

## UNIVERSAL TESTING MACHINE

- Loading accuracy as high as  $\pm 1\%$
- Straining at variable speeds to suit a wide range of materials.
- Continuous roll autographic recorder supplied as standard to enable study of the behaviour of materials.
- Motor driven threaded columns for quick effortless adjustment of lower crosshead to facilitate rapid fixing of test specimen.
- High reading accuracy due to large size and design of dial.
- Wide range of standard and special accessories, including load stabilizer.
- Large effective clearance between columns, enables testing of standard specimens as well as structures.
- Easy change from plain to threaded and screwed specimens.
- Simple controls for ease of operation.
- Robust Straining frame of an extremely rigid construction.
- Fully enclosed & protected pendulum.
- Safe operation ensured by means of safety devices.

### APPLICATION:

Aditya Universal Testing Machine is designed to perform tensile, compression, bending and shear tests on metal & other materials, both in the form of test pieces and as finished products.

### PRINCIPLE OF OPERATION

Operation of the machine is by hydraulic transmission of load from test specimen to a separately housed load indicator. The hydraulic system is ideal since it replaces transmission of load through levers & ribs edges, which are prone to wear & damage due to shock on rupture of test piece.

Load is applied by a hydrostatically lubricated ram. The oil pressure in the main cylinder is transmitted to the cylinder of the pendulum dynamometer system housed in the control panel, the dynamometer piston exerts a force proportional to the hydraulic pressure. This force is transferred through a leverage system to a pendulum.

Displacement of pendulum actuates the rack and pinion mechanism which operates the load indicating pointer.

Return movement of pendulum is effectively damped to absorb energy in the event of sudden breakage of specimen.

### Machine comprises of the following:

#### STRAINING UNIT:

This consists of a hydraulic cylinder & piston mounted on a robust base. The loading frame consists of an upper crosshead, middle crosshead and lower table.

The upper crosshead and lower table is connected by means of two plain hard chrome plated columns. The middle crosshead is fitted on two hard chrome plated threaded columns. A reduction gear motor drives the chain and sprockets fixed at the bottom of the threaded columns for height adjustment.

The cylinder and ram is individually lapped to eliminate friction. Axial loading of the ram is ensured by relieving the cylinder & ram of any possible side loading by the provision of ball seatings.

An elongation scale with least count of 1mm is provided for measurement of deformation on various samples.



COMPRESSION TEST (Standard)



ATTACHMENT FOR TENSION TEST FOR SHOULDERED AND THREADED SPECIMENS



CALIBRATION OF MACHINE WITH PROVING RING



TENSION TEST (Standard)



TRANSVERSE TEST (Standard)



ATTACHMENT FOR TENSION TEST FOR WIRE ROPES

Tension test is conducted by gripping the test specimen between the upper and middle crosshead.

Compression, Transverse, Bending Shear and hardness tests are conducted between the middle crosshead and the lower table.

#### CONTROL PANEL:

The control panel consists of a power pack complete with drive motor and oil tank, control valves, a pendulum dynamometer, a load indicator system and autographic recorder.

#### POWER PACK:

The power pack generates the maximum pressure of 200 kgf/cm<sup>2</sup>. The hydraulic pump provides continuously non-pulsating oil flow. Hence the load application is very smooth.

#### HYDRAULIC SYSTEM:

Hand operated wheels are used to control the flow to and from the hydraulic cylinder. The regulation of oil flow is infinitely variable.

Incorporated in the hydraulic system is a regulating valve, which maintains a practically constant rate of piston movement. Control by this valve allows extensometer readings to be taken.

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### PENDULUM DYNAMOMETER:

The oil pressure in the main cylinder actuates the special dynamometer system. Pressurized oil in the loading cylinder pushes up the measuring piston proportionately and deflects the pendulum. The piston is constantly related to eliminate friction. The system has effective damping arrangement to ensure smooth return of pendulum after sudden breakage of test piece. This unit permits selection of favourable hydraulic ratios producing relatively small frictional forces.

