



LEAK TESTER

Leak Tester - ToronMed™ LT01

ToronMed™ LT01 packaging leak tester is a fully automatic, negative-pressure vacuum instrument engineered to evaluate the seal integrity of a wide range of packaging formats, including bags, bottles, cans, boxes, and composite materials. Designed for quality-control laboratories and production environments across the food, pharmaceutical, medical device, and electronics industries, it provides a reliable scientific basis for assessing seal processes and establishing technical acceptance criteria. The instrument accommodates both pre-shipment seal verification and post-stress evaluation following drop or compression testing, making it suitable throughout the entire packaging qualification workflow.

The ToronMed™ LT01 operates on two complementary detection modes. The standard bubble-emission mode submerges the test sample in water within a vacuum chamber and draws down pressure; any headspace gas escaping through a defective seal produces a visible, continuous stream of bubbles that immediately localizes the failure. The gradient mode progressively increases vacuum level, allowing operators to identify the critical leakage pressure threshold of a given sample without prior knowledge of its failure point. Together, these dual detection methods give laboratories a single instrument capable of both go/no-go quality screening and detailed seal-performance characterization.

Hardware design centers on an embedded high-speed microcomputer with a 7-inch high-definition color LCD touchscreen, direct numerical entry for vacuum level and test duration, and automatic pressure compensation that maintains the preset vacuum throughout the dwell period. Up to 50,000 test records are stored internally, with automatic pass/fail judgment and printable data output. The modular, serialized design concept supports multiple vacuum tank sizes, including custom configurations, so the platform scales from small pharmaceutical vials to large flexible pouches without requiring a separate instrument.

APPLICATIONS

Leak Tester - ToronMed™ LT01 Applications

The ToronMed™ LT01 serves quality-control and R&D teams across industries where seal failure carries regulatory, safety, or shelf-life consequences. Typical application areas include:

- Food and Beverage Packaging: seal integrity testing of flexible pouches, vacuum-packed bags, and heat-sealed trays to prevent premature spoilage, contamination, and regulatory non-compliance.
- Pharmaceutical Packaging: evaluation of blister packs, sachets, bottles, and drug-delivery pouches to verify containment integrity per packaging validation protocols.
- Medical Device Sterile Barrier Packaging: testing of sterile-barrier pouches, trays, and composite packs after the sealing process and again after distribution simulation stressing.
- Glass Containers: seal integrity testing of glass bottles, vials, tubes, and jars used in pharmaceutical, laboratory, and consumer-goods packaging.
- Plastic Containers: whole-package leak testing of plastic bottles, tubes, cans, and formed trays across food, personal care, and industrial product lines.
- Metal Containers: seal verification of metal cans, tubes, and closures used in aerosol, food, and specialty-chemical packaging.
- Paper-Plastic Composite Bags and Box Materials: seal performance assessment of multi-layer laminate pouches and carton-based packaging formats.
- Electronic Component Packaging: detection of seal defects in protective enclosures and moisture-sensitive device packaging.
- Writing Instrument Cartridges: seal testing of ink cartridges and pen refills to prevent leakage in storage and transit.
- Post-Stress Packaging Evaluation: re-testing of packages after drop, vibration, or compression tests to confirm that distribution stresses have not compromised seal integrity.



Standards

The ToronMed™ LT01 supports testing in accordance with the following internationally recognized standards for seal integrity and packaging leak detection:

- ASTM D3078 - Standard Test Method for Determination of Leaks in Flexible Packaging by Bubble Emission
- ASTM D4991 - Standard Test Method for Leakage Testing of Empty Rigid Containers by Vacuum Method
- ISO 11607-1 - Packaging for Terminally Sterilized Medical Devices: Requirements for Materials, Sterile Barrier Systems, and Packaging Systems

FEATURES

Leak Tester - ToronMed™ LT01 Key Features

The ToronMed™ LT01 combines precision vacuum control, intelligent data management, and an ergonomic operator interface to deliver a reliable and efficient seal integrity testing platform:

- Dual Detection Method: supports both standard bubble-emission testing and gradient mode in a single instrument, covering both go/no-go screening and threshold characterization without additional equipment.
- Gradient Test Mode: progressively ramps vacuum to automatically locate the critical leakage pressure of a test sample, accelerating development and validation work.
- Class 0.5 Pressure Sensor Accuracy: imported high-speed, high-precision sampling chip maintains measurement error within 0.5% of full scale, satisfying the requirements of ASTM D3078 and comparable standards.
- Automatic Constant-Pressure Compensation: the system continuously monitors and corrects chamber pressure during the dwell period, ensuring each test is conducted at the exact preset vacuum level regardless of sample expansion.
- 7-Inch HD Color LCD Touchscreen: real-time display of test parameters and results with a flat-design user interface, providing a clear, intuitive operating experience.

