

**BUREAU OF INDIAN STANDARDS
NRO LABORATORY, MOHALI**

Our Ref: NROL/Mech/Solar/Thermal Efficiency

Date: 10-02-2009

Subject: FABRICATION AND SUPPLY AND INSTALLATION OF THERMAL EFFICIENCY TEST EQUIPMENT FOR SOLAR FLAT PLATE COLLECTOR AS PER IS 12933(Part 1):2003

Technical & Commercial Bids are invited for the supply of above equipment, from the nationally reputed & bonafide manufacturers / authorized dealers in separate SEALED covers, which should reach the undersigned latest by **15 00 h, on 9 March 2009**, at the following address:

**BUREAU OF INDIAN STANDARDS
Northern Regional Office Laboratory,
Plot No. B-69, Phase-VII,
Industrial Focal Point,
Mohali,
Punjab – 160 055.**

- A. Instructions, Terms and conditions of supply, etc are given in Annex-I, II & III.
- B. The detailed Specification(s) of the above mentioned equipment(s)/item(s) are given in Annex-IV.
- C. The technical Bids shall be opened in the Conference Hall, at the address mentioned above at 1600 h on 9 March 2009 and in the presence of such tenderers or their duly authorized representatives, who may like to attend.
- D. Please note that the envelopes containing Technical & Commercial Bids are sealed properly i.e. either wax sealed or with adhesive cello tape on both ends. Unsigned Bids, Unsealed /stapled envelopes and bids without EMD shall be summarily rejected. No exemption whatsoever for payment of EMD shall be accorded.
- E. This office reserves the right to reject any /all bids without assigning any reasons whatsoever. Late tender will not be accepted by any means & this office will in no way be responsible for any reasons of late submission of bids.
- F. The specification and terms & conditions can also be downloaded from BIS Website – www.bis.org.in


Scientist-F & Head

Encls: as above

**BUREAU OF INDIAN STANDARDS
NRO LABORATORY, MOHALI**

Our Ref: NROL/Mech/Solar/Thermal Efficiency
ANNEXURE-I

INSTRUCTIONS TO BIDDERS

1. Sealed tenders are invited (under two bid system i.e. Technical Bid and Financial Bid, for details please see Annexure-II) separately from reputed manufacturers and their accredited/sole selling agents for the "Supply, Installation, Commissioning and Satisfactory Demonstration" of **THERMAL EFFICIENCY TEST EQUIPMENT FOR SOLAR FLAT PLATE COLLECTOR AS PER IS 12933(Part 1):2003** (For Detailed Specification please see Annexure-IV).
 2. **Security Bid (EMD) – Rs 10,000.00 (rupees Ten thousand only)** may please be sent in the form of a Crossed/Account payee demand draft from a Nationalized Bank, payable at Chandigarh in favour of "BUREAU OF INDIAN STANDARDS". The Demand Draft of the EMD be placed inside a separate sealed envelope clearly marked 'EMD' on the right hand side corner of the envelope and be stapled along with the sealed envelope containing the Financial Bid.
 3. **TENDER DOCUMENT** : Bidders may also download the Tender Notice, specifications, terms & conditions. from **BIS Website at www.bis.org.in**
 4. Tenders not accompanied with 'EMD' shall be summarily rejected.
- Last date for receipt of Bids is: **15 00 h, on 9 March 2009**
Date of opening of Technical Bids is: **16 00 h, on 9 March 2009**
- (N.B: In the event of any of above date(s) being declared a holiday, the last date of submission of completed bid(s) shall be on the next working day.)

5. The tenders should be addressed to:

Head
Northern Regional Office Laboratory (NROL),
BUREAU OF INDIAN STANDARDS,
Plot No. B-69, Phase-VII,
Industrial Focal Point,
Mohali 160055, Punjab.

Phone No.0172-3246935, 2236722. FAX No.0172- 2237212,
2236722
e.mail: nrol@bis.org.in

BUREAU OF INDIAN STANDARDS
(NORTHERN REGIONAL LABORATORY)
ANNEXURE-II

DETAILS OF TERMS AND CONDITIONS OF CONTRACT

Ref: NROL/MECH/SOLAR/Thermal Efficiency

Instruction to bidders

1. The BUREAU gives FIRST PREFERENCE in its purchase to goods bearing ISI CERTIFICATION MARK and second preference to those which conform to the relevant Specifications.
2. The Tenderers are requested to give detailed tender in their own forms in two bids i.e.

