

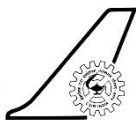


**EXPRESSION OF INTEREST**

**FOR**

**PROCUREMENT OF CABIN PRESSURE CONTROL SYSTEM (CPCS)**  
**OF THE AIRCRAFT**

**COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH  
NATIONAL AEROSPACE LABORATORIES  
P.B. NO.1779, HAL AIRPORT ROAD, KODIHALLI,  
BENGALURU-560017**



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

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**ISO:9001:2015**

Certified

**EOI No.:NAL/PUR/CAD/408/19-Z**

**27-Jan-2020**

**EXPRESSION OF INTEREST**

CSIR- National Aerospace Laboratories (NAL), Bengaluru, India is one of the premier laboratories under Council of Scientific and Industrial Research, 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.

An Expression of Interest (Eoi) is initiated at CSIR-National Aerospace Laboratories (CSIR-NAL) with the prospective manufacturers, their authorized channel partners or agents/suppliers and system integrators to discuss with the Technical Committees on the aspects of utility, technology, feature, literature, design, technical parameters, clientele and other related issues of the equipment and material for the following items to be procured for CSIR-NAL.

Sl. No.	File No.	Item Description
01.	NAL/PUR/CAD/408/19-Z	Procurement of Cabin Pressure Control System (CPCS) of the Aircraft

1. The address for submission of document and for obtaining further information:  
Controller of Stores & Purchase  
Purchase Section  
CSIR- National Aerospace Laboratories  
PB No.1779, HAL Airport Road, Kodihalli, Bengaluru – 560017  
Karnataka-India  
Tel # : 080 25086040/6041/6044  
Fax # : 080 25269611  
Email : [purchasek@nal.res.in](mailto:purchasek@nal.res.in), [mkala@nal.res.in](mailto:mkala@nal.res.in), [spo@nal.res.in](mailto:spo@nal.res.in)
2. The Bidding document can be downloaded free of cost directly from Central Public Procurement Portal (CPPP) of Government of India website <http://eprocure.gov.in/epublish/app> and CSIR-NAL website [www.nal.res.in](http://www.nal.res.in).
3. The prospective bidders should adhere to due dates specified in Tender Details corresponding to this Tender.

4. The Schedule for Submission of Bids and Opening of Bids is as follows: -

Date & Time of Submission of Bid		Date and Time of Opening of Bid	
Date	Time (IST)	Date	Time (IST)
17-Mar-2020	10:00 Hrs	17-Mar-2020	11:00 Hrs

5. Date and Time for receipt of hard copy of proposals: The proposals in hard copy should reach the tender box on or before the date and time mentioned at Sr. No.4 for submission of proposals. Late/delayed proposals will not be considered. Postal/Courier delays will not be accepted as an excuse. In case the last date and time is declared a holiday at a late date, then the due date and time for receipt, opening will be shifted to the next working date and time automatically. **No corrigendum will be issued in this regard.**
6. A brief description of the procurement is appended herewith. The Participants are requested to submit documentary evidence to prove technical capabilities, client list, experience and credentials as per Annexure enclosed.
7. The Technical Committee shall finalize specifications after knowing/obtaining details about relevant/available technology in the market suiting to the requirement and R&D needs of our Laboratory.
8. For evaluating the responses, CSIR-NAL may call the bidders for presentation of their case. Presentation can be considered via Skype/Video Conferencing also.
9. The Director, CSIR-National Aerospace Laboratories (NAL), Bengaluru, India reserves the right to accept or reject any or all EOI notification/tenders/offers or withdraw the Notice at any stage of processing without assigning any reasons whatsoever, such an event would not cause obligation of any kind to CSIR-NAL.

**Controller of Stores & Purchase**  
For and behalf of CSIR

1. **INTRODUCTION**

CSIR NAL is developing a Commuter Category Airplane with 19 passengers under FAR 23/25 category.

2. **OBJECTIVE**

The objective of this EOI is to select suitable Bidders to supply the Cabin Pressure Control System (CPCS) already installed and civil certified on any FAR 23/25 certified Aircraft. The Bidder shall also provide required support during Installation, flight testing and certification from Certifying Regulatory Bodies on the offered Cabin Pressure Control System (CPCS) for CSIR-NAL Civil 19 seater Commuter Category Aircraft.

