AIR SPRING TESTING SYSTEM

UTEST Air Spring Testing System is designed to verify EN 13913 Railway applications (Rubber suspension components, Elastomer-based mechanical parts) and EN 14817 Railway applications (Suspension components. Air-spring control elements).

The machine is equipped with three doubled ended, equal area linear actuators to generate equal force in both tension and compression in order to test Dynamic Stiffness of the specimens. One 500 kN capacity actuator is mounted on Z axis with 320 mm usable stroke length and other two 20 kN capacity actuators are mounted on X and Y axis with 240 mm usable stroke length. Servo-valves (24 lt/min at Z axis, 5 lt/min at X and Y axis) 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. LVDT type displacement sensor with 5 µm resolution is integrated in the actuators. All dynamic actuators are equipped with precision fatigue rated load cells where they are mounted on piston's rod end for accurate force measurement and control.

Hydraulic power unit is specially designed for dynamic performance of Air Spring testing systems, which are governed by oil flow and pressure. 11 kW motor installed hydraulic unit has selection of low pressure as 50 bars and high pressure 210 bars with standard ratings up to 200 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, safety indicators 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. 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.

The test can be done by regulating air pressure with digital regulator max 10 bar from the computer. The frame has 500 kN capacity. The dimension of the frame is 1400 x 1400 x 3300 mm (l x w x h) and the weight of the frame is 5500 kg.

To verify EN 13913 and EN 14817 the system makes different types of tests.

1. VERTICAL CHARACTERISTICS:

1.1 Load capability [kN] as a function of the pressure
From digital air regulator the pressure of the air changes and the corresponding load is recorded, while position is kept constant.

1.2 Vertical stiffness [n/mm] as a function of the vertical load
The piston is commanded to move +/- 10 mm by the load versus displacement. The vertical stiffness is calculated.

2. HORIZONTAL STIFFNESS IN XY-DIRECTION AS A FUNCTION OF VERTICAL LOAD
At constant load value caused by air pressure, the piston is commended on the X direction 10 mm.

3. FUNCTIONAL CHARACTERISTICS OF THE LAYER SPRING
At constant load value caused by the air pressure , the vertical and diametric deflection on the sample is recorded while the piston is commended on the X direction 10 mm.

4 CREEP [MM] FOR ADDITIONAL LAYER SPRING
Keep the pressure stable and observe displacement under constant load after 24 hours.

5. DYNAMIC STIFFNESS OF THE SYSTEM
The dynamic stiffness is measured with 1 Hz for 3 dimensions. The Y axis moves +/- 40 mm and X axis moves +/- 25 mm and the Z axis moves +/- 2 mm for 50.000 cycles.

The loads are Fz = 110kN and 123.3kN .At frequencies up to 3 Hz under tare load the dynamic stiffness should be under 600N/mm and under full load below 700N/mm