- Direct Numerical Parameter Entry: vacuum level and test time are entered numerically, eliminating multi-step menu navigation and reducing setup time between samples.
- 50,000-Record Internal Storage: test results are stored with automatic pass/fail judgment; historical records can be reviewed and printed directly from the instrument.
- Automatic Reverse Blow-Off and Unloading: at test completion the instrument automatically vents and releases chamber pressure, simplifying sample removal and streamlining throughput.
- RS232 Communication Port: standard serial interface connects the instrument to a PC or laboratory information management system for data transfer, archiving, and statistical analysis.
- Multi-Level User Permission Management: password-protected login with tiered access levels protects test parameters and data from unauthorized changes.
- Over-Pressure Protection and Power-Off Memory: safety circuit prevents chamber over-pressurization and retains program settings after a power interruption, protecting both the operator and the test sequence.
- Modular Tank System: three standard vacuum tank sizes (300, 400, and 500 series) plus custom square-tank options extend sample accommodation from small medical vials to large flexible pouches without changing the control unit.
- Dual-Voltage Power Supply: AC 220 V / 50 Hz and AC 120 V / 60 Hz compatibility supports deployment in North American and international facilities without a transformer.
- Energy-Saving Design: ultra-low-power-consumption circuitry reduces operating costs and supports laboratory sustainability requirements.

THEORY & METHOD

Theory and Method

Seal integrity testing via the negative-pressure (vacuum) method relies on the differential pressure created when a sealed package containing an internal gas is placed inside a chamber that is then evacuated. As the chamber pressure drops below the package's internal pressure, the pressure gradient across any defect in the seal forces internal gas outward. In the

standard bubble-emission mode, the package is submerged in water before vacuum is applied; escaping gas displaces the surrounding liquid and rises as a continuous stream of bubbles visible through the transparent chamber wall. The location of bubble formation directly identifies the defect site, enabling both pass/fail determination and defect localization in a single test.

The LT01's automatic constant-pressure compensation system maintains the target vacuum level throughout the dwell period by detecting and correcting for minor pressure drift. This is important because package materials expand under vacuum, which can cause small apparent pressure changes unrelated to actual leakage; the compensation circuit distinguishes between these elastic effects and genuine gas flow, improving pass/fail accuracy. Sensor accuracy is rated at Class 0.5, meaning the pressure measurement error does not exceed 0.5% of full scale across the 0 to -90 kPa operating range, ensuring that the vacuum applied to each sample is within the tolerance required by ASTM D3078 and equivalent test protocols.

The gradient test mode incrementally increases the applied vacuum and monitors the pressure response at each step. When a seal begins to fail, the system detects the characteristic inflection in pressure behavior before full bubble emission occurs, recording the critical leakage pressure threshold. This mode is particularly useful during package development and process validation, where the designer needs to understand the safety margin between the working vacuum level and the point of seal failure. Both modes draw on the same dual-sensor detection architecture, with the instrument automatically judging results against preset acceptance criteria and storing each test record for traceability and statistical process analysis.

TECHNICAL SPECIFICATIONS

Leak Tester - ToronMed™ LT01 Technical Specifications

Parameter	Specification
Vacuum Range	0 to -90 kPa
Sensor Accuracy	Class 0.5

Parameter	Specification
Detection Method	Dual detection method (bubble emission + gradient)
Detection Mode	Standard mode / Gradient mode
Vacuum Tank — 300 Series (standard)	φ270 × 210 mm (H)
Vacuum Tank — 400 Series (optional)	φ360 × 585 mm (H)
Vacuum Tank — 500 Series (optional)	φ460 × 330 mm (H)
Custom Tank Options	Custom sizes and square tanks available
Vacuum Holding Performance	Automatic pressure compensation; constant-pressure maintenance
Operation Control	Fully automatic; touchscreen operation
Air Supply Pressure	0.7 to 0.9 MPa (user-supplied compressed air source)
Voltage	AC 220 V 50 Hz / AC 120 V 60 Hz
Main Unit Dimensions (L × W × H)	300 × 385 × 150 mm
Standard 300 Tank Dimensions	φ310 × 355 mm (H)
Net Weight — Main Unit	7 kg
Net Weight — Standard 300 Tank	9.5 kg
Data Storage Capacity	Up to 50,000 test records
Communication Interface	RS232 serial port
Display	7-inch high-definition color LCD touchscreen
Language (Standard)	English
Language (Customizable)	Russian, Traditional Chinese, and others



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