### LOAD INDICATING SYSTEM:

This system consists of a large dial and a pointer. Displacement of pendulum actuates the rack and pinion mechanism, which operates the load indicating pointer. The pointer moves over a large dial indicating the load. A dummy pointer is provided to register the maximum load reached during the test. Window type dial is provided for easy and clear changing of load range.

### AUTOGRAPHIC CONTINUOUS ROLL LOAD-ELONGATION RECORDER:

A continuous roll (A strip chart) type load-elongation recorder is provided for plotting load-elongation graph. Horizontal movement of the rack produces load ordinate of the diagram and drum rotation to elongation ordinate. In the ratio of either 1:5 or 1:10.



CALIBRATION OF MACHINE WITH PROVING RING



SHEAR TEST

## ELECTRONIC UNIVERSAL TESTING MACHINE

•Construction: Aditya make electronic Universal Testing machines comprise of

### a. Loading Unit

#### b. Measuring Control Panel:

This includes:

1. Highly precision, sealed and very accurate pressure transducer mounted on the hydraulic pressure line of the loading unit.
2. Highly stable data ACQUISITION system to convert Analogue output of pressure transducer into equivalent Digital Data.

#### Digital Signal Processing Unit:

This is a state of the art, MICROPROCESSOR based signal processor which operates on Digital signal from Data ACQUISITION part and displays the test results on large digital displays. This also handles relevant calculations to get, UTS value, % Displacement, Break load etc.

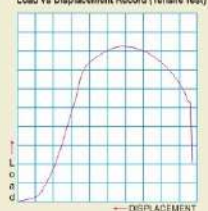
#### 4. Keyboard/Display Panel:

This is ergonomically designed for best interaction between operator and the machine. This incorporates sealed MEMBRANE type keyboard for data feeding & large display for load & displacement. Apart from above a parallel printer port & RS232 serial communication port is also incorporated. Through the printer port a Dot Matrix printer can be attached to get stress / strain curves as well as other test results. RS 232 port can be used for PC interface and hence to add variety of application softwares.

#### ACCURACY AND CALIBRATION:

Aditya Universal Testing Machines are precisely controlled for accuracy and reliable calibration during every stage of manufacture. The machines are calibrated in accordance with B.S.:1510 and I.S.:1828. An accuracy of  $\pm 1\%$  is guaranteed from 20% of the load range selected to full load. Below 20% of the selected range the maximum permissible error is 0.2% of the full load reading.

### Load Vs Displacement Record (Tensile Test)



SI No	:	1
Material	:	Mild Steel
Gauge Length	:	70 mm
Total Length	:	200 mm
Gauge dia	:	14 mm
Thickness	:	0.01mm
Width	:	0 mm
Pre load	:	0.010 kN

Cross sectional Area	:	153.94 mm <sup>2</sup>
Ultimate Load	:	64.57 kN
Ultimate Tensile Strength	:	0.42 kN/mm <sup>2</sup>
Elongation	:	13.5 mm
% of Elongation	:	19.28

### FEATURES : UTE-(H-P BASED)

- Large display for load and displacement.
- RS-232 Com port for Computer Interface
- Centronic Parallel port for Printer/Plotter, Interface.
- Results Include..
  - a) Load vs. Displacement
  - b) Max. Load
  - c) Max. Displacement
  - d) UTS Value
  - e) Proof Stress (with extensometer)
- Data entry through sealed membrane type keyboard.

### FEATURES : UTE-(PC BASED)

- Window based software
- Extensive Graphic Support.
- RDBMS based file handling.
- Variety of software packages.
- Print format of customer's choice.
- Result includes
  - a) Load vs. displacement curve
  - b) max. load, Young's Modulus, 0.1% or 0.2% proof test (with Extensometer), Real time graph etc.

INCORPORATES DESIGN FEATURES TO ENABLE HIGH ACCURACY TESTING - WITH ECONOMY SPEED & VERSATILITY.

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