

Department of Civil Engineering, IIT Madras

Specifications: Isothermal Calorimeter

The specifications are divided into: (i) equipment features, (ii) specific technical requirements, (iii) data analysis requirements, and iv) safety features.

Equipment Features

- 1) The calorimeter should be capable of carrying out measurements in isothermal condition (constant temperature).
- 2) The calorimeter should be capable of measuring heat of hydration of at least three samples simultaneously.
- 3) The temperature of the calorimeter must be computer-controlled from the software.
- 4) Operating temperature range must be from 5°C to 70 °C or higher.
- 5) The calorimeter should be able to measure the rate of heat evolution continuously, at least up to 7 days.

Specific Technical Requirements

- 1) The instrument should have circulating air thermostat with a temperature stability of $\pm 0.02^\circ\text{C}$ or better.
- 2) The baseline drift over 72 hours must be less than $0.05 \mu\text{W/g/h}$ and the baseline deviation over 72 hours must be less than $2 \mu\text{W/g}$.
- 3) Each channel in calorimeter should be able to accommodate sample sizes of up to 125 ml.

Data Analysis Requirements

- 1) Multiple data plotting routines
- 2) Rate of heat evolution plot
- 3) Total heat release plot
- 4) Activation energy calculation
- 5) Optimum sulfate estimation

Safety Features

All the safety related concerns must be stated, and details of functional access provided for safety related problems should be mentioned in detail.

GENERAL TERMS AND CONDITIONS

- The supplier/vendor must be an original equipment manufacturer or the sole authorised agent/dealer/seller of the proprietary item.
- The system should be delivered within 6 - 10 weeks from the opening of the letter of credit or issue of purchase order, whichever is later.
- Costs and related information should be given only in the financial bid.
- The cost should include 24 months warranty of the overall system and CIP up to Chennai
- Prices quoted should be valid for at least 90 days.
- Item-wise break up of cost should be provided for the different items (parts).
- IIT Madras reserves the right to exclude some items from the purchase.
- The payment conditions consist of 90% LC at site and 10% after installation and satisfactory training.
- The system should be installed and commissioned with no additional cost.
- Training at IIT Madras should be provided with no additional cost.
- Two copies of the system manual should be provided in CD form.
- There must be a local service agent in India.

Technical Bid should comprise of the following:

- Detailed Technical brochure
- Detailed technical write up explaining how each of the Technical Specifications are complied with.
- The list of at least three Institutions/R&D units/Industry where similar installations have been supplied in India/abroad including contact details (name of the person in-charge, email and phone number) is to be provided.

After Sales, Service & Application Support:

Vendor should have after sales service support centre and application support centre for the offered system at India to provide prompt services, application support for various applications of our interest.

Reference:

Quoted model should have at least 3 installations in India/Abroad. Three performance certificates of the quoted model in reputed institutions in India should be enclosed duly signed and stamped by the concerned scientist. Recent performance should be enclosed.

TECHNICAL SPECIFICATIONS-CUM-COMPLIANCE TABLE FOR ISOTHERMAL CALORIMETER

NOTE: For each specification, please enter "YES" or "NO" in the second column of this table. **If a cell in the second column is left blank, then it will be assumed that the quotation does not comply with the respective specification/requirement.** Provide catalogues, data sheets and/or other documentation to support the compliance of your equipment to the given specifications.

1 General	Yes / No	Remarks
Device for measuring the heat of hydration of cementitious materials. The system should have the following characteristics or better and should satisfy and demonstrate the performance criteria given in Section 3.		
2 Basic Equipment Features		
2.1 The calorimeter should be capable of carrying out measurements in isothermal condition (constant temperature).		
2.2 The calorimeter should be capable of measuring heat of hydration of at least three cement samples simultaneously.		
2.3 The temperature of the calorimeter must be computer-controlled from the software.		
2.4 The calorimeter should be able to measure the rate of heat evolution continuously, at least up to 7 days.		
3 Specific Technical Requirements		
3.1 The instrument should have circulating air thermostat with a temperature stability of $\pm 0.02^{\circ}\text{C}$ or better.		
3.2 The baseline drift over 72 hours must be less than $0.05 \mu\text{W/g/h}$.		
3.3 the baseline deviation over 72 hours must be less than $2 \mu\text{W/g}$.		
3.4 Each channel in calorimeter should be able to accommodate sample sizes of up to 125 ml.		
4 Data Analysis Requirements		
4.1 The software should have multiple data plotting routines.		
4.2 The software should provide rate of heat of hydration plot.		
4.3 The software should provide total heat release plot.		
4.4 The software should be able to calculate activation energy.		
4.5 The software should be able to estimate optimum sulfate content for cement.		
5 Manufacturer Experience, Installation & Training		
5.1 The manufacturer must have at least 10 years of		

	experience in the field of calorimetric measurements.		
5.2	Provide a list of IITs or government agencies, where similar equipment was supplied and their contact details.		
5.3	Hands-on training on the testing, data acquisition and basic maintenance of the equipment should be provided for a period of at least two full working days at IIT Madras, Chennai.		
5.4	The manufacturer must have well-qualified technical support team.		