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INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

Request For Technical Information and Pro Forma Quotations

For Procurement of Resonant Column Test Apparatus

1. Introduction

The Indian Institute of Technology Jodhpur (IIT Jodhpur) intends to procure **Resonant Column Test Apparatus** for academic and research purposes.

Before initiating the formal procurement process, the Institute invites **Technical Information And Indicative Pro Forma Quotations** from eligible Original Equipment Manufacturers (OEMs) or their authorized representatives.

2. Purpose

The objectives are to:

- Obtain technical information from prospective OEMs/authorized representatives.
- Obtain indicative Pro forma quotations for estimating the procurement cost.

3. Disclaimer

This document is issued **only for obtaining technical information and indicative Pro Forma quotations.**

Submission of information under this proposal:

- shall **not** be treated as a financial bid;
- shall **not** constitute any commitment on the part of IIT Jodhpur to procure the equipment;
- shall **not** confer any right upon the participating firm for award of any future contract;
- shall **not** automatically qualify the responding firm for participation in any future tender.

The Institute reserves the right to modify the technical specifications, estimated cost, procurement methodology, or procurement timeline based on its requirements.

4. Equipment Details

- Name of Equipment: Resonant Column Test Apparatus
- Quantity: 1

- Broad Functional Requirements (The essential functions or capabilities that the equipment should have, without mentioning a specific make, model, or brand):

A. Scope of Supply

Supply, installation, testing and commissioning of a Resonant Column testing apparatus for specimens of 70 mm and 100 mm diameter, complete with triaxial cell, drive and control system, sensor suite, Torsional shear setup, bender element system, data acquisition system, sample preparation accessories, an external control PC with test management software, and on-site installation and training, as detailed in this specification. Bidders shall quote against every clause and submit a point-by-point compliance/deviation statement along with supporting technical literature and datasheets.

B. Applicable Standards

The apparatus and test methods shall conform to ASTM D4015 (Standard Test Methods for Modulus and Damping of Soils by Resonant-Column Method). The bidder shall clearly state the standard(s) followed for the RC, TS, and bender element test methods.

C. General Technical Requirements

S.No	Parameter	Specification
1	Specimen size	70 mm and 100 mm diameter, with interchangeable base pedestals and top caps for both sizes
2	Specimen height	70 mm dia.: H = 140 mm (H_{max} 160 mm); 100 mm dia.: H = 200 mm (H_{max} 210 mm)
3	Cell confining pressure	Minimum 1 MPa
4	Torsional torque capacity	In the range of 1 to 6 Nm (indicative), achieved via electromagnetic drive with high-strength coils (e.g. NdFeB magnet type or equivalent)
5	Back pressure / pore pressure	Minimum 1 MPa capacity; pore pressure transducer accuracy ≤ 0.10% of Full Range Output
6	Dynamic excitation frequency (RC)	0–300 Hz or better
7	Cyclic loading frequency (TS)	Minimum of up to 2 Hz or higher

8	Boundary condition	Fixed-free configuration as standard.
9	Air compressor	Minimum 15 bar capacity, suitable for pneumatic pressure control system

D. Cell and Mechanical Components

The supply shall include, at minimum:

• Triaxial cell rated to the pressure specified in Section 3, with electromagnetic drive system incorporating precision-wound coils and high-strength permanent magnets.

• Transparent Inner cell

• 70 mm and 100 mm stainless steel (or better) base pedestals with interchangeable high-friction porous plates.

• 70 mm and 100 mm aluminium (or better/equivalent) top caps with interchangeable high-friction porous plates.

• Torsional drive unit complete with coils and crossheads, indicative maximum torque as per Section 3.

• Internally mounted, counter-balanced accelerometer(s); dual low-noise MEMS accelerometer or equivalent acceptable.

