TENDER DOCUMENT

NIT No.- DLI / C&E / WI-665 / 758

FOR


VOLUME- 2B

(Scope of Work & Technical Specification)

ENGINEERING PROJECTS (INDIA) LIMITED

(A GOVT. OF INDIA ENTERPRISE)

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Scope of work for VHF Communication 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 of VHF Communication system equipments/materials and all type of required cables for the system, completion of facilities & supervision of installation, testing & commissioning.

Submission of system drawings, software and documents in requisite copies for approval of BSP/MECON. Further the successful bidder will furnish final documents, operating software, operation and maintenance manuals.

Supervision of installation, testing, commissioning and handing over to BSP, demonstration of performance guarantee. Preparation and approval of erection survey and other related site protocols as applicable.

Supply of all mounting accessories for base stations & mobile stations, 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.

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.

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 license for system operation and services for frequency liaisoning.

Bidder to consider the repeater Interface Device and special cables (as required) as per the design requirements. Bidder to consider an approx 30 meters of coaxial cables for each base station/repeater stations.

Providing all drawings and documents with operation & maintenance manuals.

Scope of Work

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.

V.H.F. Communication system with the required number of Trans-receiver sets shall be provided. Each trans-receiver set shall be complete with transmitter, receiver, suitable antenna units, masts for antenna (as required), cables, connectors, power supply equipment, earthing of system, mounting accessories and all other erection accessories as required for the completeness of system.

The frequency allocation for operating V.H.F system shall be obtained by the successful bidder, a separate frequency preferably 149.75 MHz, from the Wireless Planning Commission, ministry of communication. The necessary help to the successful bidder shall be provided, if so needed for obtaining the same, without financial implication to the BSP/MECON/EPI.

Total numbers of Stations to be supplied by the bidder are as follows:
No. of base station = 6.
No. of mobile station = 10.
No. of handheld set = 30.
For other technical details of system, equipment & cables refer General Technical Specification (GTS).

**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.
- Duly signed with date and stamped copy of 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 VHF Communication system Schematic Drawing
- Installation arrangement Drawings
- Bill of materials
- Power distribution Drawing
- Operation & Maintenance manuals
- Pre requirements for Installation of VHF communication system
- Earthing layout drawing (as required)
- Cable schedule
- Wiring Diagram and termination drawings.
- Technical data sheet/Technical specification of all components, cables, electronic devices etc. for VHF communication system
- Total power consumption details
- Approximate weight of the equipment
- Internal test reports and certificates
- Performance check reports
- Test reports for degree of protection on enclosure.
- Quality assurance for VHF COMMUNICATION SYSTEM
- Other drawings/ documents as per BSP/ MECON requirements for the system and drgs as per the recommendation of manufacturer.
GENERAL TECHNICAL SPECIFICATION VHF COMMUNICATION SYSTEM

1. General
This General Technical Specification (G.T.S) covers the technical requirement of VHF communication system for expansion to 7.0Mt. of BSP under modernization.
VHF communication system is intended for instantaneous two-way radio communication amongst base station and a number of mobile/ portable hand held trans-receiver sets in the Steel plant complex.
In addition to the above hand held trans-receiver sets shall be provided with DTMF dial pad to interface with telephone exchange of the Steel plant. Telephone interface equipment shall also be provided.

2. Design Basis
2.01 The equipment shall use synthesised frequency control. The frequency channel shall be easily programmed and provide extremely stable frequency operation. It shall be possible to programme the sets upto 12 channels by use of PROM & E-PROM.

2.02 The transreceiver sets shall operate on simplex / semi-duplex mode.

2.03 All controls on the sets shall be positioned in a manner so as to be conveniently operated.

2.04 Protection against misuse and reverse battery polarity to be provided.

2.05 The equipment shall be light in weight and designed for low power consumption.

2.06 The equipment shall be weather proof rugged in construction and designed for continuous and reliable operation under adverse environmental and operating conditions of a power plant complex.

2.07 The mobile stations to be used in the cranes / moving machines shall be able to take the shocks and vibrations of these machineries.

2.08 The equipment shall require minimum of maintenance and be easy to maintain.

2.09 The transreceiver sets shall be designed for having high carrier stability with adequate suppression of spurious emission and a low distortion.

2.010 The units such as transmitter, receiver and power supply unit shall be mounted on separate PCB for ease of maintenance and serviceability.