Part - A: Technical Bid. 2 copies

Part - B: Financial Bid. 2 copies

(1st copy – in original, 2nd copy – Photostat Copy)

The Technical & Financial Bids should be sealed and sent separately in sealed envelopes. Such Bids shall remain valid for a period of 180 days from the date of opening.

3. The Date and Time of opening for Part B (Financial Bid) will be intimated only to prequalified and technically acceptable tenderers for the item at a later date.
4. Quotations/Bids, qualified by indefinite expressions as "Subject to immediate acceptance, Subject to prior sale", etc. and incomplete quotations are liable to be summarily rejected.
5. **Each tender document shall be accompanied with EMD of Rs 10,000.00 (Rupees Ten thousand only). The demand draft (from a Nationalized Bank) for the EMD amount shall be drawn in favour of BUREAU OF INDIAN STANDARDS payable at Chandigarh/Mohali.** The sealed envelope containing EMD should be superscribed "EMD" and stapled separately with the envelope containing the commercial Bids. The Earnest Money of successful bidder will be returned only after installation, commissioning, satisfactory demonstration and acceptance of the equipment by the user Scientist/Head as per the terms of our purchase order. The Earnest Money of the unsuccessful bidder whose technical bid has not been found suitable will be returned. Earnest money deposit shall be liable to be forfeited, if the successful tenderer withdraws the tender after opening.

6. (A) Tenders not accompanied with Demand Draft/Bank Guarantee towards "Earnest Money Deposit" will summarily be rejected.
(B) Tenders, which are submitted without following the Two-Bid Offer System, will summarily be rejected.
(C) Unsigned Tenders will also be rejected.
7. Conditional Offers will not be considered.
8. **TECHNOLOGY CERTIFICATES**
The supplier should issue a certificate stating that :
 - a) The equipment is of latest technology :
 - b) The equipment may be upgraded as and when required by BIS.
 - c) The equipments will be promptly and properly serviced by them whenever desired by BIS during it's lifespan..
9. BIS shall pay 90% of the cost after satisfactory supply installation & commissioning and the Balance of 10% as contract performance security would be paid after expiry of warranty period. Supply means "Supply, Installation, Commissioning and satisfactory demonstration of the whole system and training".
10. BIS will not provide any accommodation/transportation for the Engineers/ Representatives for attending Installation, Commissioning and Demonstration Work. It is the absolute responsibility of the Principal Supplier/Indian Agent to make their own arrangements.
11. **WARRANTY:** The equipment is to be guaranteed for trouble free performance for a **minimum period of two years** after installation. The warranty period of the equipments may be stated clearly in the Technical Bids. In case the same is not found stated, it will be presumed that warranty period as mentioned in their respective specifications of the tender document (if specified), is applicable. The manufacturer shall also submit Annex-III alongwith the tender document duly signed and stamped.
12. The defects, if any, during the warranty period are to be rectified free of charge by arranging free replacement wherever necessary.
13. Indicate the name of firm, address, contact person, phone no. and fax no. etc of onsite warranty, agency that shall maintain during warranty and undertake Annual Maintenance Contract/Comprehensive Service Maintenance Contract beyond warranty shall be given in the technical bid. In case of foreign quote, the Indian Agent who shall maintain during warranty and AMC beyond warranty shall be given in the Technical Offer.
14. The supply of spare parts is to be guaranteed at least for a period of 10 years after the supply of the equipment.

