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Romm No.-40
Dhruva, RRMD
BARC, Trombay
Mumbai-400085

GOVERNMENT OF INDIA
BHABHA ATOMIC RESEARCH CENTRE
RESEARCH REACTOR MAINTENANCE DIVISION

TENDER NOTICE

Tender Notice No: RRMD/TR- 1/TN-24/2018

Date: 04/06/2018

To,
(Company name)

Sub: Tender enquiry for fabrication, assembly, testing and supply of ECS Logic Channels

Sealed tenders are invited for and on behalf of the President of India by the Head, RRMD BARC, Trombay, and Mumbai-400085 from experienced vendors for fabrication, assembly, testing and supply of ECS Logic Channels.

1.0 Description of the work:

The work mainly involves fabrication, assembly, testing and supply of 3 channels of ECS Logic hardware with the following:

- 1.1 Fabrication and assembly of ECS Logic cards
- 1.2 Fabrication of Backplane motherboard and Bin for ECS Logic cards
- 1.3 Integration, testing and supply of ECS Logic hardware

Details of ECS Logic hardware are elaborated in Annexure-I.

2.0 Terms and conditions:

- 2.1 The offer should be valid for consideration for at least 30 days from due date of the offer.
- 2.2 The work shall be completed within **nine months** after issue of the work order.
- 2.3 On completion of the work, payment would be released on submission of bills in triplicate along with an advance stamped receipt.
- 2.4 The vendor should also clearly reply in his tender to “whether the contractor / vendor has any relative working in BARC or the contractor himself is an ex-employee of BARC or the contractor has any ex- employee of DAE on his payroll”.
- 2.5 The employees deputed at site by the contractor should have a valid police verification certificate.
- 2.6 Contractor should mention their valid **PAN** No. and GSTIN in the quotation, failing which the offer shall be rejected.

3.0 Instructions to Tenders:

- 3.1 Tenders should submit documents in support of their technical capabilities.
- 3.2 Price quoted shall be filled up in the same format given in the Schedule-B with GST if any.
- 3.3 Tender shall be submitted in the sealed cover in the vendor’s standard company format quoting our **Tender No.** on the envelope and addressed to ‘Head, RRMD, BARC, Trombay, Mumbai-400085 and submitted in the RRMD office, Dhruva’. The offer

should be submitted so as to reach RRMD office, Dhruva on or before 22/06/2018 up to 1500 hrs. Tender is to be sent only through registered post or speed post. Hand delivery or courier of tenders will not be accepted.

- 3.4 Tenders shall be opened the next (working) day at CC, BARC, Trombay. Shri N. V. Patel may be contacted on phone no. 25596237/ 25594323 from 10 AM to 5 PM to arrange entry permit if anyone wants to visit the site before sending their quotation.
- 3.5 The acceptance of the tenders will rest with Head, RRMD who does not bind himself to accept the lowest offer, and reserves to him the authority to reject any or all the tenders received without assigning any reason.
- 3.6 Quotation received after the due date and time shall be summarily rejected.

Thanking you,

Yours faithfully,

Sd/-
Head, RRMD, BARC
(For and on behalf of the President of India)

Enclosures: Schedule –A & B

Schedule –A

Tender Notice No: RRMD /TR-1/ TN-24 /2018

Dated 04/06 /2018

Name of Work: Fabrication, assembly, testing and supply of ECS Logic Channels

Sl. No.	Description	Qty	Unit	Rate
1.	Water	As required	Litre	Free
2.	Electricity	As required	KWH	Free

Schedule – B

Tender Notice No: RRMD /TR-1/TN-24 /2018

Dated 04/06/2018

Name of Work: Fabrication, assembly, testing and supply of ECS Logic Channels

Sl. No	Name of items	Qty (Q)	Supply Rate (S)	Installation Rate (I)	Total basic cost of supply (S x Q)	Total basic cost of installation (I x Q)
1	Fabrication, assembly, testing and supply of ECS Logic Channels as per specifications in Annexure-I	3 nos		NA		NA
2	GST on total basic cost of Supply					
3	GST on total basic cost of installation	NA				
4	Testing cost on 1 channel of ECS Logic hardware (Climatic and EMI/EMC)					
5	GST on testing cost					
6	Total Cost (including all charges)					

Net supply = Total basic cost of supply + GST on total basic cost of supply

Test charges = Total basic cost of testing + GST on total basic cost of testing

Total cost (including all charges) = Net supply + Test Charges

Signature of the contractor with seal

Note: The prices shall be quoted clearly without any overwriting. Overwriting/correction are not acceptable.

