

REQUEST FOR PROPOSAL

CONTRACT

FOR

OPERATION AND MAINTENANCE OF

ASSEMBLY FACILITIES & TEST FACILITIES OF

CONTROL SYSTEMS & COMPONENTS (CSC)

ENTITY AT LPSC, VALIAMALA



CONTENTS

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
11	PREBID MEETING	:	15
12	QUOTATION TEMPLATE	:	16
13	PERIOD OF CONTRACT	:	16
14	PAYMENT TERMS	:	16
15	SECURITY DEPOSIT	:	16
16	LIQUIDATED DAMAGES		17
17	FORCE MAJEURE	:	17
18	SECRECY & PATENT RIGHTS	:	17
19	GRIEVANCE REDRESSEL & ARBITRATION	:	18
20	TRANSFER OR SUBLETTING OF CONTRACT	:	18
21	SHORT CLOSING /TERMINATION OF THE CONTRACT	:	18
22	APPLICABLE LAW	:	19
	ANNEXURES		GENERAL

Annexure 1 : Location of facilities Annexure 2 : Facility description, equipment details & works to be carried out by Service Provider .

1. INTRODUCTION: Liquid Propulsion Systems Centre (LPSC) is the lead centre of ISRO, responsible for the design, development and realization of liquid Rocket engines and stages required for Launch Vehicle programmes and liquid engines for satellites. LPSC have many facilities for assembly and testing of fluid control components and control systems. There are around 19 types of facilities. It is proposed to outsource the operation and maintenance of these assembly and testing facilities for a period of two years. The Scope of work and other details are given in the following sections.

2. FACILITIES AND LOCATION

The location of these facilities is given in Annexure 1. Most of them are located inside five major facilities namely, Earth Storable Component Assembly and Test Facility (ECAT), SemiCryo Component Assembly and Test Facility (SCAT), Integrated Component & Module Assembly & Test Facility (ICMAT), High Flow Facility & CSDIG facilities. The lists of facilities are given below.

Facilities

These facilities are for assembly and testing of fluid control components and modules and control systems. Fluid control component is the device employed in propulsion systems to control the flow, pressure, direction of flow. Modules are one or more fluid control components mounted on a common plate and interlinked through plumbing. The following are the facilities under the current scope.

1. Component and Module Test Facility (CMTF) 2 nos.
2. Low Temperature Test facility (LTF) 2 nos.
3. Pneumatic Test Facility (PTF) 3 nos.
4. High Pressure Installation (HPI) – 2 nos.
5. Helium leak check facility (HLCF) 2 nos.
6. Environmental Test Facility (ETF) 2 nos.
7. Thermal & thermo vacuum Test Facility (TTF) 3 nos.
8. High Flow Test Facility (HFTF) – 1 no.
9. Spring calibration facility 2 nos.
10. Proof Pressure Test Facility (PPF) – 2 nos.
11. Instrumentation and Data Acquisition Facility (IDAF) 4 nos.

12. Clean Rooms (10,000 class) operation & Packing and dispatch facility 5 nos.
13. Deburring & Part checking facility – 2 nos.
14. Chemical Surface Treatment Facility (CSTF) 1 no.
15. Cleaning & Contamination Check Facility (CCF) & DM water plant 3 nos
16. Proof test facility (Hydraulic & Pneumatic) – 2 nos.
17. Cleaning & Contamination check facility – 1 no.
18. Pneumatic leak check facility – 1 no.
19. Flow calibration facility – 1 no.

3. SCOPE OF WORK

The scope of work consists of operation and maintenance of the above listed facilities. Facility details and nature of works is given in Section 4.

3.1. OPERATION OF FACILITIES

The operations of the above facilities are to be performed in accordance with operation manuals which will be made available by LPSC.

The operations broadly include the following:

- 3.1.1. Facility equipment operations and maintenance to maintain them in good working condition.
- 3.1.2. Coordination with Department agencies for electricity, water etc. to ensure necessary support services during the test. These utilities and other consumables required to operate and maintain the facilities will be provided free of cost by the Department.
- 3.1.3. Facility operation as per facility operation procedures given in manual for each facility, based on demand from LPSC focal point.
- 3.1.4. Troubleshooting and resolution of facility problems encountered during tests in consultation with LPSC focal point.
- 3.1.5. Pre & Post test activities such as test hardware assembly/ disassembly, delivering the test hardware and restore the facility to the original configuration.
- 3.1.6. SERVICE PROVIDER shall operate and maintain the facilities with skilled personnel.

3.2. MAINTENANCE OF FACILITIES

The SERVICE PROVIDER shall perform maintenance and repairs on equipments according to Original Equipment Manufacturer procedure and relevant operation and maintenance manuals by LPSC.

The equipments under AMC (Annual Maintenance Contract) are to be maintained by the scheduled visit of the equipment service personnel. Emergency repairs also to be arranged with the Equipment manufacturer/service team wherever it is applicable. AMC/Emergency repair contracts for these equipments will be signed by the Department and the scope and details of the same will be intimated to the Service Provider time to time. It is the responsibility of LPSC to arrange the service visits as per the AMC/ Emergency repair. However, SERVICE PROVIDER shall assist Department personal/ AMC personal for necessary arrangement and carrying out the repair. Equipments under AMC are clearly mentioned in Annexure 2. However day to day maintenance and minor repairs shall be attended by the SERVICE PROVIDER. In case of a midway break down of any of the equipments /items not covered under AMC, the SERVICE PROVIDER need to repair under the direction and guidance of the Department focal point/expert arranged by Department personal. The overall responsibility of this lies with LPSC. The major equipments listed in Annexure 2 without mentioning the AMC comes under this category. The calibration of the sensors/measuring equipments etc. will be arranged by the Department and it is the responsibility of the SERVICE PROVIDER to inform the focal point about the need for the same at specified regular intervals as per sensor/measuring equipments data sheet.

4. FACILITY DETAILS, LIST OF EQUIPMENTS AND WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

Description, Equipment details, works to be executed by the Service Provider in each of these facilities is given in Annexure 2.

5. MANHOURLY REQUIREMENT

The Service Provider shall provide required man hours for the scope of work detailed in Section 4. Minimum manhours to be positioned annually by the SERVICE PROVIDER in these facilities for operation and maintenance are given below:

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
11	PREBID MEETING	:	15
12	QUOTATION TEMPLATE	:	16
13	PERIOD OF CONTRACT	:	16
14	PAYMENT TERMS	:	16
15	SECURITY DEPOSIT	:	16
16	LIQUIDATED DAMAGES		17
17	FORCE MAJEURE	:	17
18	SECRECY & PATENT RIGHTS	:	17
19	GRIEVANCE REDRESSEL & ARBITRATION	:	18
20	TRANSFER OR SUBLETTING OF CONTRACT	:	18
21	SHORT CLOSING /TERMINATION OF THE CONTRACT	:	18
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Sl. No	Facility	GENERAL			
		Graduate Engineer	Diploma Engineer	ITI Technician	Helper
1	Component & Module test facility		9600(M)	7200 (M)	
2	Low temperature test facility		4800 (M)	4800 (M)	
3	Pneumatic test facility		9600 (M)	7200 (M)	
4	High Pressure Installation		2440 (M)	4800 (M)	
5	Helium leak check test facility		960 (M)	4800 (M)	
6	Environmental test facility		3360 (E)	4800 (M)	
7	Thermal & thermo vacuum facility		1440(E)	7200 (M)	
8	(E) – Electronics (E) – Electrical (M) – Mechanical Instrumentation & Data Acquisition Facilities	2000 (E)+ 6000 (M)	4500 (E)	7200 (E)	
9	Clean rooms operation & maintenance & Packing and dispatch facility, Laundry			4800 (M)	24000
10	High flow facility		2400 (M)	4800 (M)	

Total manhour requirement for each category is given below.

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
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5	MANHOOR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5

Working hours: 8.45hrs to 17.15hrs (Monday to Saturday). Depending on exigencies certain facilities may be occasionally working beyond the above working hours. However, the total annual man hour shall not vary more than $\pm 10\%$ of the manpower listed in the above table for each category.

Nominal monthly man hour requirement will be worked out and intimated by the LPSC focal point to the SERVICE PROVIDER's focal point based on the decision taken in Joint Review Team (JRT). This will be the subset of annual man hour envisaged. Monthly man-hour may vary depending on extra hours/ due to absentee. In case of emergency requirement of operation of facilities, the extra man hour requirement will be intimated to the SERVICE PROVIDER's focal point with the approval of JRT.

Qualification criteria:

- 1 Graduate Engineer B.E/B.Tech in Mechanical Engineering & B.E/ B.Tech in Electronics Engineering.
- 2 Post Graduate – MSc. in Chemistry.
- 3 Diploma Engineer Diploma in Mechanical Engineering for activities identified as Mechanical (M), Diploma in Electrical Engineering for activities identified as Electrical (EI) & Diploma in Electronics Engineering for activities identified as Electronics (E) as per section 5.
- 4 ITI Technician ITI Fitter/Turner for mechanical activities(M), ITI Electrical for activities identified as Electrical (EI) & ITI Electronics/Radio Mechanic for activities identified as Electronics (E) as per section 5.
- 5 Helper – Pass in upper primary level (min.)

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
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13	PERIOD OF CONTRACT	:	16
14	PAYMENT TERMS	:	16
15	SECURITY DEPOSIT	:	16
16	LIQUIDATED DAMAGES		17
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10	High flow facility		2400 (M)	4800 (M)	
11	Spring calibration		9900 (M)	4800 (M)	
12	Proof test facility			4800 (M)	
13	Deburring & Part checking facility			19200 (M)	
14	Electrical maintenance/winding/wiring		2400 (EI)	2400 (EI)	

6.2. Service provider's Responsibility

6.2.1. Statutory Rules and Regulations:

A. Keeping in view of liability under Employees Compensation Act, 1923, in case of the occurrence of any Accident during the course of execution of the Purchase Order involving any of the persons engaged by the Service provider occupied within the premises of the work site specified by LPSC and during the discharge of duties, resulting in:

- (i) Death or permanent disability from loss of both limbs (or)
- (ii) In the event of other permanent disability,

The victim/dependent shall be eligible for a compensation of Rs. 10 lakhs and Rs.7 lakhs for (i) & (ii) respectively. This compensation is applicable irrespective of whether or not there has been any wrongful act, neglect or default and notwithstanding anything contained in any other law. The liability for this shall rest with the Service provider concerned.

Whenever such incident occurs, as per the guidelines of the Department, Department shall make arrangements for disbursing this amount and shall recover the same from the Service provider concerned. For this purpose, without limiting any of the other obligations or liabilities, the Service provider shall at his own expense take a comprehensive insurance for his workforce and for all the work during the execution period from any of the Insurance companies as approved by the Insurance Regulatory & Development Authority of India (IRDA). The Service provider shall have to furnish originals along with premium receipts and other papers related thereto the Officer concerned at LPSC within 15 days from the date of placement of the Purchase order and work shall commence only thereafter. The Service Provider shall be responsible for compliance of all statutory provisions relating to Contract Labour (Regulation & Abolitions) Act, 1970 and Central Rules, 1971, Employees Provident Fund and Miscellaneous Provision Act 1952, Employees State Insurance Act, 1948 and Workmen's Compensation Act, 1923 in respect of the staff (including supervisors) of the Service Provider and shall pay the minimum wages fixed by Ministry of Labour and Employment, Government of India or wages fixed by Government of Kerala, whichever is higher as the case may be to the workers deployed, as per law of land including labour and other laws/acts.

B. In case, the Service Provider fails to comply with any statutory/taxation liability under appropriate law, and as a result thereof, if LPSC is put into any

loss/obligation, monetary or otherwise, LPSC shall have the rights to recover such liability from the Service Provider.