15. Please mention clearly in the Technical Bids regarding address of arrangements for service/repair of the equipments available. Suppliers having such arrangements near Chandigarh/Mohali would be preferred.
16. The Equipments are required to be installed at locations indicated in the Tender Notice and subsequently training is to be provided free of cost to the concerned scientists/testing personnel on site, wherever necessary.
17. Tenders complete in all respects for each item should be submitted separately for Technical as well as Financial bids as follows:
- a. One sealed envelope superscribed "Technical Bid" will contain only the Technical Specifications of the indented equipment as per details in Annexure-IV of this document.
 - b. A Second sealed envelope superscribed "Financial Bid" will contain only the financial bid in which price (alongwith warranty) and 3 year comprehensive warranty charges, Annual Maintenance Contract Charges [AMC] etc. and any other information, which has financial implications, shall only be given. The Demand Draft of the EMD be placed inside a separate sealed envelope clearly marked 'EMD' on the right hand side corner of the envelope and be stapled along with this sealed envelope containing the Financial Bid. However, the EMD of the successful Bidder may be adjusted against Performance Bank Guarantee.
 - c. Both the above sealed envelopes are to be kept in a sealed envelope, superscribed as Tender No _____ for _____ (Item/Name) due on _____ and duly sealed.
18. The **Technical Bid [Part A]** should accompany complete specification, Manufacturer's name, address and following details :
- a. Declaration regarding expected life span of equipment and accessories
 - b. List1: list of standard accessories being provided with equipment should be given separately.
 - c. List2: list of optional and any other essential items/accessories required for the maintenance of the equipment for the next three years.
 - d. List3: list of infrastructural facilities and consumables to be arranged by the Bureau for commissioning of equipment,
 - e. List4: list of the Users in India with complete postal address to whom the similar equipment has been supplied,
 - f. Near locations in India from where after sales services shall be provided along with the name of Servicing Agent,
 - g. Technical Literature of the equipment along with necessary photograph/ drawings, if any,
 - h. Signed copy of terms and conditions (all pages to bear signature of authorized signatory and duly stamped) denoting that the terms and

conditions stipulated by the Bureau are acceptable. Deviations if any to be detailed out in a deviation sheet, however the same will be accepted subject to the decision of the Competent Authority of the Bureau. In case there are no deviations it should be clearly indicated as 'Nil'. In case no deviation sheet is filled up it will be presumed all terms and conditions are acceptable and no query will be entertained at a later stage.

- i. Specification sheet duly filled in with all details.
 - j. Special preferences/conditions, if any, should be indicated in Specification sheet for the equipment or in the Deviation sheet.
19. Cost of the items should be mentioned clearly in the **Financial Bid [Part-B]**. The following details need to be included:
 - a. Price break-up of main equipment and optional accessories (as per the specification) and consumables (for the accessories and consumables which are not part of the standard equipment) to be supplied by the party,
 - b. The Comprehensive warranty charges for next three years after the expiry of warranty period,
 - c. The **rates quoted shall be valid for a period of 180 days from the date of opening of the tender**. However wherever applicable the current value of the foreign currency would be applied at the time of placing the order.
 - d. Packing, Forwarding, Freight & Insurance and Commissioning Charges, if any extra, may be quoted separately in Financial Bid.
 - e. In case your quote is F.O.R./F.O.B. basis, estimated insurance coverage charges may be indicated.
 - f. CIF (Carriage Inward & Freight), at site value both by Airfreight and Ocean freight, where applicable.
 - g. The Bids should clearly give break-up of cost of each equipment. The rates quoted should separately indicate Basic Cost, Excise Duty, Sales Tax, P&F charges, Freight, Insurance, VAT etc. Rates quoted should specifically state Sales Tax, Excise Duty or any other taxes/charges. In absence of any such stipulation, it will be presumed that the prices include all such charges and no claim for the same shall be entertained. Form C/D shall not be provided by BIS.
20. In case of foreign quote, the Principal supplier should clearly indicate the address of the Indian Agent and percentage (%) of Agency Commission payable if any, to be paid to the Indian Agent in Indian Currency.
21. Indicate the names and addresses of the Indian reputed Organizations where you have supplied the similar equipment and may attach the satisfactory performance report of the equipment from user Organization.

22. (A) If you have supplied identical or similar equipment to Govt/CSIR Labs. /National Institutes, the details of contact person, phone numbers, fax, e.mail i.d., for such supplies for the preceding three years should be given together with the prices eventually or finally paid. Preference will be given to those who have supplied to such Laboratories/Institutes

(B) Based on the above information BIS will have its option to obtain details of the equipment, their performance, after sales services etc. for evaluation of the tender, directly from the concerned Labs/Scientists etc.

(C) Clause by clause compliance with the technical specification in this tender is required. Deviation from the specification, if any, or better alternative offer by the supplier and suitability to substitute the specified conditions must be clearly brought out.

