

**Technical Specifications for Purchases Exceeding 2.5 Lakhs for the Subsurface Mechanics and Geo-Energy Laboratory under the IoE-CoE**

**Requirement:** Complete set of static triaxial apparatus including triaxial cell, 100 kN loading frame, pressure-volume controller with 20 MPa pressure and 200 cc volume, temperature control unit (both negative and positive temperature), gas pressure control unit (20 MPa), data acquisition system along with software interface. The apparatus should have sensitive internal submersible load cell, pressure transducer, linear actuators, necessary lifting equipment. All associated cables and accessories should be provided. The equipment should be capable of integration with compatible pressure-volume controllers, sensors, temperature control unit, gas-control unit and work in unison using a computer-controlled interface.

The following are the detailed technical specifications.

<b>Sl No.</b>	<b>Specification</b>	<b>Requirement</b>
<b>1.</b>	<b>Digital loading frame with velocity controlled (electro-mechanical)</b>	<b>1 Nos.</b>
i.	Axial load carrying capacity of loading frame	<b>100 kN</b>
ii	Controlled rates of strain	<b>0.00001 to 9.99999 mm per minute</b>
iii	Horizontal daylight	<b>Minimum 500 mm</b>
iv	Vertical daylight	<b>Minimum 800 mm</b>
<b>2.</b>	<b>Environmental triaxial cell</b>	<b>1 Nos. capable of handling pressure and temperature (heat and cool)</b>
i	<b>Triaxial cell capacity:</b> Maximum operating pressure Maximum operating load	<b>20 MPa 250 kN</b>
ii	<b>Temperature range</b>	<b>-20<sup>0</sup> C to +80<sup>0</sup> C</b>
iii	Loading ram diameter	<b>50 mm</b>
iv	Feed through ports in the base of the cell	<b>At least 5 nos.</b>
v	Insulated environmental cell cover	<b>1 Nos.</b>

vi	Cell top mounted internal stainless steel heat exchange coil	<b>1 Nos.</b>
vii	Specimen dimension and pedestals	<b>Maximum diameter of specimen is 100 mm and 200 mm height. Pedestal and top cap set for 100 mm, 70 mm and 50 mm should be included</b>
<b>3.</b>	<b>Advanced pressure volume controller/ positive displacement pump without pulsation (electro-mechanical system)</b>	<b>2 Nos.</b>
i	Pressure	<b>20 MPa with less than 0.1% accuracy for full range (Resolution 2 kPa)</b>
ii	Volume	<b>200 cc with less than 0.1% accuracy for full range (Resolution 1 mm<sup>3</sup>)</b>
iii	Standalone or PC controlled	<b>USB with PC interface</b>
<b>4.</b>	<b>Temperature controller (closed loop remote feedback temperature-controlled system)</b>	<b>1 Nos.</b>
i	Range	<b>-20<sup>0</sup> C to +65<sup>0</sup> C</b>
ii	Temperature probe	<b>PT100</b>
iii	Thermal stability of bath	<b>±0.05<sup>0</sup> C</b>
iv	Water-resistant	<b>Yes</b>
<b>5.</b>	<b>Internal submersible load cell</b>	<b>1 Nos.</b>
i	Load rating	<b>100 kN</b>
ii	Pressure rating	<b>Min 20 MPa</b>
iii	Temperature rating	<b>-20<sup>0</sup> C to +80<sup>0</sup> C</b>
iv	Temperature compensation Temperature effect	<b>-20<sup>0</sup> C to +80<sup>0</sup> C 0.003%/<sup>0</sup> C</b>
v	Load cell adaptors or accessories	<b>If necessary</b>
<b>6.</b>	<b>Displacement transducer (with DIN plug)</b>	<b>1 Nos.</b>

i	Range	<b>±25 mm</b>
ii	Accuracy	<b>Maximum 0.25% of the full range</b>
<b>7.</b>	<b>Pore pressure transducer (with DIN plug)</b>	<b>1 Nos.</b>
i	Pressure range	<b>20 MPa (Maximum)</b>
ii	Accuracy	<b>Maximum 0.1% of the full range</b>
<b>8.</b>	<b>Gaseous pressure controller</b>	<b>1 Nos.</b>
i	Pressure range	<b>20 MPa (Maximum)</b>
ii	Type of gas that can be injected	<b>Compressed air, Nitrogen, Methane</b>
iii	Pressure transducer	<b>20 MPa - 0.1% accuracy at full range</b>
iv	Computer controlled	<b>Yes</b>
<b>9.</b>	<b>Data acquisition (including power and communication cables)</b>	<b>Minimum 16-bit system</b>
i	Number of channel	<b>Minimum 8</b>
ii	Input voltage	<b>±5 volts</b>
iii	Input ranges for each channel	<b>±10V, ±5V, ±1V, ±200mV, ±100mV, ±30mV, ±20mV, ±10mV</b>
iv	RS232 to USB adaptor	<b>Yes</b>
<b>10.</b>	<b>Software</b>	<b>Yes</b>
i	UU, CU, CD testing module	<b>Yes</b>
ii	Independent control of axial stress, axial strain or axial load, radial stress, temperature, back pressure and slow cycles (low frequency cyclic loading) of load, displacement	<b>Yes</b>
<b>11.</b>	<b>Minimum warranty</b>	<b>One year + Two year extended warranty</b>
<b>12</b>	<b>Vendor Eligibility Criteria</b>	The manufacturer/vendor should furnish the list of the customers

		(same equipment) supplied in India or Abroad. The committee will cross check with the customers if necessary. The manufacturer or vendor should have supplied at least 3 such equipment in the past five years. The manufacturer or vendor need to furnish their experience in manufacturing laboratory equipment for geotechnical engineers.
<b>13</b>	<b>Installation</b>	Installation and commissioning support to be provided by the vendor