



AIR LEAKPROOFNESS TESTER

The ToronFM™ ALPT Air Leakproofness Tester measures the airtightness of full-face masks used in respiratory protective devices. The tester mounts the mask on one of three interchangeable silicone head forms (large, medium, and small), evacuates the enclosed volume using a built-in vacuum pump, and monitors the resulting pressure differential to determine whether air leaks through the mask body, visor seal, exhalation valve, connector, or head harness interface. The system complies with EN 136, the harmonized European standard for full-face mask performance and testing.

A precision micro-pressure sensor with a measurement range of $\pm 2,000$ Pa detects even very small leaks that would allow unfiltered air to bypass the filter element and enter the wearer's breathing zone. The vacuum pump draws air at a controlled rate of 2 L/min, and a programmable timer (0 to 99.99 s/min/h) allows the operator to set the evacuation and hold duration to match the test procedure specified by the applicable standard. The three silicone head forms replicate the anthropometric variation across the intended user population, ensuring that the mask is tested for seal performance on small, medium, and large face geometries.

The ToronFM™ ALPT is designed for use in safety inspection centers, occupational health and safety laboratories, disease prevention and control centers, fire service equipment testing facilities, and respirator manufacturing quality-control departments. The compact benchtop design requires only a standard electrical outlet and no external compressed air supply.

APPLICATIONS

Air Leakproofness Tester - ToronFM™ ALPT

Applications

The ToronFM™ ALPT supports airtightness testing of full-face respiratory protective devices across manufacturing, certification, and inspection environments.

- Full-Face Mask Manufacturing QC: performs end-of-line leakproofness checks on production full-face masks before shipment, catching visor seal defects, exhalation valve misalignment, and connector gasket failures at the factory.
- EN 136 Type-Testing and Certification: provides the leaktightness test data required for CE marking of full-face masks under the Personal Protective Equipment (PPE) Regulation, supporting Class 1, Class 2, and Class 3 mask certification.
- SCBA Face Mask Inspection: tests the airtightness of self-contained breathing apparatus (SCBA) full-face masks used by fire services, hazmat teams, and industrial rescue squads during periodic inspection and maintenance programs.
- Gas Mask and CBRN Mask Testing: verifies the seal integrity of full-face gas masks and CBRN (chemical, biological, radiological, nuclear) protective masks used by military, law enforcement, and civil defense organizations.
- Occupational Health Laboratory Testing: equips occupational health and safety laboratories with a standardized leak test for evaluating the fit and seal quality of full-face respirators assigned to workers in hazardous environments.
- Third-Party Testing and Inspection: provides independent testing laboratories and notified bodies with a repeatable, instrument-based method for verifying full-face mask airtightness as part of PPE conformity assessment.
- Respirator R&D and Design Validation: allows mask designers to evaluate new seal geometries, visor materials, exhalation valve designs, and head harness configurations for air leakage performance during the development cycle.

Air Leakproofness Tester - ToronFM™ ALPT Standards

The ToronFM™ ALPT supports the leaktightness and inward leakage test requirements of the following international standards for full-face respiratory protective devices.

- EN 136:1998 - Respiratory Protective Devices: Full Face Masks: Requirements, Testing, Marking (Section 7.16 Leaktightness, Section 8.13 Leaktightness Test)
- EN 140 - Respiratory Protective Devices: Half Masks and Quarter Masks: Requirements, Testing, Marking
- EN 148-1 - Respiratory Protective Devices: Threads for Facepieces, Part 1: Standard Thread Connection
- EN 12941 - Respiratory Protective Devices: Powered Filtering Devices Incorporating a Helmet or a Hood: Requirements, Testing, Marking
- EN 12942 - Respiratory Protective Devices: Power Assisted Filtering Devices Incorporating Full Face Masks, Half Masks, or Quarter Masks: Requirements, Testing, Marking
- NIOSH 42 CFR Part 84 - Approval of Respiratory Protective Devices (referenced leaktightness procedures)

FEATURES

Air Leakproofness Tester - ToronFM™ ALPT Key Features

The ToronFM™ ALPT combines precision pressure measurement with multi-size head forms for comprehensive full-face mask leaktightness evaluation.

- **Three Interchangeable Silicone Head Forms:** large, medium, and small head forms cover the anthropometric range required by EN 136, allowing a single instrument to test the seal performance of each mask size across the intended user population.
- **Precision Micro-Pressure Sensor ($\pm 2,000$ Pa):** detects very small pressure differentials caused by minor leaks through visor seals, valve seats, connector threads, and body joints that would compromise the mask's protection factor.
- **Built-In Vacuum Pump (2 L/min):** an integrated vacuum pump provides the air source for the leak test without requiring an external compressed air or vacuum supply, simplifying installation and reducing bench space.
- **Programmable Timer (0 to 99.99 s/min/h):** the operator sets the evacuation duration, stabilization period, and hold time to match the test procedure specified by the applicable standard or the manufacturer's internal protocol.
- **Silicone Head Form Material:** the head forms are manufactured from medical-grade silicone that replicates the compliance and surface friction of human skin, providing a realistic seal interface for accurate leak detection.
- **Compact Benchtop Design:** the self-contained unit requires only a standard electrical outlet (220 V / 50 Hz or 110 V option), no external air supply, and minimal bench space, fitting into existing QC lines and laboratory workstations.
- **Multi-Standard Compatibility:** the adjustable timer and pressure measurement range accommodate the leaktightness test procedures of EN 136, EN 140, EN 12941, EN 12942, and NIOSH 42 CFR 84.

THEORY & METHOD

Theory and Method

Air Leakproofness Tester - ToronFM™ ALPT

The leaktightness test evaluates whether the assembled full-face mask forms an airtight seal when mounted on a standardized head form. Any leak path through the mask body, visor-to-body joint, exhalation valve seat, inhalation valve seat, connector thread, speech diaphragm, or head harness attachment point would allow unfiltered ambient air to enter the wearer's breathing zone during actual use. Detecting and quantifying these leaks before the mask leaves the factory or enters service is essential for ensuring that the mask provides its rated protection factor.

The ToronFM™ ALPT positions the mask on a silicone head form that replicates the shape and compliance of a human face. The operator selects the appropriate head form size (large, medium, or small) to match the mask size being tested. The vacuum pump then evacuates the space inside the mask at a controlled rate of 2 L/min, reducing the internal pressure below ambient. The micro-pressure sensor measures the resulting pressure differential ($\pm 2,000$ Pa range). If the mask is perfectly sealed, the pressure differential stabilizes and holds; if there is a leak, air flows inward through the leak path and the pressure differential decays over time.

EN 136 specifies that the mask shall be tested for leaktightness before and after conditioning (temperature cycling, cleaning, and mechanical stress). The standard defines acceptance criteria based on the measured air flow rate or pressure decay during a specified hold period. By testing on three different head form sizes, the operator verifies that the mask seals effectively across the range of facial dimensions it is designed to fit, rather than relying on a single nominal geometry.

TECHNICAL SPECIFICATIONS

Air Leakproofness Tester - ToronFM™ ALPT Technical Specifications

Parameter	Specification
Model	ToronFM™ ALPT
Air Source	Built-in vacuum pump
Test Head Forms	3 (large, medium, small — silicone material)
Micro Pressure Range	±2,000 Pa
Timer	0 to 99.99 s/min/h (programmable)
Pumping Rate	2 L/min
Power Supply	220 V / 50 Hz (110 V option available)



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