2.011 The transreceiver sets shall have LCD display for visual indications regarding channels with back lighting for operating in a low light environment.
3. **Equipment Details**

The VHF radio communication systems shall comprise of the following –

- ---- Nos. fixed transreceiver sets to be used as bas stations.
- ---- Nos. portable handset stations
- ---- Nos. of walkie-talkies with DTMF dial pad to interface with telephone exchange.
- Telephone interface equipment shall also be provided.
- Each of the trans-receiver stations complete with connectors, cables, power supply unit, Ni-Cd rechargeable battery, battery charger, suitable antenna units and mast / structure for the base station antennas.

3.01 **Portable hand held type sets.**

The trans-receiver set shall be compact, lightweight having low power consumption.

The sets shall be fully IC based, modular in nature, synthesized frequency controlled, with multi channel facility.

Each trans-receiver set shall comprise of transmitter section, receiver section, a control unit complete with all controls, microphone, speaker, built-in helical antenna and rechargeable 12V Ni-Cd battery all housed in a splash proof cabinet cast from aluminum alloy.

Each set shall be provided with a rugged leather carrying case. The set shall have the provision for using earphone.

**Technical parameters:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>Frequency synthesized over the range of 134 - 174MHz</td>
</tr>
<tr>
<td>RF power output</td>
<td>1 to 5 Watt (variable)</td>
</tr>
<tr>
<td>Channel spacing</td>
<td>12.5 / 25 KHz</td>
</tr>
<tr>
<td>No. of channels</td>
<td>12</td>
</tr>
<tr>
<td>AF output</td>
<td>Minimum 0.5 Watt</td>
</tr>
<tr>
<td>AF distortion</td>
<td>Less than 5 % at 1 KHz</td>
</tr>
<tr>
<td>Power supply</td>
<td>12 V Ni-Cd battery (rechargeable)</td>
</tr>
<tr>
<td>Type of operation</td>
<td>Simplex or semi-duplex</td>
</tr>
<tr>
<td>Type of antenna</td>
<td>Helical spring antenna</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 - 55 degree Celsius</td>
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</tbody>
</table>
3.02 **Base / Mobile transreceiver sets**

The trans-receiver sets shall be fully solid state modular in design, synthesised frequency controlled, multi channel, based on the latest development in VHF communication field.

The set shall be compact, light weight having a splash proof cabinet cast from aluminum alloy. It shall have low power consumption.

Each trans-receiver set shall comprise of transmitter section, receiver section, a control unit complete with all controls, microphone, loudspeaker and antenna unit.

The base station shall be designed to work from a 240V AC mains supply. However a maintenance free battery of suitable capacity along with a charger unit shall also be considered for the base station.

The mobile stations shall be provided with a maintenance free rechargeable 12V Ni-Cd battery for power source.

The sets shall have

- Digital channel display.
- Provision for connecting external speaker.
- Provision for interfacing with telephone exchange.
- Provision for selective calling facility.

The transreceiver sets shall be so designed as to be easily configured into fixed base station / mobile stations, as required. The equipment shall be supplied with full range of accessories so that it shall be suitable use as mobile/static applications.

**The set shall be supplied with following accessories when used as a Fixed base station.**

- Desk top type microphone assembly.
- GP antenna / Yagi antenna with RF cable & connectors.
- Power supply unit complete with battery set, charger unit and DC power cable for fixed stations.
- Mast required for the antenna unit.

**The set shall be supplied with following accessories when used as a Mobile station in moving cranes / machineries.**

- Fist type microphone assembly.
- Mounting assembly for mounting in vehicles.
- Antenna assembly with RF cable for mobile use.
- Earphone facility / external speaker.

**Technical parameters**
Frequency range: Frequency synthesized over the range of 134 - 174MHz
RF power output: 25 Watt
Channel spacing: 12.5/25 KHz
No. of channels: 12
AF output: Minimum 1 Watt into 8 ohms load
AF distortion: Less than 5 % at 1 KHz
Type of operation: Simplex or semi-duplex
Type of antenna: GP/YAGI/WHIP antenna as per requirement
Operating Temperature: 0 - 55 degree Celsius

3.03 Battery Charger

Portable single phase battery charger shall be suitable for charging at least 6 nos. 12 Volts Ni-Cd batteries at a time.

