

**NIQ for UTM of 5 kN capacity**

Sealed quotations in two bids (Technical and commercial in separate sealed envelopes) are invited for Universal Testing Machine (UTM) with **5 kN** capacity load frame for soft material/tissue mechanics testing.

Sl. No.	Description	Tender Specification	
1	Function	1.1	<b>5 kN</b> capacity, computer controlled Universal Testing Machine to carry out static tensile testing, fatigue and cyclic compression, <b>confined as well as unconfined compression</b> on soft tissues, biomaterial or polymeric material. The machine should come with necessary environmental (e.g bio, thermal) chambers and mounting mechanism for in-vitro analysis of biological samples.
		1.2	The machine should be equipped with digitally controlled maintenance free motor driven mechanism.
		1.3	The system shall be provided with software for machine control, data acquisition and data analysis. All of these components should be fully integrated and supported by the vendor.
2	Applications	2.1	The machine should be capable of carrying out static tensile testing, slow fatigue and cyclic compression test in confined as well as unconfined compression mode on soft material like polymer, tissues, biomaterial etc.
		2.2	It will also be good if the machine comes with additional DMA capability for viscoelastic material characterization .
3	Standards	3.1	The machine should comply with all necessary international standards for biomedical applications.
4.	Loading frame	4.1	The machine should have robust construction having single or double column frame which is

		<p>vertically oriented with easy access for the job mounting and dismantling, grips changing, extensometer positioning etc.</p> <p>4.2 It should include a digital closed loop command and feedback motion control system with high performance.</p> <p>4.3 The moving cross head shall be driven by single precision screws with preloaded nuts providing zero backlash.</p> <p>4.4 The vertical distance between the top surface of base platen and to the bottom surface of the moving crosshead shall be at-least 1200 mm at their farthest location.</p> <p>4.5 <b>The load capacity: 5 kN</b></p> <p>4.6 Crosshead Speed range: 0.001-600 mm/min, with a speed accuracy of 0.05% of set speed measured over full speed range. The system should be capable of running the machine at full speed at full load and vice versa.</p> <p>4.7 Return crosshead speed should be atleast 600 mm/min.</p> <p>4.9 The load frame should include and ISO approve bright red emergency stop switch. For safety purposes, the system shall not restart the cross head moving when the emergency stop button is released.</p> <p>5.0 The load frame should come with all the necessary accessories, like base table for providing proper test area, stability etc during experiments.</p>
<b>5. Measurement Transducer</b>		
5.1	Load	Load Measurement through a single <b>500 N capacity</b> and <b>5 kN capacity load cell</b> . Strain gauge load cell for both tension and compression (confined/unconfined) applications.

		5.1.1	Load range 0.2% to 100% of the capacity. Force measurement should confirm ASTM E4, ISO75001, EN 1002, DIN 51221 Standards.
		5.1.2	Load accuracy: should be atleast $\pm 0.5\%$ or better from 1% of the load cell capacity to the full scale capacity and $\pm 1\%$ or better from 0.2% to 1% of the load cell capacity.
		5.1.3	The load cell shall have an over load capacity without permanent zero shift of 150% of the capacity and overload protection of atleast 300% of the rated capacity without mechanical damage.
5.2	Displacement		Displacement measurement through suitable sensors.
		5.2.1	Position accuracy on the crosshead should be atleast $\pm 2 \mu\text{m}$
		5.2.2	Displacement resolution 20 bit or better.
5.3	Strain/Extension	5.3.1	Strain measurements through Non contact extensometer ( <u>video extensometer preferred</u> ) to measure elongation of the specimen upto break.
		5.3.2	Resolution of the extensometer should be $1 \mu\text{m}$ or better for 200 mm field of view, $5 \mu\text{m}$ or better for 1000 mm field of view.
		5.3.3	The extensometer should be good enough to measure large extension of the soft material.
		5.3.4	Stepless change of gauge length is necessary.
		5.3.5	Extensometer should be capable to be used in the temperature bath and along with the bio-chamber.
5.4	Self recognition electronics	5.4.1	Integrated with suitable sensor conditioner card for providing closed loop control and data acquisition capability.
		5.4.2	All transducer available for the system shall include self identification (recognition) electronics in the connector directly attached to