5. Sensors and Instrumentation

S.No	Parameter	Specification
1	Axial displacement	LVDT, range ± 10 mm, with signal conditioning, power supply, and connection for data acquisition
2	Pressure transducers	Minimum three (cell, back, pore pressure), accuracy as per Section 3
3	Proximity / eddy-current sensors	For auxiliary displacement measurement, with miniaturized actuator for repositioning during testing (desirable)
4	Volume change measurement	Automatic pressure/volume controller, capacity 200 cc / 1 MPa (or equivalent), volume accuracy ≤ 0.25% of measured value, pressure accuracy ≤ 0.15% of full

		range, resolution 0.001 cc / 0.1 kPa, with remote keypad and USB or equivalent digital interface
5	Current and voltage sensors	For monitoring drive coil excitation current and voltage

E. Bender Element System

The bender element system shall be included as part of the base scope of supply, comprising:

• Combined P-wave transmitter / S-wave receiver bender element insert for the base pedestal, and combined S-wave transmitter / P-wave receiver insert for the top cap (or equivalent arrangement providing both P- and S-wave measurement), nominal element size approx. 20 mm diameter, rated for pressure of atleast 1 MPa.

• Signal conditioning and generation unit supporting: excitation waveform of single sine pulse (2–60 kHz) at minimum, amplification with user-selectable gain (minimum range 1–100), sampling rate of at least 500 kHz (higher sampling rate is preferred and should be stated), and simultaneous sampling of transmitted and received waveforms.

• Analysis methods: start-to-start, peak-to-peak, and cross-correlation, with real-time signal viewing and analysis tools.

• 70 mm and 100 mm base pedestal / top cap sets compatible with the bender element inserts, including porous discs with "V"-groove and "blade" profiles for clay specimens.

F. Data Acquisition and Control System

S.No	Parameter	Specification
1	Data acquisition channels	Minimum 8-channel, 16-bit resolution or better
2	Signal supply	± 5 V (or equivalent) supply voltage available independently per channel
3	Gain ranges	Minimum 8 selectable gain ranges per channel, software-configurable
4	Communication interface	USB and/or RS232 (or equivalent), with all necessary cables
5	Control PC	External PC (minimum configuration - Intel core i7, 16GB ram, 1 TB SSD, Keyboard & Mouse, 22" LED, ATX

		cabinet with SMPS) included in the supply, dedicated to test management, data recording and analysis
6	Amplifier	Transconductance (current-driven) amplifier for the drive motor, providing constant torque independent of frequency
7	Pneumatic pressure controller	Single-channel pneumatic pressure controller, minimum 1 MPa (1000 kPa), with output suitable for data acquisition system input

G. Software Requirements

The test management software shall, at minimum, be capable of computing/reporting:

• Resonant frequency (Hz), maximum shear strain, shear wave velocity (m/s), and shear modulus (MPa).

• Damping ratio by free-vibration decay method (%) and by half-power bandwidth method (%).

• Predominant frequency from free-vibration data via FFT analysis (Hz).

• Natural frequency derived from resonant frequency and phase shift, and from resonant frequency and free-vibration decay.

• Resonance and damping ratio in both torsion and flexure modes; slow-speed (< 2 Hz) torsional shear.

• Support for chirp and random excitation test methods, in addition to standard sine excitation.

• Bender element data acquisition and analysis, per Section 6.

The software shall be fully licensed for use on the supplied control PC, with no recurring license fee restricting routine laboratory use.

H. Sample Preparation and Calibration Accessories

The supply shall include a complete sample preparation and calibration set for both 70 mm and 100 mm specimens, comprising at minimum:

• Two-part specimen former (aluminium or equivalent) - 1 no. for each sample size.

• Porous discs (standard) - 5 nos. for each sample size.

• Porous discs with "V"-groove profile for clay specimens — 5 nos. for each sample size.

• Porous discs with "blade" profile for clay specimens — 5 nos. for each sample size.

- Sintered bronze porous discs — 5 nos. for each sample size.
- Calibration bars — 3 nos. for each sample size.
- Latex membranes — 50 nos. for each sample size.
- O-rings — 20 nos., and associated valves, pressure feedthroughs, tools and screw kits.
- Calibration kit including reference mass and base/head adapters.

I. Cell Lifting arrangement

S.No	Parameter	Specification
1	Lifting frame	Mechanical lifting arrangement with a minimum lifting capacity of 80 kg for heavy cell lifting (weight > 15 kg). May be omitted if the cell assembly weight is low enough (≈10–15 kg) for manual handling

J. Installation, Training, and Documentation

The OEM/bidder shall provide a minimum of three (3) days of dedicated on-site support, covering complete system installation, commissioning, and hands-on training for the end-user team. Complete documentation, including operation and maintenance manuals, calibration certificates, and software user guides, shall be supplied with the equipment.

