



**Department of Aerospace Engineering
IIT Kanpur**

Oct 11, 2012

Quotation request notice

Sealed quotations are invited from dealers/distributors by the undersigned for 'Single Column Table top Universal Testing Machine' of following specifications. The quote should be submitted to the Department of Aerospace Engineering, IIT Kanpur by 20.10.2012.

Enquiry No.: IITK/AE/R_Kitey/15

Opening date: 0900hrs, 11.10.2012

Closing date: 1800hrs, 20.10.2012

Single Column Table Top Uniaxial Tensile Testing Machine

Load cell – (i) 5 N (ii) 5 kN

Grips and Fixtures – Mechanical wedge action grips with serrated jaw faces for tension test on polymers and polymer composites, 3-point bend fixtures, Pneumatic grips for single fiber tension test

Crosshead travel – 875 mm or more

Loading rate – 0.05 mm/min to 1000 mm/min

Note: Detailed specifications of load frame and equipment accessories are attached.

Terms & Conditions of the quotations are as under:

1. The quotations should be submitted in the properly sealed envelop, addressed to the undersigned. The enquiry no. and date should invariably be quoted on the top of the envelope.
2. The time allowed for carrying out the above note work is 10 days.
3. The equipment is to be delivered at IIT Kanpur. The quoted price should be inclusive of sales tax and other taxes including freight charges (if any).
4. The quotations shall remain valid for two months from the date of opening.
5. The material should be used as per enclosed approved list of make.
6. The Institute reserves the right of accepting or rejecting any quotations without assigning any reason thereof.

Your early response in this matter would be highly appreciated.

Sincerely,

Dr. Rajesh Kitey

Assistant Professor

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5 kN Capacity Universal Materials Test System Specification

I. GENERAL

The testing instrument shall consist of a 5kN capacity Load frame, a Load weighing system, and Software for machine control, data acquisition and data manipulation. All of these components must be fully integrated and supported by the vendor.

II. MATERIAL TESTING SYSTEM SPECIFICATIONS

This unit shall integrate the following major sub-systems into a complete operating system. The major sub-systems and their specifications are:

A. LOADING FRAME

1. The Single column-loading frame shall be capable of tension, compression, flexure testing. It should include a digital closed loop command and feedback motion control system with a high performance DC permanent magnet brushed servo motor.
2. The frame shall include dual level mechanical limit switches on the front of the frame that prevent the crosshead from traveling too high or too low. The first level switch should stop the crosshead and the second level limit switch should cut the power to the frame.
3. The frame shall include adjustable leveling feet and an integrated graduated measurement scale.
4. The vertical distance between the top surface of the base platen to the bottom surface of the moving crosshead shall be at least 1380 mm for load cells, grips and fixtures.
5. The total height of the load frame shall be a maximum of 1625mm and weight of the machine should be less than 60 kgs.
6. Maximum power consumption should be 300VA.
7. The maximum load capacity shall be at least 5kN
8. The speed range should be 0.05 mm to 1000 mm per minute and shall be settable continuously. The return speed should be 1000 mm/min.
9. The Crosshead Speed accuracy (zero or constant load) should be +/- 0.2% of the set speed.
10. The maximum load at 1000 mm/min shall be at least 5kN.
11. For safety purposes, the frame shall incorporate an auto-frame standby mode that automatically stops the frame when the transducer, interface, or computer is disconnected or shutdown.
12. The frame shall include integrated T-slots on the front and back of both column covers for easy mounting of accessories.
13. The frame must include an operator panel which can be used to run and stop tests at the frame as opposed to through the PC and software.
14. The operator panel shall have up to (4) live displays that are in synch with the testing software live displays as well as (2) shortcut keys that can be used to carry out functions such as balancing load, strain or marking data.

B. LOAD WEIGHING SYSTEM, TRANSDUCERS, & ELECTRONICS

1. The system should be supplied with +/-5kN and +/-5N capacity load cells mounted under its moving crosshead.
2. Load cell and extensometer transducers should include self-identification (recognition) electronics in the connector directly attached to these transducers which automates the calibration of these devices. System should allow for manual calibration of third party transducers also.
3. The machine Electronics should have 19 bit resolution capability. i.e. the load cell of 500 kgs should be able to measure a low load of 0.96 grams
4. The load weighing system accuracy shall be within +/-0.5% of reading down to 1/100th of the load cell capacity for load cells 500N or higher. Digital signal processing of the load signal should be used to achieve this accuracy throughout the entire range without affecting the resolution of the data by having the operator, software, or electronics to perform manual or automated ranging.
5. Any load cell provided shall have 105% over range protection that will stop the frame automatically. For safety purposes, the maximum load for a test should be set by identification electronics located in the connector directly attached to the load cell. .

