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**Council of Scientific and Industrial Research  
NATIONAL AEROSPACE LABORATORIES**

PB No.1779, HAL Airport Road, Kodihalli, Bangalore – 560017, India  
Phone: +91-80-25086040/6041 Fax: +91-80-25269611  
Email: purchasek@nal.res.in

**Date:15-Jul-2021**

**CORRIGENDUM / ADDENDUM**

Tender No. NAL/PUR/STTD/404/20-Z-G  
Tender ID: 2021\_CSIR\_81930\_1 Dated 12-Jul-2021

In continuation of CSIR-National Aerospace Laboratories Tender No. NAL/PUR/STTD/404/20-Z (G) Dated 12-Jul-2021 for **“Procurement of Hydraulic Systems LRUs”** the Chapter 4 enclosed with this corrigendum / addendum may be considered for Pre-Bid Meeting and Submission of Quote instead of Chapter 4 appended in the Tender document.

Other clauses of the bidding document remain unchanged.

  
**Sr. Controller of Stores and Purchase**  
For and on behalf of CSIR

## Chapter 4

### Specifications and Allied Technical Details for Hydraulic systems LRU's

#### 4.1 End Use:

SARAS MK II Aircraft

#### 4.2 Detailed Specifications (including the list of spares, if any)

##### 4.2.1 Specification of Hydraulic System LRU'S

##### 4.2.1.1 Pedal Transducer/Potentiometer

**Table 4-1 Pedal Transducer/Potentiometer specifications**

1.	End Use	19 Seater Commuter Type SARAS MK II Aircraft (with FAR 23 Type Certification)
2.	Type	Linear Potentiometer (Preferable) / LVDT
3.	Function/Operation/Description	To measure the pedal travel for brake application
4.	Location of the Pedal Transducer/Potentiometer in the Aircraft	In Cockpit (Behind Rudder Pedal)
5.	Applicable Regulatory and Certification Documents	Shall meet FAR-23 amendment 23-64 performance-based regulations. The prescriptive provisions within previous latest amendments of FAR-23, where applicable, may be used.
6.	Altitude Requirement	Maximum flying altitude is 30000 feet. Pedal Transducer/Potentiometer is required to be operational till 25000 feet, to support high altitude Landings
7.	Stroke	20mm (Indicative)
8.	Electrical Channel	Dual Sensor Output Preference 1: 4-cup potentiometer Preference 2: Min Dual Digital encoders Preference 3: Min Dual LVDT
9.	Accuracy	< ±0.5% for full range
10.	Mean Time Between Failure	To be provided by the OEM

11.	Electrical Input	Normal supply 28V DC. 18 V(Emergency) to 32 .2V (Abnormal Voltage Limits) DC Electrical connector pin details be provided by the OEM.  LRU's/ Sensors should be supplied with MIL grade (crimp type) (Light weight) mating connectors and back shell (Connector should be preferably of the D38999 Series 3 type)
12.	Physical Dimensions Installation and Mounting Details	To be provided by the OEM
13.	Target Weight	0.340 Kg/To be provided by the OEM
14.	Product Support	The proposal shall include assurance of maintenance and spares support for the product during the next 30 years, the aircraft is expected to be in service.

#### Environmental Qualification Requirements:

Pedal Transducer/Potentiometer shall be qualified up to 25,000 ft altitude in **functional-mode**  
Pedal Transducer /Potentiometer shall be qualified up to 30,000 ft in **non-functional** mode

Pedal Transducer/Potentiometer shall be qualified as per RTCA-D0-160G, as per the detailed sub-categories mentioned below in Table 4-1a

Table- 4-1a: RTCA-D0-160G Environmental conditions for Pedal Transducer/Potentiometer Qualification with list of applicable sub-categories

