

UNIVERSAL STRENGTH MACHINE



OPERATIONAL MANUAL

1 Application

• Universal Strength Machine is used to determine various strengths, such as compression, shear, Tensile, Transverse, splitting and also to measure direct load required to break the specimens and to measure the deformation of the specimen while testing. The range of the machine is as given below –

- 1) Direct load - 300 kg.
- 2) Compression Strength - 15 kg/cm²
- 3) Shear & splitting strength - 12 kg/cm².
- 4) Tensile Strength - 60 kg/cm².
- 5) Transverse Strength - 600 kg/cm².

2 Description

• The Machine consists of a loading frame, motor, loading mechanism, facility to accommodate various accessories and the calibration kit, strength indicator, load cell. Standard accessory consists of compression pad set as standard accessory. The provision is made to accommodate shear, split, transverse, tensile, deformation, and calibration units. (Some boxes also have interface facility with printer, computer. -provided at extra cost).

3 Pre-setting

- Place the machine on plain sturdy platform, near electric supply.
- Level the instrument.
- Check the power supply. Insure with tester that the live terminal is at right side & earthing terminal is properly earthed. (i.e. voltage between Live & neutral & voltage between live and earth should be same).
- Insert the three-pin plug of the instrument in the socket & switch 'ON'.
- Indicator will indicate Co, Sh depending upon the last trails. Co means Compression, SH means Shear.

4 Setting The Parameters

- Press 'SET' key > 'oL 300' (Overload setting is at 300Kg), **Do not change this value.** Press 'ENTER'

Key

- Ⓜ 'In' (Instrument No) (**This only available for comptor interface facility.**) If ok press 'ENTER' key.

To change no use 'Ñ' & 'D' & then press 'ENTER' key.

Following functions are available only to the control box having printer facility

- Ⓜ 'Sn' (Serial no of reading). If ok press 'ENTER' key. To change no use 'Ñ' & 'D' then press 'ENTER' key.

key.

- Ⓜ 'dY' (Date) If ok press 'ENTER' key. To change no use 'Ñ' & 'D' then press 'ENTER' key.
- Ⓜ 'tH' (Month) If ok press 'ENTER' key. To change no use 'Ñ' & 'D' then press 'ENTER' key.
- Ⓜ 'Yr' (Year) If ok press 'ENTER' key. To change no use 'Ñ' & 'D' then press 'ENTER' key
- Ⓜ 'Hr' (Hour) If ok press 'ENTER' key. To change no use 'Ñ' & 'D' then press 'ENTER' key
- Ⓜ 'nt' (Minute) If ok press 'ENTER' key. To change no use 'Ñ' & 'D' then press 'ENTER' key.
- Setting is over & instrument is ready for tests.

5 Procedure To Measure the Compression Strength

- Prepare the standard specimen i.e. 50 mm diameter X 50 mm height with help of Versatile Sand Rammer.
- Insert the compression pads and place the specimen on lower compression pad as shown in sketch.
- Press the mode key on indicator till Co 0.00 appears on control box. If required set '0' by rotating the trimpot on control box.
- Press 'START' key so that loading will start; & the maximum reading in Kg/Cm² can be measured with peak hold facility and automatic unloading will be started. Note down the readings.
- Press 'RST' key to come out of cycle. Now the machine is ready for next test.
- Take 3 readings and average will give the result.

6 Procedure To Measure Shear Strength

- Prepare the standard specimen i.e. 50 mm diameter X 50 mm height with help of Versatile Sand Rammer.
- Insert the shear pads Model VHS in place of compression pads and place the specimen as shown in sketch.
- Press the mode key on indicator till SH 0.00 appears on control box. If required set '0' by rotating the trimpot on control box.
- Press 'START' key so that loading will start; & the maximum reading in Kg/Cm² can be measured with peak hold facility and automatic unloading will be started. Note down the readings.
- Press 'RST' key to come out of cycle. Now the machine is ready for next test.
- Take 3 readings and average will give the result.

7 Procedure To Measure the Split Strength

- Prepare the standard specimen i.e. 50 mm diameter X 50 mm height with help of Versatile Sand Rammer.
- Insert the Splitting pads Model - VSA & place the specimen as shown in sketch.
- Press the 'MODE' key on indicator till SH 0.00 appears on control box. If required set '0' by rotating the trimpot on control box.
- Press 'START' key so that loading will start; & the maximum reading in Kg/Cm² can be measured with peak hold facility and automatic unloading will be started. Note down the readings.
- Press 'RST' key to come out of cycle. Now the machine is ready for next test.
- Take 3 readings and average will give the result.

8 Procedure To Measure the Tensile Strength

- Prepare the standard tensile specimen with help of tensile core box.
- Insert the tensile strength attachment Model-VAS and clamp with the screw provided with the attachment. Adjust the position of the rollers, so that flats of the rollers will touch together as shown in the sketch & insert the specimen as shown in sketch.
- Press the mode key on indicator till 'tE' 0.00 appears on control box. If required set '0' by rotating the trimpot on control box.
- Press 'START' key so that loading will start; & the maximum reading in Kg/Cm² can be measured with peak hold facility and automatic unloading will be started. Note down the readings.
- Press 'RST' key to come out of cycle. Now the machine is ready for next test.

