

COMPUTERISED UNIVERSAL TESTING MACHINE



Analogue Version of UTM

Electronic Extensometer



Mechanical Extensometer



Computerized Universal Testing Machine

APPLICATION

Universal testing machine have a wide range of application. A number of material and metals in different forms and shapes can be tested for a variety of tension, compression, transverse, bend, shear, brinell hardness, etc. special attachments are also available for testing of flat belts, chain links, wire ropes, etc.

CONSTRUCTION

1) Loading Frame

The base has a hydraulic cylinder at its centre, and two main screws at both ends. The middle cross head is mounted on screws through main nuts. The middle cross head can be moved up or down through chain transmission and geared motor to adjust the initial tensile / compression clearance. On the piston rests an assembly of upper, lower crosshead and two columns. The individually lapped cylindrical piston assembly ensures smooth transfer of force with minimum friction.

2) Hydraulic System

Hydraulic circuit consists of hydraulic power pack having a directly driven radial plunger pump which gives a continuous non pulsating flow of oil pressure upto 250 bar. Oil filter, oil strainer, air breather, oil level indicator, drain plug are on the power pack. A pressure compensated needle type flow control valve is provided to control the oil flow to cylinder thereby achieving desired piston speed. Infinitely variable speeds can be obtained with the help of valves.

3) Electrical System

A separate switch box and electrical panels are provided. Both the hydraulic pump motor and the geared motor have interlocks. Limit switches are provided to stop the hydraulic pump motor if the load increases beyond the machine capacity or if piston stroke is exceeded.

ANALOGUE CONTROL PANEL

1) Load measuring system

The oil pressure in the main cylinder is transferred to the small dynamometer cylinder. The dynamometer piston is kept rotating at a slow speed to ensure dynamic friction condition. The piston exerts a force proportionate to the pressure on the hanger connected to one arm of the pendulum, through an auto range selecting lever system. This force deflects the pendulum. The range selection can be effected by simply turning a knob, provided outside of the panel. An effective damping arrangement is provided to ensure slow return of the pendulum after sudden fracture of the test specimen.

2) Load indicating arrangement

The pendulum lever pushes rack which slides over two pulleys. The rack movement is proportionate to the load. A pinion in engagement movement of the rack rotates and moves the pointer fixed to its shaft. The pointer moves over a large dial indicating the load. A window type dial is provided for easy and clear change of the load range.

3) Recording system

A continuous roll type load elongation recorder is provided for plotting a load- elongation graph. Load is plotted by the horizontal movement of the rack. Elongation is plotted on the vertical axis and is equal to the movement of the main piston elongation ratio of 1:2 and 1:5 can be obtained.

4) Accuracy and calibration

All measuring ranges of the machine are calibrated within an accuracy of $\pm 1\%$ from 20% to 100% of each range as per IS 1828 and BS 1610.

Analogue Universal Testing Machine

COMPUTERISED CONTROL PANEL

1) Load measuring system

The oil pressure in the main cylinder is also transferred to an electronic pressure transducer which gives a proportionate signal to the data acquisition unit. Both, the motor for hydraulic operation and cross head motion controlled by push button and they have interlocks to prevent simultaneous working of the motors. The electrical panel is fixed on the control panel. Displacement measurement is carried out by means of a rotary encoder. Encoder signal is fed to the data acquisition panel to get displacement in mm.

2) Features of data acquisition unit

- A microcontroller based data acquisition system for data acquisition & indication.
- Two 16 characters x 2 lines LCD displays for displaying load & crosshead travel value.
- Auto - detection of over-load, over travel & specimen break. On detection of any of the above conditions, the machine is automatically switched off.
- Load is indicated with resolution of 0.01% of machine capacity for the entire measurement range (in other words with a resolution of 0.04kN for 400Kn model)
- Tare load & reset elongation facilities available.
- Elongation is indicated with a resolution 0.1 mm
- Storage space to store data of off-line test.

3) Feature of win UTM software

1. The Win UTM software can run a variety of mechanical tests, recall data from previous test & prepare test report
2. Menu driven software for easy of use
3. Test reports & graph can be sent directly to the printer via parallel port USB port.
4. Storage & retrieval of test parameters.
5. Display of load elongation (stress & strain are optional) at any instant through out the test.
6. On line display of load Vs elongation or stress Vs strain characteristics during conduction of test. The plot is auto scaled & displayed.
7. Selectable units (kN, Kgf, lbf, mm, inch)
8. Variable sample break detection.
9. Load is indicated with a resolution of 0.01% of machine capacity for the entire measurement range of 2% to 100% of machine capacity.
10. Elongation is indicated with a resolution of 0.1 mm
11. Provision of auto- zeroing of elongation at set pre-load.
12. Tare load and reset elongation facilities available.
13. Auto-detection of over load, one travel and specimen break. On detection of any of these conditions, the machine is automatically switched OFF.
14. High precision sensors and encoders used for load and elongation measurement.
15. Large storage capacity for sloring data (upto 50,000) on the computer.
16. Provision for calculations of parameters such as load and elongation at yield, peak load at break. Yield stress, ultimate stress etc. the parameters to be calculated are user selectable.
17. Test conditions, test data and test results are stored in a specific file based on a unique file structure.
18. Built in facility for printing the test results and test graph from PC. A printer copy of consolidated test results conducted on a particular date can also be obtained. Graph of load Vs Crosshead travel, Load Vs Time, Crosshead travel Vs Time, Load Vs Extension, stress Vs strain etc. are available.
19. Specific software for tensile, compression, shear, bend, TOR-Steel and other tests.
20. If an electronic extensometer is used, then proof stress values (from 0.1% to 1.0%) can be determined.
21. If an electronic extensometer is used, software prompts the user to remove extensometer as soon as proof load is crossed. After removal of extensometer, measurement of crosshead travel by the encoder commences and proceeds till completion of test. A combined auto scaled graph using extensometer and encoder is available.