Sr. No.	RTCA Section No	Item Description	Category
		Location	Cockpit
		LRU name at location	Pedal Transducer/Potentiometer
1	4	Temperature and altitude	Category C2*
		Operating Low Temp. (deg C)	-55**
		Operating High Temp. (deg C)	+70
		Short-Time Operating Low Temp. (deg C)	-55**
		Short-Time Operating High Temp (deg C)	+70
		Ground Survival Low Temperature (deg C)	-55**
		Ground Survival High Temperature (deg C)	+85

		Altitude Test*	Temp: Ambient Equipment 'ON' Pressure corresponding to 35000 ± 100 ft (23.84 kPa or 7.04 in Hg, absolute)
		Decompression Test	Not Applicable
* Aircraft altitude may be limited to 30000 ft instead of 35000 ft, as required for Category C2.			
** Operating Low Temperature, Short-Time Operating Low Temperature and Ground Survival Low Temperature for the equipment may be limited to -45 deg C, as the aircraft maximum altitude is restricted to 30000 feet.			
2	5	Temperature Variation (A minimum of two cycles shall be accomplished)	Category C Temp. Variation 2 deg C per minute
3	6	Humidity	Category A
4	7	Operational Shock and crash safety	Category B
		<b>Up: 3.0g; Forward: 18.0g; and Side (Left &amp; Right) 4.5g for the specified orientation by OEM</b>	
5	8	Vibration	Category S, Test Curve M
6	9	Explosive atmosphere	Not Applicable
7	10	Water proofness	Not Applicable
8	11	Fluids Susceptibility	Not Applicable
9	12	Sand and Dust	Not Applicable
10	13	Fungus Resistance	Not Applicable
11	14	Salt Fog	Not Applicable
12	15	Magnetic Effect	Category Z
13	16	Power Input	Category B
14	17	Voltage spike	Category A
15	18	Audio Frequency Conducted Susceptibility	Category B
16	19	Induced Signal Susceptibility	Category ZCE, (E is required only for non-metallic enclosure)
17	20	Radio Frequency Susceptibility	Category W
18	21	Emission of Radio Frequency Energy	Category M
19	22	Lightning Induced Transient Susceptibility	B3K3L3

20	23	Lightning Direct Effects	Not Applicable
21	24	Icing	Not Applicable
22	25	Electrostatic Discharge Requirements	Category A
23	26	Fire, Flammability	Category C (Flammability)

#### 4.2.1.2 Pressure Transducer

**Table 4-2 Pressure Transducer specifications**

1.	End Use	19 Seater Commuter Type SARAS MK II Aircraft (with FAR 23 Type Certification)
2.	Type	Pressure Transducer
3.	Function/Operation/Description	To measure System Pressure and Brake Pressures.
4.	Location of the Pressure Transducer in the Aircraft	In Main Landing gear Bay (Non-controlled pressure location & Non-controlled Temperature zone)
5.	Applicable Regulatory and Certification Documents	Shall meet FAR-23 amendment 23-64 performance-based regulations. The prescriptive provisions within previous latest
6.	Altitude Requirement	Maximum flying altitude is 30000 feet. Pressure Transducer is required to be operational till 25000 feet, to support high altitude Landings
7.	Fluid Type	MIL-PRF-5606H/MIL-PRF-83282 or Equivalent
8.	System pressure	207 bar (g)
9.	Rated flow	12 L/min
10.	Proof pressure	310.5 bar (1.5 times of rated pressure)
11.	Burst pressure	517.5 bar (2.5 times of rated pressure)
12.	Pressure Range (Readable)	0-4000psi (g) (< ± 0.5 % Accuracy for full range)
13.	Electrical Channel	Minimum Dual Sensor Output Preferable sensor output type: Single Ended analog signal Preferable sensor output voltage range: 0-5V
14.	Maximum degree of contamination	Up to class 10 (NAS 1638)
15.	External Leakage	NIL
16.	Mean Time Between Failure	To be provided by the OEM
17.	Electrical Input	Normal supply 28V DC. 18 V(Emergency) to 32 .2V (abnormal voltage limits) DC Electrical connector pin details to be provided by the OEM. LRU's/ Sensors should be supplied with MIL grade (crimp type) (Light weight) mating connectors and back shell (Connector should be preferably of the D38999 Series 3 type)

18.	Physical Dimensions, Installation and Mounting Details	To be provided by the OEM
19.	Weight	0.11 Kg/To be provided by the OEM
20.	Product Support	The proposal shall include assurance of maintenance and spares support for the product during the next 30 years, the aircraft is expected to be in service.

