



INVITATION LETTER

Package Code: TEQIP-III/UP/biej/111

Current Date: 24-May-2019

Package Name: CE-Digital Tri-axial Shear Test Apparatus

Method: Shopping Goods

Sub: INVITATION LETTER FOR Digital Tri-axial Shear Test Apparatus

Dear Sir,

1. You are invited to submit your most competitive quotation for the following goods with item wise detailed specifications given at Annexure I,

Sr. No	Item Name	Quantity	Place of Delivery	Installation Requirement (if any)
1	Digital Tri-axial Shear Test Apparatus	1	BIET, Jhansi	Yes

2. Government of India has received a credit from the International Development Association (IDA) towards the cost of the **Technical Education Quality Improvement Programme [TEQIP]-Phase III** Project and intends to apply part of the proceeds of this credit to eligible payments under the contract for which this invitation for quotations is issued.

3. **Quotation**

- 3.1 The contract shall be for the full quantity as described above.
- 3.2 Corrections, if any, shall be made by crossing out, initialling, dating and re writing.
- 3.3 All duties and other levies payable by the supplier under the contract shall be included in the unit Price.
- 3.4 Applicable taxes shall be quoted separately for all items.
- 3.5 The prices quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
- 3.6 The Prices should be quoted in Indian Rupees only.

4. Each bidder shall submit only one quotation.

5. Quotation shall remain valid for a period not less than **60**days after the last date of quotation submission.

6. Evaluation of Quotations: The Purchaser will evaluate and compare the quotations determined to be Substantially responsive i.e. which

- 6.1 are properly signed; and

- 6.2 Confirm to the terms and conditions, and specifications.

7. The Quotations would be evaluated for all items together.

8. Award of contract The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.

- 8.1 Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of Contract.
- 8.2 The bidder whose bid is accepted will be notified of the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be Incorporated in the purchase order.
9. Payment shall be made in Indian Rupees as follows:
- Satisfactory Delivery & Installation - 90% of total cost**
Satisfactory working after one month of installation - 10% of total cost
10. Liquidated Damages will be applied as per the below:
Liquidated Damages Per Day Min % : N/A
Liquidated Damages Max % : N/A
11. All supplied items are under warranty of **36** months from the date of successful acceptance of items and AMC/Others is .
12. You are requested to provide your offer latest by **15:00** hours on **13-Jun-2019**.
13. Detailed specifications of the items are at Annexure I.
14. Training Clause (if any) **Yes**
15. Testing/Installation Clause (if any) **Yes**
16. Performance Security shall be applicable: **0%**
17. Information brochures/ Product catalogue, if any must be accompanied with the quotation clearly indicating the model quoted for.
18. Sealed quotation to be submitted/ delivered at the address mentioned below,
Bundelkhand Institute of Engineering & Tech., Jhansi, 284128
19. We look forward to receiving your quotation and thank you for your interest in this project.

(Authorized Signatory)

