

## Specifications for Erection of Instrumentation System at SDSC - SHAR

**1.0 LOCATION OF THE WORK:** Second Launch Pad (SLP), Satish Dhawan Space centre (SDSC SHAR), Sriharikota, Tirupati, AP

### **2.0 Objective of the document**

This document is intended for techno commercial specification for realizing and testing of instrumentation interfaces related to Gaganyaan project at OMPF, CESB & UT at SLP complex. The guidelines to be followed by the erection agency to carry out the erection works are also outlined.

### **3.0 Contract Period : (18 months from the date of department clearances)**

The total scope of work shall be completed as per below schedule:

- Commencement of Erection works: Department will give clearances within TWO months from PO (Based on site clearances)
- Clearances will be given for execution of works in Two / Three slots based on site clearances
- Delivery period for Erection: 18 Months from the date of department clearances.

### **4.0 Scope of Erection Agency:**

- a) Realization of the systems taking department procured items as free issue items. Which includes
  - i. Erection and commissioning of Pollution Monitoring system at OMPF
  - ii. Safety systems like gas detection systems, FDA, remote water monitors, EP valves extension to remote I/o
  - iii. Erection and commissioning of Pollution Monitoring system at CESB / SLP
  - iv. Temperature sensors interfaces to remote I/o through Field junction box and Instrumentation junction boxes with Data / control cables.
  - v. Refurbishment of safety consoles for isolation of 24V dc supply from common authorization.
  - vi. Installation of instruments, Equipments like Instrumentation junction boxes, Instrument racks & Field junction boxes
  - vii. Data, control and power Cable laying, glanding, MIL connector terminations (Crimping type)
  - viii. Internal wiring of Junction boxes

- ix. Synthesized pollution alarms extension to the UT
- x. Individual Analog (4-20mA) signal of Gas detection sensors extension to remote I/o
- xi. Qualification checks for Electrical interface chains

**5.0 Scope of work for execution:**

Sl No	Description of work	Unit	Qty
5.1	<p><b>Erection and commissioning of Pollution Monitoring system at OMPF</b></p> <ul style="list-style-type: none"> <li>a. Installation of Pollution transmitters (20 Nos) and electrical interfaces to the transmitters</li> <li>b. 1P x 0.5 Sq.mm cable glanding and terminations for each transmitter</li> <li>c. Approx. cable laying in cable trench:               <ul style="list-style-type: none"> <li>1. 1P x 0.5 Sq.mm cable : 1000 Mt</li> <li>2. 20P x 0.5 Sq.mm cable : 500 Mts</li> </ul> </li> <li>d. All the cables need to be terminated both the ends with MIL connectors (Crimping type).</li> <li>e. All cables to be entered in Junction box or Instruments end through Double compression cable glands.</li> <li>f. All the Pollution transmitters are to be interfaced through Isolators. Towards that Installation of Isolators, terminations (04 Nos each) shall be considered.</li> <li>g. Wall mount Installation of control panel with dimensions of Apprx. 300(H) x 400(W) x 150(D)</li> <li>h. SMPS type DC power supply units shall be installed in the panel (04 Nos)</li> <li>i. Installation of Annunciator panels Apprx. 300(H) x 300(W) x 150(D) and electrical interfaces through cable gland.</li> </ul>	Lot	01
5.2	<p><b>Installation and internal wiring of Instrument racks:</b></p> <ul style="list-style-type: none"> <li>a. Dimensions of Instrument rack: 2100(H) x 600(W) x 800(D)</li> <li>b. Instrument racks shall be placed / installed at control rooms</li> <li>c. SMPS type DC power supply units shall be installed (Maximum of 12 Nos per rack)</li> <li>d. Installation of Oring modules and DC power extension from power supply to Module. Oring module output to be extended to the MIL connector.</li> <li>e. Internal wiring of AC and DC power extension to the power supply units</li> <li>f. All incoming and outgoing terminations through MIL 38999 connectors (crimping type: Maximum of 20 connectors of 04 pin / 2.5 Sq.mm)</li> <li>g. Glanding of all incoming cables and party has to provide the Gland plate with punching as per required dimension.</li> <li>h. Electrical connections shall be established for exhaust and intermediate fans.</li> <li>i. Spare holes to be plugged with dummy plugs</li> <li>j. Cross ferruling for internal wiring</li> <li>k. Identification of connectors and fixing of connectors on connector plates</li> <li>l. Hookup wire, mounting accessories and wiring accessories shall be in the scope of Department</li> </ul>	Nos	04