3. **SCOPE OF WORK**

Bidder is requested to submit technical proposal for the Scope of work which includes the following:

Sl. No	Item
3.1	Supply of 4 set of Cabin Pressure Control System (CPCS)
3.2	System Design Reviews
3.3	Training
3.4	Documentation
3.5	Product Support

**CSIR-NAL Responsibilities:**

a)	Aircraft System Level Specifications and Requirements.
b)	Review of Performance report of system supplied by Bidder/Vendor.
c)	System components/LRUs Pre installation/Functional tests.
d)	System Installation design and Integration on aircraft.
e)	Aircraft System level performance tests on ground and in flight.
f)	Certification of system on aircraft in coordination with certifying regulatory authorities.

**Bidders/Vendor Responsibilities:**

a)	Aircraft System Level Architecture finalization by both CSIR-NAL and Vendor.
b)	Supply of Performance report of system for the flight conditions provided by CSIR-NAL.
c)	Supply of 4 set of Cabin Pressure Control System (CPCS). (Preference to be given to incorporate LRUs with long lead service life and on condition)
d)	Supply of System 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.
e)	Supply of System level and LRU level Electrical Wiring Diagrams with installation details.
f)	Supply of Documents of System COC/FAA/EASA approvals of system/LRUs, Reliability Analysis (RBA), Failure Hazard Analysis (FHA), Failure Mode Effects and Criticality Analysis (FMECA) and Fault Tree Analysis (FTA).
g)	Review of System Installation design and Integration on aircraft.

h)	Review of Aircraft System level performance test schedules and reports on ground and in flight.
i)	Technical Support during Certification of system on aircraft in coordination with certification regulatory authorities.
j)	Supply of Sub systems/ LRUs of CPCS and Support for Service of LRUs on need basis.

### 3.1.1 Specification of CPCS

1. The Cabin pressurization system should meet current FAR-23/25 requirements.	
2. The cabin Pressure control system (CPCS) shall automatically regulate the cabin air pressurization to provide passenger comfort within the limit of the structure.	
3. The cabin pressure control shall be obtained by regulating the rate of exhaust of regulated cabin airflow which is provided for pressurization and ventilation of the aircraft cabin.	
4. The CPCS shall be <b>electro-pneumatic</b> in operation providing automatic control and manual backup control which are both dual redundant.	
5. The CPCS shall maintain cabin pressure within the specification requirements when operated within the aircraft design parameters.	
6. CPCS should have provision to do fuselage leakage test without removing CPCS components.	
7. Aircraft Design Parameters	
a) Cabin pressurized volume	28.82 m <sup>3</sup>
b) Pressurization of total airflow maximum	18.18 kg/min (40 lb/min)
c) Air temperature range:	
• Cabin	18°C to 30°C (Nominal 24°C)
• Ambient	-55°C to +55°C
d) Aircraft altitude maximum	29848 feet (9.1 km)
e) Aircraft maximum normal operating altitude	29848 feet (9.1 km)
f) Maximum cabin altitude	8000 feet (2.4 km)
g) Cabin pressure differential	6.5 psi (0.457 kg/cm <sup>2</sup> )
h) Maximum cabin pressure differential	6.9 psi (0.485 kg/cm <sup>2</sup> )
8. System performance:	Auto mode / Manual mode
8.1. Altitude:	
• Landing altitude:	-305 m and 4270 m (-1000 ft and 14000 ft)
• Cabin altitude accuracy	± 61 m (± 200 ft)
• Cabin altitude control limit	4267.2 m ± 304.8 m (14,000 ± 1000 ft)
8.2. Limit Cabin rate of change:	
• Max. rate of climb at S/L	609 m/min (2000 fpm)
8.3. Positive differential pressure relief:	
• Max positive differential pressure controlled at 28 mb max (+ 0.4 psi)	
8.4. Negative differential pressure relief:	
• Negative differential pressure controlled at -35 mb max (- 0.5 psi)	
8.5. Rapid depressurization:	