C. Department will not pay any compensation for whatever cause arising during the period of contract or subsequently. However, the persons engaged by Service Provider shall scrupulously follow necessary safety precaution while performing the duty. The Service Provider shall arrange sufficient GROUP INSURANCE/PERSONAL ACCIDENT INSURANCE to cover any claim arising out at the time of discharging the contracted scope of work or for any damages / losses caused to the personnel while performing the duty. In the event of damages to LPSC property or injury to LPSC's / Service Provider's personnel due to the negligence of Service Provider's employees, the responsibility shall solely rest with the Service Provider. LPSC shall not be responsible for loss of life of the Service Provider's workers due to accidents/natural calamities/ explosives etc. Department of Space/ISRO shall not be compensated to persons for accident/ injuries/death while on work.

6.2.2. SERVICE PROVIDER shall provide the work force for operation and maintenance of the facilities as demanded by the LPSC focal point.

6.2.3. SERVICE PROVIDER shall identify a focal point for interacting with department focal point, who shall be the single point of contact for the Department for day to day execution of the contract. SERVICE PROVIDER'S focal point shall ensure close communication with the LPSC focal point for the smooth execution of the contract.

6.2.4. In case of exigencies of work, SERVICE PROVIDER shall ensure that personnel are deployed to work beyond normal working hours and on holidays as required by LPSC.

6.2.5. SERVICE PROVIDER shall prevent attrition of manpower in critical facilities like Environmental facility and instrumentation facility since this job involves familiarizing the critical testing procedures to the SERVICE PROVIDER's personnel from LPSC side and also due to security reasons. It will be the responsibility of the Service Provider to ensure that the new person shall be adequately familiarized to the job by the person leaving the job.

6.2.6. Transport: Transport of Service Provider's employees to & from LPSC is in the SERVICE PROVIDER's scope.

6.2.7. Uniform: All the employees of the Service Provider shall be provided with neat uniform by the SERVICE PROVIDER. All the employees of the SERVICE PROVIDER shall compulsorily wear the uniform & industrial shoes on all working days. Soiled & torn uniform shall not be worn.

6.2.8. SERVICE PROVIDER shall ensure that all employees shall have security clearance

certificate from respective police station and based on this only the entry permit/pass will be issued by LPSC.

6.2.9. SERVICE PROVIDER shall provide Identification cards (ID cards) for all the employees positioned by them.

6.2.10. In case of any medical exigencies inside LPSC first aid shall be provided by LPSC during the normal working hours of LPSC. For further medical treatment and for any other emergency beyond the working hours of the laboratory, the SERVICE PROVIDER shall make his own arrangement. LPSC will not have any liability towards any accident caused during operation of machines, material handling etc.

6.2.11. SERVICE PROVIDER shall ensure safety of the operating personnel and plant and machinery in these facilities by adhering to the safety instructions issued by LPSC from time to time.

6.2.12. All equipment and utilities entrusted to the Service Provider should be handled with due care and caution and any liability whatsoever in nature due to mishandling or otherwise would be borne by the Service Provider. It is also agreed by and between the parties that in any case, any liability arises, neither LPSC/ Department or representative of LPSC/Department shall be responsible for the same. In case it is found that the damages have been caused due to intentional mishandling by the SERVICE PROVIDER, the SERVICE PROVIDER shall be liable to pay the entire damages to LPSC.

6.2.13. SECURITY: The Service Provider shall follow all the LPSC security instructions applicable for personnel & processes prevailing at present and those issued from time to time by the Department.

6.2.14. SAFETY: Testing activities involves high pressure operations and the facilities are provided with sufficient safety features and equipments. All personnel engaged in high pressure activities are given appropriate briefing/instructions on maintaining personal safety and the same will be extended to the SERVICE PROVIDER's personnel. They shall strictly adhere to the instructions and the responsibilities to ensure this compliance rest entirely with the Service Provider. Other general safety precautions as laid down by LPSC shall also be strictly adhered. Due to the non-compliance of safety guidelines, any loss/damage/injury occurring to the personnel engaged/facilities shall be the responsibility of SERVICE PROVIDER for compensation, if any.

6.2.15. SERVICE PROVIDER shall maintain logbooks, maintenance history of equipments/system, Inventory records of spares & consumables, records of

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
11	PREBID MEETING	:	15
12	QUOTATION TEMPLATE	:	16
13	PERIOD OF CONTRACT	:	16
14	PAYMENT TERMS	:	16
15	SECURITY DEPOSIT	:	16
16	LIQUIDATED DAMAGES		17
17	FORCE MAJEURE	:	17
18	SECRECY & PATENT RIGHTS	:	17
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1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
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6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
11	PREBID MEETING	:	15
12	QUOTATION TEMPLATE	:	16
13	PERIOD OF CONTRACT	:	16
14	PAYMENT TERMS	:	16
15	SECURITY DEPOSIT	:	16
16	LIQUIDATED DAMAGES		17
17	FORCE MAJEURE	:	17
18	SECRECY & PATENT RIGHTS	:	17
19	GRIEVANCE REDRESSEL & ARBITRATION	:	18
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7. RIGHTS OF THE DEPARTMENT (LPSC)

- 7.1. The Department reserves the right to split the order between two or more parties at the same terms and conditions.
- 7.2. The Department reserves the right to seek replacement of any of the SERVICE PROVIDER's employee, if found unfit at any stage.
- 7.3. The Department reserves the right to deduct the payment in case of failure of the bidder to operate & maintain any/ all of the facilities.
- 7.4. The Department reserves the right to augment/ modify the existing facilities, if required.
- 7.5. LPSC has the right to verify the declarations made/ documents submitted by the Service Provider at any point of time.
- 7.6. LPSC shall have the right to assess and oversee the service provider's personnel performing activities.

8. OPERATION PROCEDURE TRANSFER TEAM (OPTT)

- 8.1. This team from LPSC shall be associated with SERVICE PROVIDER during the initial one month of the contract as Operation Procedure Transfer Team (OPTT) composed of Engineers, Diploma engineers, technicians etc.
- 8.2. The complete operation and maintenance procedure of the facilities shall be explained by the OPTT to the SERVICE PROVIDER. All the relevant operation and maintenance manuals shall be provided by OPTT.
- 8.3. OPTT will be available only for one month from start execution of contract and after this all interaction with LPSC will be through the LPSC focal point only. Hence, the Service Provider shall complete the total familiarization process during this one month.

9. JOINT REVIEW TEAM (JRT)

A Joint Review Team (JRT) formed by Director, LPSC (with representatives from LPSC & SERVICE PROVIDER) for reviewing the progress of contract and for removing any administrative and other bottle necks.

10. ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS

- 10.1. General 10.1.1. The quote shall contain information on the company, financial standing and line of business. 10.1.2. Documentary evidences shall be furnished for supporting the stated facts.

10.2. Criteria for scrutiny and evaluation of parties

10.2.1. Prior experience of more than 1 year is essential in operation and maintenance of high pressure pneumatic systems/ instrumentation facilities for aerospace/Defense sector.

10.2.2. The service provider shall possess human resource with adequate knowledge, skill and experience in the areas of operation and maintenance of facilities. The details of the same with their qualification and experience shall be provided along with the offer.

10.2.3. Annual turnover of the company should be greater than Rs.1 Crore for each of the last 2 financial years.

10.2.4. Certified copies of Annual financial turnover and balance sheets showing profit / loss for the last 2 years shall be furnished.

10.2.5. The company should have proven heritage of having successfully executed orders/ Purchase orders of value not less than Rs.1 Crore for similar services for ISRO/ Defence/ Aerospace sectors during last 1 year.

10.2.6. The companies desirous of submitting proposals shall mandatorily be accredited with AS 9100/ ISO 9001:2015 or equivalent standard for the last 3 years for the company's existing operations.

10.2.7. Companies shall be familiar with Aerospace/ ISO Quality System Requirements. Note: For clauses 10.2.1 to 10.2.7, the information provided by the companies shall be backed by documentary evidences.

11. PREBID MEETING th₁₉

A prebid meeting is scheduled to be held on September 2019 at LPSC Valiamala at 11:00 AM by inviting the parties who are interested to participate in the twopart tender for giving them an overall idea about the activities involved in operation and maintenance activities of the facilities. This is to enable the parties to understand the complexity of work involved in operation and maintenance activities of the facilities thoroughly before submitting their price bid. Bidders interested to participate in the prebid meeting may register their name before 5:00PM of 18th September 2019 by sending email to psa_3@lpsc.gov.in or spso_purchase@lpsc.gov.in. Please note that the bids from the parties who do not participate in the Prebid meeting will be summarily rejected.

12. HOW TO QUOTE? (QUOTATION TEMPLATE). All inclusive hourly rates for completing the scope of the contract shall be quoted for each category as follows:

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
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* The hourly rate shall be firm and fixed for a period of 2 years and include all aspects including mandatory payments as per all social security & other statutory requirements etc. No other charges shall be payable by LPSC. The GST element (%) shall be quoted extra.

13. PERIOD OF CONTRACT

Period of contract is two years from the date of start of executing the contract by positioning the man power as demanded by LPSC focal point. The start of execution of contract shall not exceed one month from date of signing the contract. At the end of second year, based on satisfactory performance and mutual consent, the contract shall be amended for one more year with the approval of Department on same terms.

14. PAYMENT TERMS Payment shall be made once in a month based on the certification by LPSC focal Point with the approval of JRT. The payment will be made based on the actual man-hour engaged for each category in that month. All payments shall be made through epayment mode only & SERVICE PROVIDER must provide the relevant details to facilitate this.

15. SECURITY DEPOSIT SERVICE PROVIDER shall provide interest free Security Deposit worth 10% of the Order value apportioned for one year in the form of Bank guarantee in non-judicial stamp

paper of appropriate value obtained from a Nationalized/Scheduled bank within 2 weeks from the date of receipt of Purchase order and shall be valid for a period of 3 months beyond the date of completion of Contract. This shall be returned after successful execution of the Contract. If the Contract gets extended for any further periods, associated Security Deposit (similar to as cited above) terms and conditions are to be met by SERVICE PROVIDER.

Offers from SERVICE PROVIDER(s), who are not agreeing to provide Security Deposit shall not be considered.

16. LIQUIDATED DAMAGES If the Service Provider fails to deploy the requested monthly manhour requirement by the LPSC focal point, LPSC shall recover from the Service Provider as liquidated damages a sum of 0.5 % per week of the cost of manhour not deployed. However, the total liquidated damages recovered shall not exceed ten percent (10%) of the value for the non-deployed manhour.

17. FORCE MAJEURE Neither party shall bear responsibility for the complete or partial non-performance of any of his obligations (except for failure to pay any sum which has become due on account of receipt of goods under the provisions of the present Purchase Order/Contract) if the nonperformance results from such force majeure circumstances such as, but not restricted to, flood, fire, earthquake, civil, commotion, sabotage, explosion, epidemic, quarantine restriction, strike, lockout, freight embargo, acts of the Government either in its sovereign or Contractual capacity, hostility, acts of public enemy and acts of God as well as war or revolution, military operation, blockade, acts or actions of State authorities or any other circumstance beyond the control of the parties that have arisen after the conclusion of the present Purchase Order/Contract.

18. SECRECY & PATENT RIGHTS a) The documents/drawings/process sheet/data of the results are strictly confidential and the SERVICE PROVIDER or his employees shall not divulge any information that is made known to him or he has come across to any person not authorized to receive such information. b) The Service Provider or his employees shall not take any document/process sheet/data of the results/CD/USB, etc issued containing work details, outside the place of work.

c) Any violation of secrecy, detected at any time of the Contract, by the Service Provider or any of his employees may lead to termination of services of the employee/Contract itself as deemed fit by Department. Any violation in this regard shall attract serious action.

d) The plant designs etc. whether or not protected by patent, are to be strictly treated as secret & the SERVICE PROVIDER shall not disclose any details of the above to any unauthorized person or to any other party not directly linked with LPSC and shall not use the same for any other purpose.

e) In case of a contract/ work order, the entire contract and all activities covered under the same shall be treated as confidential and no part of it shall be divulged to any third party without the prior written consent of the Department.

