## Automatic Soil Consolidation Testing Equipment

Ye Chance Design & manufacture materials Testing Equipment.



If you used to experience with the tests for soil consolidation, then you must be inconveniently

- The computer will control the pneumatic pressure weight system without the necessity for pressure-adding counterpoises to automatically change the experimented object weights.
- According to the value reading form experiment requirements, the computer will execute the automatic operation without any further management and also accessible for auto-stop and instrument nullification.
- It is featured with the complete reporting capability permanently available for storage and it is suitable for academic research and engineering quality.

impressed by the chores of regular reading for registering and the counterpoises adding during stage alternation. Such laborious testing equipment has been taken for granted for its adoption in soil consolidation experiments.

With the advancement of computer technology and industry rudimental components, this equipment is mainly framed with computers and programs. Meanwhile, it can also automatically control newly designed indirect pneumatic pressure soil consolidation testing machine with pistons as the power source to replace the counterpoises. The computer-controlling pneumatic pressure system will be the locomotion to thrust pistons. This innovated alternation also downsizes the machine structures considerably. The computer-controlling pneumatic system program, according to the experiment requirements for soil consolidation tests, will control the pneumatic pressure system to output the proper pressure exerting on the tested objects. On the tested objects, they will naturally receive the identical pressure. Their feedback signals, after the programmed calculation, will amend the output commands to make the tested objects comply with the requirements of consolidation experiments.

As for the detecting components, the sagging value caused by consolidation against the tested objects, it can be adopted with the Linear Variable Differential Transformer to detect. The weight of tested objects will be detected with electronic weight components with the contact pressure of 0.05 kg/sq.cm. The weights of each consolidation stage will be respectively 0.125, 0.25, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, 32.0 kg/sq.cm, totally 9 stages. The pressure addition of each weight on initial point and terminal point will be determined by operator's key-in before experimenting.

If the operator is not familiar with the consolidation tests, it will cause the input of irrational figures and the parameters will, referring to the input figures, amend them and display the information in the computer screen after the amendment. After the permission of operator, the program will, according to this information, automatically operate the consolidation instruments. Also, the program is availably operating the stage alternation and pressure addition. The sagging value caused by the weight against the objects will be read and stored into the memory temporarily. After finishing the experiment, it will be stored into disk. The reading duration for each consolidation stage is respectively 4, 10, 20, 40, 90, 180, 360, 900, 1800, 3600, 7200, 14400, 28800, 43200, 86400 seconds, also complying with the requirements of consolidation tests. At east, it is available that the whole process is automatically executed by computer, except the preparation of tested objects, tested object placement onto instruments, and the basic information input. The operator can estimate the completeness durations for experiments to reach for the tested objects on due time.

## System Specification:

Measuring Capability and Component Specification:

Control Interface Circuit: It can automatically control pneumatic pressure consolidation testing machines. Calibration Accuracy: Within +/- 1%

Analogy-Digit Converter: 14 Bit.

Sag Measuring Gauge: 0-10 mm LVDT, 0.0006 mm; auxiliary for a 0-5 VDC output signal amplifier

Load cell: 1000 kgf. 0.061 kgf/div, auxiliary for a 0-5 VDC output signal amplifier

Design Mechanism Load: 1500 kgf.

Operate Load: 0.125 - 32 kgf. /sq.cm.

Operate Manner: Automatic computer control over pneumatic pressure source, auxiliary for the surging wave eliminating system

Loading Release System: Automatic computer control over pneumatic pressure source

The Setting for Pressure Addition Stage: Keyboard Key In

The Setting for Loading Duration: Keyboard Key In

The Stage Number for Pressure Addition or Pressure Release: Automatic computer control over pneumatic pressure source, Automatic Stage Shift: 0.125, 0.25, 0.5, 1, 2, 4, 8, 16, 32 kg/sq.cm.

Re-pressure Test: Automatic computer control over gradual pneumatic pressure release and then adding pressure gradually

Weight Duration for Each Stage: Keyboard setting with the maximum of 1440 minutes.

Weight Release Duration for Each Stage: 240 minutes.

The Reading Duration for Sag Value: According to the setting for duration input, the figure reading durations for each consolidation stage are respectively 4, 10, 20, 40, 90, 180, 360, 900, 1800, 3600, 7200, 14400, 28800, 43200, 86400 seconds.

Contact Pressure: Automatic computer control, 0.05 kg/sq.cm.

Control Circuit: It is adopted with the circuit design of solid type and also fulfills the simultaneous automatic operation consolidation-testing machine controlled by computer.

Valves & Pipeline: Endurable features required no matter in valves or pipelines, 10 kg/sq.cm. above.

Consolidation Testing Machines: Suitable for automatic computer control

**Report Content:** 

The report contents described for each consolidation stage against each tested object respectively:

With the time adjustment manners of square roots, it can depict the graphs of "the correlation between sag value and square root time" and print out below data with text types:

Si (The initial reading for the stage weight beginning to sag.); S0 (The revised origin of sag); Sf (The final reading for the sag within the stage weight); S90 (The 90% consolidation point within the stage weight); t90 (The time for the 90% consolidation reached within the stage weight); Cv (Consolidation Coefficient);

Ri (Initial compress ratio); Rp (Main compress ratio); Rs (Secondary compress ratio).

After the consolidation tests for each testes object, input the soil mass, specific gravity, and moisture density into the computer with the below reports printed out:

e (Pore ratio for each stage weight) av (Compress coefficients for each stage weight)

mv (Volume compress coefficient for each stage weight) The curve diagrams for the correlation between weight and pore ratio

Application Software:

**Operation System: Windows** 

The program dedicated to consolidation tests include:

1)-Automatic execution for consolidation tests

2)-List for test information

3)-The processing and graphing for test information 4)-Setting the data paths for disks

The Chinese software dedicated to automatic consolidation tests: The program is read with dialog boxes for the convenient operation and the capability to execute inspection on systems.

It can operate 4 serial sets of consolidation testing machines simultaneously and automatically read, store, process for data and execute the functions of depicting diagrams so as to satisfy the system requirements of foresaid various measuring and controlling.

Computer System: 2.4GHz Celeron CPU above, 256DDR RAM, 17" LCD Color Screen, 1 set of 80 GB Hard Disk Drive, 1 set of 52X CD-Rom Drive, A4 Color Ink-Injection Printer

Air Compressor: 110 or 220 VAC, it fulfills the requirements of the foresaid equipment.

System Design and Manufacture:



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