Annexure-I

Technical Specifications for ECS Logic Channels

1.0 Introductions

The ECS Logic governs the interlocks related to operation of cooling equipment (valves and motors) during the reactor shutdown condition. The hardwired ECS Logic is based on solid state digital electronics. The digital electronics consist of CMOS logic gates, BJTs, opto-isolators, resistor, capacitors etc. There are not programmable devices in the logic.

One channel of ECS Logic Hardware consists of

- Three CLC cards (Current to Logic Converter card)
- One VMC card (Valve and Motor Command card)
- One EMS card (Emergency Signal Card)
- One Standard 19" bin with 6U height for housing cards
- One PCB based backplane for interconnectivity of card to card signals
- 5 nos. of Interface Modules (IFMs) and Flat Ribbon cables with IDC connectors for interfacing field signals to cards

Each card is having two 64 pin Euro connectors (Male) and backplane is having two 64 pin Euro connector (Female) for mating. At the rear side, backplane is having one 64 pin IDC connector for each card for either receiving field inputs or sending field outputs. The ECS Logic works on 12V DC Power Supply. Field input contacts are wetted by 12V DC and ECS Logic outputs drive 12V Relays.

ECS Logic has 46 digital inputs and it provides 26 digital outputs. Circuit diagram of CLC, VMC, EMS, Backplane PCB and IFMs will be provided to the party at the time of placing the order.

2.0 Technical specifications of CLC Card

A CLC card processes 24 inputs coming from the limit switches/ process parameter switches / breaker contactors of various valves, motors, turbines, and pumps.

The current to logic level conversion is done on the CLC cards. The input contact status feed input current that are converted to logic signal level '0' or '1' by the CLC cards.

Bill of Material for one CLC Card:

ICs	Nos.
Opto-Isolators 4N37, 60% CTR	48
Hex Inverting Buffers MV14049	3
Hex Non Inverting Buffers MV14050	3
BCD Decimal Decoders MC14028	3
Hex Non Inverting buffers 78C29	6
Diodes	Nos.
1N4148	60
Capacitors	Nos.
1mfd.	24
0.01mfd.	24
Resistors	Nos.

680W, 0.25W	24
560W, 0.25W	48
100KW, 0.25W	24
5.1KW, 0.25W	24
Connectors	Nos.
64 pin EURO connectors (Male)	2

As far as possible, industrial grade through-hole components should be used. Glass-epoxy PCB should be used with lacquer coating on circuit tracks.

3.0 Technical specifications of VMC and EMS card

The logic signals from PLC cards are given to VMC and EMS cards. The interlock requirements are properly implemented in these cards, using CMOS logic gates, so as to generate appropriate signals for energising or de-energising the relays.

Bill of Material for one VMC Card:

ICs	Nos.
Quad two input NOR gate MC14001B	9
Triple three input NOR gate MC14025B	3
Hex Non Inverting Buffers MV14050	
Quad two input NAND gate MC14011B	3
Dual four input NAND gate MC14012B	6
Hex Inverting Buffers MV14049B	6
NE555P Timer	3
Transistors	Nos.
2N3019	9
Diodes	Nos.
1N4148	9
Capacitors	Nos.
0.1mfd.	9
0.01mfd.	6
0.001mfd.	3
100mfd./35V	3
Resistors	Nos.
2.2KW, 0.25W	72
220KW, 0.25W	63
10KW, 0.25W	21
22KW, 0.25W	6
39KW, 0.25W	6
68KW, 0.25W	3
100W, 0.5W	9
2.2KW, 0.5W	9
Potentiometer 100K, 0.25W	3
Connectors	Nos.
64 pin EURO connectors (Male)	2

As far as possible, industrial grade through-hole components should be used. Glass-epoxy PCB should be used with lacquer coating on circuit tracks.