19. **GRIEVANCE REDRESSAL AND ARBITRATION** The provisions relating to grievance redressal mechanism, including the details of the authority to which a Service Provider /supplier may submit an application for review of any decision or action taken by the Centre/Unit, shall be incorporated in the Purchase Order/Contract. In the event of any dispute or difference arising out of or in connection with any of the terms and conditions of this Purchase Order/Contract, such dispute or difference shall be settled amicably by mutual consultations or through the good offices of the respective parties. If such resolution is not possible, then the unresolved dispute or difference shall be referred to the sole arbitrator appointed by DirectorLPSC, in accordance with the rules and procedures of the Arbitration and Conciliation Act of 1996 or any reenactment or modification thereof. The decision of the Arbitrator shall be final and binding upon the parties and the expenses for the arbitration shall be paid as may be determined by the Arbitrator. The Arbitration shall be held at Thiruvananthapuram, Kerala.

20. **TRANSFER OR SUBLETTING OF CONTRACT** The Service Provider shall not sub let the work under the contract either in whole or in part for the fulfillment of the contractual obligations vested with them.

21. **SHORTCLOSING/ TERMINATION OF THE CONTRACT** a) In case of failure on the part of Service Provider for taking over the whole facilities within a period of one month from the date of signing of the contract, Department reserves the right to terminate the contract and Service Provider shall forfeit the security deposit in total.

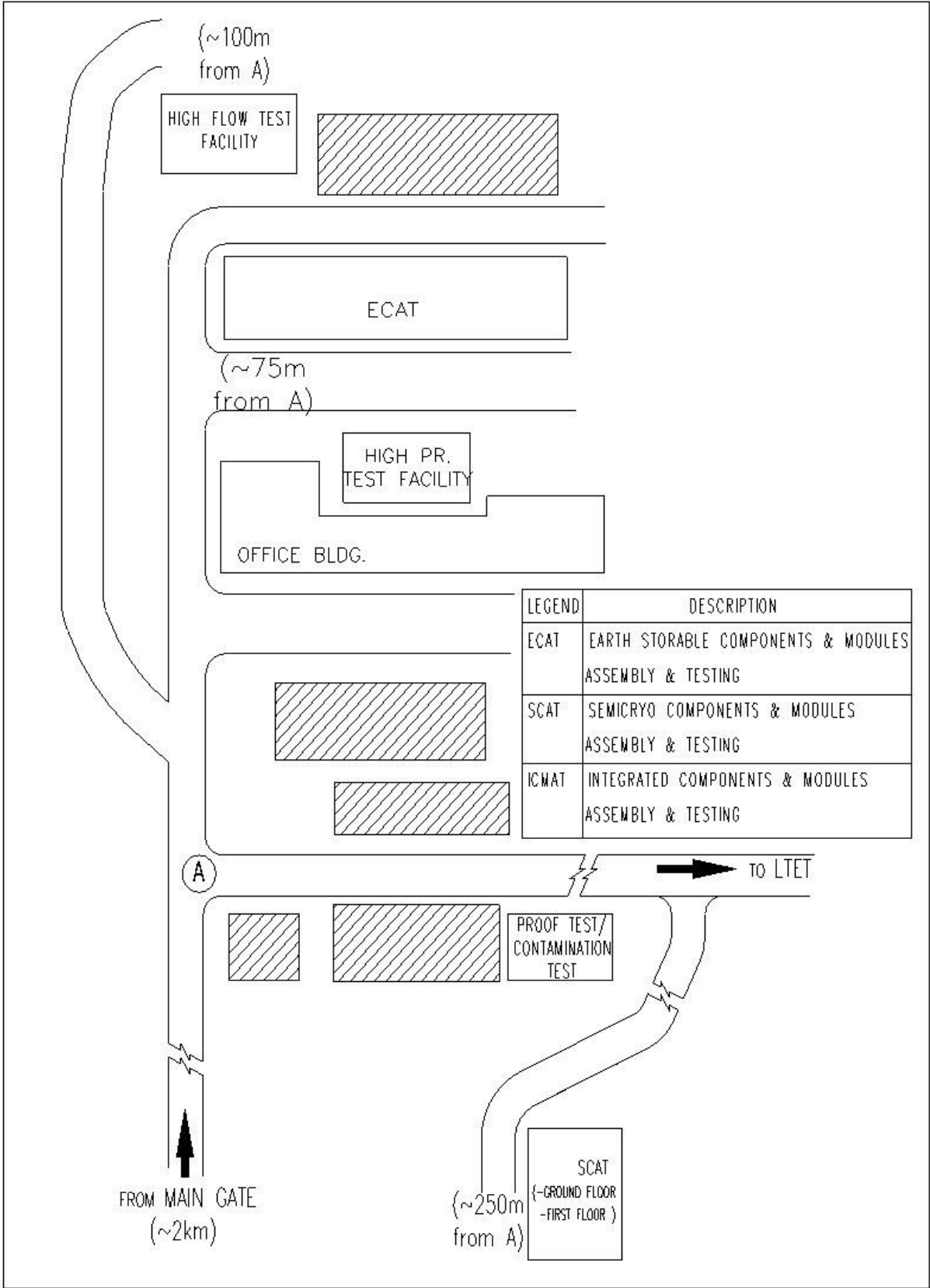
b) In case of non performance of the Service Provider in fulfillment of the contract obligations vested with them, Department reserves the right to terminate the contract and notify the Service Provider accordingly. In such case also, the Service Provider shall forfeit the security deposit in total. On receipt of short closing/termination notice the Service Provider shall take all necessary steps for winding up of the contract in line with the notice within a reasonable period but in any case not later than one month from the date of posting this notice.

c) If any of the workforces of the Service Provider misbehaves or commits any misconduct, LPSC reserves the right to refuse permission to such persons to enter LPSC. Any violation in this regard shall result in the termination of the Contract without any notice.

d) In case of major changes in the policies of the Government of India, as a result of which the Department is compelled to curtail the requirements wholly or partly, Department and the Service Provider shall enter into negotiation to mutually agree to terminate this contract wholly or partly. The compensation if any, to be paid to the Service Provider shall be agreed to by the mutual negotiations and in no case shall exceed the total order value.

22. **APPLICABLE LAW** This contract shall be governed by and interpreted and construed in accordance with the Rule of Law in India. The Department shall not be responsible and shall be totally absolved if the Service Provider infringes the laws or statutes in force during the currency of the contract.

LOCATION OF FACILITIES (INDICATIVE)

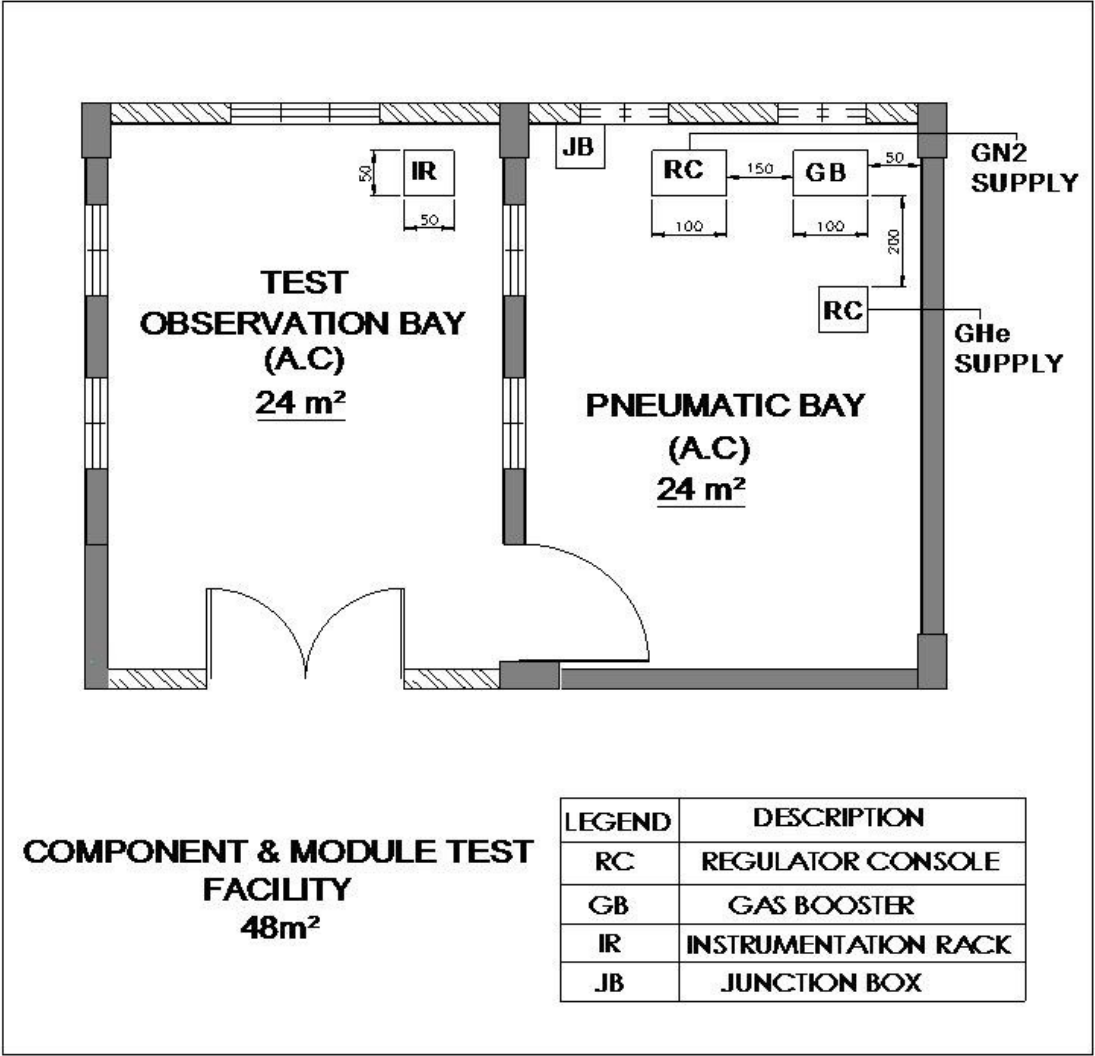


1. GENERAL DESCRIPTION OF WORKS TO BE CARRIED OUT BY SERVICE PROVIDER.

(The details provided & the activities mentioned herein are indicative only)

1.1 COMPONENT & MODULE TEST FACILITY (CMTF) All the fluid control components and modules are tested in this facility for evaluating their performance. The test includes response tests, component flow tests, module level flow tests etc. General schematic and list of items in this facility are given below. This facility receives high pressure gaseous nitrogen/helium from the High Pressure Installation. The maximum operating pressure in this facility will be 250 bar. There are two Component and Module Test Facilities. One facility is located in ECAT and another in SCAT.

1.1.1 GENERAL SCHEMATIC



1.1.2 EQUIPMENT DETAILS & SPECIFICATIONS

List of equipments/items in each facility is listed below.