### Environmental Qualification Requirements:

Pressure Transducer shall be qualified up to 25,000 ft altitude in **functional-mode**

Pressure Transducer shall be qualified up to 30,000 ft in **non-functional** mode

Pressure Transducer shall be qualified as per RTCA-D0-160G, as per the detailed sub-categories mentioned below in Table 4-2a

Table- 4-2a : RTCA-D0-160G Environmental conditions for Pressure Transducer Qualification with list of applicable sub-categories

Sr. No.	RTCA Section No	Item Description	Category
		Location	Landing Gear Bay
		LRU name at location	Pressure Transducer
1	4	Temperature and altitude	Category C2*
		Operating Low Temp. (deg C)	-55**
		Operating High Temp. (deg C)	+70
		Short-Time Operating Low Temp. (deg C)	-55**
		Short-Time Operating High Temp (deg C)	+70
		Ground Survival Low Temperature (deg C)	-55**
		Ground Survival High Temperature (deg C)	+85
		Altitude Test*	Temp: Ambient Equipment 'ON' Pressure corresponding to 35000 ± 100 ft (23.84 kPa or 7.04 in Hg, absolute)
		Decompression Test	Not Applicable

		<p><b>* Aircraft altitude may be limited to 30000 ft instead of 35000 ft, as required for Category C2.</b></p> <p><b>** Operating Low Temperature, Short-Time Operating Low Temperature and Ground Survival Low Temperature for the equipment may be limited to -45 deg C, as the aircraft maximum altitude is restricted to 30000 feet.</b></p>	
2	5	Temperature Variation (A minimum of two cycles shall be accomplished)	Category A Temp. Variation 10 deg C per minute
3	6	Humidity	Category C
4	7	Operational Shock and crash safety	Category B
		<b>Up: 3.0g; Forward: 9.0g; and Side (Left &amp; Right) 4.5g, for the specified orientation by OEM</b>	
5	8	Vibration	Category S, Test Curve T
6	9	Explosive atmosphere	Zone I Category H
7	10	Water proofness	Category R
8	11	Fluids Susceptibility	Category F
9	12	Sand and Dust	Category S
10	13	Fungus Resistance	Category F
11	14	Salt Fog	Category S
12	15	Magnetic Effect	Category C
13	16	Power Input	Category B
14	17	Voltage spike	Category A
15	18	Audio Frequency Conducted Susceptibility	Category B
16	19	Induced Signal Susceptibility	Category ZCE, (E is required only for non-metallic enclosure)
17	20	Radio Frequency Susceptibility	Category W
18	21	Emission of Radio Frequency Energy	Category H
19	22	Lightning Induced Transient Susceptibility	B3K3L3
20	23	Lightning Direct Effects	Not Applicable
21	24	Icing	Category A



22	25	Electrostatic Discharge Requirements	Category A
23	26	Fire, Flammability	Category C (Flammability)