	<ul style="list-style-type: none"> <li>• A quick cabin depressurization is achieved when the “DUMP” push button switch is in “ON” position.</li> </ul>
	<ul style="list-style-type: none"> <li>• The cabin may also be depressurized by operating the manual rotating valve “NEEDLE VALVE” to the maximum anti clockwise position.</li> </ul>
8.6. Cabin altitude limitation:	
	<ul style="list-style-type: none"> <li>• Cabin altitude controlled at 4267.2 m ± 304.8 m (14,000 ± 1000 ft)</li> </ul>
	<ul style="list-style-type: none"> <li>• Cabin pressurization warning 3078 m ± 115 m (10425 ft ± 375 ft)</li> </ul>
9. Normal cabin pressure control:	
	<ul style="list-style-type: none"> <li>• The system shall provide the capability of maintaining a maximum cabin altitude of 2400 m (8000 ft) for a maximum aircraft altitude of 9.114 km (30000 ft). The electronic control maximum differential shall be 0.457 kg/cm<sup>2</sup> (6.5 psi).</li> </ul>
	<ul style="list-style-type: none"> <li>• The system shall be capable of limiting the cabin pressure of 0.485 kg/cm<sup>2</sup> (6.9 psi) at nominal air mass flow of 18.18 kg/min (40 lb/min).</li> </ul>

### 3.1.2 Requirements

- Cabin Pressure Control System (CPCS) shall maintain cabin altitude between 0 feet (14.7 psia) to 8000 feet (10.9 psia). Max ceiling of cabin altitude is 8000 feet (10.9 psia). Max ceiling of Aircraft altitude is 30000 feet (4.37psia).
- System shall be capable of maintaining the established pressure control when the total outflow decreases to a minimum value of 10 lb/min excluding cabin and outflow valve leakage.
- System shall be capable of maintaining cabin pressure control at airflows upto 40 lb/min.
- System shall be electro-pneumatic in operation providing automatic control and manual backup control which are both dual redundant.
- System in Automatic control shall have options Ground Mode, Take off Mode, Flight Mode, Initiated Built-in Test.
- System shall be having provision to DUMP, Altitude Limiting, Positive pressure relief, Negative Pressure relief, Sensing and Transmission of Cabin- to-Ambient Differential Pressure, Sensing and Transmission of the High Cabin Altitude Warning and Sensing and Transmission of Excessive Positive and Negative Differential Pressure Warning.
- CPCS should have provision to do fuselage leakage test without removing CPCS components.
- Selectable cabin rate of change (15 to 600 m/minute or 50 to 2000 ft per minute).
- Maximum cabin differential pressure control (6.5psid).

- Safety valve differential pressure limit.
- Cabin altitude limitation.
- Cabin depressurization
- Manual backup to the automatic control system.
- Mechanical mating connections of all components should be given
- Electrical receptacle of all components should be supplied.
- Electrical details like voltage and power consumption along with electrical wiring diagram should be given.
- The proposed system should be based on components in service and as far as possible should be off - the - shelf items