- Take 3 readings and average will give the result. Please note that by default the direct reading is for 22.36 mm C.S. (5 Cm²) Specimen. **For 1"x1" specimen 1.29 multiplier is to be used to get the reading.**

9 Procedure To Measure the Transverse Strength

- Prepare the standard transverse specimen with help of transverse core box.
- Insert the transverse attachment model VTS as shown in the sketch & insert the transverse Specimen.
- Press the mode key on indicator till 'tr' 0.00 appears on control box. If required set '0' by rotating the trimpot on control box.
- Press 'START' key so that loading will start; & the maximum reading in Kg/Cm² can be measured with peak hold facility and automatic unloading will be started. Note down the readings. Take 3 readings and average will give the result.
- Press 'RST' key to come out of cycle. Now the machine is ready for next test.

10 Procedure To Measure the Twin Transverse Shear Strength

- Prepare the standard specimen i.e. 50 mm diameter X 50 mm height with help of Versatile Sand Rammer.
- Insert the twin transverse shear attachment as shown in sketch and place the test specimen in the vertical position between two jaws.
- Press the mode key on indicator till 'Co' 0.00 appears on control box. If required set '0' by rotating the trimpot on control box.
- Press 'START' key so that loading will start; & the maximum reading in Kg/Cm² can be measured with peak hold facility and automatic unloading will be started. Note down the readings. To obtain shear strength in Kg/Cm² i.e. reading on compression scale divided by 2.
- Press 'RST' key to come out of cycle. Now the machine is ready for next test.
- Take 3 readings and average will give the result.

11 Procedure to Measure High Strength -With VUD

- Take the standard specimen i.e. 50 mm diameter X 50 mm height.
- Take high Strength attachment model VUH-D.
- Insert the ball pad in a lower location of universal strength machine as shown in a sketch.
- Lift the attachment and insert the boss of attachment in the upper location of the upper bracket as shown in the sketch. Clamp the same with screw provided.

12 To Check Compression Strength

- Insert the compression pad of the machine having big boss in a lower bracket of the attachment and the special flexible pad provided with the attachment in upper location, insert the compression Specimen in between the pads.
- Tight the upper screw if there is a gap between specimen & upper pad till upper pad just touches to the specimen.
- Press the mode key on indicator till 'Co 0.00' appears on control box. If required set '0' by rotating the

trimpot on control box.

- Press 'START' key so that loading will start; & the maximum reading in Kg/Cm² can be measured with peak hold facility and automatic unloading will be started. Note down the readings. To obtain compression strength in kg/cm². Multiply the noted readings by 4.
- Press 'RST' key to come out of cycle. Now the machine is ready for next test.
- Take 3 readings and average will give the result.

13 To Check Shear Strength

- Use standard shear pad model VHS in place to compression pads.
- Adapt same specimen clamping procedure.
- Adopt the same procedure like compression.

14 Procedure for Calibration of VUD

- Take 'Versatile' calibration kit Model VCU C (B), insert ball pads in the place of compression pads, and insert the kit between pads.
- Press the mode key on indicator till 'di 0.00' appears on control box. If required set '0' by rotating the trimpot on control box.
- Press the 'LOAD' Key till ball pad touches to the kit.
- Put the lever provided at the left side of the machine to disengage position.
- Use 6 mm allen key and rotate screw anti clock wise provided in front of the machine to load the kit gradually.
- Deformation in the dial of calibration kit verses 'direct load' indicated is to be noted and to be compared with the readings provided with the kit. If there is any difference adjust the trimpot provided at the backside of control box by screwdriver.
- Calibration in other modes will be done automatically using the multiplying factors. This can be confirmed by pressing 'MODE' key.

15 Display on Control Box

Co Compression

All instruments.

SH Shear

tE Tensile

tr Transverse

di Direct load

oL Overload

In Instrument No.

Only for computer interface

tran

Data is transferring to

computer

Sn Reading serial No.

Only for instruments having printer interface facility.

dY Date

tH Month

Yr Year

Hr Hour

Nt Minute

16 Keys On Control Box

SET To set various parameters like Date, Year etc....

ESC Escape key, to come out of setting

D To increase the set value

START To start the test.

Ñ To decrease the set value

MODE To select the mode i.e. Compression, Shear etc---

ENT Enter, To accept the change / reading while setting.

O.L. Overload, to see overload settings in various modes.

RST To reset the cycle after test.(ready for next test)

LOAD To load the specimen 'manually'

UNLOAD To unload the specimen 'manually'

17 Indicators On Control Box

L Loading is active

U Unloading is active,

18 Precaution

- Clean the machine after use.
- Protect the Parts from rusting; apply rust preventing oil when not in use.
- Take care of Hands. Do not insert under the plunger.