### 4.2.1.3 Pressure Switch

**Table 4-3 Pressure switch specifications**

1.	End Use	19 Seater Commuter Type SARAS MK II Aircraft (with FAR 23 Type Certification)
2.	Type	Pressure Switch
3.	Function/Operation/Description	To indicate the set pressure in the system
4.	Location of the Pressure Switch in the Aircraft	In Main Landing Gear Bay (Non-controlled pressure location & Non-controlled Temperature zone)
5.	Applicable Regulatory and Certification Documents	Shall meet FAR-23 amendment 23-64 performance-based regulations. The prescriptive provisions within previous latest amendments of FAR-23, where applicable, may be used.
6.	Altitude Requirement	Maximum flying altitude is 30000 feet. Pressure Switch is required to be operational till 25000 feet, to support high altitude Landings
7.	Fluid Type	MIL-PRF-5606H/MIL-PRF-83282 or Equivalent
8.	System pressure	207 bar (g)
9.	Rated flow	12 L/min
10.	Proof pressure	310.5 bar (1.5 times of rated pressure)
11.	Burst pressure	517.5 bar (2.5 times of rated pressure)
12.	Electrical Signal Type	Discrete (ON/OFF)
13.	Switching pressure Range	100bar(g) -105bar (g) (50% of System Pressure)
14.	Electrical Channel	Dual Sensor Output (preferably 4 poles)
15.	Maximum degree of contamination	Up to class 10 (NAS 1638)

16.	External Leakage	NIL
17.	Mean Time Between Failure	To be provided by the OEM
18.	Electrical Input	Normal supply 28V DC. 18 V(Emergency) to 32 .2V (abnormal voltage limits)DC Electrical connector pin details to be provided by the OEM. LRU's/ Sensors should be supplied with MIL grade (crimp type) (Light weight) mating connectors and back shell (Connector should be preferably of the D38999 Series 3 type)
19.	Physical Dimensions, Installation and Mounting Details	To be provided by the OEM
20.	Weight	0.12Kg/ To be provided by the OEM
21.	Product Support	The proposal shall include assurance of maintenance and spares support for the product during the next 30 years, the aircraft is expected to be in service.

**Environmental Qualification Requirements:**

Pressure Switch shall be qualified up to 25,000 ft altitude in **functional-mode**

Pressure Switch shall be qualified up to 30,000 ft in **non-functional** mode

Pressure Switch shall be qualified as per RTCA-D0-160G, as per the detailed sub-categories mentioned below in Table 4-3a

Table- 4-3a : RTCA-D0-160G Environmental conditions for Pressure Switch Qualification with list of applicable sub-categories

Sr. No.	RTCA Section No	Item Description	Category
		Location	Landing Gear Bay
		LRU name at location	Pressure Switch
1	4	Temperature and altitude	Category C2*
		Operating Low Temp. (deg C)	-55**
		Operating High Temp. (deg C)	+70
		Short-Time Operating Low Temp. (deg C)	-55**

		Short-Time Operating High Temp (deg C)	+70
		Ground Survival Low Temperature (deg C)	-55**
		Ground Survival High Temperature (deg C)	+85
		Altitude Test*	Temp: Ambient Equipment 'ON' Pressure corresponding to 35000 ± 100 ft (23.84 kPa or 7.04 in Hg, absolute)
		Decompression Test	Not Applicable
		<p><b>* Aircraft altitude may be limited to 30000 ft instead of 35000 ft, as required for Category C2.</b></p> <p><b>** Operating Low Temperature, Short-Time Operating Low Temperature and Ground Survival Low Temperature for the equipment may be limited to -45 deg C, as the aircraft maximum altitude is restricted to 30000 feet.</b></p>	
2	5	Temperature Variation (A minimum of two cycles shall be accomplished)	Category A Temp. Variation 10 deg C per minute
3	6	Humidity	Category C
4	7	Operational Shock and crash safety	Category B
		<p><b>Up: 3.0g; Forward: 9.0g; and Side (Left &amp; Right) 4.5g for the specified orientation by OEM</b></p>	
5	8	Vibration	Category S, Test Curve T
6	9	Explosive atmosphere	Zone I Category H
7	10	Water proofness	Category R
8	11	Fluids Susceptibility	Category F
9	12	Sand and Dust	Category S
10	13	Fungus Resistance	Category F
11	14	Salt Fog	Category S
12	15	Magnetic Effect	Category C
13	16	Power Input	Category B
14	17	Voltage spike	Category A
15	18	Audio Frequency Conducted Susceptibility	Category B
16	19	Induced Signal Susceptibility	Category ZCE, (E is required only)