Bill of Material for one EMS Card:

ICs	Nos.
Hex Inverting Buffers MV14049B	3
Triple three input NOR gate MC14025B	3
Dual four input NOR gate MC14002B	5
Quad two input NAND gate MC14011B	2
Triple three input NAND gate MC14023B	2
Transistors	Nos.
2N3019	10
Diodes	Nos.
1N4148	10
Capacitors	Nos.
0.1mfd.	9
Resistors	Nos.
2.2KW, 0.25W	26
220KW, 0.25W	20
10KW, 0.25W	20
1KW, 0.25W	1
4.7KW, 0.5W	1
Connectors	Nos.
64 pin EURO connectors (Male)	2

As far as possible, industrial grade through-hole components should be used. Glass-epoxy PCB should be used with lacquer coating on circuit tracks.

4.0 Standard 19" bin (6U)

Standard 19" in bin, having 6U height, is used to house the cards of the ECS Logic. It should be having good workman ship and standard dimensions.

5.0 Backplane PCB

Backplane should be made of glass-epoxy PCB with lacquer coating on circuit tracks. It should have EURO connectors (10 nos. of 64 pin EURO connectors (Female) for card interface) and IDC connectors (5 nos. of 64 pin IDC Connector (male) for field Interfaces).

Glass-epoxy PCB should be used with lacquer coating on circuit tracks.

6.0 Interfacing Modules (IFMs) for field signal interfacing to cards

IFM modules should have 64 pin IDC and corresponding field signal termination blocks for facilitating field signal interface to cards of ECS Logic through Flat Ribbon Cables.

7.0 Qualification tests on Hardware

Qualification of hardware components is intended to meet the required reliability level. Dry heat-damp heat test and EMI susceptibility should be carried out on 1 channel of ECS Logic Hardware.

The following qualification tests will be carried out.

- Dry heat-damp heat test
- EMI susceptibility test

Scope, testing details and acceptance criteria for Qualification tests are mentioned below.

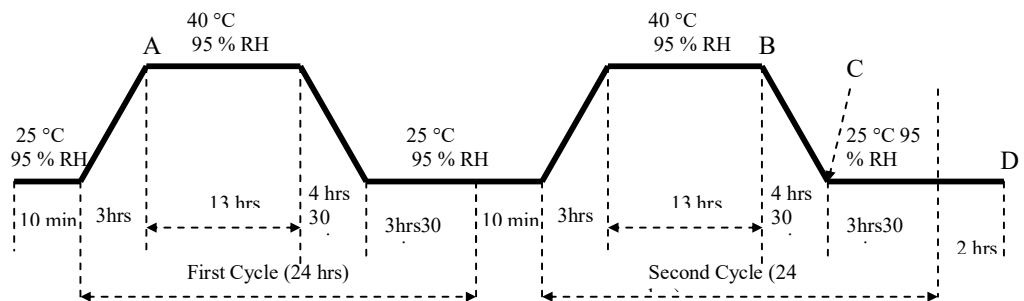
7.1 Dry heat- Damp Heat Tests:

Scope:

Dry Heat & Damp Heat tests are to be conducted on ECS Channels at an approved lab / facility.