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
11	PERIODIC MEETING	:	15

1.1.3 WORKS TO BE EXECUTED

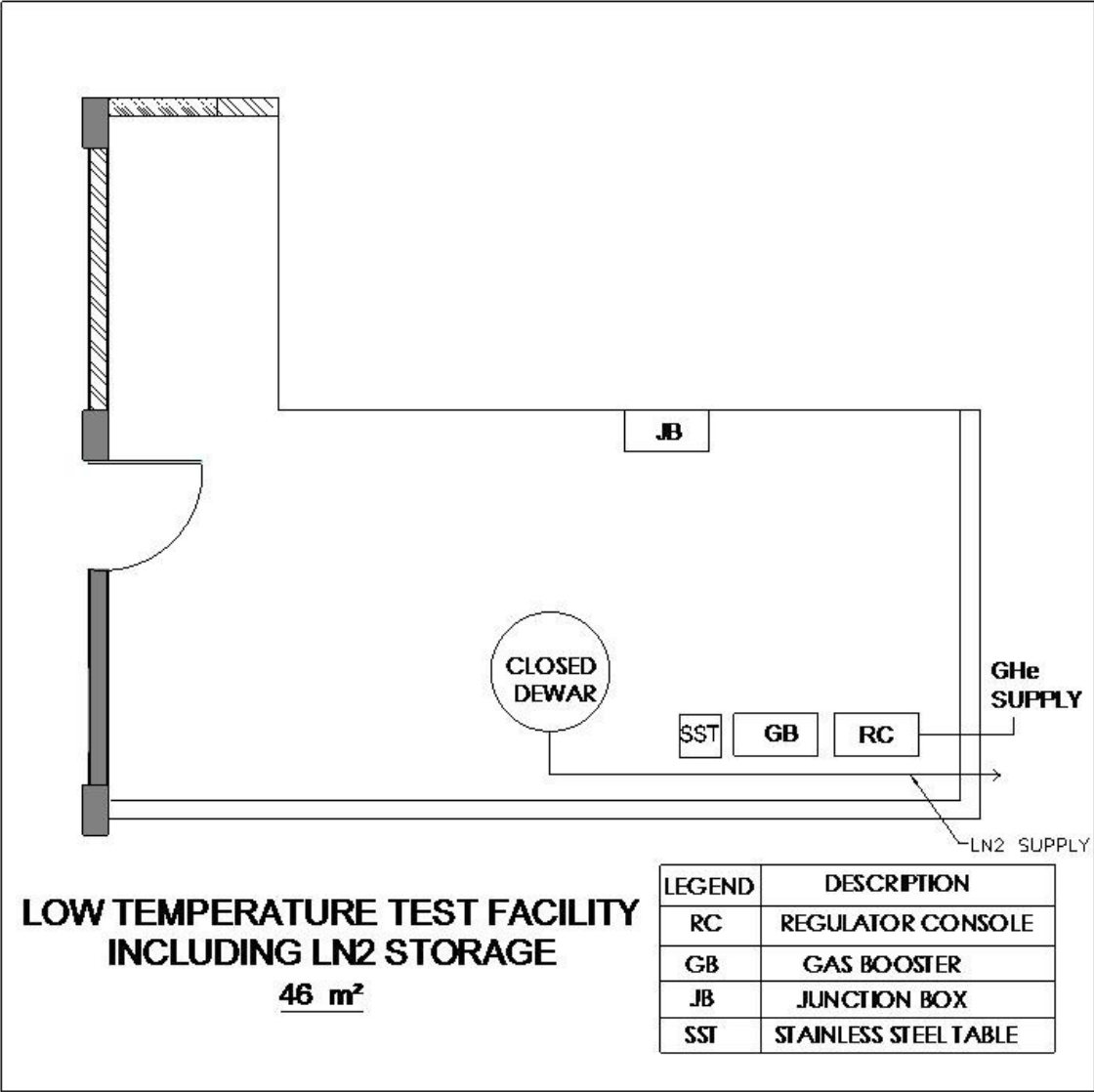
- Receipt of components/ modules for testing.
- Preparation of mounting arrangement and preparation of pneumatic lines, interconnecting hoses.
- Mounting of test article in the respective test bays and connecting the interface lines to the test article with necessary hoses.
- Leak check of joints at specified pressures.
- Manual operation of valves to admit necessary test fluids to the test article.
- Dismantling the hardware after each test and handing over the same to Assembly team.
- Periodic test and evaluation of the facility as per maintenance manual.
- Maintaining the facility equipments/items (listed in Annexure) as per the direction of the department personal and maintenance manual.
- Coordination for calibrating the pressure gauges and measuring instruments as per the facility operation & maintenance document.

1.2 LOW TEMPERATURE TEST FACILITY

The fluid control components and modules for cryo application are tested in this facility for evaluating their low temperature performance. The test includes response tests, component flow tests, module level flow tests etc. This facility receives high pressure gaseous nitrogen/helium from the High Pressure Installation through a heat exchanger to reduce the gas temperature to around 80 Kelvin. The maximum operating pressure in this facility is 250 bar. There are two low temperature facilities. One facility is located in SCAT and another in ICMAT.

1.2.1 GENERAL SCHEMATIC

1.2.2EQUIPMENT DETAILS &
SPECIFICATIONS



List of equipments/items in each facility is listed below.

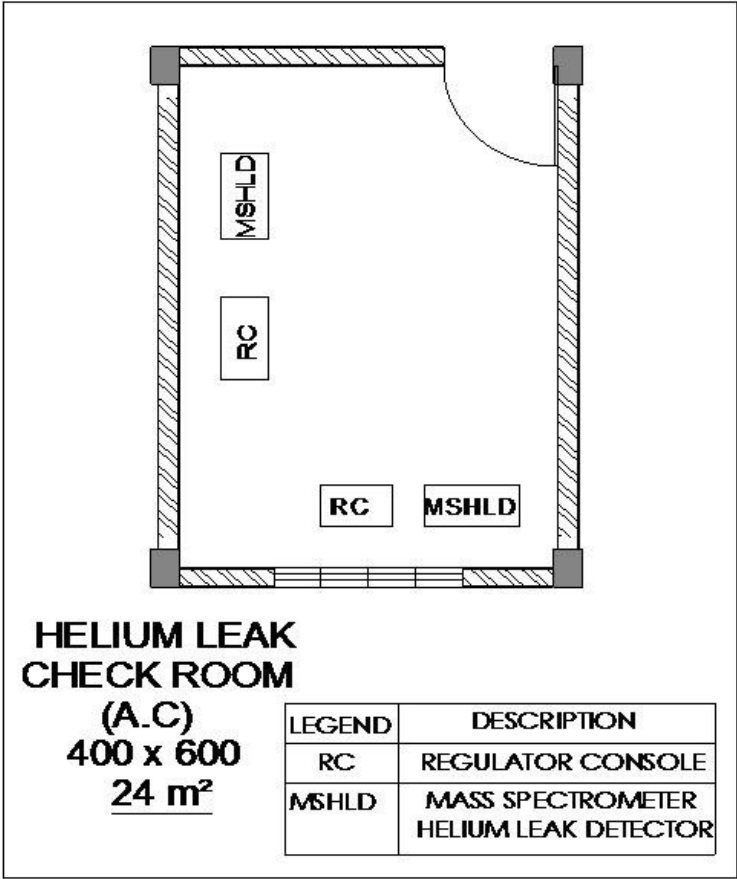
CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOURLY REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
1.2.3	WORKS TO BE EXECUTED BY THE SERVICE PROVIDER		

- Receipt of components/ modules for low temperature testing.
- Preparation of mounting arrangement and preparation of pneumatic lines, interconnecting hoses.
- Mounting of test article in the respective test bay and connecting the interface lines to the test article with necessary hoses.
- Leak check of joints at specified pressures.
- Manual operation of valves to admit test fluid to the test article.
- Ensuring sufficient temperature and flow rate through the test article.
- Dismantling the hardware after each test and handing over the same to Assembly team.
- Periodic test and evaluation of the facility as per maintenance manual.
- Maintaining the facility equipments/items as per the direction of the department personal and maintenance manual.
- Coordination for calibrating the pressure gauges and measuring instruments as per the facility operation & maintenance document.

1.3. PNEUMATIC TEST FACILITY & HELIUM LEAK CHECK FACILITY

There are three pneumatic test facilities namely, one in ECAT, one in SCAT and one in ICMAT and two Helium leak Check Facility namely, one in ECAT and one in SCAT. There are 5 pneumatic test consoles for gaseous nitrogen in each of this facility. Maximum operating pressure for these consoles is 400 bar. Each console consists of two sets of pressure regulators, pressure gauges, valves, relief valves, filters and distribution system. Two pressure test consoles with helium as test fluid will be used exclusively for helium leak check using sniffer probe in each Helium leak check facility.

1.3.1 GENERAL SCHEMATIC



1.3.2 EQUIPMENT DETAILS & SPECIFICATIONS

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
	MANHOLE REQUIREMENT & INSTRUCTION TO THE		

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14

1.3.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

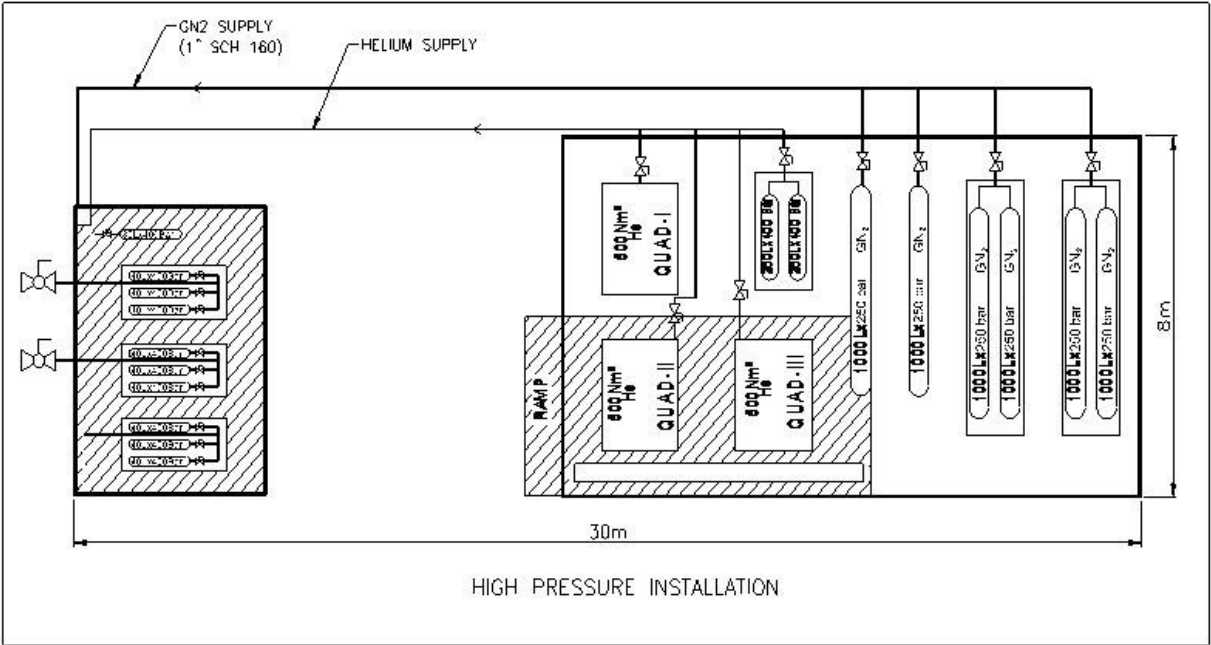
- Receipt of components/ modules for testing.
- Preparation of mounting arrangement and preparation of pneumatic lines, interconnecting hoses.
- Mounting of test article in the respective test bays and connecting the interface lines to the test article with necessary hoses.
- Carrying out internal leak check of test article at specified pressures.
- Carrying out external leak check of test article at specified pressures using helium leak detector/ snoop solution.
- Dismantling of test article after each test and handing over the same to assembly team.
- Periodic test and evaluation of the facility as per maintenance manual.
- Helium leak detector will be under AMC with Equipment manufacturer. The Service Provider has to coordinate with them to complete the AMC at regular intervals and in case of emergency calls during break down.
- Coordination for calibrating the pressure gauges and measuring instruments as per the facility operation & maintenance document.

1.4. HIGH PRESSURE INSTALLATION Necessary test fluids such as GN2 and GHe will be supplied from this facility. The schematic of this facility is given below. Liquid nitrogen will be stored in the tank and then it will be pumped using liquid nitrogen pump and it is evaporated using evaporator and stored in the cylinder at high pressure. Gaseous nitrogen from the cylinder will be used for testing the components. Higher pressures above 300 bar will be obtained using nitrogen booster. Gaseous helium will be stored in the small cylinders of 100 liter capacity. The Helium pressure will be boosted to the

high pressures using gas booster as per test requirement. There are two High Pressure Installations, one near ECAT and one near SCAT.