(D) Technical specification shall be as per the requirements laid down. However, any deviations offered may be considered by the Technical Committee subject to suitability and the needs of the Organisation.

(E) The specifications of equipments, have been specified at Annex-IV. However, bidder(s) may be required to arrange practical demonstration of equipment/model(s) quoted by them before finalization of order, where felt necessary by BIS.

(F) Where it is essential, the Bidder has to state in detail the Electrical Power/UPS requirements, floor space, head room, foundation needed and also to state whether Air-conditioned environment is needed to house the system and to run the tests. i.e. pre-installation facilities required for installation may please be intimated in the technical bid.

(G) Bidder shall be responsible for installation/demonstration wherever applicable and for after sales service during the warranty and thereafter.

23. Fax / E-mail / Telegraphic / Telex tenders shall not be considered.

24. All the Bank Charges inside and outside India, including opening of LC, communication, confirmation, amendments etc., will have to be borne by supplier only.

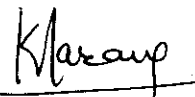
25. If applicable, with regards to terms of payment including period of warranty, we prefer to release the payment on BILL Basis (excluding Indian Agency Commission) after receipt of consignment in good condition and satisfactory installation, and commissioning thereof. Alternatively, depending upon the value and foreign exchange regulations the payment can also be considered through Sight Draft / Letter of Credit through the

State Bank of India for the order value excluding the Indian Agency Commission. However, the detailed payment for Sight Draft / Letter Credit is mentioned above in this tender terms and conditions.

26. Details of after-sales services offered by you are to be made clear in the tender.
27. The delivery of the stores is required to be made within 30 days of receipt of order. If, it is not possible for you to effect delivery within the period, you are required to specify the date by which you can guarantee delivery of the stores. Delivery period mentioned in the Purchase Order should be strictly adhered to. Otherwise the tenderer will forfeit EMD, after maximum 10 days of the last date of delivery.
28. All goods received would be subjected to inspection, by BIS before or after receipt or commissioning (as applicable) and the decision of BIS shall be binding. Rejected items/goods/stores shall be removed by the supplier at his own cost and risk, within 30 days of receipt of notice for the removal of such goods, and no liability, whatsoever, on the Bureau shall be attached for the rejected/disapproved goods/items/stores.
29. The Bureau takes no responsibility for delay, loss or non-receipt of tenders after dispatch.
30. In case of non compliance with the Terms & Conditions of the contract, the Bureau reserves its right to:
 - a. Cancel/rescind/revoke the order if supply is not made in time and is not conforming to the required specification.
 - b. Impose Penalty up to 1% of the total value of the order for a delay of every seven days after the schedule date subject to the ceiling of a maximum of 10% of the total value of the order.
31. Goods should not be dispatched until the Vendor receives a firm order.
32. Firms which have already supplied similar equipment to BIS shall indicate details of installation/commissioning.
33. **Printed conditions of the quotation will not be binding on BIS.**
34. BIS will not be responsible:
 - a. For delayed / late quotations submitted / sent by Post / Courier etc.
 - b. For submission / delivery of quotations at wrong places other than this office.

35. All question, disputes or differences arising under, out of or in connection with this Bid document shall be subject to the exclusive jurisdiction of Chandigarh /Mohali Court

36. The Bureau reserves the right to accept any tender in full or in part or to reject the lowest or any or all tenders without assigning any reason.



Scientist-F & Head
Northern Regional Laboratory
Bureau of Indian Standards.

वैज्ञानिक 'एफ' एवं प्रमुख / Sci. 'F' Head
भारतीय मानक ब्यूरो/Bureau Of Indian Standards
उ० क्षेत्र क० प्रयोगशाला / NRO Laboratory
बी-69, फेज-7, औद्योगिक क्षेत्र, मोहाली (पंजाब)
B-69, Phase-7, Industrial Area, Mohali (Punjab)

Annexure-III

We warranty that everything to be supplied by us hereunder shall be brand new, free from all defects and faults in materials, workmanship and manufacture and shall be of the highest grade and quality and consistent with the established and generally accepted standards for material of the type ordered, shall be in full conformity with the specification, drawing, or samples, and operate properly. We shall be fully responsible for its efficient operation. This warranty shall survive inspection of and payment or, and acceptance of the goods, but shall expire (except in respect of complaints of which the contractor has been notified prior to such date) 24 months after their successful installation, commissioning and acceptance by BIS.