(The above requirements are indicative and may be revised after evaluation of the responses.)

5. Eligibility Criteria

Interested firms should:

- Be an Original Equipment Manufacturer (OEM) or an authorized distributor/dealer.
- Have experience in supplying similar equipment.
- Have adequate installation and after-sales service support in India.

6. Information/Documents to be Submitted

The interested firms shall submit the following (*Annexure-I*):

1. Company Profile.
2. Details of the OEM.
3. Product Brochure/Catalogue.
4. Detailed Technical Specifications.
5. Compliance with the Broad Functional Requirements.
6. List of previous users/clients with installation reports
7. Details of Warranty.

8. Details of After-Sales Service Support.
9. Authorization Letter from OEM (where applicable).
10. Any additional technical information relevant to the offered equipment.

7. Pro forma Quotation

- Interested firms are requested to submit a Pro forma Quotation (*Annexure-II*) along with their Request For Technical Information and Pro Forma Quotations response. Indicative **Pro Forma** quotation in Indian Rupees (INR), including the cost of the equipment, essential accessories, taxes, duties, freight, insurance, installation, commissioning, training, and any other associated charges. Wherever applicable, the Annual Maintenance Contract (AMC) and/or Comprehensive Maintenance Contract (CMC) charges and spare parts shall be quoted separately as additional charges.
- Expected delivery schedule and other relevant technical and commercial information.

Important Note:

- The **Pro Forma** quotation is required only for cost estimation and budget planning purposes.
- The prices quoted shall be indicative/non-binding.
- The Pro Forma quotation shall not be treated as a financial bid.
- Submission of a **Pro Forma** quotation shall not confer any right or preference in the subsequent procurement process.

8. Presentation/Demonstration

The Institute may invite for a technical presentation or product demonstration. The date and venue shall be communicated separately.

9. Submission :

Interested firms may submit their Proforma Quotations on or before the due date in sealed cover or through email (as applicable).
The envelope/email should be superscribed as:
"Request For Technical Information and Pro forma Quotations for Procurement of Resonant Column Test Apparatus"

8. Important Dates

Activity	**Date**
Publication	7-8-2026
Last Date for Submission	15-8-2026
Technical Presentation (if required)	To be informed
Clarification Meeting (if required)	To be informed

10. General Terms & Conditions

1. This **Request For Technical Information and Pro forma Quotations** is issued only for obtaining technical information and **Pro Forma** estimates.
2. The Institute reserves the right to accept or reject any or all responses without assigning any reason.
3. Submission of an **Request For Technical Information and Pro forma Quotations** does not create any contractual obligation.
4. The Institute may seek additional information, technical clarifications, demonstrations, or presentations from any participant.
5. The Institute may modify the technical requirements based on the responses received.
6. The final technical specifications may be prepared by the User Committee after evaluating all **Request For Technical Information and Pro forma Quotations** responses.
7. The subsequent procurement, if any, shall be carried out through an appropriate procurement method in accordance with the GFR 2017 and applicable procurement rules.
8. Participation in this **Request For Technical Information and Pro forma Quotations** does not automatically entitle any firm to participate in or receive any preference during the subsequent tender process.

11. Contact Details

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Annexure-I

Request For Technical Information and Pro forma Quotations Response Format

1. Name of the Firm:
2. Registered Address:
3. Name of OEM (if applicable):
4. Contact Person:
5. Email:
6. Phone:
7. Product Name and Model:
8. Brief Technical Description:
9. Compliance with Broad Functional Requirements:
10. List of previous users/clients with installation reports:
11. After-Sales Service Details:
12. Any Additional Features:
13. Remarks (if any).

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Annexure-II

Format for Pro forma Quotation

Sl. No.	Description	Amount (INR)
1	Indicative **Pro forma** quotation in Indian Rupees (INR), including the cost of the equipment, essential accessories, taxes, duties, freight, insurance, installation, commissioning, training, and any other associated charges.	

Warranty Period: _____

AMC/CMC Charges (after warranty): _____

Delivery Period: _____

Authorized Signatory
Name: _____

Designation: _____

Company Seal & Signature