### 3.1.3 System Control Law (Cabin Altitude Vs Aircraft Altitude Variation)

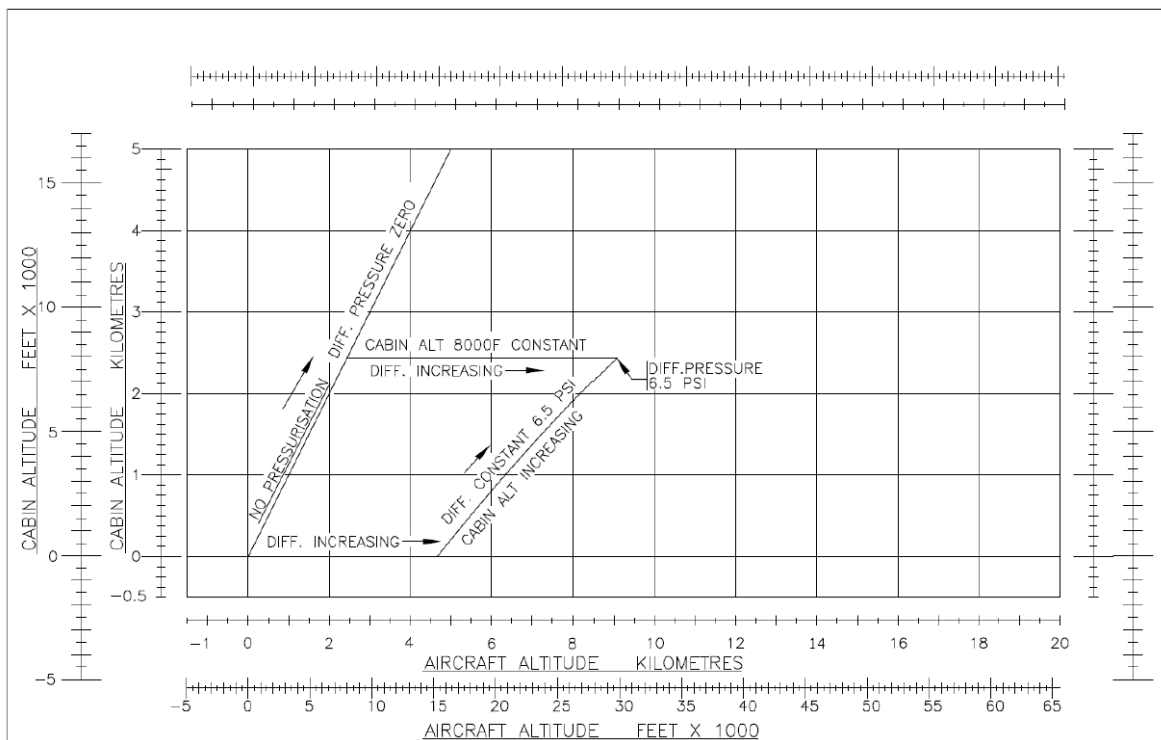


Fig.1: Cabin Altitude Vs Aircraft Altitude Variation

### 3.1.4 **Certification Requirements**

Qualification tests of the system components/LRUs to conform to RTCA/DO-160G or higher

The OEM/Bidders shall provide the:

Technical proposal with all LRUs they deem fit for certification of FAR 23/25 aircraft
Detailed CPCS System integration & its architecture
Reliability
Component Data
Performance

### 3.2 **System Design Review**

Bidder shall participate in Preliminary Design Review, Critical Design Review and all other stages of review from time to time. They shall carry out customization as per requirements of NAL Civil 19 seater Commuter Category Aircraft.

### 3.3 **Training**

Bidder shall provide training to NAL ground crew and flight test crew on the maintenance and operating procedures of the Cabin Pressure Control System (CPCS).

### 3.4 **Documentation**

Bidder shall provide documentation related to Cabin Pressure Control System (CPCS) being supplied. The broad categories of documents are:

a)	Installation Manuals
b)	LRU level test schedules to carry out pre and post installation checks for proper functioning of all mechanical, electrical and electronic components.
c)	Electrical Wiring Diagrams with installation details
d)	Copy of FAA/EASA/DGCA approvals for systems installed on another aircraft
e)	System Reliability Analysis (RBA)
f)	Failure Hazard Analysis (FHA)
g)	Failure Mode Effects and Criticality Analysis (FMECA)
h)	Fault Tree Analysis (FTA)
i)	Any other as deemed necessary

### 3.5 **Product Support**

Bidder shall provide on-site and off-site product support for technical inputs to certification and ground test, flight test activities.

## 4. **Eligibility Criteria**

### 4.1 **Technical**

4.1.1 Original Equipment Manufacturers (OEMs) / Cabin Pressure Control System (CPCS) Integrators who have proven expertise in successful integration of the Cabin Pressure Control System (CPCS) on any FAR 23/25 certified aircraft



followed by certification of the systems of the CPCS from FAA/EASA/DGCA for such aircraft.

4.1.2 Bidder should ensure all quoted CPCS parts/LRUs should be available for more than 20 years.

4.1.3 The Bidder shall provide required support during initial integration, ground and flight testing and certification from DGCA on the offered CPCS for NAL Civil Commuter Category 19 Passenger Capacity Aircraft.

4.1.4 Technical Capability Bidder should have successfully completed/executing a similar scope of work of supply and installation in Government organizations in India.

a)	Relevant support certificates to be submitted.
b)	Copies of supply order & Project completion / Phase completion report.
c)	The bidder should have direct authorization from the Original Equipment
d)	Manufacturer (OEM) for supply, installation and maintenance of similar system.
e)	Valid MAF issued by OEM's for all components quoted by the Bidder to be submitted.