The obligations under the Warranty expressed above shall include all cost relating to labour, spares, maintenance (preventive and unscheduled) and transport charges from site to the manufacturer's works and back and free repair/adjustment or replacement at site or any parts of the equipment which under normal and proper use and maintenance proves defective in design, material or workmanship or fails to conform to the specification previously given by BIS to the contractor.

Signature of the Vendor

Date: _____

Place: _____

DEVIATION SHEET

1. Column 1, 2 and 3 to be filled up, Column 4 is for BIS use
2. More than one may be used for filling up deviations from the specified terms and conditions

Sl no	Clause no and ref of BIS document (annexure no)	Type of deviation	Acceptable/Not acceptable (FOR BIS USE)
(1)	(2)	(3)	(4)

Signature of the Vendor

Date: _____

Name _____

Place: _____

Seal of Firm

ANNEXURE-IV

Thermal Efficiency Test Equipment for Solar Flat Plate Collector

Ref No: NRO/MECH/SOLAR/THERMAL EFFICIENCY

Equipment Name: THERMAL EFFICIENCY TEST EQUIPMENT FOR SOLAR FLAT PLATE COLLECTOR

Quantity: 1

Sl. No.	NROL SPECIFICATION	BIDDER'S RESPONSE
1.	The equipment with complete attachments and installation is required for carrying out thermal performance test as per IS 12933 (Pt 1) and (Pt 2)-2003. The equipment shall be fitted with attachments as per the specifications enclosed.	(Bidder shall indicate "Complied" or "Non Complied" as applicable in each row. In case of "Non Complied", detail shall be mentioned)
2.	The unit shall consists of : <ul style="list-style-type: none"> Water bath fitted with pump rotometer capable of delivery 2.0 lpm to 3.0 lpm, accuracy of $\pm 1\%$. The water bath shall be capable of maintaining temperatures at Digitally set points of 30°C, 40°C, 50°C, 60°C & 70°C. Rotometer shall be as per SFPC-011 (enclosed at page 13) Molded insulated water tank of 500 l capacity as per SFPC-018(enclosed at page 14) Air Temperature measuring device (digital) Stevenson screen with Temperature and RH sensor as per SFPC-020(enclosed at page 15) Mass Flow meter as per SFPC-017, 1(enclosed at page 16) 12 Channel data logger and sensor DL 1002 with PC, Printer & accessories as per SFPC-021(enclosed at page 17) RTD temperature indicator (4 Nos) of $0-100^{\circ}\text{C} \pm 0.1^{\circ}\text{C}$, as per SFPC-022(enclosed at page 18) Electronic Balance Air Blower for Solar collector test stand PID Controller as per SFPC-028(enclosed at page 19). Two Channel Solar Integrator as per SFPC 010, 1(enclosed at Page 20) All Electronic Devices shall have cable attachment for monitoring the parameters at a length of approximately 100m. 	
3.	Necessary Pyranometers will be provided by us which only shall incorporated/ assembled in the above set-up. (Details of Pyranometers are as per our Tender Ref:NRO/MECH/Solar/SFPC-10 dated 13.06.2007 available at our web site www.bis.org.in which can be down loaded. This information is for using the Technical Specification of the Pyranometers)	
4.	The equipment shall be installed at our premises at Mohali, Punjab and shall be demonstrated for Satisfactory Testing of Thermal Efficiency of Solar Flat Plate Collectors as per IS 12933(Part-1 and 5),2003.	
5.	Necessary Training of our testing personnel at site shall be provided.	
6.	ANY OTHER ITEMS (OTHER THAN GIVEN AT 2 ABOVE) AS DEEMED NECESSARY SHALL ALSO BE INCORPORATED.	

**BUREAU OF INDIAN STANDARDS
(BANGALORE BRANCH OFFICE LABORATORY)**

EQUIPMENT SPECIFICATION

EQUIPMENT SPEC. CODE	:	SFPC 011, SFPC 013 and SFPC 015
NAME OF THE EQUIPMENT	:	ROTAMETER
PROPOSED FOR DIS LABS	:	NROL
TOTAL QUANTITY REQUIRED	:	One No each.