			for non-metallic enclosure)
17	20	Radio Frequency Susceptibility	Category W
18	21	Emission of Radio Frequency Energy	Category H
19	22	Lightning Induced Transient Susceptibility	B3K3L3
20	23	Lightning Direct Effects	Not Applicable
21	24	Icing	Category A
22	25	Electrostatic Discharge Requirements	Category A
23	26	Fire, Flammability	Category C (Flammability)

#### 4.2.2 Design Requirements

- 1) LRU'S should have no operational limitations for the proposed flight envelope.
- 2) Ease of installation and removal of LRU'S with minimum attachment points to the structure.

##### a) Certification Requirements

LRU'S should comply with FAR 23, Amendment 64 based on FAR 23-63 regulations with applicable advisory circulars as on date and other requirements specified in this document.

##### b) Mandatory information towards Maintainability Requirements

The following information is necessary to be provided by the Bidder. Without this information, the technical quote will be rejected.

- Shelf Life, Time Between Overhaul (TBO), Total Technical Life (TTL) should be commensurate with Industry standards and should be as high as possible. Values of shelf life, Time Between Overhaul (TBO), Total Technical Life (TTL) for the equipment shall be specified by Bidder based upon technology maturity level.

##### c) Product Support

- i. Vendor shall provide on-site and off-site product support for technical inputs to certification and ground test, flight test activities.
- ii. Vendor should ensure all quoted LRUs are fully certified and should be available for 30 years.
- iii. After Shelf life expiry, product support to be provided by the OEM to make it as serviceable/OEM has to provide suitable procedures to make it serviceable.

##### d) Testing and Acceptance

The type testing shall be conducted as detailed in qualification test schedules/procedure. The acceptance tests for all components shall be as given in the relevant drawings. The qualification test schedule for LRU'S shall include examination of the product, acceptance test, leakage tests, verification test, proof pressure test, strength tests and other applicable tests as demanded as and when required till completion of aircraft type certification.

##### e) Disclaimer:

All data mentioned in this document is preliminary and subject to revision. All the appropriate clauses in the FAR 23, Amendment 64 based on FAR 23-63 regulations or latest version advisory circulars shall be complied.

#### 4.2.3 List of Deliverables:

Sl. No.	Item Description	Quantity per Aircraft	Total Quantity
1.	Pedal Transducer /Potentiometer	4	20
2.	Pressure Transducers	3	15
3.	Pressure switch	1	5

#### 4.2.4 List of Documentation:

Sl. No.	Item Description
1.	Supply of manuals for system level and LRU level
2.	All assembly and installation drawings shall be provided (Hard copies/CAD models)
3.	Performance data (Hydraulic/Electrical for all LRUs)
4.	LRU level test schedules to carry out pre installation checks of all mechanical, electrical and electronic components. Component Maintenance Manuals
5.	Components/LRUs Life document: Shelf life, TBO, Service Life etc.
6.	MTBF details for all LRUs
7.	System safety and Reliability assessment reports
8.	Mounting/Installation and interface drawings (Mechanical/Electrical)
9.	Component/LRU design specification
10.	Qualification test procedures (QTP)
11.	Qualification test report (QTR)
12.	Acceptance test procedure (ATP)
13.	Acceptance test reports (ATR)
14.	COC/FAA/EASA/DGCA/CEMILAC/DGAQA Approvals
15.	Declaration of Design and Performance (DDP)
16.	Operating instructions and first line maintenance instructions
17.	Wiring diagrams (If Applicable)
18.	Recommendations for ground support equipment
19.	Spares recommendation list
20.	Storage Procedure
21.	Datasheets of the pedal transducer, pressure transducer, potentiometer and pressure switch to be provided.
22.	Moment of Inertia Values of LRU's( $I_{xx}, I_{yy}, I_{zz}, I_{xy}, I_{xz}, I_{yz}$ ) to be provided