	<p>m. Identification of junction boxes with engraved plates.</p> <p>n. Total number of man days required for completion:~10days / panel (for estimation of quantum of works only)</p>		
5.3	<p><b>Gas detection sensors Erection and commissioning at CESB</b></p> <p>a. Installation of Gas detection transmitters (16 Nos) and electrical interfaces to the transmitters</p> <p>b. Internal wiring of existing IJB to accommodate as additional interfaces</p> <p>c. 1P x 0.5 Sq.mm cable glanding and terminations for each transmitter</p> <p>d. Approx. cable laying in cable trench:</p> <p>e. 1P x 0.5 Sq.mm cable : <b>1000 Mt</b></p> <p>f. 20P x 0.5 Sq.mm cable : <b>500 Mts</b></p> <p>g. All the cables need to be terminated both the ends with MIL connectors (Crimping type).</p> <p>h. All cables to be entered in Junction box or Instruments end through Double compression cable glands.</p> <p>i. All the Pollution transmitters are to be interfaced through Isolators. Towards that Installation of Isolators, terminations (04 Nos each) shall be considered.</p> <p>j. SMPS type DC power supply units shall be installed in the panel (04 Nos)</p> <p>k. Installation of Annunciator panels Apprx. 300(H) x 300(W) x 150(D) and electrical interfaces through cable gland. Qty: 04 Nos</p>	Lot	01
5.4	<p><b>Instrumentation Junction boxes:</b></p> <p>a. Dimensions of Junction box: 2100(H) x 2400(W) x 800(D)</p> <p>b. Instrument racks shall be placed / installed at control rooms</p> <p>c. All incoming and outgoing terminations through MIL 38999 connectors</p> <p>d. Glanding of all incoming cables and party has to provide the Gland plate &amp; Connector plate with punching as per required dimension.</p> <p>e. This junction box planned to use for marshaling the interfaces from field I/Os to Remote controller I/Os through cage clamp terminal blocks.</p> <p>f. Installation of relay boards on DIN rail and wiring</p> <p>g. Spare holes to be plugged with dummy plugs</p> <p>h. Cross ferruling for internal wiring</p> <p>i. Identification of connectors and fixing of connectors on connector plates</p> <p>j. Hookup wire, mounting accessories and wiring accessories shall be in the scope of Department</p> <p>k. Identification of junction boxes with engraved plates.</p> <p>❖ Total number of man days required for completion:~20days/ panel (for estimation of quantum of works only)</p>	Nos	03