1.0

Scope

Prescribes the requirements for a precision rotameter for measuring the irradiance on a plane surface which results fro direct solar radiation and from the diffuse radiation from the hemisphere.

This instrument is required for carrying out the following tests:

- Outdoor No-flow exposure test as per Cl. 5.2 of IS 12933 (Pt.5).
- External thermal shock test as per Cl. 5.4 of IS 12933 (Pt.5).
- Internal thermal shock test as per Cl. 5.5 of IS 12933 (Pt.5).
- Thermal performance test as per Cl. 6.4 of IS 12933 (Pt.5).

2.0

Requirements

Body: Acrylic
 Connection: Flanged with control valve
 Materail for wetted parts: SS 304
 Floats: SS 304
 Maximum temperature: up to 85 ° C
 Maximum pressure: 15 kgf/cm²
 Range: 0-6 lpm, 0-12 lpm and 0-60 lpm
 Flow media: Water
 Accuracy : ± 1% of FR

3.0

Calibration :

Calibration certificate from NABL accredited calibration agency shall be furnished along with the equipment.

7.0

Guarantee

The equipment shall be guaranteed for a minimum period of one year of satisfactory operation.

8.0

Specification

9.0

Accessories

Nil

BUREAU OF INDIAN STANDARDS
(BANGALORE BRANCH OFFICE LABORATORY)

EQUIPMENT SPECIFICATION

EQUIPMENT SPEC. CODE	:	SFPC 018
NAME OF THE EQUIPMENT	:	MOULDED WATER TANK
PROPOSED FOR BIS LABS	:	NRoL
TOTAL QUANTITY REQUIRED	:	One No.
1.0	Scope	<p>Covers the requirements for rotational moulded tanks for storage of water tank for testing of solar flat plate collector. This tank is required for storing water for the following tests:</p> <ul style="list-style-type: none"> ➤ Outdoor No-flow exposure test as per Cl. 5.2 of IS 12933 (Pt.5). ➤ External thermal shock test as per Cl. 5.4 of IS 12933 (Pt.5). ➤ Internal thermal shock test as per Cl. 5.5 of IS 12933 (Pt.5). ➤ Rain Penetration test as per Cl.5.6 of IS 12933 (Pt.5) ➤ Thermal performance test as per Cl. 6.4 of IS 12933 (Pt.5).
2.0	Materials	<p>The tank is moulded from polyethylene powder by the process of rotational moulding. The material of construction of tank, lid and fittings which come in contact with water shall be such that it does not impart any taste, colour or odour to water, nor have any toxic effect and it shall not contaminate water thereby making it unpotable. Polyethylene resin used for the manufacture should be rotational moulded grade and duly stabilized with antioxidants. The antioxidants used shall not exceed 0.3 % by mass of finished resin and physiologically harmless.</p>
3.0	Requirements	<p>Density of the resin at 23° C: 932 to 943 kg/m³</p> <p>Melt flow index (temperature 190° C and nominal load 2.16 kg): 2.0 to 6.0g /10 minutes</p> <p>Carbon black content: 2.0 to 3.0 and dispersion of black shall be satisfactory.</p> <p>Capacity : 500 liters</p> <p>Overall diameter range : 800 to 1140 mm</p> <p>Overall height range : 625 to 1025 mm</p> <p>Minimum internal diameter of man-hole: 370 mm</p> <p>Minimum wall and bottom thickness: 4.0 mm</p> <p>Minimum weight of tank(with out lid) : 18.0 kg.</p> <p>Resistance to deformation:</p>
4.0	Specification	IS 12701
5.0	Accessories	Nil