#### 4.2.5 Services

- (i) Participation in the preliminary design review (PDR) and the Critical design review (CDR) to be held at CSIR-NAL Bangalore.
- (ii) CSIR-NAL Team shall witness Qualification and System testing at Bidder's place.
- (iii) If requested by CSIR-NAL; Bidder shall also provide engineering support during the integration of the Hydraulic systems LRU'S on to the Aircraft, including making an engineer available in India for a period not exceeding 5 working days (CSIR-NAL to provide office accommodation, local transport and communication facilities).

#### 4.3 Scope of Supply and incidental works:

##### Scope of Supply includes the following:

- (i) Supply of LRU'S as per the Specifications & Requirements along with the accessories as per clause No.4.2
- (ii) Installation, Commissioning and Acceptance as per clause No.4.4.5
- (iii) Training as per clause no.4.5
- (iv) On site comprehensive Warranty as per clause No.4.6.
- (v) Annual Maintenance Contract / Maintenance Support as per clause No.4.7
- (vi) Delivery Schedule as per clause No.4.8.

**CSIR-NAL Responsibilities:**

1. LRU Specifications and Requirements.
2. Review of Performance report of LRUs supplied by Bidder/Vendor.
3. LRU Installation design and Integration on aircraft.
4. LRU performance tests on ground and in flight.
5. Certification of LRU on aircraft in coordination with certifying regulatory authorities.

**Bidders Responsibilities:**

1. Provide list of documents mentioned in Sec 4.2.4
2. Supply of LRU Performance tests and reports for the ground and flight cases.
3. Supply of components/LRUs Specification, ATP, ATR, QTP, QTR, Envelope/ installation drawing, Performance data, DDP, Pre installation test schedule, Details of Shelf life, TBO, Service life etc. as specified in Para 4.2.4
4. Supply of LRU level Electrical Wiring Diagrams with installation details (If Applicable).
5. Supply of Documents of LRU COC/FAA/EASA/CEMILAC/DGAQA/DGCA approvals of system/LRUs, Reliability Analysis (RBA), Failure Hazard Analysis (FHA), Failure Mode Effects and Criticality Analysis (FMECA) and Fault Tree Analysis (FTA).
6. Review of LRU Installation design and Integration on aircraft.
7. Technical Support during Certification of system on aircraft in coordination with certification regulatory authorities.
8. Supply of Spares/Sub systems/ LRUs and Support for Service on need basis.

**4.4 Inspection & Tests****4.4.1 General**

1. The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified here.
2. The inspections and tests may be conducted on the premises of the Supplier or its subcontractor(s), at the point of delivery and/or at the Goods final destination.
3. Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.
4. Should any inspected or tested Goods fail to conform to the specifications, the Purchaser may reject the goods and the Supplier shall either replace the rejected Goods or make alterations necessary to meet specification requirements free of cost to the Purchaser.
5. The Purchaser's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival at final destination shall in no way be limited or waived by reason of the Goods having previously been inspected, tested and passed by the Purchaser or its representative prior to the Goods shipment.