6. The computer must communicate with the frame through an Ethernet 10/100 Mb/sec interface.

C. SOFTWARE

1. Test frame control

- a) Operator should be able to copy the graphs and result tables from the main screen of the Software through right click of mouse and then paste the same on any Microsoft Office application like Word, Excel etc..
- b) The control software will be a true graphical user interface meeting all of the Microsoft Windows standards.
- c) The software must have multi levels of user access based on his or her login name and password.
- d) The testing software must be able to perform tensile, compression, flexure, peel, tear, friction and simple cyclic tests and include an appropriate calculation list for each type of test.
- e) Digital displays on the computer monitor should show live load, displacement, and optional strain values engineering units that can be selected to be Metric, S.I., U.S. customary. Up to 4 live display windows shall be available for display simultaneously.
- f) The control software shall include set-up of the following: test speed, limits on all channels, automatic calibration and balance of transducers, specimen dimensions, and results tables at a minimum.
- g) An unlimited number of test methods and shall be available for storage and retrieval.
- h) The system shall include an integrated context sensitive help and reference system.
- i) The software shall be user friendly and allow the user to be prompted during testing.
- j) The software shall provide security based on defined user levels with password protection.
- k) The software should include these methods by default:- ASTM D 638, D 695, D 732, D 790, D 882, D 1004, D 1612, D 1708, D 1894, D 3163, D 6272 for plastics
- l) The software should have a intuitive web-like design with simple, memorable icons.
- m) A facility for Set-up and configuration of the display screen and control panel
- n) A facility for Set-up of limits and gain controls
- o) A Facility for User calculation creator for defining custom calculations
- p) Live runtime test plot with automatic scaling and zoom-in/out facility is a must.

2. Data acquisition

- a) Run time screen must be capable of displaying both the real time graph and the calculated results of multiple specimens simultaneously.
- b) The control software shall be capable of acquiring data at 100 Hz across load, displacement, and up to two optional strain channels.
- c) Data shall be acquired at a user selectable, continuous rate without gaps.
- d) Specimen geometry's for each specimen shall include most common geometries.
- e) A real time X-Y plot of two selected variables should be displayed. The variable for each axis will be load, stress, extension, and optional strain 1 as selected by the user. Other graph features will include manual and automatic scaling, legend symbols, to distinguish individual test curves, horizontal and vertical offset between test curves, and selectable number of test curves per display.
- f) Test control software must be able to automatically store raw data or calculated results in an Excel format.
- g) The software shall offer the multiple user inputs:

3. Data manipulation

a) The software shall offer the following calculations:

- Maximum Peak (all available channels)
- Minimum Peak (all available channels)
- Specimen Break Point (all available channels)
- Yield (Zero slope, Offset and Energy at Yield)
- Modulus (Secant, Tangent, Automatic Young's, User-defined Young's, Chord)

- 5 Present Points
 - 2 User Calculations
 - Average Load Between 2 Points based on average load, number of peaks, number of troughs, number of peaks and troughs
 - Channel values at defined limits per cycle
 - The software should have the PDF reporting formats.
- b) The software must include the capability to define correction factors such as machine compliance, slack, pretension, load and gauge length.
- c) The ability to re-analyze past test data using different calculations must be provided.
- d) The software shall allow the user to define the company logo as a part of the method.

D. SERVICEABILITY AND SYSTEM STATUS

1. Factory trained service engineers based in Delhi must be available for additional training or warranty service.
2. The supplier shall install the system and provide basic on-site training for a minimum of one day.
3. Optional advanced on-site training classes shall be available at the customer's location.
4. Vendor should provide the Calibration of the system up to 5 kN Load with ASTM or ISO standards.

E. 5kN GRIP SPECIFICATIONS:-

1. The grip capacity should be at least 5 kN and serrated jaw faces of 25mm wide and 57mm height should be provided with it.
2. The grips should be based on the principle of Wedge Action.
3. It should be able to with stand a temperature ranging from -150 deg C to +250 deg C.
4. The grips should include a Specimen Centering Device.

F. 5N GRIP SPECIFICATIONS:-

1. Grip Capacity should be 5N.
2. Principal of operation should be Pneumatic Action
3. A pneumatic foot switch should be provided with the system.
4. Temperature range: -29 °C to 80 °C (-20 °F to 176 °F).
5. Maximum specimen thickness: 3.96 mm (0.156 in).
6. It should Include 9.5 x 9.5 mm smooth faces for gripping fibers and monofilaments.

G. FLEXURE FIXTURE SPECIFICATIONS:-

1. The Flexure Fixture should have a capacity of 5 kN..
2. It should conform to ASTM/ISO and DIN Standards.
3. Lower Rollers should have an adjustable span distance of up to 190 mm.
4. The Diameter of upper anvil and lower support anvils should be 10mm.
5. It should be able to withstand a temperature range from -100 degrees C up to +350 degrees C.
6. Optional 3 point to 4 point bends test accessories.

H. COMPRESSION PLATES:-

1. Compression platens with Dia 50 mm should be provided.
2. The temperature range should be -70 deg C to +315 Deg C.
3. Hardness should be 55-65 HRC
4. Overall height should not be more than 50mm