(Prof. Mukesh Shukla)
Nodal Officer Procurement
TEQIP-III, BIET, Jhansi

Annexure I

Sr. No	Item Name Digital Tri axial Shear Test Apparatus
	Specifications
	<ul style="list-style-type: none"> • Fully Computer Controlled operation • Automated Strain rate control system for soils • Conforms the test requirement of IS-2720 (Part-XII), BS-1377 and relevant other International standards (ASTM, AASHTO etc.) • All the modules namely Load Frame, Confining Pressure System and Back Pressure System must be totally controlled by the dedicated computer. • Also, parameters such as Load, Displacement, Confining Pressure, Back Pressure, Pore Pressure and Volume Change must be measured through the computer. • Once the specimen is assembled in the Triaxial cell, required parameters like Strain Rate, Confining Pressure and Back Pressure must be programmed through the computer. • Capable of conducting UC, UU, CU, \overline{CU}, CD tests, Stress Path Triaxial Test, K_o Consolidation and Swelling Test • Confining Pressure & Back Pressure setting through computer • Strain rate programmable form 0.0001mm/min – 9.9999mm/min. (Optional up to 50mm/min) • Inching or Release operation to adjust the specimen • Triaxial Cell to accommodate specimen size up to 50 mm or 100 mm dia specimen • Highly precise stepper/servo motor driven pressure system with step less increment in pressure • Programmable Pressure Range - $0.05 \text{ kg/cm}^2 - 20 \text{ kg/cm}^2$ • Pressure controlling accuracy is with in +1% of programmed value • Online plotting of Load v/s Displacement, Load v/s Time and Displacement v/s Time curves and display of data for all the channels • Built in safety features for Over Load, Over travel and pressure • Advanced Analysis software • De-airing system with vacuum pump <p>The complete system should consists of -</p> <ol style="list-style-type: none"> <i>i.</i> Digital Load Frame <i>ii.</i> Automatic Pressure Controllers (Confining and Back Pressure Controller) <i>iii.</i> Triaxial Cell with Accessories <i>iv.</i> PC based Control system and Control Software <p>Signal Conditioning and Controlling Unit with Transducers</p> <ol style="list-style-type: none"> <i>a.</i> Computer for controlling and Data acquisition <i>b.</i> Control & Analysis software <p>Detailed specifications of the individual modules are given as under:</p> <p><i>DIGITAL LOAD FRAME</i></p> <ul style="list-style-type: none"> • Rate of Loading must be controlled through combination of Electronics and Stepper motor & is programmable through computer. • Load cell and L.V.D.T fitted in the loading frame for the measurement of Axial load and deformation. • A set of limit switches must incorporated in the frame for safety against over travel of the ram. <p><u>Specification</u></p> <p>Load Capacity - 50 kN</p> <p>Test Speed - 0.00001mm/min. to 9.9999mm/min.</p>

Travel - 100 mm

AUTOMATIC PRESSURE SYSTEM

Confining Pressure Controller

- This controller must run by a micro stepper motor and operated through computer.
- Automatic filling and draining of water from the controller must be done through computer.

Specification

Pressure Range	:	0.05 kg/cm ² – 20 kg/cm ²
Volume capacity	:	300 cc
Controlling accuracy	:	+1% of programmed value

Back Pressure Controller

- Similar to the confining pressure controller, this controller must have an additional sensitive volume change sensor to measure the volume change taking place during the test.

Specification

Pressure Range	:	0.05 kg/cm ² – 20 kg/cm ²
Volume capacity	:	300 cc
Controlling accuracy	:	+1% of programmed value
Volume Change sensor	:	300 × 0.01cc

UNIVERSAL TRIAXIAL CELL

- Pressure Range – 2000 kPa
- Suitable for performing triaxial tests on soil specimens of varying diameters from 38 mm, 50 mm, 75 mm and 100 mm dia with lateral pressure up to 20 kg/cm².
- The cell has four take off positions and is fitted with three no volume change valves.
- **Accessories:** one pedestal, one loading pad, top drainage connection, pair of plain discs, pair of porous stones, one split sand former, one sheath stretcher, rubber sheaths (pack of ten) and four sealing O-rings for sizes varying from 38-100 mm dia specimen.

PC BAESD CONTROL SYSTEM AND CONTROL SOFTWARE

Control system provides the digital control of the motors to apply axial load & pressures, data acquisition etc. for the continuous operation of the system.

a. Signal Conditioning and Control Unit with Transducers

- The multi-channel signal conditioning and control unit should have drive cards that controls the operation of three modules (Load Frame, Confining Pressure Controller and Back Pressure controller) independently to set the shearing strain, Cell and Back pressures.
- Signal conditioning unit also receives the output signal from the various transducers (Load cell, Displacement Transducers, Pressure Transducers and Volume change) and amplifies and process that signal as per the requirement and transfer it to computer through connecting cables where it is accepted by the data acquisition system.
- The readings of Axial Load, Confining Pressure, Back/Pore Pressure, Volume change and Vertical Displacement are directly indicated in the computerized display.
- The Load is displayed in terms of 'kg' with a resolution of 0.1kg; Pressures are in 'kg/cm²' with resolution of 0.01 kg/cm², Displacement in terms of 'mm' with a resolution of 0.01mm and Volume change in 'cc' with a resolution of 0.01cc. Five analog output voltage points for each channel with ground is also provided in the unit.