6. The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.
7. With a view to ensure that claims on insurance companies, if any, are lodged in time, the bidders and /or the Indian agent, if any, shall be responsible for follow up with their principals for ascertaining the dispatch details and informing the same to the Purchaser and he shall also liaise with the Purchaser to ascertain the arrival of the consignment after customs clearance so that immediately thereafter in his presence the consignment could be opened and the insurance claim be lodged, if required, without any loss of time. Any delay on the part of the bidder/ Indian Agent would be viewed seriously and he shall be directly responsible for any loss sustained by the purchaser on the event of the delay.
8. Before the goods and equipment are taken over by the Purchaser, the Supplier shall supply operation and maintenance Manuals together with Drawings of the goods and equipment built. These shall be in such details as will enable the Purchase to operate, maintain, adjust and repair all parts of the works as stated in the specifications.
9. The Manuals and Drawings shall be in the ruling language (English) and in such form and numbers as stated in the Contract.
10. Unless and otherwise agreed, the goods and equipment shall not be considered to be completed for the purposes of taking over until such Manuals and Drawing have been supplied to the Purchaser.
11. On successful completion of acceptability test, receipt of deliverables, etc. and after the Purchaser is satisfied with the working of the equipment, the acceptance certificate signed by the Supplier and the representative of the Purchaser will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the equipment.

#### 4.4.2 Manufacturer's Inspection Certificate

After the goods are manufactured and assembled, inspection and testing of the goods shall be carried out at the supplier's plant by the supplier, prior to shipment to check whether the goods are in conformity with the technical specifications. Manufacturer's test certificate with data sheet shall be issued to this effect and submitted along with the delivery documents. The purchaser reserves the options to be present at the supplier's premises during such inspection and testing.

#### 4.4.3 Pre Dispatch Inspection (*delete if not applicable*) or *elaborate*

(i)	The bidder will carry out pre-dispatch inspection at manufacturer's location and check for trouble free operation of the system. A separate report on the pre-dispatch inspection has to be provided with the supply of the system.
(ii)	Bidder to prove out all the specifications as outlined in the Chapter 4.
(iii)	Copy of the Inspection, Maintenance and Trouble Shooting manuals to be given to the representatives of CSIR-NAL. Explanation of the same to be done.

#### 4.4.4 Third Party Inspection (*delete if not applicable*) or *elaborate*.

NA

#### 4.4.5 Installation, Commissioning and Acceptance Test

The acceptance test will be conducted by the Purchaser, their consultant or other such person nominated by the Purchaser at its option after the equipment is installed at Purchaser's site in the presence of supplier's representatives. The acceptance will involve trouble free operation. There shall not be any additional charges for carrying out acceptance test. No malfunction, partial or complete failure of any part of the equipment is expected to occur. The Supplier shall maintain necessary log in respect of the result of the test to establish to the entire satisfaction of the Purchaser, the successful completion of the test specified.

On the event of the ordered item failing to pass the acceptance test, a period not exceeding two weeks will be given to rectify the defects and clear the acceptance test, failing which, the Purchaser reserve the right to get the equipment replaced by the Supplier at no extra cost to the Purchaser.

Successful conduct and conclusion of the acceptance test for the installed goods and equipment shall also be the responsibility and at the cost of the Supplier.

The acceptance tests at the final destination include the following:

a)	Visual Inspection
b)	Leakage Tests
c)	Room Temperature Functional/Performance Tests
d)	Bonding & Insulation Resistance Tests

#### 4.5 Training

NA

#### 4.6 Incidental Services

(i) **On site Comprehensive Warranty:**

- **3 Years** from Installation & Commissioning and date of acceptance
- In case the Equipment / System remains non-operational for more than **30 days** then warranty period will be extended for the equivalent period for which Equipment / System remained non-operational. Warranty extension in such case shall be done without prejudice to any other Term & condition of the contract

#### 4.7 Annual Maintenance Contract (*delete if not applicable*) or elaborate.

Not Applicable

#### 4.8 Delivery Schedule (including supply, installation, commissioning, training & acceptance)

Delivery of the Item		Installation & Commissioning		Training At CSIR_NAL, if any	Acceptance of the item
Days/ Weeks/Months	Location	Days/ Weeks/Months from the date of receipt of equipment	Location	Days/ Weeks/Months from the date of Installation & Commissioning	Days/ Weeks/Months from the date of Installation, Commissioning & Training

12 months	CSIR-NAL, Bangalore	1 Month	CSIR-NAL, Bangalore	-	1 Month
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