4.1.5 The Bidder shall indicate the timelines necessary for providing the items under Scope of Work.

4.1.6 The Bidder shall provide the complete technical information (without any IP related material) with specific OEM name, Model Number and ROM

4.1.7 The Bidder shall provide the complete LRUs/Systems for FAR23/25 compliant CPCS architecture as required for International Certification.

4.1.8 Similar Work Experience Details:

Sl. No.	Name of the work with location	Date & Ref. no of completion certificate (If available)	Date of start Cost of work	Reference document (Work Order/ Work Completion Certificate) to be attached, mention page no

## 4.2 Commercial

- 4.2.1 The Bidder shall be a company having an average turnover of Rs.5 Crore for each of the last Three financial year ending on 31st March 2019.
- (a) Audited Balance sheets.
  - (b) CA Certificate with CA's Registration number/Seal. Indicating required turnover
- 4.2.2 Average Net Worth the Tangible Net Worth of the bidder shall be positive CA Certificate with CA's Registration number/Seal.
- 4.2.3 The Bidder shall enclose the following documents:
- (a) Copy of Company registration certificate issued by statutory authority (duly attested by Notary Public).
  - (b) Copy of Memorandum and Article of Association (duly attested by Notary Public).
- 4.2.4 Legal Entity: The bidder must be a registered company in India, registered under the Companies Act 1956/2013 (if any).
- (a) Company Profile
  - (b) Memorandum & Articles of Association
  - (c) Copy of Certificate of Incorporation
- 4.2.5 Tax Registration & clearance The Bidder shall have valid PAN and GSTIN. Copy of GSTIN & of PAN to enclosed (if any).
- 4.2.5 Blacklisting Declaration that the bidder has not been banned or delisted by any Govt. of India or Quasi Govt. Agencies or PSUs. If banned / delisted, the fact must be clearly stated. Self-Declaration on company letter head.
- 4.2.6 The Bidder may submit a Budgetary Estimate for all the items under the Scope of Work. The Budgetary Estimates shall be held confidential and will not be disclosed to other Bidders after the EOI responses are opened.
- 4.2.8 Bid Validity Period: The offered bid shall be valid for a period of 90 days from the date of submission of Bids as per Tender Document.

## 5. Other Terms

### 5.1 Expression of Interest

In order to fine-tune the technical specifications for carrying out **Supply, Integration and Certification of Environmental Control System (ECS) for Aircraft** and for short-listing of potential Bidders, Expression of Interest is being sought from internationally reputed and competent Bidders/consulting firms. Bidders are requested to submit all the required documents for Bidder evaluation as per Pre-qualification criteria.

### 5.2 Purchase of EOI Document

The Expression of Interest document shall be downloaded from Central Public Procurement Portal (CPPP) of Government of India website <http://eprocure.gov.in/epublish/app> and CSIR-NAL Website [www.nal.res.in](http://www.nal.res.in) at free of cost.

### **5.3 Clarifications on the EOI Document**

Any clarification in the EOI document may be sent in writing to the following address or through email:

Controller of Stores & Purchase

Purchase Section

CSIR- National Aerospace Laboratories

PB No.1779, HAL Airport Road, Kodihalli,

Bengaluru – 560017, Karnataka-India

Tel # : 080 25086040/6041/6044

Fax #: 080 25269611

Email [purchasek@nal.res.in](mailto:purchasek@nal.res.in), [mkala@nal.res.in](mailto:mkala@nal.res.in), [spo@nal.res.in](mailto:spo@nal.res.in)

However, no extension of the time or date of EOI submitted will be provided on the ground that CSIR-NAL has not responded to any query/clarification raised by any Bidder.

### **5.4 Amendment of Terms and Conditions of EOI**

5.4.1 CSIR-NAL may at its discretion or as a result of a query, suggestion or comment of an Bidder, may modify the EOI document by issuing an amendment or a corrigendum at any time before opening the EOI. Any such Addendum or Corrigendum will be uploaded on CPPP Portal <http://eprocure.gov.in/epublish/app> and CSIR-NAL's website [www.nal.res.in](http://www.nal.res.in) and the same will be binding on all the Bidders, as the case may be.

5.4.2 CSIR-NAL at its discretion may extend the due date of submission of EOI and the decision of CSIR-NAL in this respect would be final and binding on the respondents. In the event of changes in the time schedule, CSIR-NAL shall notify the same only through its CSIR-NAL website [www.nal.res.in](http://www.nal.res.in). Interested Bidders are advised to check the above website regularly for corrigendum / addendum, if any, which will be published only in the web site.