7.1.1 Damp Heat Test:

No of cycles.	2
Duration of each cycle	24 hours
Upper Temperature	40±2 °C
Relative Humidity at upper temperature	95% RH
Lower Temperature	25±3 °C
Relative Humidity at lower temperature	95% RH
Rise & Fall	As per IS-9000 part V



Damp Heat Cycles

Observation:

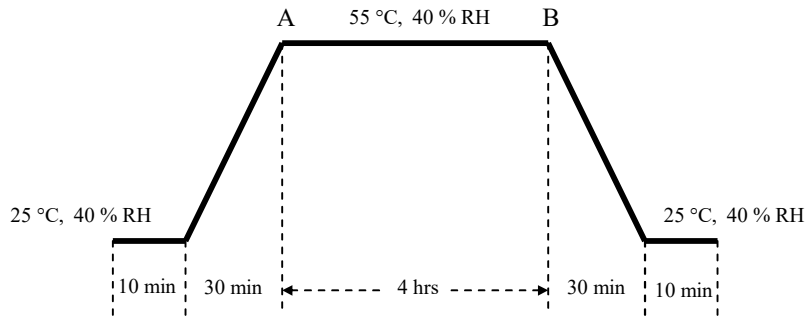
Functionality to be tested (minimum) at equilibrium points (A, B & C) and after a recovery period (D) of 2 hrs.

Acceptance criteria:

Instrument must meet all the functional and performance specifications

7.1.2 Dry Heat Test:

No of cycles.	1
Duration of cycle	5 hr 21 min. (4 hour maintained at peak)
Upper Temperature	55±2 °C
Relative Humidity at upper temperature	< 50% RH
Lower Temperature	25±3 °C
Relative Humidity at lower temperature	< 50% RH
Rise & Fall	As per IS-9000 part III



Dry Heat Cycle

Observation:

Functionality to be tested (minimum) at equilibrium points (A & B) and after completion of test.

Acceptance criteria:

Instrument must meet all the functional and performance specifications.

7.2 EMI / EMC Test:

Radiated and conducted susceptibility tests:

As various electrical noise sources exist in reactor operating environment, therefore C&I equipment/systems are to be qualified for satisfactory operation in such environment. Electrical noise is coupled to the C&I equipment through conduction and radiation. Conducted noise immunity tests in low frequency range and Radiated noise immunity tests in high frequency range should be conducted on the C&I equipment for qualification as detailed below:

Immunity to radiated radio-frequency electromagnetic field as per IEC 61000-4-3:

The hardware will be tested for immunity to RF electromagnetic field in the frequency band of 80 MHz - 1000MHz at 3m up to a field strength of 10 V/m. Acceptance criteria for RF immunity shall be “Normal performance within limits specified by the purchaser”.

Immunity to conducted radio-frequency electromagnetic field as per IEC 61000-4-6:

The conducted RF disturbances voltage should be superimposed on the AC input power ports using CDN and signal ports using EM clamp of the EUT in the test frequency range of 150 kHz to 80MHz. The voltage level should be Level 2, 130dB μ V i.e. 3Vrms.

Acceptance criteria for conducted immunity shall be “Normal performance within limits specified by the purchaser”.

Conducted & Radiated emission test as per IEC 61000-6-4:

For EMC, the hardware should not degrade the ambient noise level in which they are operating. The hardware will be tested for conducted & radiated emissions so that the

emissions are within specified limits. The test shall be conducted as per IEC-61000-6-4 and the limits are given below.

A) Conducted Emissions Test, 150 kHz to 30 MHz:

Frequency Range (MHz)	Applicable Test Limit (dB μ V/m)	
	Quasi-peak,	Avarage
0.15 to 0.5	79	66
0.5 to 5	73	60
5 to 30	73	60

Note: These are Limit Line for Group 1 & Class A equipment

B) Radiated Emission Test, 30 MHz to 1 GHz

RE as per IEC 61000-6-4: The EUT shall meet the limit at the measurement distance of **10m**.

Frequency Range (MHz)	Quasi-Peak Test Limit (dB μ V/m)
30 to 230	40
230 to 1000	47

8.0 Other terms & Conditions:

Inspection & Testing:

Inspection & testing of all items will be carried out by BARC at vendor's works for ascertaining conformity to requirements specified above.

Guarantee:

The material should be guaranteed against any defective design & poor workmanship for a period of 12 months from the date of receipt of material at purchaser's end.