VERTEX

UNIVERSAL TESTING MACHINE

A Universal testing machine, also known as universal tester, material testing machine and material test frame is used to test the tensile stress and compressive strength of materials. It is named after the fact that it can perform many standard tensile and compression tests on materials, components and structures. Once the machine is started it begins to apply an increasing load on the specimen. Throughout the tests the control system and its associated software record the load and extension or compression of the specimen. Machines range from very small table top systems to ones with even over 53MN capacity

APPLICATION:

VERTEX Universal Testing Machine is designed for testing metals and other materials under tension, compression bending, transverse and shear loads. Hardness test on metals can also be conducted.

FEATURES:

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

PRINCIPLE OF OPERATION:

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

- Load is applied by a hydrostatically lubricated ram. Main cylinder pressure is transmitted to the cylinder of the pendulum dynamometer system housed in the control panel. The cylinder of the dynamometer is also of self-lubricating design. The load transmitted to the cylinder of the dynamometer is transferred through a lever system to a pendulum. Displacement of the pendulum actuates the rack and pinion mechanism which operates the load indicator pointer and the autographic recorder. The deflection of the pendulum represent the absolute load applied on the test specimen.

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

MACHINE CONSISTS OF:

- This consists of a hydraulic cylinder motor with chain and sprocket drive and a table coupled with the ram of the hydraulic cylinder, mounted on to a robust base. The cylinder and the ram are individually lapped to eliminate friction. The upper cross-head is connected to two screwed columns which are driven by a motor. Axial loading of the ram is ensured be reveling the cylinder and ram of any possible side loading by the provision of ball settings.

- An elongation scale with a minimum graduation of 1 mm, is provided to measure the deformation of the specimen.

- Tension test is conducted by gripping the test specimen between the upper and lower cross-heads, Compression, transverse, bending, shear and hardness tests are conducted between the lower cross head and the table.

- The lower cross-head can be raised or lowered rapidly by operating the screwed columns thus facilitating ease of fixing of the test specimen.

CONTROL PANEL:

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

POWER PACK:

- The power pack generates the maximum pressure of 200 kgf/cm2 the hydraulic pump provides continuously no pulsating oil flow. Hence the load application is very smooth.

HYDRAULIC CONTROLS:

- 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.

LOAD INDICATOR SYSTEM:

- This system consists of a large dial and a pointer. A dummy pointer is provided to register the maximum load reached during the test. Different measuring ranges can be selected by operating the range selection knob. An overload trip switch is incorporated which automatically cuts out the pump motor when the load range in use is exceeded.

PENDULUM DYNAMOMETER:

- This unit permits selection of favorable hydraulic ratios producing relatively small frictional forces. Pressurized oil in the loading cylinder pushes up the measuring piston proportionately and actuates the special dynamometer system. The piston is constantly rotated to eliminate friction. The dynamometer system is also provided with an integral damper and ensures high reliability of operation. The load transmitted to the dynamometer is transferred through a pendulum to the load indicator.

AUTOGRAPHIC CONTINUOUS ROLL LOAD-ELONGATION RECORDER:

- This unit is of the pen and drum type and is supplied as standard. The horizontal motion of the pen produces the load ordinate of the diagram and the drum rotation produces the extension ordinates in the ration of either 1:5 or 1:10.

ACCURACY & CALIBRATION:

- AII VERTEX Universal Testing Machines are closely controlled for sensitivity, accuracy and calibration during every stage of manufacture. Every machine is then calibrated over each of its measuring ranges in accordance with the procedure laid down in BS : 1610 : Part 1 :1992 and IS 1828 : (Part 1) : 1991.
- VERTEX Universal Testing Machines comply with Grade "A" of BS : 1610 : Part 1:1992 and class 1 of IS 1828 : (Part1) : 1991 An accuracy of + 1.0% is guaranteed from 20% 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.

TECHNICAL SPECIFICATION:

MODEL	**-**	**UTE-10**	**UTE-20**	**UTE-40**	**UTE-60**	**UTE-100**	**UTE-200**	**UTE-300**
Maximum capacity	kN	100	200	400	600	1000	2000	3000
1st Measuring Range	kN	0-100	0-200	0-400	0-600	0-1000	0-2000	0-3000
Minimum Graduations	kN	0.2	0.4	1	1	2	4	5
2nd Measuring Range	kN	0.50	0-100	0-200	0-300	0-500	0-1000	0-1500
Minimum Graduation	kN	0.1	0.2	0.5	0.5	1	2	2.5
3rd Measuring Range	kN	0.25	0-50	0-100	0-120	0-250	0-500	0-600
Minimum Graduations	kN	0.05	0.1	0.25	0.2	0.5	1	1
4th Measuring Range	kN	0.10	0-20	0-40	0-60	0-100	0-200	0-300
Minimum Graduations	kN	0.02	0.04	0.1	0.1	0.2	0.4	0.5
Clearance for tensile at fully descended working piston	mm	50-700	50-700	50-700	50-800	50-850	50-900	50-900
compression test at fully descended working piston	mm	0-700	0-700	0-700	0-800	0-850	0-900	0-900

Clearance between columns	mm	500	500	500	600	750	850	850
Ram stroke	mm	150	200	200	250	250	300	300
Straining/piston speeds (at no load)	mm/ min	0-300	0-150	0-150	0-100	0-80	0-45	0-50
Connected load	-	-	-	-	-	-	-	-
HP	-	1.3	1.3	2.3	2.5	3.5	6.5	8.5
V	-	400-440	400-440	400-440	400-440	400-440	400-440	400-440
Ø	-	3	3	3	3	3	3	3
Dimension	-	--	-	-	-	-	-	-
L X W X H (approx.)	mm	2032 x 750 x 1960 x	2032 x 750 x 1960 x	2060 x 750 x 2180 x	2065 x 750 x 2534 x	2415 x 815 x 2900 x	3000 x 1200 x 3600 x	3500 x 1900 x 4550 x
Weight approx.	kg	1500	1500	2500	3500	5500	12500	22000
Standard Accessories	-	-	-	-	-	-	-	-
For tension test	-	-	-	-	-	-	-	-
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	0-25 25-50 50-75 100s
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 20-60 60-80	25-50 50-70 70-90
For compression test	mm	-	-	-	-	-	-	-
Pair of compression plates of diameter	mm	120	120	120	120	160	220	220
for transverse test	mm	-	-	-	-	-	-	-
Table with adjustable rollers width of rollers	mm	160	160	160	160	160	200	200
Diameter of rollers	mm	30	30	30	50	50	70	70
Maximum clearance between supports	mm	500	500	500	600	800	900	1000
Radius of punch tops	mm	6,12	6,12	12,16	16,22	16,22	30,40	50,75