

A.

1. SCOPE OF WORK

1.1. To carry out tasks related to Assembly and Testing of Umbilical Systems in “Umbilical Integration & Testing Lab” of LPSC.

2. DIMENSIONAL INSPECTION OF PROPULSION SYSTEM ELEMENTS

Service provider need to carryout activities broadly related to:

2.1. **Part Preparation**—Collection of parts from bonded stores, Collection of dimensional reports and its review, De-burring of parts, preparation of inspection requests, Collection of standard parts from bonded stores. Cleaning of parts for pre-assembly, Assembly of fixtures for proof pressure test and collection of proof pressure test result and their compilation, Examination of parts under microscope before final clearance for assembly.

2.2. **Pre-assembly operations**—Pre-assembly operations to check critical clearances and assembly corrections required. Preparation of assembly correction requests, handing over parts to machining shop and collecting them back with reports. Scrutiny of FCD inspection reports, Re-verification sliding clearances and comparing them with FCD acceptance criteria.

2.3. **Realization of sub-assembly** – Cleaning of parts in ultrasonic cleaner, Assembly of parts for sub-assembly realization, welding request generation, collecting parts after welding, Carrying out leak check with Helium mass spectrometer.

2.4. **Realization of final assembly** – Assembly part list preparation. Cleaning of parts, Assembly of components by assembling fasteners and then leak checking it with helium to check leak tightness in various joints. Filling of delta documents for assembly and testing.

2.5. **Testing**-Preparation of test article for vibration testing, thermal testing, interface leak checks. Collection of test reports from the respective facilities. Carrying out necessary tests and consolidation of the results.

2.6. **Preparation of final reports**—Preparation of final reports compiling all the assembly and test data for each component. Generation of graphs for various tests like flow test, response tests etc. Compilation of test result database.

2.7. Any other activity that may be called for from time to time as may be felt necessary by LPSC.

3. **MANPOWER AND QUALIFICATION**

3.1. Party deputed personnel shall have following qualification/experience:

Diploma Engineer

- a. Diploma in Mechanical Engineering (DME) with minimum 2 years' experience in relevant field. (1 No.)
- b. Diploma in Mechanical Engineering (DME, 1 No.)

ITI Technician

- a. ITI Fitter (Mechanical) with minimum two year experience in relevant field. (1 No.)
- b. ITI Fitter (Mechanical, 1 No.)

3.2. Service provider shall submit the details regarding the qualification and experience of the work force being deployed, as and when manpower is positioned/ changed. Personnel meeting the aforesaid pre-requisites should be able to demonstrate their skills in the presence of LPSC representative. In case of any attrition in the skilled manpower, party shall seek for fresh skill demonstration of personnel, so as to ensure minimum number of skilled manpower available with them always as a redundant measure for substituting the absentees.

4. **WORKING HOURS**

08.45 to 17.15 Hrs with 6 days per week, the exact time and days shall be applicable to the Industry concerned. If required, work shall be arranged on holiday and beyond normal working hours at the same rate as agreed for the normal working Hours.

5. **ACTIVITY LIST AND WORK UNITS**

- 5.1. Service provider shall provide all the required manpower for assembly & testing activities.
- 5.2. Service provider shall submit the details regarding the qualification and experience of the work force being deployed.
- 5.3. Following is the Work unitsto be positioned by the SERVICE PROVIDER for assembly and testing of Umbilical systems. This will be more or less uniformly spread over the whole year.