1.4.1 GENERAL SCHEMATIC

1.4.2 EQUIPMENT DETAILS & SPECIFICATIONS



1.4.2 EQUIPMENT DETAILS & SPECIFICATIONS

Equipment details for each High Pressure Installation are given below.

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14

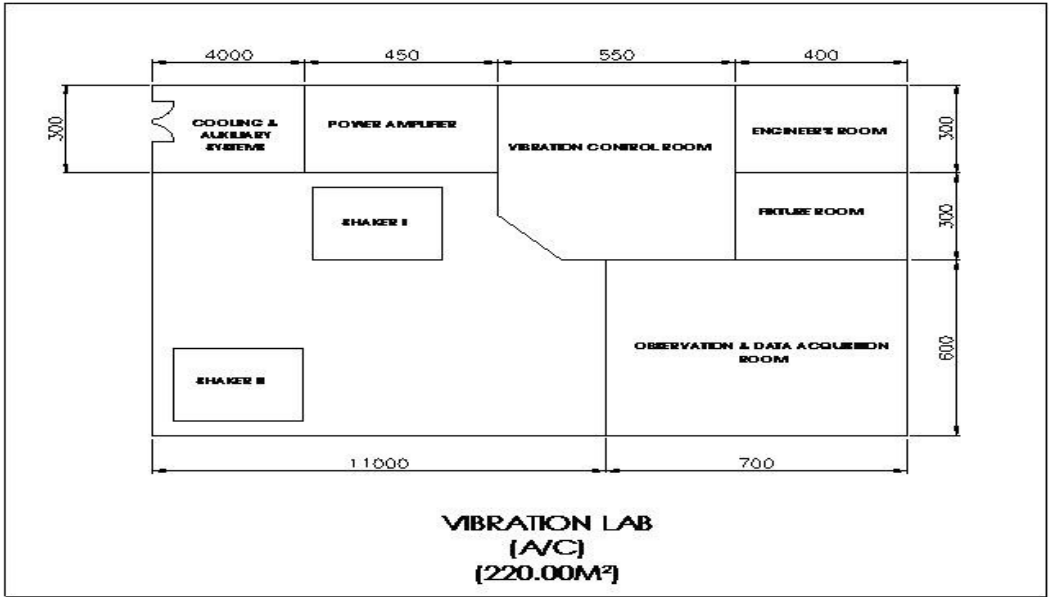
1.4.3. WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Unloading and filling of liquid nitrogen in liquid nitrogen tank.
- Operation of liquid nitrogen pump & evaporator & filling GN2 in cylinders.

- Operation of booster for boosting the pressures for conducting the tests.
- Dispatch of cylinders for filling the helium gas and receipt of the same. The necessary transport of the cylinder will be arranged by LPSC.
- Filling of GHe cylinder from helium quad.
- Maintenance work of boosters shall be carried out by the Service Provider as directed by the department. This includes disassembly of all three stages (including diaphragm stages) of compressor, pipelines, valves (Suction, discharge, condensate) and intercoolers of all stages and replacement of wornout parts. The required spares will be supplied by Department. Finally the assembly of compressor shall be carried out.
- Maintenance work of Liquid Nitrogen pumps shall be carried out by the Service Provider as directed by the department. This includes disassembly of Cold end, Crank drive, pipelines, valves (Suction, discharge) and replacement of wornout parts. The required spares will be supplied by Department. Finally the assembly of Liquid Nitrogen pumps shall be carried out.

1.5. ENVIRONMENTAL TEST FACILITY Components and modules are vibration tested in the component level and module level for development, qualification and acceptance. There are two environmental test facility, one in ECAT and one in SCAT. There are two vibration shakers in each facility. The components/modules are mounted on the vibration shaker table and the vibration tests are done with required levels as per the test procedure document.

1.5.1. GENERAL SCHEMATIC



1.5.2. EQUIPMENT DETAILS & SPECIFICATIONS

Equipment details of each environmental test facility are given below.

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5

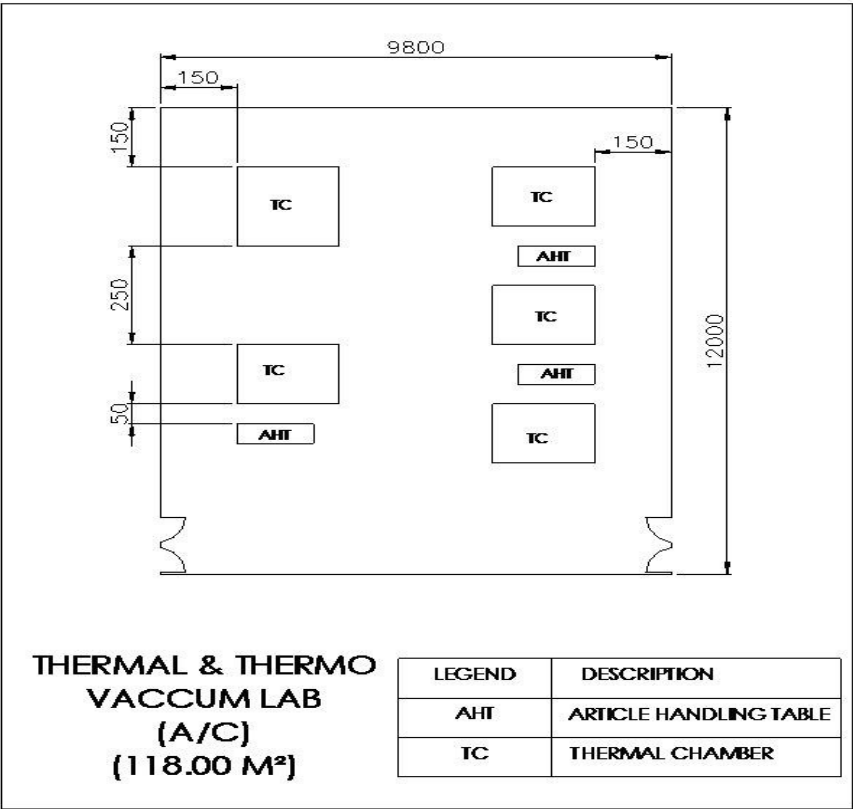
1.5.3. WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of hardware with necessary test requirements.
- Mounting of test article on the vibration shaker table.
- Fixing and checking of vibration sensors.
- Shaker checking and conducting the vibration tests as per test procedure.
- Certain modules are to be pressurized during testing using pneumatic consoles.
- Dismantling the hardware from vibration shaker table and handing over the hardware after tests.
- Recording of the data and report generation also to be carried out.

1.6. THERMAL & THERMO VACUUM FACILITY

Components will be kept inside the thermal chamber for thermal testing for duration of around 412 hours. There are three thermal facilities, one in ECAT, one in SCAT and one in ICMAT. There is only one Thermovacuum facility at ECAT. Certain Component undergoes thermovacuum tests for evaluation of their performance under space conditions for duration of 8 hours in thermovacuum chamber.

1.6.1 GENERAL SCHEMATIC



1.6.2 EQUIPMENT DETAILS & SPECIFICATIONS

Equipment details for all three thermal facility and one thermovacuum facility are given below.

CLAUSE NUMBER	TITLE		PAGE NUMBE
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8

1.6.3. WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

Thermal chamber

- Receipt and placing inside thermal chamber.
- Setting of necessary temperature inside the chamber.

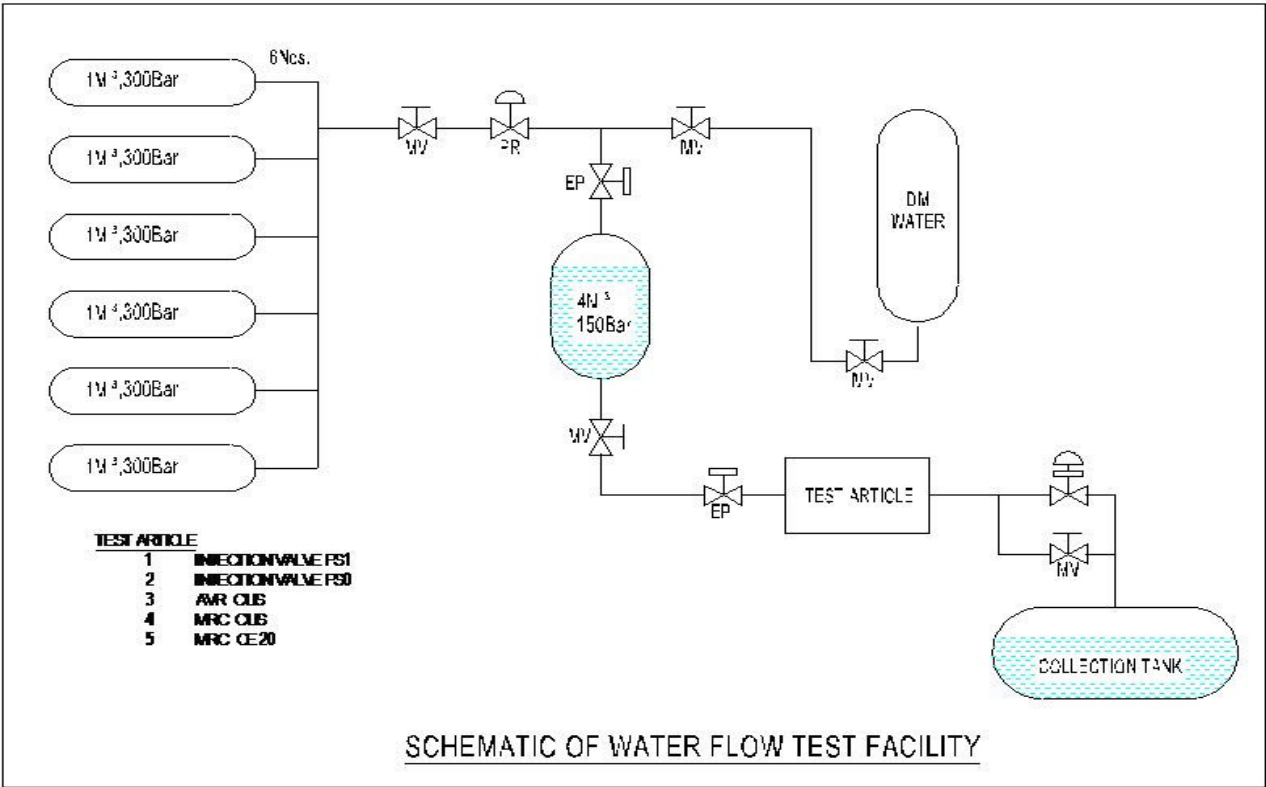
- Handing over the component after tests with reports.

Thermovacuum chamber

- Receipt and placing inside thermo vacuum chamber.
- Setting up the liquid nitrogen system with Dewar, lines etc. for circulation inside the chamber.
- Setting of necessary temperature inside the chamber in temperature controller.
- Switching on the vacuum system.
- Thermal cycling using the liquid nitrogen circulation.
- Completion of thermal cycling test.
- Handing over the component after tests with reports.

1.7 HIGH FLOW TEST FACILITY Some components during their process of development/ qualification/acceptance need to undergo flow tests using water. In these tests, the facility has to cater to the flow and pressure requirement to the inlet of the test article and necessary collection of water.