			these transducers which automates the calibration of these devices.
6	<b>Grip/Fixtures</b>	6.1	The machine should have versatile removable grips and fixtures so that it can be changed quickly to meet variable requirements.
		6.2	Pneumatic grips Fmax should be greater than or equal to 200 N, application in temperature bath (submersible)/bio-chamber-double actuating, symmetrical closing of the jaws inserts-temperature range -10...+40 <sup>0</sup> C. Proper pneumatic control unit should come with the system.
		6.3	All the additional compatible grips/fixtures should come with the system to carry out tests to the full capacity of the <b>500 N and 5 kN load cells in ambient temperature for soft polymeric/tissue type material</b> . Grips with both wedge-screw type locking is preferred for preventing slippage.
		6.4	Special compression platen/fixtures should be provided for <b>confined compression</b> test on tissue/soft samples.
		6.5	Grips/fixtures for 3-point bending tests.
		6.6	Grips for <b>shear testing</b> should also be included with the system as an additional option.
		6.7	Compatible grips/fixtures (modular drive) for <b>torsion testing</b> should be included as an additional option.
7	<b>Software</b>		The control software shall be a true graphical user interface meeting all of the Microsoft Windows standards (OS: Windows XP, VISTA or Windows 7)
	7.1 Test Frame Control	7.1.1	The software must have multi levels of user access based on login name and password synchronization of the video capturing, the graphical sequence editor so that test method and sequence can be defined.

		7.1.2	The testing software must be able to perform tensile, compressive (confined and unconfined), cyclic, fatigue and flexure tests as per relevant international test standards.
		7.1.3	System shall be capable of controlling the movement of the crosshead as a function of load, stress, strain in addition to position control
	7.4 Enhanced control		The control software shall be capable of acquiring data at minimum of 500 Hz simultaneously and synchronously across load, displacement and strain channels. Data rates should not be affected by the number of strain channels collected.
	7.5 Data acquisition	7.5.1	Run time screen must be capable of displaying both the real time graph and calculated results of multiple specimens simultaneously.
		7.5.2	Data shall be acquired at a user selectable, continuous rate without gaps.
		7.5.3	A real time X-Y plot of two selected variables shall be displayed. The variable for each axis will be load, stress, extension, and optional strain as selected by user. The available system of units for each axis shall be in Metric, or SI units and will be independently set by the user.
		7.5.4	Test control software must be able to automatically store raw data or calculated results in an ASCII file. Data should be easily exported to other readable file format.
8	Warranty		Three years.

- General condition:**
1. The vendor should have sold this kind (5 kN capacity) of instruments in India before, and should be able to arrange for "on site" demonstration on request. Purchase committee needs the list of the references where the instruments have been sold.
  2. The purchase committee will also give priority to after sell service record of the vendor.

**General guidelines:**

1. Please quote the above item on **FOB** (Freight on Board) mode as per the IIT Delhi policy.

- 2.If the above system is a proprietary item then a Proprietary Certificate should be enclosed.
3. Letter from the manufacturer specifically to quote for this tender is to be attached for authenticity of dealership/ agency and the dealer should be authorized service provider.
4. Vendor should get a fresh certificate directly from their product principal's clearly mentioning about three years warranty of the equipment to be delivered from the date of installation.
5. The lowest quotation however does not depend upon the warranty period.
6. The validity of the quotation should be at-least three months, the vendors will do the **installation, training and demonstration in the IIT Delhi premises without additional charges.**
7. Taxes, terms and conditions should be clearly mentioned.
8. Specifications form should be similar to the given specification sheet.
9. Compliance statement for the required specification should be attached.
10. Payment terms and conditions should be clearly mentioned. No advance payment is encouraged by IIT Delhi.
11. Firm MUST provide a compliance statement vis-à-vis specifications in a “tabular form” clearly stating the compliance and giving justification, if any supported by technical literature with clear reference of page number, paragraph or lines. This statement must be signed, with the company seal, by the tendered for its authenticity and acceptance that any incorrect or ambiguous information found submitted will result in disqualification of the tender. The quotation should be complete in all respects. (as per IIT-Delhi rules).
12. The bidder must be a reputed Original Equipment Manufacturer(OEM) or an authorized local agent.
13. Further, if the Indian agent quotes for the above mentioned item on behalf of the foreign supplier, then the Indian agent should be enlisted with the department of Expenditure, Ministry of Finance (Government of India). Copy of the supporting documents has to be enclosed with the quotation. Further, in the letter it must be clearly stated from the principles that the bidder is an authorized agent.

**The Institute/ purchase committee has the right to accept or reject any bid or all quotations without assigning any reason whatsoever. Sealed quotations in separate envelopes of Technical and Commercial bids kept in one sealed outer envelope (super-scribed “Quotation for UTM”) should be addressed to**

**Dr. Sitikantha Roy,  
Room 243, Department of Applied Mechanics,  
IIT-Delhi, Hauz Khas, New Delhi 110016**

**The quotations should reach the Department of Applied Mechanics , IIT-Delhi by 1200 hrs on November 8th , 2012.**