SI No	Description of work	Unit	Qty
5.5	<p><b>Installation and internal wiring of Field Junction boxes:</b></p> <ul style="list-style-type: none"> <li>a) Dimensions of Field junction box: 670(H) x 340.5(W) x 190(D)</li> <li>b) Filed junction box shall be placed / installed at field</li> <li>c) All incoming and outgoing cables entry through flame proof glands and terminations through cage clamp type terminal blocks / MIL 38999 connectors</li> <li>d) Spare holes to be plugged with dummy plugs</li> <li>e) Cross ferruling for internal wiring</li> <li>f) Identification of connectors and fixing of connectors on connector plates</li> <li>g) Hookup wire, mounting and wiring accessories shall be under the scope of Department</li> <li>h) Identification of junction boxes with engraved plates. <ul style="list-style-type: none"> <li>❖ Total number of man days required for completion: ~10days / panel (for estimation of quantum of works only)</li> </ul> </li> </ul>	Nos	06
5.6	<p><b>Refurbishment of Gas check system panels:</b></p> <ul style="list-style-type: none"> <li>a) Refurbishment of Gas check system includes the extension of individual 4-20mA signals of sensors to the remote I/o (~30 Channels)</li> <li>b) Modifications of Alarm signals which will be interfaced to Annunciator panels</li> <li>c) Removal of signal conditioners and plug in control cards (30 Nos)</li> <li>d) Installation of Isolators and DC power extension to the isolators, associated wiring interfaces <ul style="list-style-type: none"> <li>❖ Total number of man days required for completion: ~15days / panel (for estimation of quantum of works only)</li> </ul> </li> </ul>	Nos	04
5.7	<p><b>Temperature sensors interfaces to remote I/o : Qty: 58 Nos</b></p> <ul style="list-style-type: none"> <li>a. Installation of Temperature sensors in the process circuits.</li> <li>b. Installation of IS Barriers and associated wiring for extension of DC Power, field interfaces and output to Remote I/o.</li> <li>c. Internal wiring of Field junction box and Instrumentation junction boxes</li> <li>d. All incoming and outgoing cables entry through flame proof glands and terminations through cage clamp type terminal blocks / MIL 38999 connectors <ul style="list-style-type: none"> <li>❖ Total number of man days required for completion: ~10days (for estimation of quantum of works only)</li> </ul> </li> </ul>	Lot	01
5.8	<p><b>Refurbishment of Safety control panels:</b></p> <ul style="list-style-type: none"> <li>a. Refurbishment of existing DC logic wiring for the console Authorisation.</li> <li>b. Delinking of local console operations from common Authorisation key at safety console Local</li> <li>c. Replacement of Isolators and restoration of electrical interfaces (40 Nos)</li> <li>d. Main &amp; Redundant DC supply for operation of pumps and EP valves to be isolated.</li> <li>e. Note: Wiring modifications will be carried out as per approved drawings provided by Department. <ul style="list-style-type: none"> <li>❖ Total number of man days required for completion:-10days / panel (for estimation of quantum of works only)</li> </ul> </li> </ul>	Nos	03

<b>5.9 Cable laying:</b> (Electrical checks shall be carried out for cable drums before laying the cable and test report shall be submitted to Dept). .. Material handling support will be extended by Department for shifting of cable drums from Stores to Site, required manpower shall be deployed by Vendor)			
A	<b>From Field instruments to field junction boxes</b> (Cable laying in existing cable tray) a) 1Pair x 0.5 sq.mm b) 2Pair x 0.5 sq.mm	Km Km	2.0 2.0
B	<b>From Field junction boxes to Instrumentation junction Box</b> (Cable laying in existing cable trench) from UT - LCR a) 20Pair x 0.5 sq.mm b) 16Pair x 0.5 Sq.mm	Km Km Km	1.0 1.0
C	<b>From Instrumentation junction Box to Remote I/O</b> (Cable laying within building, below false floor) a) 20Pair x 0.5 sq.mm b) 16Pair x 0.5 sq.mm	Km Km Km	0.5 0.5
D	<b>From Instrumentation rack to Power Distribution box</b> (Cable laying within building, below false floor) a) 3 Core x 1.5 sq.mm b) 4 core x 2.5 sq.mm	Km Km	0.5 0.5
<b>5.10 Glanding for Cables:</b> cable end preparations and Glanding			
A	½ ” Polyamide glands at instrument end	Nos	250
B	¾” ET glands at Instrument end	Nos	100
C	1 ¼” BSP Glands	Nos	100
D	1 ½” BSP Glands	Nos	100
5.11	<b>Crimping type connectors:</b> Following type of connectors are planned to use for cable interfaces. Receptacle connectors are wired as part of junction box wiring and plug for cable alone to be terminated in connectors (MIL 38999 / MIL26482 series II crimping type connectors) Unit: No. of connectors a) 41 Pin connector b) 32 Pin connector c) 10 Pin connector d) 4Pin Power connectors e) 3pin connectors	Nos Nos Nos Nos Nos	100 100 50 50 50
5.12	Technical support for qualification of system: A. Harness checks of Interface cable B. Cold checks for IJB, IR & FJB to verify the integrity of wiring as per wiring diagrams C. Electrical chain simulation checks for measurement chains D. DC power supply units voltage settings E. Voltage measurements across the load when commanded Total number of man days required for completion:~10days (for estimation of quantum of works only)	Lot	01
5.13	Removal of Ex. Proof Instrumentation panels at UT and associated wiring interfaces. (Apprx. Size: 500mm (H) x 500mm (W) x 250mm(D), weight ~50Kg each, No. of cables:20 nos, Terminations to be removed: ~200 wires), shifting of panels to Instrumentation rooms (~300Mts away from UT.. Material handling support will be extended by Dept.) Unit: Number of Panels	Nos	15