5.4.3 No oral modification or interpretation of any provisions of this EOI shall be valid. Written communication shall be issued by CSIR-NAL when changes, clarifications or amendments to the EOI document are deemed necessary by CSIR-NAL at its sole discretion.

5.5 EOI submission shall be in English language. EOI response shall be free from correction, over writing, erasures etc. Duly authorized representative of the Applicant shall sign on each page of the EOI documents. EOI documents shall be prepared in such a way so as to provide a straight forward, concise description of Applicant and capabilities to satisfy the requirements of this EOI.

5.6 If at any time during the examination, evaluation and comparison of EOI, CSIR-NAL at its discretion can ask the Bidder for the clarification of its EOI. The request for clarification and the response shall be in writing. However, no post submission of EOI, clarification at the initiative of the Bidder shall be entertained.

5.7 All cost and expenses associated with preparation and submission of EOI response shall be borne by the Bidder while submitting the EOI. CSIR-NAL shall have no liability, in any manner in this regard, or if it decides to terminate the process of short listing for any reason whatsoever.

- 5.8 No Agent/Agents or third party/parties are engaged by CSIR-NAL in this process.
- 5.9 CSIR-NAL is not responsible for any firm/agency expression or representing to express himself/herself/themselves to be the agent or third party representing CSIR-NAL in this process.
- 5.10 It is advised to deal directly with CSIR-NAL representative who is the signatory to this document.
- 5.11 Disregard of any instruction may result in offer being ignored.
- 5.12 This EOI and subsequent tender is governed by TERMS AND CONDITIONS of CSIR-NAL.
- 5.13 Canvassing by respondents in any form, including unsolicited letters on EOI submitted or post corrections shall render their EOI response liable for summarily rejection.
- 5.14 Conditional offers will be summarily rejected. EOI which is found to be incomplete in content and / or attachments and / or authentication etc. is liable to be rejected.
- 5.15 EOI that are incomplete in any respect or those that nor consistent with the requirements as specified in this document may be considered non-responsive and may be liable for rejection and no further correspondence will be entertained with such Bidders.
- 5.16 **The responses from firms submitted the EOI only will be considered on our subsequent CPPP enquires.**
- 5.17 CSIR-NAL reserves the right to accept a response to EOI notification or reject any or all of them or withdraw the Notice at any stage of processing without assigning any reason whatsoever. Such an event would not cause obligation of any kind to CSIR-NAL.
- 5.18 **Bidder evaluation criteria**
- 5.18.1 Bidder evaluation will be made by a Committee constituted by the Director, CSIR-NAL for Supply, Integration and Certification of Cabin Pressure Control System for Aircraft.

The following details shall be submitted along with EOI.

Sr. No.	Documents	Compliance [Yes / No]
A	<b>Company Profile</b>	
1	Name of the Organization: Website	
2	Name of the Contact Person: a) Name: b) Address c) Telephone: d) Fax: e) E-Mail:	
3	Year of Incorporation	
4	Type of Organization  a) Public Sector/ Limited/Private Limited/ Partnership/ Proprietary/ Society/ Any other b) Whether 'Foreign Equity Participation (Please give name of foreign equity participant and percentage thereof) c) Names of Directors of the Board/ Proprietors d) Name and address of NRI(s), if any	
5	Category of the firm: Large/Medium/Small scale unit	
6	Address of the Registered Office:	
7	Number of Offices with addresses (Excluding Registered Office): a) India  b) Abroad	
8	Certificate of registration as a manufacturing unit	
9	Permanent Account Number	
10	GST Number	
11	Status of ISO Certification	
12	Black Listing Declaration	
13	Validity of the response	

B.	ESSENTIAL REQUIREMENTS	
12	The turnover is to be supported by financial statement of accounts/ Annual reports duly certified by a Chartered accountant/ Balance sheets of last 3 years/ Income tax returns for the last 3 years period.	
13	Details of absorption of technology for a product/ knowhow that has been taken up on production scale in the past may also be given	
14	List of products/technologies worked with as regular activity in last three years.  Give the list of products/technologies with general specifications and the customers.	

Signature with Name & Seal:

Place:

Date: