

WORK CONTRACT FOR THE INSTRUMENTATION ACTIVITIES RELATED TO THE GROUP AIIS/AISE

2. EARTH STORABLE DIVISION

2.A. WORK DESCRIPTION:

1. PROOF PRESSURE TESTS :

A. Strain Gauge bonding

1. Strain gauge bonding surface readiness: Location identification, surface degreasing using alcohol, surface roughening using emery paper and clean the surface using alcohol.
2. Strain gauge alignment: Alignment of the strain gauge using cellophane tape at the correct location as identified by the supervisor. The direction of the strain gauge thus aligned should coincide with the direction of measurement.
3. Strain gauge bonding: Bonding of strain gauge with department supplied adhesive as per the documented procedures. Apply thumb pressure for a minimum period of one minute. Remove the cellophane tape used over the bonded strain gauge.
4. Terminal pad bonding surface readiness: Confirm removal of cellophane tape and clean the surface using alcohol.
5. Terminal pad alignment: Alignment of the terminal pad using cellophane tape on the already prepared bonding surface.
6. Terminal pad bonding: Bonding of the aligned terminal pad using the department supplied adhesive as per the documented procedures. Apply thumb pressure for a minimum period of one minute. Remove the cellophane tape used over the bonded terminal pad.
7. Strain gauge soldering: Soldering of strain gauge leads on to the bonded terminal pad and cleaning with Isopropyl alcohol for flux removal.
8. Terminal pad wire preparation: Teflon cable length sizing, end preparation, soldering to terminal pads on one side and to connector pins on the other side and cleaning with Isopropyl alcohol for flux removal.
9. Terminal pad wire soldering: Soldering of prepared terminal pad wires on to their respective bonded terminal pads and cleaning with Isopropyl alcohol.
10. External cabling: External cabling is required for propellant tanks only. This includes cable laying & harnessing of proof pressure test Strain measurement cables over the tank.
11. Resistance check of unbonded strain gauges: Before bonding, each strain gauge resistance has to be measured in two wire configuration using the given digital multimeter. The measured values have to be properly logged.
12. Resistance check of bonded strain gauges: After bonding each bonded strain gauge resistance has to be measured & logged following the above mentioned procedure of point no: 11.
13. Pre-test health checkout: Checkout consists of resistance measurements of strain gauges carried out after external cabling is over. The external cables have 37 pin connectors at the ends and the resistance measurement has to be done at the connectors and the values have to be logged properly.
14. Protective coating: Application of the department supplied protective coat over the okay-ed strain gauges and Terminal pads.
15. Post-test health checkout and cable removal: Checkout consists of resistance measurements of strain gauges carried out at the external cable end connectors. The values have to be logged properly.

B. Thermocouple bonding

1. Resistance check of unbonded Temperature sensor: Before bonding, each temperature sensor resistance has to be measured in two wire configuration using the given digital multi meter. The measured values have to be properly logged.
2. Temperature sensor bonding surface readiness: Location identification, surface degreasing using alcohol, surface roughening using emery paper and surface cleaning using alcohol.
3. Thermocouple alignment: Alignment of Thermocouple using self adhesive Aluminum tape at the correct location as identified by the supervisor.
4. Thermocouple bonding: Bonding of Thermocouple at the identified location by of sticking of the self adhesive Aluminium tape.
5. Pre-test health checkout: Checkout consists of resistance measurements of fresh Thermocouple after bonding and hot air blower functional check of the bonded Thermocouples. The values have to be properly logged.

C. Facility Instrumentation chain readiness

Facility instrumentation system include measurement & command systems. Measurement system contains Strain, Pressure, Temperature & Displacement chains. Command system contain E/P valve command & status chains.

1. Strain measurement: Readiness works include cable continuity check and Electrical calibration by shunting strain gauge with known resistors R1 & R2. Logging of the measured values and read outs in the DAS.
2. Pressure measurement: Readiness works include Cable continuity check, measure input & output impedance, Excitation source voltage, Zero/Full scale Electrical calibration and measure ambient output voltage measurements. Logging of the measured values and read outs in the DAS.
3. Temperature measurement: Readiness works include cable continuity check and Ambient °C readout in the DAS. Logging of the observed values.
4. Displacement measurement: Readiness works include cable continuity check, Excitation source voltage measurement, Zero/Full scale Electrical calibration and measure Ambient output voltage measurement. Logging of the measured values and read outs in the DAS.
5. E/P valve command: Readiness works include Coil resistance measurement, remote actuation of E/P valves from the console & Coil voltage measurement, Status checking in the console and logging of the measured & observed values.

