

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्  
Council of Scientific & Industrial Research  
राष्ट्रीय वांतरिक्ष प्रयोगशालाएं  
National Aerospace Laboratories



CSIR - NAL Estd. 1959  
ISO 9001 : 2015  
Certified Organization

INVITATION FOR BIDS/NIT

Tender No. NAL/PUR/FMCD/413/20-Y

Dated: 05-Feb-2021

CSIR- National Aerospace Laboratories (NAL), Bengaluru, India is one of the premier laboratories under Council of Scientific and Industrial Research (CSIR), an autonomous body under Department of Scientific and Industrial Research, Government of India, New Delhi. CSIR-NAL is a Science and Knowledge based Research, Development and Consulting Organization. It is internationally known for its excellence in Scientific Research in Aerospace Engineering.

The Director, CSIR-NAL invites online quotation for procurement of the following item(s) for day to day research work.

Sl.No.	Description of Items	Unit	Quantity
1	Angle of attack Vane Sensor (1 set of 2 nos) - Aircraft Grade (Please refer annexure for detailed specification)	Set	3

Single / Double Bid	Single	Tender Type	Open Tender
Bid Security (EMD) (in INR)	Bid Security Declaration should be enclosed with quotation	Bid submission end date	25-Feb-2021 10.00 Hrs
Performance Security	3% of the purchase order value	Bid opening date	26-Feb-2021 11.00 Hrs

01. Tender Documents may be downloaded from Central Public Procurement Portal <https://www.etenders.gov.in>. Aspiring Bidders who have not enrolled/ registered in e- procurement should enroll/ register before participating through the website <https://www.etenders.gov.in>. The portal enrolment is free of cost. Bidders are advised to go through instructions provided at 'Instructions for online Bid Submission'.
02. Tenderers can access tender documents on the website (For searching in the NIC site <https://www.etenders.gov.in>, kindly go to Tender Search option, select tender type and select ' Council of Scientific and Industrial Research' in organization tab and select NAL-Bengaluru-CSIR in department type Thereafter, Click on "Search" button to view all CSIR-NAL, Bengaluru tenders). Select the appropriate tender and fill them with all relevant information and submit the completed tender document online on the website <https://www.etenders.gov.in> as per the schedule given in the next page.
03. Either the Indian Agent on behalf of the Foreign principal or the Foreign principal can bid directly in a tender but not both. However, the offer of the Indian Agent should also accompany the authorization letter from their principal. To maintain sanctity of tendering system, one Indian Agent cannot represent two different Foreign principals in one tender.
04. Unsolicited / conditional / unsigned tenders (Quotations) shall not be considered. Quotations received after the due date and time shall be summarily rejected.
05. The Bidder shall comply the terms and conditions of the tender, failing which, the offer shall be liable for rejection.
06. The prospective bidders are requested to refer to the Standard Terms and Conditions available on NAL Internet ([www.nal.res.in](http://www.nal.res.in)) under the icon Tender-Purchase before formulating and submitting their bids
07. The Director, CSIR- National Aerospace Laboratories, Bengaluru reserves the right to accept any or all the tenders either in part or in full or to split the order without assigning any reasons there for.

Raman Kumar  
Stores & Purchase Officer

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## 1. Technical Specifications

SARAS Mk2 is a twin-engine turboprop 19 seater multi role transport aircraft that is being developed by CSIR-NAL.

SARAS Mk2's primary flight control system (PFCS) consists of ailerons, for roll control mounted on the wing, elevators on the horizontal stabilizer for pitch control, and a rudder mounted on the vertical fin for directional control. The PFCS consists of mechanical linkages (cables and push pull rods) connecting the pilot yoke and pedals to each of the respective control surfaces and is reversible. In addition to the primary control surfaces, the aircraft has a trim tab on the elevator, aileron and the rudder for trimming the control forces in the three axes.

SARAS Mk2 aircraft will be equipped with a limited authority Automatic Flight Control System (AFCS) to reduce the pilot workload. SARAS Mk2 AFCS will be designed to be certifiable for IFR and VFR operation and providing landing guidance and control up to CAT II minimum in compliance with FAR Part 23.

Towards the indigenous design and development of the SARAS AFCS the following Line Replaceable Unit (LRU) is required.

SI No.	Item Description	Quantity
1	Angle of attack Vane Sensor (1 set of 2 nos)	3 sets

### General Specifications:

1. The above mentioned LRU's shall be aircraft grade with the applicable TSO certifications.
2. The LRU shall be of high reliability and shall preferably have a digital interface, preferable ARINC 429 interface.
3. The software, if any, used shall adhere to RTCA DO-178B standards
4. The LRU shall meet the environmental qualifications of atleast RTCA DO-160G or higher.
5. If possible the vendor shall indicate the aircrafts the quoted LRU's are fitted and certified.

SARAS AFCS computer hosts a Stall Warning module (SW) which has Stall annunciation and Stall prevention functionality. The function of the SW module is to give a reliable and accurate indication of the aircraft Angle of Attack (AOA) and alert the crew members by tactile means of the imminent stall. The SW function also shall provide stall protection function by activating the stick pusher which will bring the aircraft nose down and away from stall. The major LRU of the SW module is the Angle-of-Attack (AOA) Vane Transducer.

The specifications for Angle-of-Attack (AOA) Vane Transducers are as follows.

### 1.1 Angle of attack (AOA) Vane Transducer Specifications

- Shall comply with FAR Part 23 and Part 25 aircraft requirements
- Operating AOA range: atleast  $\pm 50$  deg Angle of attack
- Accuracy: Less than  $\pm 0.25$  deg
- Operating temperature range: Typically  $-55^{\circ}$  C to  $75^{\circ}$  C
- Weight: less than 2 kg
- Should have both Vane heater and case heater
- Case and Vane Heater power supply: 18-32 VDC, nominal 28VDC
- No of potentiometer cups: minimum 3 nos
- Excitation voltage – 30 VDC maximum
- Load Impedance: 100K Ohms Nominal
- Tolerance: 10% of full scale
- FAA Certification: TSO-C54
- Environmental Certification: to meet or exceed RTCA DO-160G
- Output interface: Potentiometer output/ Synchro/Resolver/RVDT/ (Desirable ARINC 429 Digital bus interface)
- Reliability: MTBF > 100,000 hours
- Physical dimensions
  - Vane Base
    - Depth – 2 to 5 inch
    - Width – 2 to 5 inch
    - Length – 2 to 5 inch
  - Vane
    - Thickness – less than 1 inch
    - Width – 2 to 5 inch
    - Length – 2 to 5 inch
- Shall have Max altitude operation of atleast 30000 feet
- Connector: Case Mounted MIL STD connector
- Total technical life (TTL) > 25 years
- Assurance for maintenance and spares support for the product during the next 25 years
- The Supplier/Vendor shall provide a minimum of 5 years of warranty of the LRU items supplied.



**BID-SECURING DECLARATION FORM**

Date: \_\_\_\_\_

Bid No. \_\_\_\_\_

To (insert complete name and address of the purchaser)

I/We. The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

(a)	have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
(b)	having been notified of the acceptance of our Bid by the purchaser during the period of bid validity  (i) fail or refuse to execute the contract, if required, or  (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown)  
in the capacity of (insert legal capacity of person signing the Bid Securing Declaration).

Name: (insert complete name of person signing the Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of: (insert complete name of Bidder)

Dated on \_\_\_\_\_ day of \_\_\_\_\_ (insert date of signing)

Corporate Seal (where appropriate)

**Note:**

1. In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid.
2. Bid Security declaration must be signed in by the Proprietor/CEO/MD or equivalent level of Officer of the company.