

## Product Code

### UTSP-0500 Indoor Cyclic Plate Load Testing Equipment for Base/Subbase

UTEST is well equipped to perform most standard mechanical and materials testing, as well as specialized testing designed to customer's requirements. UTEST is the leading supplier in Turkey of high performance test systems in order to help customers handle research and development processes in their designs and manufacturing processes and to determine the mechanical behavior of materials, products and structures.

UTSP-0500 has been designed basically to perform dynamic, static and quasi-static loading tests on soil and asphalt surface where it is mainly simulating deformation of soil due to the effects of heavy loaded truck wheel. The test system consists of digital control system, software, robust heavy duty box type frame, high speed data logger system, servo-hydraulic actuator and hydraulic power pack. The system can be supplied with dynamic testing capability, also can be modified with appropriate sized servo valve, manifold and hydraulic power unit to suit the particular application.

System has box type floor standing frame where top and sub soil layers are filled, where asphalt, concrete or composite road surface is applied as sample. Frame has detachable blocks at one side to ease loading and unloading soil layers. Frame has needed accessories to place pressure cells and LVDT type displacement transducers for measuring the deformations. An electric motor is placed upon the frame to place actuator X-Y axis according to researchers need.

The machine is equipped with doubled ended, equal area linear actuators. Actuator is mounted on upper part of the system with 250 mm usable stroke length and mounted with manifold attached on it. Servo-valve and accumulators are close coupled in order to improve performance with highest possible response and minimum pressure losses where most accurate test control is achieved. SSI type displacement sensor with 5  $\mu$ m resolution is integrated in the actuators. All dynamic testing systems are equipped with precision fatigue rated load cells where they are mounted on piston's rod end for accurate force measurement and control.

UTEST uses fully digital servo-hydraulic motion controller for displacement and/or force closed loop control of static and dynamic tests. Control loop time is 1 kHz as standard, but can be adjusted to 4 kHz according to application. Data acquisition rate of the controller is standard 100Hz but can be adjusted to 4 kHz if the application's control algorithm can run in this loop time. Effective resolution of analogue channels 19 bit over full  $\pm 10$  V range (18 bit for 0-10V and  $\pm 5$  V, 17 bit for 0-5 V, 16 bit for 4-20 mA).



The hydraulic power units are specially designed for dynamic performance of test systems, which are governed by oil flow and pressure. The series have standard 500kN dynamic force capability at 280 bar (3000 psi on servo-valve – system pressure can be adjusted to any value with rotary accessory) system pressure with standard ratings up to 40 l/min oil flow. For larger oil flows, the unit can be modified to suit customers' requirements. Electrical parts as indicators, system management buttons and controller is involved in the power pack. Bladder type accumulators are supplied with the pack in order to compensate pressure drops while actuator is operating and any pressure losses between the HPU and test station, in order to smooth pump ripples. Oil level, oil temperature, filter's condition and motor temperature are continuously checked by controller and system has necessary interlocks for fault conditions. Factory –set pressure relief valve prevents excessive increases in pressure. Variable-capacity pump ensure maximum electrical efficiency, consuming only sufficient electrical power to maintain the required flow, even during times of reduced flow demand. Compact designed hydraulic power units allow systems configured to control up four systems independently, this means saving valuable floor space in your lab. Installed isolation manifold lets hydraulic power system running multiple test stations, preventing over pressurization, discharging system pressure separately and power isolation of the stations. According to the environment where system is going to be built, air/oil cooler and water/oil cooler is supplied as standard. However alternative closed loop cooler systems can be adapted to unit if customer requests.

### PC SOFTWARE

Cyclic loading test box is controlled by a computer with the free of charge software uDyna. uDyna is flexible and user-friendly windows based application software for both static and dynamic testing. In the software user can create either test methods (dynamic, fatigue or static) or custom test sequences where you can manage to run simple ramp to cyclic waveforms (sine, haversine, trapezoidal, square, triangle etc.), even arbitrary custom motion profiles. Synchronized 100 Hz data transfer from feedback signals supplies detailed recording of running tests. This rate is flexible up to 4 kHz if the application is applicable. Graphical and numeric monitoring is displayed real time in the user interface. Data reduction and peak values recording are running in cyclic tests. Safety limits (pressure and displacement limits) and internal algorithm protect the machine against any fault condition occurred in the system. uDyna always optimizes the control parameters(PID and feed forward terms) during test in order to adapt actuator control to the changing stiffness characteristic of the specimen. The software also includes an easy calibration check facility. The machine gives some constant load values and waits there for easy check mechanism. Furthermore uData and DCS 100-A are also delivered to customer freely, where data analyzing and reporting operations will be handled with uData while data loggers' gathered data will be observed with DCS 100-A.



### Technical Specifications

Control	Standard: Force and displacement closed loop controlled Option : Analogue (strain, stress) channel closed loop controlled
Actuator	Standard: 0.01 to 5 Hz. Frequency , 500 kN static 400 kN dynamic force capacity, 250 mm stroke (±250mm) Option : Different frequencies, force capacities, shorter or longer stroke
Hydraulic Power Pack	Standard: Free standing with air cooling unit, one output channel Option : water/oil cooler, four test station capable
Power Requirements	400 V/AC/50 Hz/ 3 Ph + N + E

Field cyclic plate load test equipment for Base/Subbase Soil is available upon request.