

Laser Leak Test System LTS 200



LTS 200

- very sensitive (10^{-9} mbarl/s)
 - no temperature effects
 - replacement for underwater-bubble-test
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Laser Leak Test System LTS 200

Range of Application

LTS 200 provides completely new possibilities in the field of integral leak testing. Offering a high degree of reliability, the system allows the detection of very small leaks, so far only detectable by manual under-water tests or by helium leak tests. As the temperature of the objects tested has no influence on the measuring process, LTS 200 provides reproducible constant results, even under rough conditions typical of industrial production. Warm as well as elastic parts may reliably be tested for leaks. The fully automatic use of this system permits rejection rates in the low ppm-range, as in contrast to the under-water test no operator-related influences are involved. With a typical measuring time of 1 s, the part-to-part cycle time in a typical test stand is in most cases determined mainly by the choice of peripheral components, e.g. by the size of the vacuum pump. A self-diagnosis module, implemented in the LTS 200, controls and registers each important system parameter. The system is especially suited to control quality and survey production.

Principle of Operation

LTS 200 uses a newly developed principle for the detection of leaks (patent pending). A detection cell (test cell) with windows, situated in the measuring head, is lit up by an especially developed CO₂-laser. The air surrounding a leaking test object necessarily contains the test gas escaped from that object in case of a leak. When it is pumped into the test chamber, certain types of test-gas-specific optical absorption activities take place, which allow a definite detection of the test gas. The signal emanating from the sensor is nearly proportional to the concentration of the test gas in the test cell. As a test gas, commonly the inert gas SF₆ is used. The sensor in the test cell features a dynamic range of over 1000. The individually necessary sensor sensitivity is automatically set by a microcontroller during the calibration of the test object. Even under rough conditions the system is able to distinguish between SF₆ and other gases. Thus soiled or wet parts may be tested.

System Interfaces

LTS200 offers three types of system control:

- manual control by keyboard and LCD-display on the front of the electronic controller
- control by digital I/O-signal (24V / SPS)
- control by serial interface (RS232) and computer, for instance

Each of those three interfaces allows the user to start the measuring process or a calibration. One of sixteen test parameter sets can be selected. The test parameters may be edited manually as well as be loaded by means of the serial interface. All activities of the system and their results are output through the serial interface and therefore may be printed by a printer or monitored by a computer. Thus it is possible to make statistical use of the test data for quality control purposes during the production process and to recall possible disturbances of the production process even after years.

Periphery and Application

For integral leak testing the test object is placed into a test chamber. The inside of the object is filled and pressurized with the test gas. Depending on the size of the object and the leak rate this may also be achieved by using a mixture of air or nitrogen and test gas. The space between the walls of the chamber and the test object together with the test cell is now evacuated. Test gas escaping through a possible leak reaches the test cell of the measuring head and, after ventilating the test chamber, may there be detected. As the measuring of the test gas concentration normally takes place at atmospheric pressure, the vacuum is only necessary to increase the diffusion speed. This ensures a constant concentration of the test gas throughout the test chamber and the test cell independent of the location of the leak. No high vacuum is required, and in most cases an absolute pressure of 10 to 20 mbar will be sufficient and can be obtained by the use of an oiltightened rotary vane pump. Therefore only moderate demands must be made regarding the tightness of the test stand or the test chamber. The system may be connected by simple conventional plastic tubings and quick couplings, as used in the field of pneumatics. Even after flooding the test cell with test gas, e. g. after a gross leak, it can be sufficiently ventilated within a few seconds to be ready for the next measurement.

Technical Specification

Testing method	Integral test
Test gas	Ethene (C ₂ H ₄), N ₂ O, CO ₂ , R134a, Sulfurhexafluoride (SF ₆), Dimethyl-ether and others
Leak rate	ca. 10 ⁻⁹ to 1 mbar l / s
Lowest detectable test gas concentration *)	ca. 1 ppb
Measuring time	1 s
Laser class	1; no safety measures necessary
Self-diagnosis	continuous and automatic

Measuring head:

Size	525 x 240 x 100 mm
Weight	12 kg

Control electronics:

Size	19-inch case or insert; 6HE
Weight	23 kg
Power	230 V; 50 Hz; ca. 200 W
Interfaces	24 V digital I/O; RS 232, Profibus DP

*) Using the test gas SF₆

12/2004

Subject to alterations!