1.7.1 GENERAL SCHEMATIC



1.7.2 EQUIPMENT DETAILS & SPECIFICATIONS

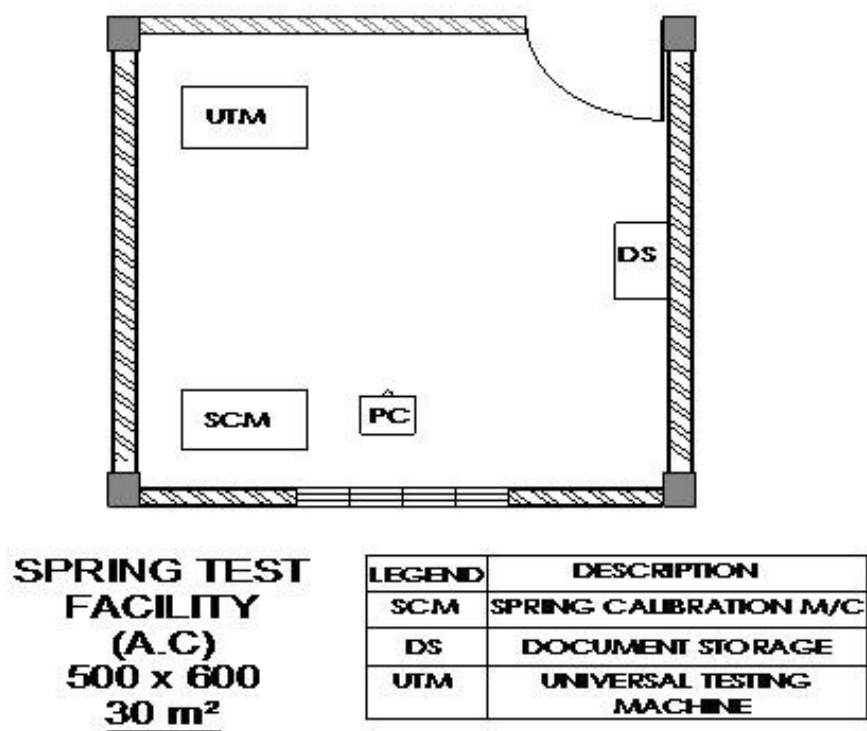
CLAUSE NUMBER	TITLE		PAGE NUMBE
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	.JOINT REVIEW TEAM (.JRT)	:	14

1.7.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of components/ modules for testing.
- Preparation of mounting arrangement and preparation of pneumatic lines, interconnecting hoses, pressurizing cylinders of required volume.
- Mounting of test article in the respective test bays and connecting the interface lines to the test article with necessary hoses.
- Leak check of joints at specified pressures.
- Manual operation of valves to admit necessary test fluids to the test article.
- Dismantling the hardware after each test and handing over the same to Assembly team.
- Periodic test and evaluation of the facility as per maintenance manual.
- Maintaining the facility equipments/items as per the direction of the department personal and maintenance manual.

1.8. SPRING CALIBRATION FACILITY There are two spring test facilities. Each facility houses Universal testing machine of 100 KN capacity and two spring testing machines of 10 KN capacities. These are used for checkingthe stiffness of the springs used in fluid control components.

1.8.1 GENERAL SCHEMATIC



1.8.2 EQUIPMENT DETAILS & SPECIFICATIONS

Equipment details of each spring calibration facility are given below.

CLAUSE NUMBER	TITLE		PAC NUME
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5

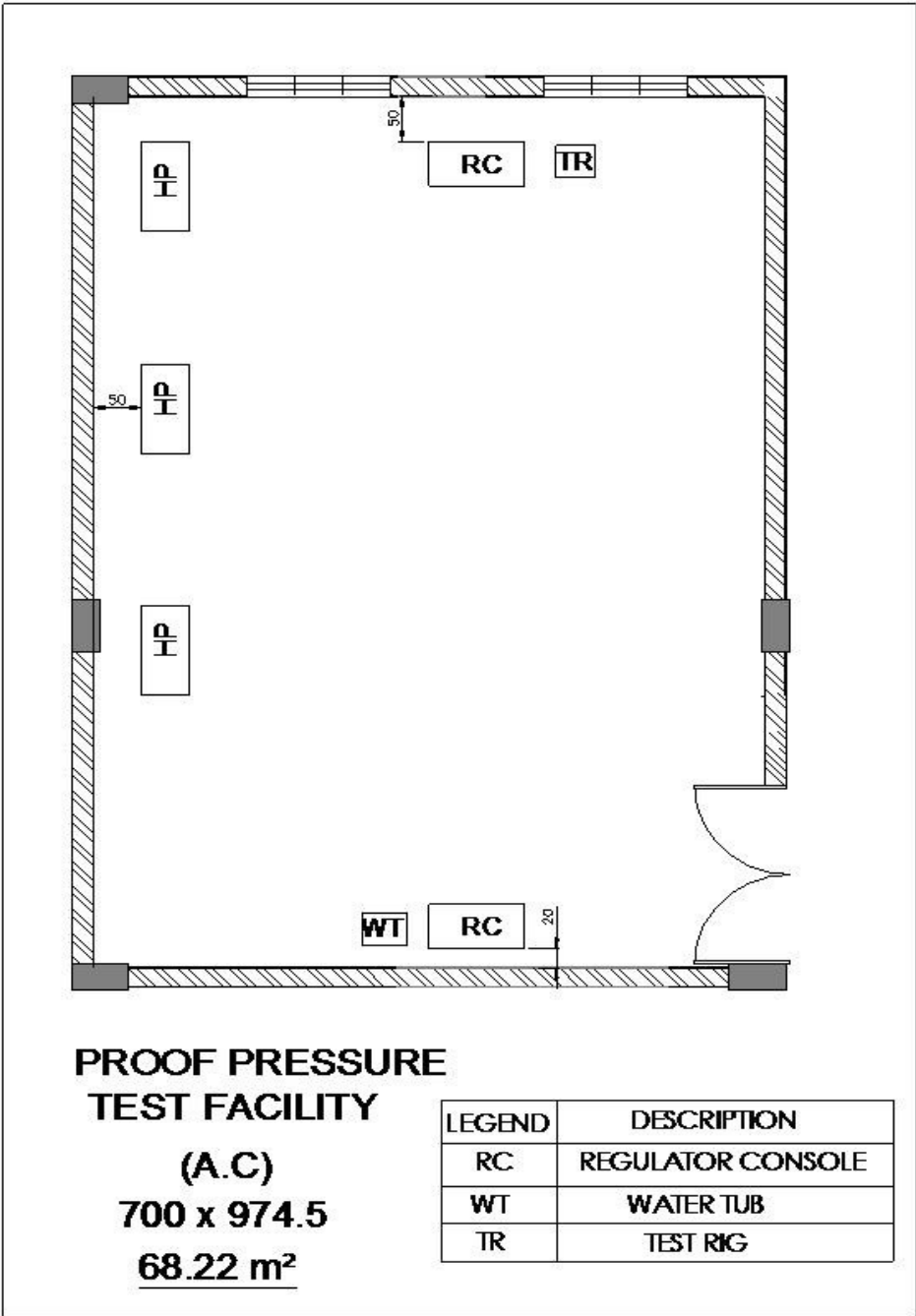
1.8.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of springs to be calibrated with test details and recording the same in the logbook.
- Conducting spring calibration after fixing on spring loading machine.
- Handing over the calibrated spring with test reports.
- Maintenance of the equipments as per AMC with original manufacturer as arranged by LPSC.

1.9. PROOF PRESSURE TEST FACILITY (PPTF)

This facility is used for conducting the proof test of component parts/ tanks with oil/DM water. The parts/component/tanks to be proof tested will be connected to proof pressure test unit using flexible hoses and required pressure with DM water/hydraulic oil. Each proof pressure test facility houses four proof pressure units each consisting of media storage vessel, hydraulic pump, pressure gauges and distribution piping. There are two proof pressure test facility for components and one for tanks.

1.9.1 GENERAL SCHEMATIC



1.9.2 EQUIPMENT DETAILS & SPECIFICATIONS

Equipment/item details in each proof pressure test facility are given below.

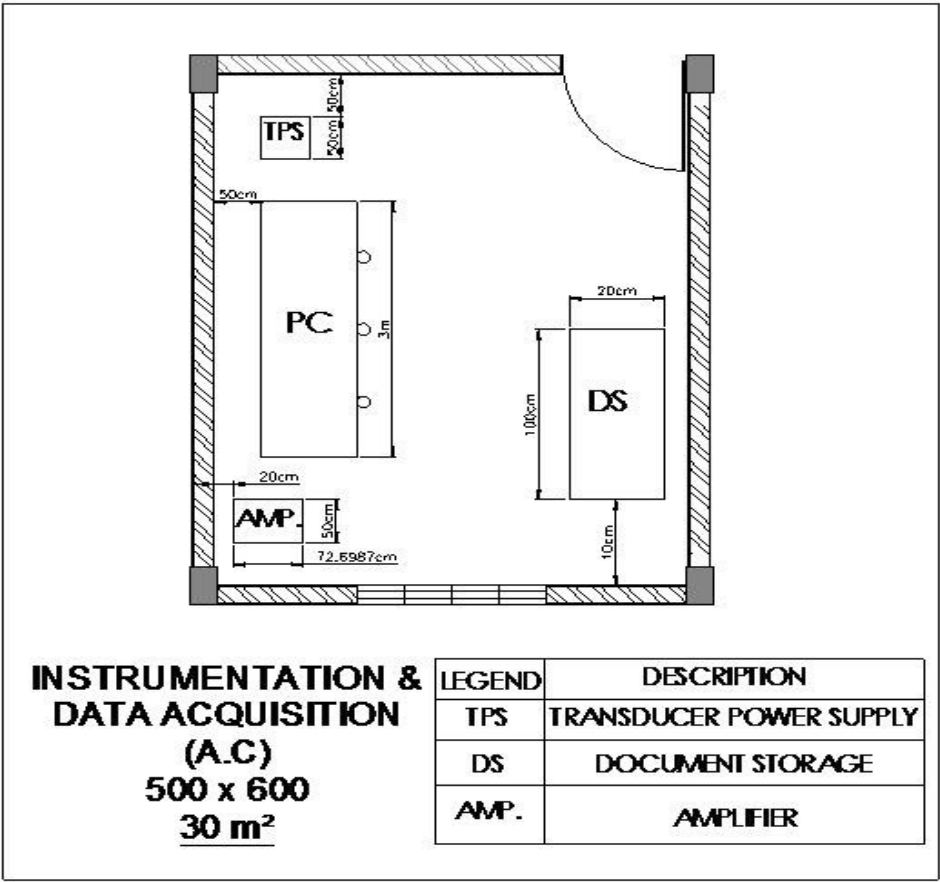
CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
11	PREBID MEETING	:	15
12	QUOTATION TEMPLATE	:	16
13	PERIOD OF CONTRACT	:	16
14	PAYMENT TERMS	:	16
15	SECURITY DEPOSIT	:	16
16	LIQUIDATED DAMAGES		17
17	FORCE MAJEURE	:	17
18	SECRECY & PATENT RIGHTS	:	17
1.9.3	WORKS TO BE EXECUTED BY THE SERVICE PROVIDER	:	18

- Receipt of hardware with test requirement.
- Connecting the test article with proof pressure test equipment using flexible hoses.
- Proof pressure test of hardware with oil/DM water and handing over the same to cleaning facility for cleaning operations.
- Report generation and handing over the same to the coordinator.
- Maintenance of the proof pressure test unit has to be carried out as per the maintenance manual as per the direction of Department.

1.10 INSTRUMENTATION AND DATA ACQUISITION FACILITY (IDAF) There are three facilities for instrumentation and data acquisition located in ECAT,SCAT, High flow Facility& Flow calibration facility. In addition to this, instrumentation support to be provided to clean rooms during certain tests like response tests.

- 1 Component and module test facility – 2 nos.
- 2 High Flow Test Facility.
- 3 Low Temperature Test Facility.
- 4 Flow calibration facility of CSDIG. Components and modules after assembly will be tested for checking their performance. Transducers/sensors need to be mounted in the respective locations as per measurement plan document and these data will be acquired during tests. The necessary commands will be issued from the control systems. These data will be recorded and processed using lab view software. Facility is capable of measuring 20 pressure channels, 20 temperature channels and command issuing capability of 10 nos.

1.10.1 GENERAL SCHEMATIC



1.10.2 EQUIPMENT DETAILS & SPECIFICATIONS

Equipment details of each instrumentation and data acquisition facility is given below.

