

Technical Specification of Universal Testing Machine

S.No.	Technical specifications	IPR Requirement	Compliance
1	Capacity	Up to 100 KN	
2	Test Speed		
2.1	Minimum test Speed	0.01 mm/min	
2.2	Maximum test Speed	500 mm /min	
2.3	Full & Return Speeds	Compatible with above Speed specification	
2.4	Maximum Force at Full Speed	Compatible with Full speed	
3	Dimensions and Features of cross heads of UTM		
3.1	Width	Preferably in the range of 1000-1200 mm	
3.2	Depth	Preferably in the range of 500-600 mm	
3.3	Height	Preferably in the range of 1600-2000 mm	
3.4	Total Crosshead Travel	Preferably in the range of 1200-1400 mm	
3.5	Total Vertical Test Space	Preferably in the range of 1200 mm-1400 mm	
4.	Frame Stiffness	Medium (Higher is preferable)	
5	Data acquisition	AS per ASTM E 1856	
6	Mechanical test to be carried on UTM		
	<ul style="list-style-type: none"> a) Tensile Test b) Compressive Test c) Adhesion Test d) Ductility Test e) Fatigue/ Cyclic Test f) Flexure / Bending g) Shear / Torsion Test 	Must able to performed all mentioned test	
7	Operational condition		
7.1	Test Temperature	Room Temperature	

7.2	Test Humidity	Normal	
8	Display / User Interface		
8.1	Digital Readout / Interface	Must be there	
8.2	Video / Graphic Display	Must be there	
8.3	Computer Interface	Via USB or Ethernet	
8.4	Application Software	Suitable and should be compatible with OS	
8.5	Controlled by PC	Must be there	
9	Strain Measurement System		
9.1	Industry Standards that should be followed and their document Grade/Class Range Limits <ul style="list-style-type: none"> • ASTM E83 • BS 3846 A • ISO 9513 	Must follow any of mentioned standard	
9.2	Accuracy	~ 0.5 μ m	
9.3	Repeatability	~ 0.25 μ m	
9.4	Discrimination/Resolution	0.0004% of range	
10	Force Measurement System		
10.1	Accuracy	~ \pm the larger of 0.5% of reading or 0.01% of capacity	
10.2	Repeatability	~ \pm the larger of 0.25% of reading or 0.005% of capacity	
10.3	Industry standards That should be Followed <ul style="list-style-type: none"> • ASTM E4 • BS 1610 • DIN 51221 • ISO 7500 	Must follow one the mentioned standard	
11	Load frame & Drive System Specifications		

11.1	Lateral Motion	~ ±0.25mm (0.01 in.) maximum over full crosshead travel	
11.2	Speed Accuracy	~ ±0.1% of set speed for all forces within the capacity of the machine when averaged over the larger of 15seconds or 50mm (2 inches)	
11.3	Position Resolution	~ 0.6µm (25 micro inches) standard/ 0.06 µm is optional with high resolution encoder	
11.4	Position Accuracy	The greater of 0.025mm (0.001 in.) or 0.025% of movement	
12	Measuring Units		
12.1	Micrometer type	Reading to 0.001mm (0.00005 in)	
12.2	Calliper type	Reading to 0.01mm (0.0005 in)	
	Dial indicator type	Reading to 0.025, 0.0025 or 0.00025mm (0.001, 0.0001 or 0.00001 in)	
13	Special Features Needed		
13.1	Up gradation facility should be available	Must be there in UTM	
13.2	Automatic program control of load rate, strain rate, and crosshead speed	Must be there in UTM	
13.3	Capable of Performing repetitive cycling for <ul style="list-style-type: none"> • Position, strain or load • Count cycles • Record limits values • Auto shutdown on failure or over-limit values 	Must be there in UTM	
13.4	Wide variety of grips and fixtures	Must be there in UTM	
13.5	Real-time graphic display of Load (or Stress) vs. Extension	Must be there in UTM	
13.6	Automatic Stop or Return following sample break	Must be there in UTM	
13.7	Standard system supports one load and one extensometer input channel	Must be there in UTM	

13.8	Operator-selectable measurement units: English, Metric, SI, or mixed	Must be there in UTM	
13.9	Operator may set any test speed within the capacity of the machine using keyboard entry	Must be there in UTM	
13.10	Limits programmable-position, load or strain	Must be there in UTM	
13.11	Cycle functions programmable-position, load or strain control	Must be there in UTM	
13.12	Digital servo control system – optional encoder, digital signal processor, solid state amplifier. Optional upgrades, customized or “specific-brand”	Must be there in UTM	
13.13	Computer systems should be provided to meet special application requirements	Must be there in UTM	
14	Standard To be followed		
	ASTM E4 - Practices for Force Verification of Testing Machines ASTM E74 - Practice for Calibration of Force Measuring Instruments for Verifying the Force Indication of Testing Machines ASTM E83 - Practice for Verification and Classification on Extensometer Systems ASTM E1012 - Practice for Verification of Test Frame and Specimen Alignment Under Tensile and Compressive Axial Force Application ASTM E1856 - Standard Guide for Evaluating Computerized Data Acquisition Systems Used to Acquire Data from Universal Testing Machines	Must follow all applicable standard relating to UTM and testing of materials	
	ASTM D882 ASTM D1938 ASTM D3330		

	<p>ASTM F904</p> <p>ASTM D952</p> <p>ASTM E 143</p> <p>ASTM E 190</p> <p>ASTM E 9</p>	<p>Must follow all applicable standard relating to UTM and testing of materials</p>	
15	<p>Should be Suitable For mechanical testing of Following Material</p>		
	<ul style="list-style-type: none"> • Stainless Steel • Modified Stainless Steel Such as SS 316,SS 316 LN • Polymers such FRP, Polyamides, Epoxy esters • Different Metals such as Copper, Aluminium alloys etc 	<p>UTM must be suitable for testing all mentioned materials</p>	