The on-line plot shows the graph of load Vs extension (using extensometer) and the plot is continued when measurement is through rotary encoder. The extension Vs elongation axis is appropriately scaled automatically.

4) Accuracy and calibration

Every machine is calibrated in accordance with procedure laid down in BS 1610-1964 and 1828-1991. Computerized Universal Testing Machine comply with grade A of BS 1610-1964 and grade 1 of IS 1828- 1991. An accuracy of +/- 1% guaranteed from 2% to 100% of capacity of the machine.

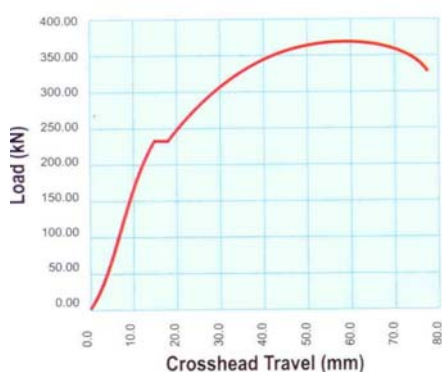
The Computerized Universal Testing Machine is supplied without the necessary computer, its operating system and the printer; but is supplied with requisite software, conditioning system and the interfaces.

LOAD RATE CONTROL

Servo based automatic programmable load rate control which will load the sample at a defined rate upto specified load, keep it constant upto set time and unload at a preset rate.

Specifications :

Capacity		100KN	200KN	400KN	600KN	1000KN	2000KN
Maximum capacity	kN	100	200	400	600	1000	2000
Measuring Range	kN	0-100	0-200	0-400	0-600	0-1000	0-2000
Clearance for tensile at fully descended working piston	mm	50-700	50-700	50-700	50-800	50-850	50-900
Clearance for compression test at fully descended working piston	mm	0-700	0-700	0-700	0-800	0-850	0-900
Clearance between columns	mm	500	500	500	600	750	850
Ram stroke	mm	150	200	200	250	250	300
Straining/piston speeds (at no load)	mm/min	0-300	0-150	0-150	0-100	0-80	0-45
Power 3Phase 415 V 50Hz AC	HP	1.5	1.5	2.5	2.5	4.0	6.5
L X W X H (approx.)	mm	1950 x 800 x 1850	2000 x 800 x 1900	2100 x 800 x 2060	2200 x 800 x 2400	2350 x 800 x 2700	3000 x 800 x 3600
Weight approx.	kg	1300	1400	2300	3200	5100	10000
STANDARD ACCESSORIES							
FOR TENSION TEST Clamping jaws for round specimens diameter	mm	10-20 20-30	10-20 20-30	10-25 25-40	10-25 25-40 40-55	10-25 25-45 45-70	20-40 40-60 60-80
Clamping jaws for flat specimens thickness width	mm	0-10 10-20 50	0-10 10-20 50	0-15 15-30 65	0-15 15-30 70	0-22 22-44 44-65 70	0-20 20-45 45-70 90
FOR COMPRESSION TEST Pair of compression plates of diameter	mm	120	120	120	120	160	220
FOR TRANSVERSE TEST Table with adjustable rollers width of rollers	mm	160	160	160	160	160	200
Diameter of rollers	mm	30	30	30	50	50	70
Maximum clearance between supports	mm	500	500	500	600	800	900
Radius of punch tops	mm	6,12	6,12	12, 16	16, 22	16, 22	30, 40



SAMPLE TEST REPORT

File Name :
 Specimen width = 30.40 mm
 Specimen Thickness = 28.40 mm
 Gauge Length = 131.00 mm
 Pre load Value = 0.0 kN
 Load at yield point = 231.99 kN
 Crosshead travel at yield point = 16.1 mm
 Yield Stress = 268.71N/mm-sq
 Ultimate load = 365.39 kN
 Crosshead travel at ultimate load = 64.1 mm
 Ultimate Stress = 423.22N/mm-sp
 Load at break = 328 mm
 Crosshead travel at break = 76.6 mm
 Test completed due to :
 Tested By : specimen Break
 MMS

Date :
 = 30.40 mm
 = 28.40 mm
 = 131.00 mm
 = 0.0 kN
 = 231.99 kN
 = 16.1 mm
 = 268.71N/mm-sq
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 = 64.1 mm
 = 423.22N/mm-sp
 = 328 mm
 = 76.6 mm
 specimen Break
 MMS

- Wide range accessories offered on request at additional cost. (Load Stabilizer, Shear test attachment, Mechanical extensometer, Brinell Test attachment etc.)
- Due to constant R & D specification and features are subject to change without notice.
- The dimensions given above are approximate.

GATHA Enterprises

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