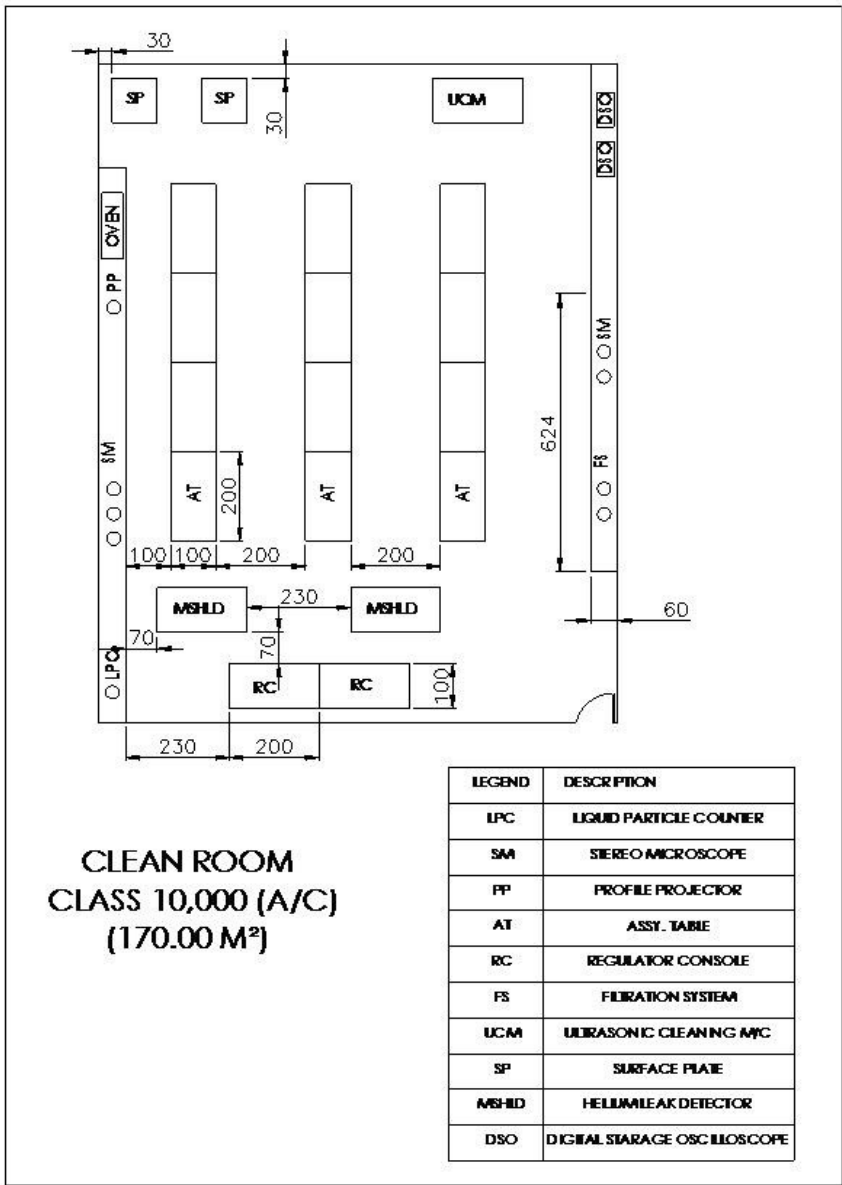
CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14
8	OPERATION PROCEDURE TRANSFER TEAM (OPTT)	:	14
9	JOINT REVIEW TEAM (JRT)	:	14
10	ESSENTIAL CRITERIA FOR SCRUTINY OF PROPOSALS	:	14
1.10.3	WORKS TO BE EXECUTED BY THE SERVICE PROVIDER		

- Checking the validity of calibration of transducers to be mounted for each test article.
- Conducting the chain calibration and test sequence trail runs including ambient check for measurements.
- Operating the test operation and acquisition software (LAB VIEW) to run the test and acquiring the data.
- Report preparation with various graphs and data and providing the reports to coordinator.
- Maintenance of the equipments listed in annexure as per the directions of the Department focal point.
- Informing the calibration requirement of the transducers and instruments in the facility to Department focal point.

1.11 CLEAN ROOMS OPERATION ,PACKING & DISPATCH FACILITY The clean room operation and equipment maintenance will be the scope of the Service Provider. Toolcrib for each clean room also will be the responsibility of Service Provider.

The modules/components after completion of Assembly and clearance will be kept in finished component stores. Based on the demand, these components/modules are to be packed properly and then it has to be properly kept in delivery box with necessary mounting arrangement and has to be dispatched. The proper packing is the responsibility of the Service Provider.

1.11.1 GENERAL SCHEMATIC



1.11.2 EQUIPMENT DETAILS & SPECIFICATIONS

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	EQUIPMENT ALLOCATION	:	4

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5

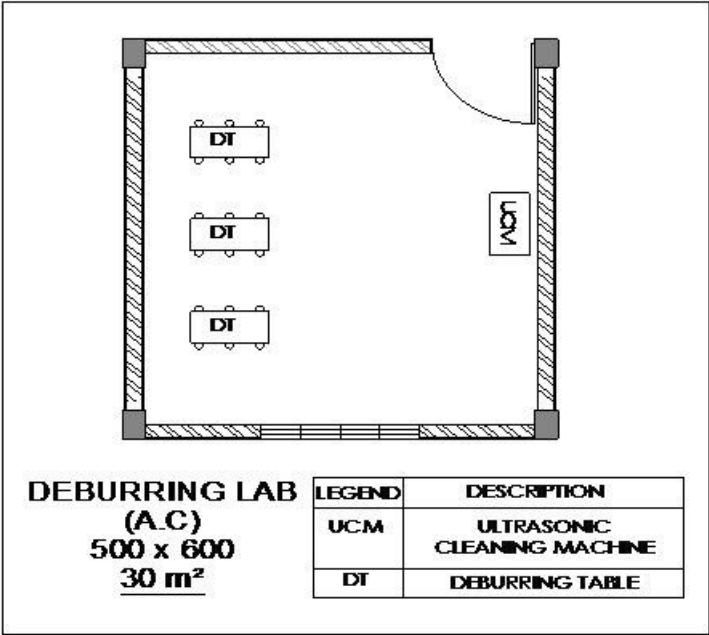
1.11.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Operation and maintenance of clean room and cleanroom equipments as per operating and maintenance manual and directions of department focal point.
- Cleaning, mopping of clean room5 nos.
- Cleaning, drying and ironing of clean room garments.
- Ensuring the availability of cleanroom consumables in coordination with LPSC.
- Packing and dispatch of fluid control components/modules in packing boxes identified for the same.
- Receipt of component/module and logging the details.
- Packing the component/module properly with protective covering and keeping in delivery box.
- Ensuring the stock of packing sheets and boxes in consultation with the Department.
- Logging the details of dispatched hardware.

1.12 DEBURRING & PART CHECKING FACILITY

Fabricated parts which are bonded need some deburring operations before it is taken for final assembly. The deburring is carried out using electrical deburring tools. Also, the parts debonded due to modification in drawings need to be corrected/modified based on the new drawings. The coordination of this activity with different agencies and rebonding of the parts also need to be carried out. Also, the bonded parts are to be taken for particular assembly and then these are to be checked for sliding clearance etc. with necessary fixtures/suiting parts with the assistance of the assembly team. The necessary corrections required for these parts may be intimated to respective assembly team for taking up the machining in workshop. There are two such facilities, one in ECAT and one in SCAT.

1.12.1GENERAL SCHEMATIC



1.12.2 EQUIPMENT DETAILS & SPECIFICATIONS

List of equipments/items in each facility is given below.

CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5

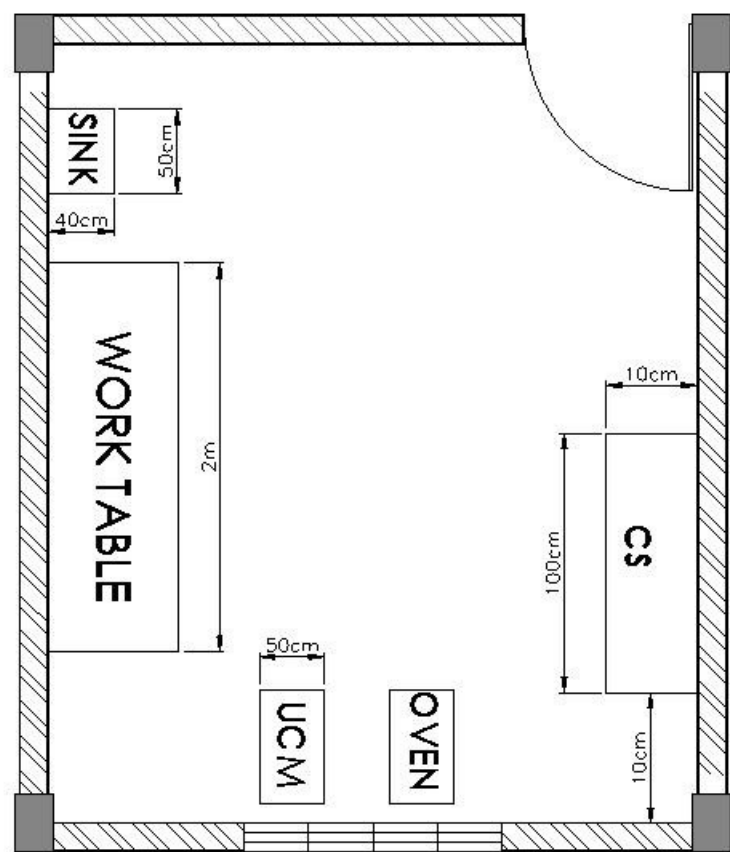
1.12.3. WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of hardware with the details of the required activity to be carried out.
- Carry out part suiting as per the part list given.
- Carry out deburring activity using deburring tools.
- Recording the activities carried out in the logbook.
- Handing over the parts after the activity.

1.13 CHEMICAL SURFACE TREATMENT FACILITY(CSTF)

The chemical surface treatment and cleaning by vapour degreasing are carried out in this facility. Pickling, passivation and decontamination operations of component's parts are carried out using respective chemicals. The facility mainly consists of pickling, passivation and decontamination baths. The facility also houses one vapour degreasing unit for cleaning the parts using organic/ inorganic solvents.

1.13.1 GENERAL SCHEMATIC



CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3

1.13.2 EQUIPMENT DETAILS & SPECIFICATIONS

CLAUSE NUMBER	TITLE		N
1	INTRODUCTION	:	
2	FACILITIES & LOCATION	:	
3	SCOPE OF WORK	:	
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	
6	RESPONSIBILITIES	:	
7	RIGHTS OF THE DEPARTMENT	:	

