C to 55 deg.C
- Relative -Upto 90% at 35 deg. C
- humidity
- Surrounding -Dusty and Corrosive
- Vibrations -25 Hz (+/-) 2 Hz
- Ambient noise -90 to 110 db

03. Establishment of a call

Any person willing to communicate with another person has to go to the nearest subscriber station, lift the handset, press the "PRESS TO PAGE" switch and call for the desired person.
A call attention gong automatically proceeds the paging announcement. The paging announcement is heard on all the loudspeakers of the system except that of the calling station. After the announcement the calling person releases the "PRESS TO PAGE" switch and waits for the response of the called person.

The called person can go to the nearest station and communicate with the calling person directly in private mode by simply lifting the handset. A third person can join the conversation in conference mode. During the private mode the associated loudspeakers are free to receive paging announcement generated by other stations.

04. Equipment details

04.01 Each system shall be distributed amplifier type and broadly consist of (but not limited to) the following:

- Subscriber station of both desk and outdoor (pole/wall/structure mounted) type complete with built-in amplifiers, additional extension amplifiers (if required), microphones etc. as per the requirements.
- Industrial horn type / box type loudspeakers.
- Power supply unit.
- Interconnecting cable networks comprising power supply cable, signal cable, loudspeaker cables, Junction boxes, cable termination devices, mounting accessories & other erection accessories for the system.

04.02 Subscriber stations

The subscriber stations shall be indoor desk or outdoor wall/ pole mounted type as per the requirement.

Desk mounted subscriber stations conforming to IP 52 shall be used in control rooms, offices, etc. while outdoor stations conforming to IP 55 shall be used for shop floor areas and outdoor applications.

The desk mounted subscriber station shall broadly comprise a desk top hand set station, an extension amplifier and box type loudspeaker. The desk top hand set station shall consist of line amplifier, signal processing unit, function switches, indication lamps, etc. all housed in moulded fibre glass reinforced polystyrene case. The wall mounting type extension amplifier shall consist of a power supply unit and a plug in type power amplifier electronic module.

The pole / wall / column mounting subscriber station shall have die cast aluminum alloy (LM6) housing / fibre glass housing. The station shall broadly comprise of line amplifier, power amplifier, control signal lamps, switches for page / private channels and other functions, noise canceling microphone and receiver hand set, etc. all housed in the above mentioned housing. The subscriber station shall be provided with dust, weatherproof protection cover suitable for outdoor installation. The re-entrant horn type loudspeaker shall be used in conjunction with these stations.
Pilfer proof subscriber stations shall be considered for outdoor locations where there is scope of pilferage.

The subscriber station shall also have provision for direct plugging in additional higher wattage amplifier to raise the power output wherever required.

The press to talk micro switch shall be provided in the handset itself. It shall be designed in such a manner that only when this micro switch is pressed the microphone shall be ON.

04.02.01 Amplifiers

The amplifiers shall be fully solid state using integrated circuits/semiconductor devices and shall generally have a frequency response characteristics of +/-3 db between 60 Hz to 10 KHz and the response shall drop off sharply beyond the speech frequency zone to achieve maximum intelligibility under higher noise level conditions.

The design of the amplifiers shall be such as to limit the effects of external interference. It shall essentially be free from hum and have a total harmonic distortion of not more than 5% at full output.

The amplifier dynamic characteristic shall accommodate the entire dynamic range of sound signal and shall provide optimum fidelity ensuring faithful sound reproduction.

The amplifiers shall be of suitable wattage and impedance to match with the speakers connected to it.

The amplifiers shall be designed to operate from power supply with voltage variation of +/-10% without much variation in output or gain.

04.02.02 Microphones

Microphones shall be of robust construction matching with amplifier input.

It shall be of noise canceling type with proper directional response pattern to suppress ambient noise.

It shall be designed to limit the non-linear effects caused by external interference due to magnetic fields, mechanical vibration and wind. The microphone shall be immune to the stray magnetic fields and mechanical vibration.

It shall be provided with a gooseneck / suitable mounting / fist type for the indoor stations and shall be in built in the handset for out door stations.

04.02.03 Loudspeakers

The loudspeaker shall have uniform sensitivity and low frequency cut off having suitable directional response pattern for efficient and high quality
speech reproduction. It shall match the output of the amplifier. Necessary line matching transformer shall be provided for each loudspeaker.

The loudspeaker shall be either industrial re-entrant horn type (conforming to IP 55) or box type (conforming to IP 52) depending upon the location where the station shall be used.

The indoor box type loudspeaker shall be housed in sheet steel enclosure suitable for wall mounting and shall have built in volume control facility.

The industrial horn type loudspeaker shall be weather proof version of die cast Aluminum body with sturdy mounting bracket suitable for mounting on pole / wall / column. The driver unit shall be concealed in the horn to prevent damage due to environmental conditions and pilferage.

Peak output -6 watts indoor box loudspeakers power -15 watts outdoor industrial re-entrant horn loudspeaker

**04.03 Power supply.**

The equipment will be suitable for operation from a centralized uninterrupted power supply. This power supply source shall be made available to the tenderer for use in the respective control rooms of the units. The power supply equipment shall be provided with protections against short circuit, over voltage, under voltage and transients.

**04.04 Cable network**

Each of the loudspeaker talk back system shall have a separate cable network for facilitating the provision of subscriber stations as required for the plant.

**04.05 Cables for the LSTB Systems:**

The signal cables shall be completely separated from wiring of any other circuit of high voltage. When the cables are to be laid in the electrical cable trays of the conveyor galleries, sufficient space shall be maintained (as per the Indian electricity rules) from the cables of the high voltage circuits.

Each subscriber station shall be connected to the power supply unit through a separate cable network using 3 core power supply cables of min size.2.5 sq.mm stranded copper conductor & FRLS grade.

Armoured PVC cable shall be used when the cable is to be laid on trays in cable tunnels / overhead cable galleries / overhead cable trays.

The tenderer shall furnish the specification of the signal cable, power supply cable and loudspeaker cable proposed to be used in the system.

All cables used shall be made up of annealed high conductivity solid /
annealed copper conductor. All PVC armoured and un armoured telephone cables shall be Fire retardant low smoke type (FRLS Type) having protective system of inner and outer sheath specially designed with thermoplastic or thermosetting materials having superior resistance to ignition and flame propagation with smoke emission and toxicity or corrosive characteristics. The cable will conform to the following standards:

* IEC-332 (Part 1)
* IEC-332 (Part 3)
* IEEE-383
* BS-4066
* Swedish Chimney test as per 4241475

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