

REQUIRED TECHNICAL SPECIFICATION OF COMPUTERIZED UNIVERSAL TESTING MACHINE

(all the conditions should be met)

Key Features:

- The Computerized Universal Testing Machine should have the ability to perform most of the standard mechanical tests (Tensile, Compression, Bend, Flexure, Tear etc.)
- The machine should be capable of testing metals and their alloys, ceramics, composites, polymers and rubber etc.
- The system should have provision for installing an environmental chamber in future.

Mandatory Technical specifications:

Parameters	Values or Notes
Types of tests to be performed	Tensile, Compressive, Bending, Flexure, Peel Adhesion etc.
Materials to be tested	Metals, Alloys, Ceramics, Composites, Polymers and Rubber etc.
Specimen Geometry	The machine should be capable of testing all ASTM and ISO standard test samples (tension, compression, bending, tear, flexure etc.). Equipment should be capable of testing ASTM sub-sized samples as well.
Temperature of testing	<ul style="list-style-type: none"> • Room temperature (tensile, compression, bending, tear, flexure etc.)
Force range	0 to 30 kN or higher
Load Resolution	0.01 kN or better
Load Frame	Double Column Frame
Load cell accuracy	<ul style="list-style-type: none"> • Load cell should have the capability to measure 0 to 30 kN (with a least count of 10 N or lower) • Cell accuracy of $\pm 0.5\%$ over 5 to 100% Load Cell range (for example: For 1.2 kN measurement, accuracy should be minimum ± 6 N)
Position control resolution (Machine resolution)	0.01 mm or better
Position measurement accuracy	± 0.1 mm or better
Cross head travel	1000 mm, from top of bottom plate to bottom of platen
Testing speed range	From 0.1 to 500 mm/min or better
Actuator drive	Digital AC Servo Drive with Servo Motor

Compatibility with test specifications	All the relevant ASTM and ISO standards for material testing should be met.
Safety Features	Emergency Stop, Over Travel Protection
Tension Testing Fixture and platens	Self-tightening Wedge type tensile grip suitable for holding standard tensile samples, 2 Nos. with support fixture (Including LVDT mounting holes) The tensile grips shall be insulated to handle current up to 1500 A current and a maximum temperature of 600°C.
Compression Testing Fixture and platens	50 mm diameter or above, 2 Nos. with support fixture (Including LVDT mounting holes). The platen shall be insulated to resist up to 1500 A current.
Computer with Software	<p>Features:</p> <ul style="list-style-type: none"> • Windows based software should be compatible with the latest version of Windows operating system (Windows 10) and hardware for control of Computerized UTM, Online Data Acquisition to PC and Data Analysis. • Real time display of data, Test curves, • Online/Offline generation of Graphs of Load Versus length, Load versus Displacement, Load vs Elongation, Stress vs Strain, with scaling feature and error analysis. • Comparative study of various test results using features like Multi Graphs, Bar Graphs. • Software password protection. • Test Speed Control and Automatic Return • Database of Test Results • Printing of Test reports for tested Samples • Ability to store test data in files • Statistical analysis of test samples • Comparative analysis using Multi Graphs • Self-recognition and Calibration of Load Cell • User can design and add new tests • Automatic Calculation of Parameters like Percentage Elongation, Peak load, Break load, Displacement, Peak Elongation, Peak tensile Strength, Break tensile strength, Proof stress, Strain, Young's modulus.
Equipment utilization	Should be capable of running up to 24 hrs. daily.
Power Supply (Mains)	220 V AC
Warranty period	<ul style="list-style-type: none"> • Entire machine inclusively all systems/ accessories should be warranted for 24 months from the date of installation/commissioning against all the design, material or

	<p>manufacturing defects.</p> <ul style="list-style-type: none"> • Provision for AMC upon completing the warranty period should be clearly mentioned • Supplier should make at least four free visits to IIT Chennai facility as customer support program during warranty period to train our personnel, carry out calibration and maintenance.
Delivery condition	Equipment to be delivered in test ready, factory calibrated condition to IIT Madras in CIP charges.
Optional Accessories: Accessories for Bending, Tear, Adhesion, Flexure and Peel etc. will be purchased in future	
Extensometer and strain gauge/card	Extensometer with length resolution in range of 0.001-0.01 mm (for a gauge length of 12mm) should be provided.
Bending Fixture	Suitable 3 point bending fixture for flexure measurement/ cross breaking strength with provision for adjustable span. Maximum Load: 30KN
	Suitable Environmental chamber (Testing range: Subzero to elevated temperature, using either induction or radiative heating)

Other requirements (compulsory)

- 1) Supplier must have supplied at least two equipment to any of the centrally funded technical institutions such as IITs and NITs. A documentary evidence of the installations should be provided, preferably in the form of “letter of satisfaction” from the head of the laboratory or Professor in-charge.
- 2) Supplier must provide the details of similar supplied equipment (same make) to the government/semi-government institutions where it is being used successfully. A documentary evidence of the installations should be provided, preferably in the form of “letter of satisfaction” from the head of the laboratory.
- 3) Supplier must provide all the relevant manuals, safety guidelines, and circuit diagrams - Soft copy in .pdf format and 2 sets of hard copies.
- 4) Supplier should provide necessary training to at least 5 persons designated by the customer in all types of testing (as mentioned in “Types of test to be performed” parameter) in IIT Madras upon installation of the equipment.
- 5) A detailed compliance statement needs to be provided by vendors clearly specifying COMPLY/NON COMPLY with remarks of all of the points mentioned in this technical specification document.