The unit shall comprise a transformer provided with mains voltage tapings, full wave bridge silicon rectifiers and controlling choke. The charger shall be provided with mains isolator switch, rotary switch for selecting different charging modes, flush mounted charging current DC ammeter, supply ON/OFF indication lamp and protective fuses.

The entire assembly shall be housed in a sturdy sheet steel box having proper ventilation arrangement, terminals with insulated knurled screwed knobs for connecting to batteries and provided with mains and battery leads and pair of battery charging clips with marked polarity.

4 Training of EPI/BSP/MECON personnel.

The successful bidder shall arrange for training of EPI/BSP/MECON personnel for operation & maintenance of the VHF system. It is under the successful bidder scope. The successful bidder shall give the detailed training program mutually agreed as per requirement well in advance prior to commencement of training.

5 PERFORMANCE GUARANTEE

5.01 The bidder shall study the specification & satisfy himself thoroughly regarding the workability of the plant, equipment & system offered & also takes full responsibility for the guaranteed operation & performance of the same as well as for their smooth, safe & reliable working.

All equipment shall be guaranteed for workmanship, materials design and satisfactory performance to the parameters in accordance with the specification document and relevant clauses of the General Condition of Contract. The guarantee for performance shall cover individual items and systems for their ratings/outputs.

5.02 The bidder shall guarantee the integrated operation of complete system & equipment covered in his scope as a whole including interfaces required to be established with other related system.

The successful bidder shall conduct performance/ acceptance tests on each of the major items of equipment supplied to demonstrate
that the equipment and system supplied are capable of achieving the performance parameters specified and contracted for, in accordance with the General Condition of contract. The total system performance shall also be guaranteed and demonstrated. Should the tests specified show that the equipment has failed to achieve the guaranteed parameters, the supplier shall carryout necessary modification or part replacements to achieve the guaranteed parameters & successful demonstration the tests shall be repeated without any extra cost to the EPI/BSP/MECON.

6 INSTALLATION OF EQUIPMENT, TESTING & COMMISSIONING.

6.01 The successful bidder shall be fully responsible for the satisfactory erection, installation, testing & commissioning, start-up & performance test of the V.H.F equipment and it’s associated cable network.

6.02 The successful bidder shall furnish with his tender the particulars of the license held by him / the sub vendor he proposes to engage for carrying out the installation work against this specification.

The successful bidder shall furnish to the EPIL/BSP/MECON, the names and particulars of the certificate of competence of the supervisors and workmen to be engaged for carrying the installation work against this specification.

6.03 All erection, testing & commissioning work shall be carried out in accordance with the requirement specified in this tender document, the standard recommended practice and best workmanship. All electrical work shall also comply with standard norms and practices adopted by the EPIL/BSP/MECON and representative state /Central Govt. authorities.

6.04 For complete erection, testing & commissioning, the successful bidder shall bring all insulation aids/materials, consumables, tools, test equipment, qualified & experienced personnel, in order to carry out the job successfully. A list of the same shall be furnished to the purchaser for review.

All technical personnel assigned to the site by the successful bidder must be fully conversant with the system hardware & software.

6.05 The successful bidder shall provide and maintain an office at the site during installation, testing and commissioning stage for his staff. The successful bidder shall make his own arrangement at his own cost for the transport of his staff and labour to and from the site of works. Appropriate storage of the materials to be supplied will be arranged by the successful bidder at the site. The successful bidder’s responsibility shall also include safety and security of the equipment at site.

6.06 On completion of erection & installation of all equipment, & before start u.p, each item of the system shall be jointly inspected by the EPIL/BSP/MECON and the successful bidder for correctness and completeness of the installation and accessibility to start up leading to commissioning tests.
The list of commissioning tests to be performed shall be mutually agreed upon and included in the successful bidder’s Quality Assurance Plan (QAP).

The commissioning spares for all items/equipment shall be included along with the commissioning services. The consumables required during the commissioning of the system shall be included as part of the commissioning spares. Requisite factory & site test reports shall be supplied by the successful bidder.

6.07 The Tenderer’s scope for testing and commissioning shall also include Provision of all necessary measuring instruments/test equipment. Preparation of final commissioning report.

Conducting Preliminary Acceptance Test (PAT) & Final Acceptance Test (FAT) and attending rectification of all points raised during all above tests.