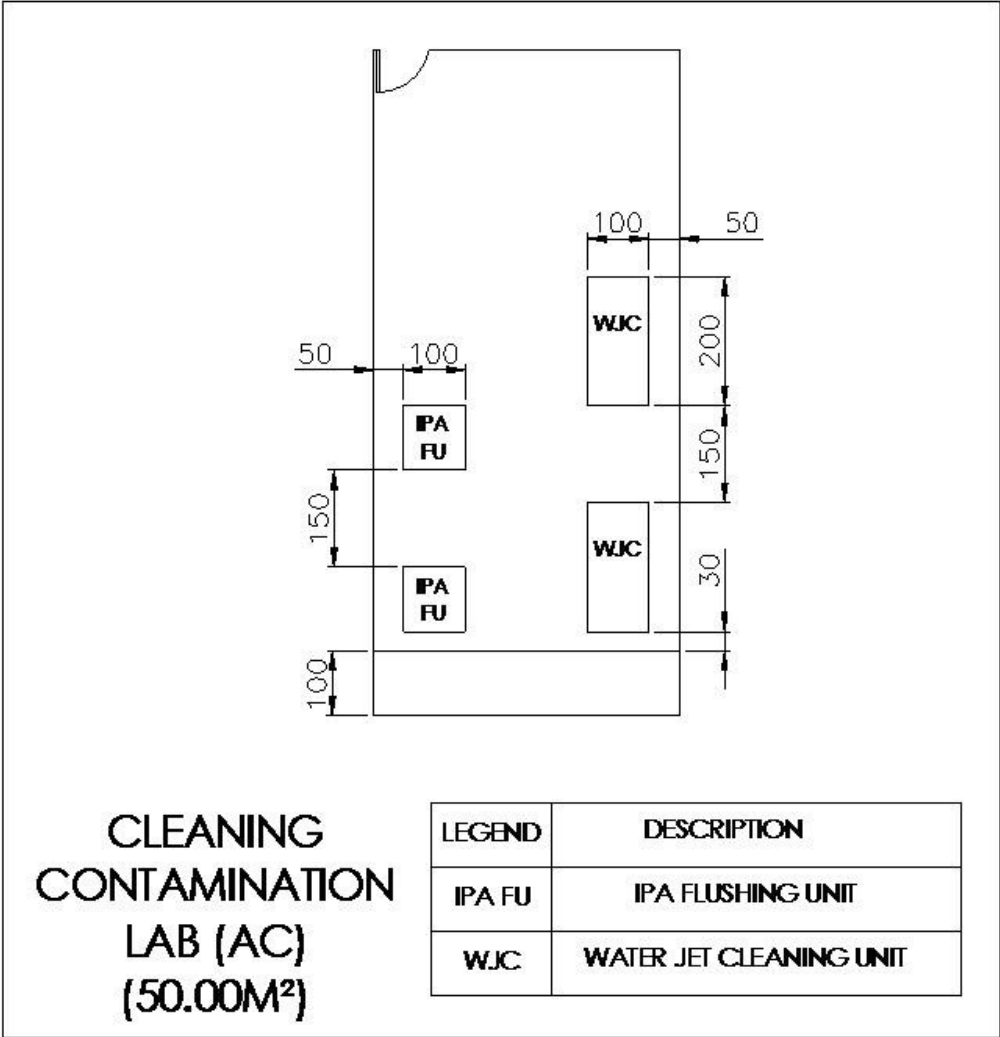
1.13.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of hardware and logging the details
- Identification of the process (pickling, passivation, decontamination etc.) to be carried out and preparing the arrangements for the same.
- Carrying out the required process.
- Handing over the hardware after the completion of process.
- Operation and maintenance of the facility.
- Availability of consumables by coordinating with LPSC.

1.14 CLEANING AND CONTAMINATION CHECK FACILITY& DM WATER PLANT

In this facility components/tanks will be cleaned to remove greases etc. Some components will be cleaned in the degreasing unit and then all the parts of each component will be cleaned in ultrasonic cleaner using Isopropyl Alcohol. There are three such facilities, one in ECAT, one in SCAT and one in ICMAT. Altogether, there are three degreasing units and 6 ultrasonic cleaners. Certain components undergo flushing to remove the contamination. Both water jets and Isopropyl will be used for flushing. There are three units for water flushing and IPA flushing, one in each facility. After cleaning, the fluid is collected for contamination check using particle counter. There are three particle counters for all facilities together.

1.14.1GENERAL SCHEMATIC



1.14.2EQUIPMENT DETAILS & SPECIFICATIONS

Equipment details for each facility are given below.

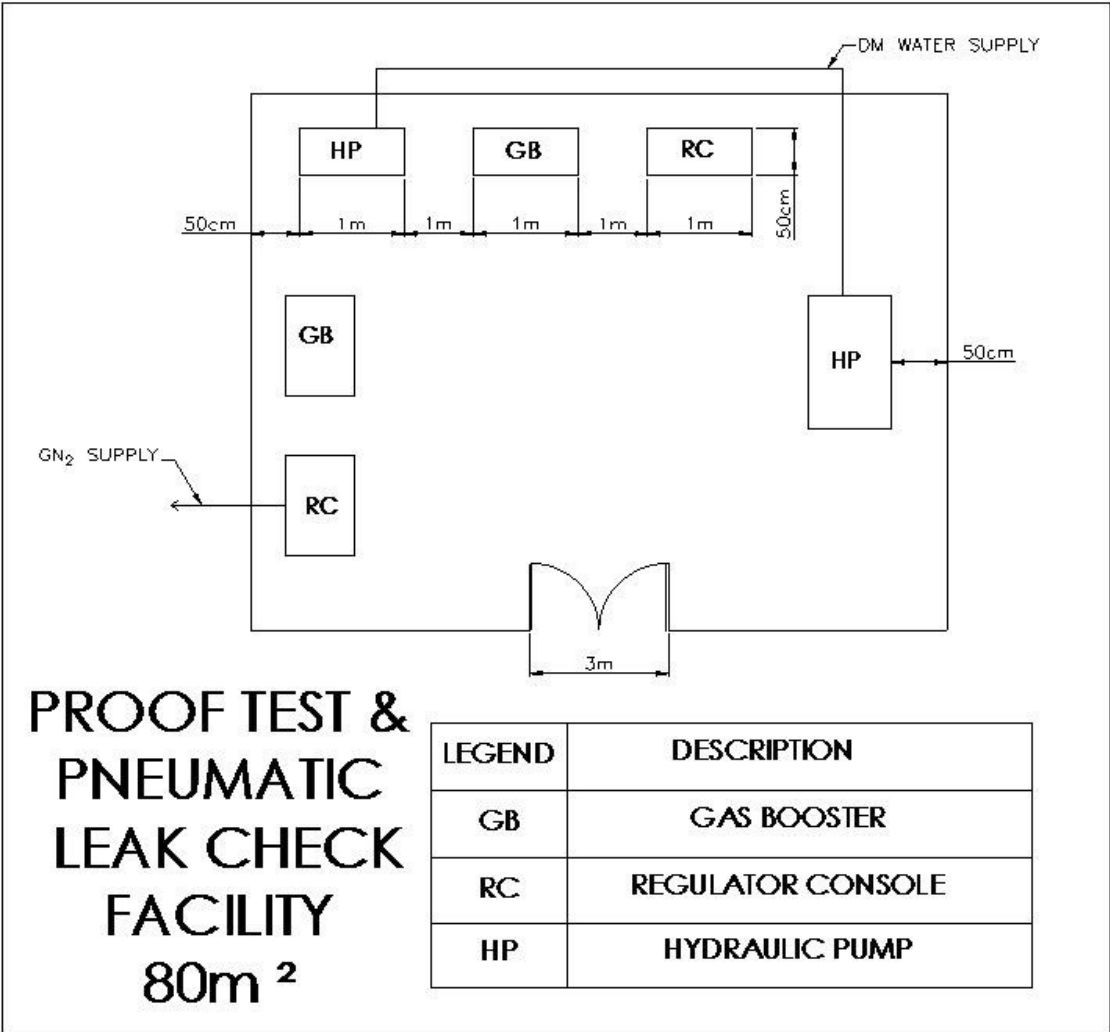
CLAUSE NUMBER	TITLE		PAG NUMB
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	11

1.14.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of hardware for flushing.
- Filling of DM water/IPA in the tank and operating equine after connecting the article to be cleaned.
- Sample collection and checking the contamination level, if contamination is more the flushing to be repeated.
- Dismantling and drying the component.

1.15PROOF TEST& PNEUMATIC LEAK CHECK FACILITY

1.15.1GENERAL SCHEMATIC



1.15.2 EQUIPMENT DETAILS & SPECIFICATIONS

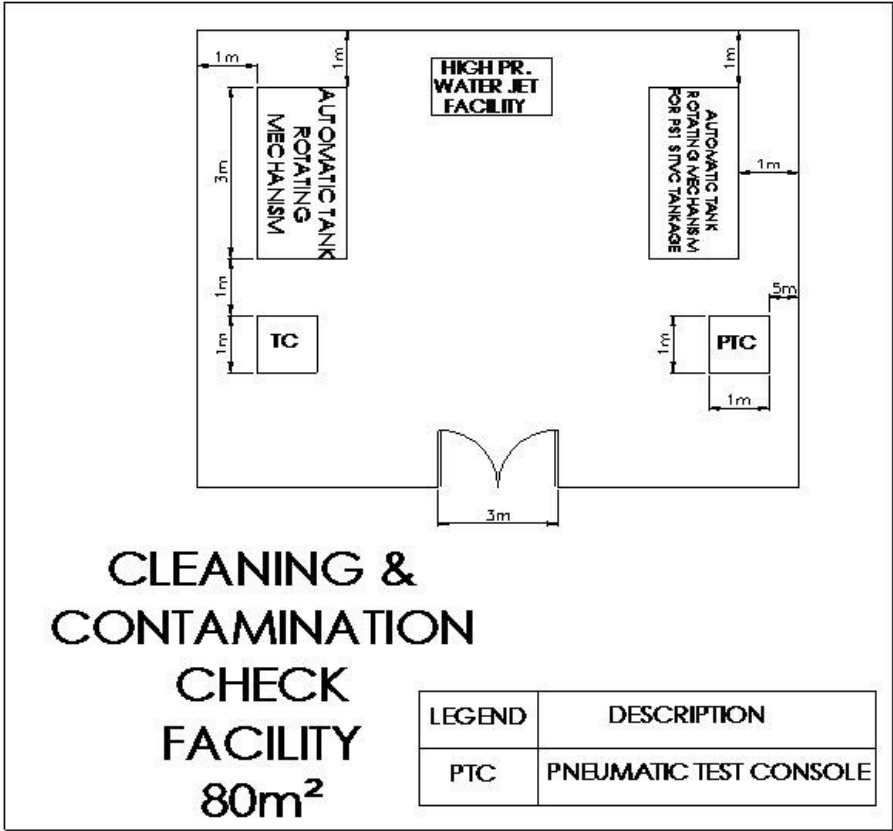
CLAUSE NUMBER	TITLE		PAGE NUMBER
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5

1.15.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of flight hardware like PS1 SITVC tankages (1630 liters), PS1 RCS MMH tank (163 liters), PS1 RCS MON tank (143 liters), welded feed lines, QCDC's, welded blocks etc., and updating/stock keeping of hardware.
- Preparation of test set up as per schematic provided including collection and preparation of test medium, positioning of test article at appropriate place with proper mounting etc.
- Removing the test article from the test setup with utmost care.
- Purging of test article/ drying of test article with isopropyl alcohol and purging thoroughly till liquid particles are removed.
- Protection of test article by closing all the test ports with proper closures.
- Storing of test article and handing over of test article for next operation.
- Periodic test and evaluation of facilities in the proof pressure and pneumatic leak check facilities.

1.16. CLEANING & CONTAMINATION CHECK FACILITY

1.16.1 GENERAL SCHEMATIC



1.16.2 EQUIPMENT DETAILS & SPECIFICATIONS

CLAUSE NUMBER	TITLE		PAG NUMB
1	INTRODUCTION	:	3
2	FACILITIES & LOCATION	:	3
3	SCOPE OF WORK	:	4
4	FACILITY DETAILS, LIST OF EQUIPMENTS & WORKS TO BE CARRIED OUT BY SERVICE PROVIDER	:	5
5	MANHOUR REQUIREMENT & INSTRUCTION TO THE SERVICE PROVIDER	:	5
6	RESPONSIBILITIES	:	8
7	RIGHTS OF THE DEPARTMENT	:	14

1.16.3 WORKS TO BE EXECUTED BY THE SERVICE PROVIDER

- Receipt of hardware and updating / stock keeping of hardware.
- Handling of tankages / flight elements and loading of tankages to automatic tank rotating mechanisms.
- Receipt and preparation of cleaning fluids like trichloroethylene, isopropyl alcohol, distilled water as per procedure using various equipments..
- Receipt and proper storing of cleaning medium with adequate safety precaution.
- Cleaning of the tankages using cleaning fluid by rotating the tankages using automatic tank rotating mechanisms.
- Draining of cleaning fluid periodically and filling with fresh fluid.
- Filtering of cleaning medium and inspection of filters.
- Contamination checking of cleaning medium.
- Unloading of tankages from rotating mechanism.
- Preparation of purging setup and purging of tankages using filtered nitrogen gas and drying.
- Closing of filling ports in test article using proper closures and storing of flight hardware properly.
- Periodic test and evaluation of facilities.