2. TRANSDUCER ISSUE FOR VIKAS ENGINES

The Instrumentation works for a VIKAS ENGINE include the following:

1. Transducer labeling using the prepared paper tags and cellophane tape
2. Transducer physical inspections of mounting port thread & mating connector
3. Transducer checks for Input & Output resistances & Isolation resistances, whichever applicable, for the transducers to be issued.
4. Transducer ambient checking (pre issue to EAIE).
 - i) Ambient measurements of mV for Pressure
 - ii) Resistances for Temperature
 - iii) 1g functional test for Vibration.
 - iv) Resistances for Speed
5. Transducer ambient checking(after mounting)
 - i) Ambient measurements of mV for Pressure
 - ii) Resistances for Temperature

- iii) Tap functional testing for Vibration sensors
 - iv) Resistances for Speed
6. Transducer ambient checking(prior to Cal. Lab. return)
- i) Ambient measurements of mV for Pressure
 - ii) Resistances for Temperature
 - iii) 1g functional test for Vibration
 - iv) Resistances for Speed

3. FREQUENCY RESPONSE TESTS ON PLUMBINGS related to FLIGHT VIKAS ENGINES and FLIGHT STAGES

1. Vibration sensor bonding using the Bee wax or the instant cure adhesive at the appropriate place & direction on the Plumbing as instructed by the Supervisor.
2. Apply Force using the Impact Hammer at the correct direction in order to produce vibrations in the Plumbing. Repetition of Force application may be required for a max. of three times, if the correct frequency response is not obtained as given in the documented procedures.
3. Record the Real Time graphs acquired in the Recorder as per the documented procedures.
4. Take print-out in A4 paper by running the software in the Recorder as per the documented procedures.

4. WATER FLOW TESTINGS for VIKAS ENGINES

A. Pressure Transmitter chain readiness works

1. Verification of A0 & A1 constants, zero and offset in DAS.
2. Feed 4-20mA signal, in steps of 4mA using HART communicator and log the results for every test.
3. Verification of output at ambient condition. Report if any change is noticed.
4. Compare results with calibration data sheet values and report any anomaly.

B. Flow Transmitter chain readiness works

1. Verification of output at no flow, flow trial conditions and report on changes.
2. Verification of A0 & A1 constants, zero and offset in DAS.
3. Feeding 4-20mA signal with 4mA steps using Remote Terminal Unit from field and logging the results for every test.
4. Compare results with calibration data sheet values and report any anomaly.
5. Flow re-ranging of flow meters using panel keys in the RTU as and when required.

C. Control valve chain readiness works

1. Log the current input pressure input to I/P converter of control valve.
2. Using PID controller gives current 4 & 20mA to I/P converter and confirm the corresponding openings of control valve are 0 & 100% respectively.

D. E/P Valve chain readiness works

1. Switch ON/ OFF the corresponding channel and ensure correct operation. Physical opening and closing of valve and ensure the Open/Close status received in the console.
2. Enter the details in logbook.

E. Data Acquisition System readiness works

1. Identification of channel in acquisition system.
2. With available zero and FS electrical voltages, calculate constants as per the standard calculation procedure.
3. Enter the constants in the acquisition system.
4. Log the Electrical and engineering values in the logbook.

2.B. WORK CONTENT:

Sl. no.	Work content with identification name	Quantity	UoM
1.	2-Activities-1.A.1 to 1.A.3	3000	nos
2.	2-Activities-1.A.4 to 1.A.6	3000	nos
3.	2-Activities-1.A.7 to 1.A.9	10000	nos
4.	2-Activities-1.A.10 to 1.A.12	3000	nos
5.	2-Activities-1.A.13 to 1.A.15	3000	nos
6.	2-Activities-1.B.1 to 1.B.3	1000	nos
7.	2-Activities-1.B.4 to 1.B.5	1000	nos
8.	2-Activity-1.C.1	2000	nos
9.	2-Activity-1.C.2	1000	nos
10.	2-Activity-1.C.3	500	nos
11.	2-Activity-1.C.4	500	nos
12.	2-Activity-1.C.5	1000	nos
13.	2-Activity-2.1	2000	nos
14.	2-Activity-2.2	2000	nos
15.	2-Activity-2.3	2000	nos
16.	2-Activity-2.4.i	2000	nos
17.	2-Activity-2.4.ii	160	nos
18.	2-Activity-2.4.iii	100	nos
19.	2-Activity-2.4.iv	100	nos
20.	2-Activity-2.5.i	2000	nos
21.	2-Activity-2.5.ii	100	nos
22.	2-Activity-2.5.iii	100	nos
23.	2-Activity-2.5.iv	100	nos
24.	2-Activity-2.6.i	2000	nos
25.	2-Activity-2.6.ii	200	nos
26.	2-Activity-2.6.iii	100	nos
27.	2-Activity-2.6.iv	100	nos
28.	2-Activity-3.1	1800	nos
29.	2-Activity-3.2	2000	nos
30.	2-Activity-3.3	2000	nos
31.	2-Activity-3.4	1000	graphs
32.	2-Activities-4.A.1 to 4	3000	Chls.
33.	2-Activities-4.B.1 to 5	1000	Chls.
34.	2-Activities-4.C.1&2	400	Chls.
35.	2-Activities-4.D.1&2	400	Chls.
36.	2-Activities-4.E.1 to 4	400	Chls.

2.C. CONTRACT CONDITIONS - TECHNICAL:

1. Based on our past experience, the average number of Personnel required to carry out the **2.B. Work Content** are **4 Diploma holders and 0 ITI holders for 2 years**. However, depending on the work load, the Contractor may require to deploy more people as and when required.
2. The persons should have educational qualifications as min. **Diploma in Electronics & Communication** or **Electrical & Electronics branches of Engg. & min. ITI in Electronics/Electrical trade**.
3. The **2.B. Work content** table in the Tender contains **36 rows** of items starting as '**2-Activity(ies)- XX**'.