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EQUIPMENT SPECIFICATION

EQUIPMENT SPEC. CODE	:	SFPC 020
NAME OF THE EQUIPMENT	:	AIR TEMPERATURE & HUMIDITY SENSOR
PROPOSED FOR BIS LABS	:	NROL
TOTAL QUANTITY REQUIRED	:	ONE NO. EACH
1.0 Scope	Covers the, functional requirements air temperature and humidity sensor for performance testing of solar flat plate collector. This sensors are required for testing as per Cl. 6.4 of IS 12933 Pt 5.	
2.0 Requirements	Air temperature sensor Sensing: Standard platinum RTD element (PT 1000 or PT 100 mounted on weather shield) Range : - 40 ° C to + 60 ° C Resolution : 0.1 ° C Accuracy : + 2 ° C Output : Resistance Weather shield : Weather shield coated with weather proof reflective white Housing: Nylon body with weather shield and brass stem to mount the sensor Weather shield shall be provided to avoid direct heating of Relative humidity Sensing : Solid state capacity type sensor Range : 0 to 100 % operating at - 40 ° C to + 50 ° C Resolution : 0.1 % Accuracy : + 3 % of full scale reading Operating temperature : - 40 ° C to + 50 ° C Power : + 5 volts DC Power consumption: ~ 4 ma Output : 0- 1 V for 0 to 100 % humidity Weather shield : Weather shield coated with weather proof reflective white	
3.0 Standard Accessory	Mounting Stem: Brass Epoxy coated.	
4.0 Calibration :	Calibration certificate from NABL accredited calibration agency shall be furnished along with the equipment.	
5.0 Guarantee	The equipment shall be guaranteed for a minimum period of one year of satisfactory operation.	
6.0 Specification	----	

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BUREAU OF INDIAN STANDARDS
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EQUIPMENT SPECIFICATION

EQUIPMENT SPEC. CODE	: SFPC 017.1
NAME OF THE EQUIPMENT	: MAGNETIC FLOWMETR SENSOR AND SIGNAL CONVERTOR
PROPOSED FOR BIS LABS	: NROL
TOTAL QUANTITY REQUIRED	: One No.
1.0	Scope Prescribes the requirements for a electromagnetic flow meter and sensor for measuring flow of water during performance test of solar flat plate collector as per Cl. 6.4 of IS 12933 (P.L.S).
2.0	Requirements Magnetic flow sensor: Primary head : DN 25 mm Electrical conductivity : >5 micro sec/cm Operating temperature: -60 to +80° C Insulation class of field coils : H class Electrode design: Flat elliptical electrodes, surface polished, self cleaning Grounding rings : Standard version Protection: IP 67/ equivalent to NEMA 4 and 4X Signal Converter Current output function: Galvanically isolated from all output and input circuits Current: 0 - 20 mA Active mode: max 500 ohms load Passive mode: external Voltage 1.5 - 20 V DC Load 0 - 500 ohms Error: 2.6 mA Time Constant: Cut off "on" value : 0.1 to 19% Cut off "off" value: 0.2 to 20% Display: 8 digit segment LED display for actual flow rate Power Supply: 230/240 V, 50 Hz Housing: Die cast Aluminium
3.0	Calibration : Calibration certificate shall be furnished along with the equipment with traceability to National standards.
4.0	Guarantee The equipment shall be guaranteed for a minimum period of one year of satisfactory operation
5.0	Accessories Nil

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**BUREAU OF INDIAN STANDARDS
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Equipment Specification

EQUIPMENT SPEC. CODE	:	SFPC 021
NAME OF THE EQUIPMENT	:	16CHANNEL DATA LOGGER AND SENSOR
PROPOSED FOR BIS LABS	:	NR0L
TOTAL QUANTITY REQUIRED	:	One No.

1.0 Scope

Covers the performance requirement of 12 Channel Data Logger and Sensor. The Data Logger and Sensor are required for monitoring the various parameters required to be measured during testing of Solar flat plate collectors. These instruments are required for the following tests:

- Outdoor No-flow exposure test as per Cl 5.2 of IS 12933 (Part 5)
- External Thermal Shock test as per Cl 5.4 of IS 12933 (Part 5)
- Internal Thermal Shock test as per Cl 5.5 of IS 12933 (Part 5)
- Thermal Performance test as per Cl 6 of IS 12933 (Part 5)

2.0 Requirements

Microprocessor based weather monitoring system with built-in clock and calendar.
Power Requirement: 12 V DC

One parallel port for connecting memory module

Outputs: One serial port for data transfer (RS 232)

One Alpha numeric two line liquid crystal display for indicating real time data and time & calendar

Keyboard: 20 key keyboard for setting clock, calendar, averaging interval and manual operation.

Input Channels: 16 Channels

Analog Digital Conversion: 12 Bit double slope ADC.

3.0 Accessories

Battery 12 V, 7AH

4.0 Guarantee

The equipment shall be guaranteed for a minimum period of one year of satisfactory operation.