## **6.0 FREE ISSUE ITEMS (ISRO SCOPE OF SUPPLY):**

Following are the detailed list of Instrumentation items which will be issued to supplier as free issue items by ISRO and shall be installed, erected, tested & commissioned by supplier as a complete system.

- a. Data / control and power cables
- b. Pollution transmitters & sensors
- c. MIL 38999 connectors (Crimping and soldering type) along with pins
- d. Cable glands & Instrumentation Junction boxes
- e. Instrument racks & DC power supply units
- f. Test equipments & Wiring accessories

## **7.0 Test & Evaluation:**

- a. As per panel wiring diagrams, Cold checks need to be carried out to verify the wiring integrity before establishing the field and remote I/o connections.
- b. Simulator level testing need to be carried out to ensure the interface channel integrity and voltage, current parameters need to be recorded.
- c. End to End testing of field instruments from control system up to field elements.
- d. After Completion of the loop tests, supplier shall connect back all terminations and connections, which may have been removed for loop test.
- e. Supplier shall arrange sufficient manpower during testing and commissioning.

## **8.0 Conditions for Quotation:**

- a. Party should quote for the total works, partial offers are liable for rejection.
- b. Total Erection works will be awarded to single party, splitting of the orders shall not be considered. Hence Technically suitable and overall lowest offer will only be considered.
- c. Party should have experience of executing the similar nature of erection and commissioning activities of Instrumentation systems (As per sl.no:05). Copies of relevant purchase orders / experience certificates are to be submitted along with the quotation, failing which the offer will not be considered.
- d. Party should deploy the necessary tools and man power required to carry out the above works to site.
- e. Payment will be made on **PRO-RATA** basis (% completion of each Line item) on completion of works and duly certified by the department engineer.
- f. Tenderer shall clearly indicate the items, if any, excluded from his scope of work, failing which it will be deemed that the scope of work is in conformity with the requirements of the technical specifications.

## **9.0 Conditions for Execution:**

- a. Sriharikota is an island and situated around 100 kms north of Chennai and the work spot (Second launch Pad / SLP complex) is located at about 10 kms from main entrance gate. Transportation for the working personnel to and from work spot has to be arranged by the contractor.
- b. Contractor shall take enough care to ensure to progress the work without any damage of material and personnel at work spot.
- c. It is the sole responsibility of contractor to ensure all safety norms to his personnel during transportation between work spot.
- d. Department permission shall be obtained by contractor for establishing shed/ office with an under taking for construction of shed with non-flammable material and for demolition of the same after completion of work.
- e. Department will provide electricity and water required for the job, free of cost at locations identified by ISRO and further distribution to be done by the contractor.
- f. The execution of work shall be carried out as per the guideline given by Dept. engineers.
- g. The contractor shall arrange Accommodation & Transportation of their staff.
- h. Qualification checks for the Instrumentation system to be carried out along with the department personnel.
- i. Free issue materials except cables will be supplied at ISRO Stores and contractor shall arrange for transportation of materials to site.
- j. Material handling support will be arranged by the department for the transportation of cables from stores to site. The contractor shall supply the required labor.
- k. Supplier can take back the erection, testing & calibration equipments, tools brought by him to the site after completion of all the activities included under his scope of work. However dept. permission shall be required for withdrawal of these equipments from site.
- l. Supplier's responsibility shall include adherence to all the rules, regulations & requirements of statutory bodies of State of Andhra Pradesh & Govt. of India, as applicable. Minimum wages to be ensured and Insurance for the working personnel shall be the responsibility of the contractor. Party has to submit the copy of insurance for the deployed staff before start of work and also, party has to submit the certificate (every month) stating that minimum wages paid to the employees.
- m. No claims of extra payment on grounds of any special local working conditions shall be entertained after acceptance of work.