The following transducers with necessary cables and connections must be supplied with the system for the accurate measurement of various parameters:

- Load Cell – 1000kg (Standard)
- Displacement Transducer - +20mm
- Confining Pressure Transducer – 20kg/cm²

- Pore Pressure Transducer – 20kg/cm²
- Back Pressure Transducer – 20kg/cm²
- Volume Change Transducer – 300cc

b. Computer for Controlling and Data Acquisition

System must be provided with dedicated computer of latest available configuration with built in data acquisition card and wave generator.

Data acquisition card

The PCI Bus advanced data acquisition card provides the following advanced features

- 32 bit PCI- bus
- 16-bit Analog Input resolution (Higher bit resolution up to 24bit)
- Auto Scanning Channel selection up to 16 channels
- Up to 100 KHz A/D Sampling Rates
- 16 Single ended Analog Input channels
- Bipolar Input signals
- Programmable gain of x1, x2, x4, x8, x16
- Input range: +/-10V, +/-5V, +/-2.5 V, +/-1.25V, +/-0.625V
- One 12-bit Monolithic multiplying Analog Output channel
- 16 Digital Output and 16 Digital Input channels
- 4 extended Digital Input and Digital Output channels on the 37 - pin connector
- 3 Independent programmable 16-bit down counters.
- Three A/D Trigger modes: Software Trigger, Programmable Pacer Trigger and - External Pulse Trigger
- Pre-trigger control
- Internal DC-to-DC converter for stable Analog power source

c. Control Software

- Windows based user friendly software must be the integral part of the system for precise controlling & Data Acquisition and analysis
- Capable of testing standard static tests; UC, UU, CU, \overline{CU} , CD, and all types of stress path tests along with isotropic and K₀ consolidation
- On-Line Data Acquisition from Signal Conditioning Unit to Computer
- Programmable Rate of loading, Sample Parameter and data saving interval
- Computer/Software programmable Safety Limits for each load, displacement and pressures and volume
- Independent Taring of each channel
- Facility to Load and Unload the specimen at specified rate
- Facility to hold the loading and restart the loading during the test
- Facility for Inching and release for adjustment of the gap
- Facility to set and maintain the pressure in confining and back pressure controllers independently
- Facility to fill and drain water from the pressure controllers independently
- Facility for Back pressure saturation, consolidation isotropic & Anisotropic
- On-line display of readings of Load, Displacement, Confining pressure, Back/Pore Pressure and Volume Change
- On-line display of Load v/s Time, Displacement v/s Time and Load v/s Displacement graph
- Auto adjustment of graph scales
- Facility to save the data after the test

d. Analysis Software

- Tri-axial Data Analysis Software that does all the calculations of UC, UU, CU, \overline{CU} , CD, and all types of stress path tests along with isotropic and K₀ consolidation.
- Has option for manual as well as automatic recording of data.

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| | <ul style="list-style-type: none">• Calculates dry density, moisture content, void ratio, degree of saturation, 100% saturation moisture content etc.• Evaluates t_{100} and calculates strain rate depending Upon the drainage condition in CD & CU• Display the following Plots (Graphical)<ul style="list-style-type: none">➤ Consolidation curve➤ Stress - Strain Curve for every test➤ Axial Strain v/s Pore Pressure➤ Effective Stress Ratio v/s Axial strain➤ P-q plot➤ Mohr Circles & envelop giving |
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FORMAT FOR QUOTATION SUBMISSION

(In letterhead of the supplier with seal)

Date: _____

To: _____

Sl. No.	Description of goods \ (with full Specifications)	Qty.	Unit	Quoted Unit rate in Rs. (Including Ex-Factory price, excise duty, packing and forwarding, transportation, insurance, other local costs incidental to delivery and warranty/ guaranty commitments)	Total Price (A)	Sales tax and other taxes payable	
						In %	In figures (B)
Total Cost							

Gross Total Cost (A+B): Rs. _____

We agree to supply the above goods in accordance with the technical specifications for a total contract price of Rs. _____ (Amount in figures) (Rupees _____ amount in words) within the period specified in the Invitation for Quotations.

We confirm that the normal commercial warranty/ guarantee of _____ months shall apply to the offered items and we also confirm to agree with terms and conditions as mentioned in the Invitation Letter.

We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

Signature of Supplier

Name: _____

Address: _____

Contact No. _____