5.0 Calibration

Calibration certificate shall be furnished along with the Data Logger.

**BUREAU OF INDIAN STANDARDS
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EQUIPMENT SPECIFICATION

EQUIPMENT SPEC. CODE	SFPC 022
NAME OF THE EQUIPMENT	RESISTANCE TEMPERATURE DETECTOR (RTD)
PROPOSED FOR BIS LABS	NROL
TOTAL QUANTITY REQUIRED	4
1.0 Scope	Prescribes the requirements for a resistance temperature detector for measuring the temperature for heat transfer medium during the performance test. This instrument is required for carrying out the following tests: ➤ Thermal performance test as per Cl. 6.4 of IS 12933 (Pt.5).
2.0 Requirement	Platinum resistance thermometer. Sensor element: Platinum PT-100 Insulation: Mineral oxide Outer sheath: INCONEL 600 External diameter: 2 mm Grounded Junction Range : 0 to 100° C Accuracy : Class A $\pm 1^\circ$ C Digital temperature controller (Microprocessor) Temperature : 0 to 100° C Accuracy: $\pm 1^\circ$ C Display: 0.5" 7 segment LED Red for pre-set value 0.5" 7 segment LED Green for set value Ambient temperature : not more than 70° C Input power supply : 230 V AC $\pm 10\%$ 50 Hz Current rating: 5 Amps at 220 V to resistive load
3.0 Calibration :	Calibration certificate from NABL accredited calibration agency shall be furnished along with the equipment.
4.0 Guarantee	The equipment shall be guaranteed for a minimum period of one year of satisfactory operation.
5.0 Specification	
6.0 Accessories	Nil

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EQUIPMENT SPECIFICATION

EQUIPMENT SPEC. CODE	SFPC 028
NAME OF THE EQUIPMENT	PID CONTROLLER
PROPOSED FOR BIS LABS	NROL
TOTAL QUANTITY REQUIRED	One No.
1.0 Scope	Covers the performance requirement of PID Programme Controller for monitoring the temperature at inlet and outlet of the Collector during performance test. This instrument is required for Thermal performance test as per Cl 6 of IS 12933 (Part 5)
2.0 Requirements	Proportional – Integral – Derivative Controller (PID Controller) Programmer with Microprocessor Number of segments:8 Number of Programme: 8 Display 1: 4½ digit LED Red Display 2: 4½ digit Alpha Numeric LED Memory: Built in Output 1 : Relay: 1 NO & 1 NC Output 2: SSR Output 3: 4 – 20 mA Interface: RS 232 – Communication Power Supply: 230 V AC, 50 Hz
3.0 Guarantee	The equipment shall be guaranteed for a minimum period of one year of satisfactory operation.
4.0 Calibration	Calibration certificate shall be furnished along with the PID Controller.
5.0 Accessories	Nil

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EQUIPMENT SPECIFICATION .

EQUIPMENT SPEC. CODE		SFPC 010.1
NAME OF THE EQUIPMENT		TWO CHANNEL SOLAR INTEGRATOR
PROPOSED FOR BIS LABS		NROL
TOTAL QUANTITY REQUIRED		One No.
1.0	Scope Covers the requirements for two channel solar integrator for calculating the irradiation. This instrument is required for the following tests: <ul style="list-style-type: none"> > Outdoor No-floe exposure test as per Cl. 5.2 of IS 12933 (Pt.5). > External thermal shock test as per Cl. 5.4 of IS 12933 (Pt.5). > Internal thermal shock test as per Cl. 5.5 of IS 12933 (Pt.5). > Thermal performance test as per Cl. 6.4 of IS 12933 (Pt.5). 	
2.0	Requirements Input voltage: 0-60 mV Input off set: $\leq \pm 5$ micro volts Temperature coefficient: $\pm 0.04 \%/^{\circ}\text{C}$ Output : 0-2000 W/m ² Output resolution : ± 1 W/m ² Reset subtotals : Programmable Serial output : RS-232 with DTR Reset totals: Manual Power supply : 9V, 1W Operating temperature : ± 5 to $\pm 40^{\circ}\text{C}$	
3.0	Guarantee The equipment shall be guaranteed for a minimum period of one year of satisfactory operation.	
4.0	Specification ---	
5.0	Accessories Signal cable	

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