Table-1 :Work Description for Diploma Engineers

No.	WORK DESCRIPTION FOR DIPLOMA ENGINEERS	No.of activities/ year	Man hour required/ activity	Annual Man-hour
1	Assisting in preparation and updation of delta document for assembly and testing of Umbilical Systems and preparation of presentations in digital format.	75	4	300
2	Assisting in Preparation of test reports compiling all the assembly and test data for each component. Generation of graphs for various tests like flow test, response tests etc. Compilation of test result database.	75	4	300
3	Assisting in management of assembly and test activities, Service Provider's employee and participate in real time assembly & testing by following approved assembly & test procedure documents.	150	2	300
4	Preparation of fabricated & standard parts list with part identification nos. and request preparation for QA (Quality Assurance) clearance.	200	1	200
5	Arranging parts for Functionally Critical Dimension (FCD) inspection.	250	1	250
6	Listing down of FCD parameters and estimation of clearance and verification within the acceptance criteria.	100	1	100
7	Spring & Bellows inspection and compilation of their calibration data.	200	1.5	300
8	Preparation of indents/requests for inspection, welding, test activities, assembly corrections etc.	75	2	150
9	Recording assembly & test operations in log books.	100	2	200
10	Preparation of Assembly execution documents.	100	2	200
11	Supervision of Assembly & test activities according to laid down procedures.	100	2	200
12	Supervision of proof test/pneumatic test, functional tests, leak test of sub assemblies and valves etc.	150	2	300
13	Supervision of plumbing sub-assembly preparations and testing.	250	2	500
14	Supervision of functional assembly operation	100	2.5	250

	and test set ups.			
15	Verification of test data with the specification requirements and obtain clearance from QA.	100	1.5	150
16	Checking of valve assembly related measurements, seat load calculations etc.	100	1.5	150
17	Arranging Weld sub assembly for Dye Penetrant test, radiography tests etc.	150	2	300
18	Verification of interface engraving details, closures and packing in polythene cover and storage of valves in controlled environment/ transportation to user agency.	196	2	392
19	Preparation of valves/Umbilicals for Interface Critical Dimension (ICD) inspection	150	2	300
20	Preparation of Test results documents.	100	1.5	150

TOTAL ANNUAL MAN HOUR

4992

Table-2: Work Description for ITI, Technician

No.	WORK DESCRIPTION FOR ITI, TECHNICIAN	No. of activities/ year	Man hour required/ activity	Annual man hour
1	Collection of fabricated and standard parts from Bonded Stores as per the assembly part list.	150	2	300
2	Ultrasonic cleaning of parts in IPA/TCE, N2 gas purging, water jet cleaning, cleaning of parts in soap water and vacuum drying.	150	2	300
3	Visual inspection and microscopic inspection of parts for any damages, burrs, scratches, line marks, dent marks in sliding areas, seating areas etc.	200	2	400
4	Deburring of holes, edges corner, suiting of sliding parts, suiting of threads and suiting of interface.	100	2	200
5	Preparation of parts for passivation, decontamination, anodisation, DP tests, radiography tests etc.	100	1.5	150
6	Preparation of parts for bellow sub assembly, suiting, measurements, assembly for welding.	200	1.5	300
7	Post weld cleaning of welded areas.	100	1.5	150
8	Preparation of weld specimen for welding process qualification.	100	1.5	150
9	Inspection of valve level assembly measurement like stroke, air gap, over travel, site critical dimensions etc.	75	3	225

10	Cleanliness checking of parts, plumbing, IPA filtration for final valve assembly.	150	1.5	225
11	Carrying out final assembly of valves by assembling various parts and sub-assemblies.	150	1.5	225
12	Assembly for Hydro and Pneumatic test of valves and test set up preparation, testing etc.	150	1.5	225
13	Preparation of internal and external leak test set ups by using Mass spectrometer helium leak detector (MSHLD) and carrying out the test.	200	1.5	300
14	Preparation of valves for environmental testing, thermal cycling, vibration, humidity, thermo vacuum testing etc.	200	2	400
15	Preparation of plumbing of different geometry and carrying out the test procedures.	150	2	300
16	Preparation of test assembly for carrying out pneumatic flow tests, water flow tests, IPA test etc, and carrying out the test.	150	2	300
17	Preparation of test set up and bubble point testing of filters and carrying out the test.	75	2	150
18	Carrying out assembly and testing of module as per the assembly document procedures.	246	2	592
19	Wire locking of fasteners as per the assembly drawing.	100	2	200

TOTAL ANNUAL MAN HOUR

4992

Total annual man-hour requirement for each category is given below.

Table-4 : Total Annual man-hour requirement

Sl. No.	Category	Annual man- hour requirement
1	Diploma Engineer	4992
2	ITI Technician	4992

6. WORK UNITS AND COMPUTATION

One work unit is defined as one hour duration of work perperson and the total quantum of work carried out will be computed on monthly basis based on the completed work unit. The Service provider shall be available for work not only during office hours but also during late office hours and on holidays if needed.