

3-STATION THERMAL SHRINKAGE TESTER



3-Station Thermal Shrinkage Tester - ToronFST™ 14616

Shrink Force, Contracting Force and Shrinkage Ratio Tester

The ToronFST™ 14616 is a shrink force tester that measures the shrink force, contracting force, and shrinkage ratio of heat-shrinkable films. A heated hood raises the specimen to a set temperature while a load cell records the force the film generates as it tries to shrink, and a sensor tracks the dimensional change. Three independent stations test three specimens at once.

The ToronFST™ 14616 heats specimens over a room-temperature to 260°C range with $\pm 0.3^\circ\text{C}$ control, and a 100N load cell resolves shrink and contracting forces to 0.05% of full scale. The shrinkage-ratio measurement spans 100 mm at 0.1 mm resolution. Oil-free operation keeps specimens clean, and one-click testing runs the full sequence automatically.

Force and ratio curves display for single or multiple stations, so operators can compare films through the heating cycle. The bundled software handles data analysis and output, and the embedded system supports remote maintenance. The ToronFST™ 14616 (Shrink Force, Contracting Force, and Shrinkage Ratio Tester) suits shrink-film, shrink-sleeve, stretch-film, and battery-separator labs.

APPLICATIONS

3-Station Thermal Shrinkage Tester - ToronFST™ 14616 Applications

The ToronFST™ 14616 measures the thermal shrink behavior of heat-shrinkable films across packaging and industrial uses.

- **Heat-Shrink Films and Wraps:** measures the shrink force and shrinkage of shrink wrap and overwrap films.
- **Shrink Sleeve Labels:** characterizes the shrink force and ratio of sleeve-label films for consistent application.

- **Stretch and Blown Films:** measures the shrink behavior of stretch and blown films.
- **Battery Separator Films:** tests the thermal shrinkage of separator films, where shrinkage affects cell safety.
- **Shrink Bundling and Pallet Films:** verifies the contracting force of bundling and pallet-wrap films.
- **Film Development and Formulation:** supports development of shrink films by quantifying force and ratio.
- **Extrusion and Orientation Process Control:** monitors how process settings affect shrink behavior.
- **Quality Control:** verifies shrink performance against specification batch to batch.



Standards

The ToronFST™ 14616 is designed to align with internationally recognized standards for shrink force and shrinkage testing of heat-shrinkable films.

- ISO 14616 - Plastics: Heat-Shrinkable Films of Polyethylene, Ethylene Copolymers, and Their Mixtures: Determination of Shrinkage Stress and Contraction Stress
- DIN 53369 - Determination of the Shrinkage Stress and Shrinkage Force Behavior of Plastic Films

FEATURES

3-Station Thermal Shrinkage Tester - ToronFST™ 14616 Key Features

The ToronFST™ 14616 measures shrink force, contracting force, and shrinkage ratio across three independent stations.

- **Shrink Force, Contracting Force, and Shrinkage Ratio:** measures all three shrink properties on one instrument.
- **Three Independent Stations:** each station runs a full force and ratio test on its own for higher throughput.
- **Heated Hood to 260°C:** a hood heats specimens over a room-temperature to 260°C range with $\pm 0.3^\circ\text{C}$ control.
- **High-Accuracy Force Measurement:** a 100N load cell resolves shrink and contracting forces to 0.05% of full scale.
- **Precise Shrinkage-Ratio Measurement:** a 100 mm range at 0.1 mm resolution captures the dimensional change.
- **Force and Ratio Curves:** single and multiple-station curves show how films behave through the heating cycle.
- **One-Click Testing:** a single command runs the full test sequence and displays results automatically.
- **Oil-Free Operation:** clean, oil-free operation avoids contaminating the specimens.
- **Analysis Software:** bundled software handles data analysis, curves, and output.
- **Remote Maintenance:** the embedded system supports remote maintenance and firmware upgrades.
- **RS232 Communication:** a serial port connects the instrument to the control PC.

THEORY & METHOD

Theory and Method

Heat-shrinkable films are stretched during manufacture and hold that orientation until heat releases it. When the film is heated, it tries to return toward its original dimensions, which produces two measurable effects: a change in length if the film is free to move, and a force if the film is held. This instrument measures both.

For shrink force, the specimen is clamped at a fixed length and heated in the hood. As the film tries to shrink against the fixed grips, it generates a shrink force, and a load cell records how that force rises and falls with temperature and time. Contracting force is measured the same way as the film contracts under heat.

For shrinkage ratio, the free dimensional change is measured as the film shrinks, and the result is the percentage reduction in length. A hood heated to a set temperature applies the heat evenly, and three stations run independently so several specimens are tested together. Force and ratio curves show how each film behaves through the heating cycle.

TECHNICAL SPECIFICATIONS

3-Station Thermal Shrinkage Tester - ToronFST™ 14616 Technical Specifications

Parameter	Specification
Force Range	100 N (standard)
Force Accuracy	0.05% of full scale (max)

Parameter	Specification
Shrinkage-Ratio Range	100 mm
Shrinkage-Ratio Accuracy	0.1 mm
Hood Temperature	Room temperature to 260°C
Temperature Accuracy	±0.3°C
Sample Size	Width 15 mm; length > 100 mm
Work Stations	3, independent
Gas Source	0.1 MPa to 0.8 MPa (clean, oil-free air)
Gas Interface	Ø8 mm
Dimensions	590 mm (L) × 385 mm (W) × 435 mm (H)
Voltage	AC 220 V, 50 Hz (others optional)
Net Weight	61 kg

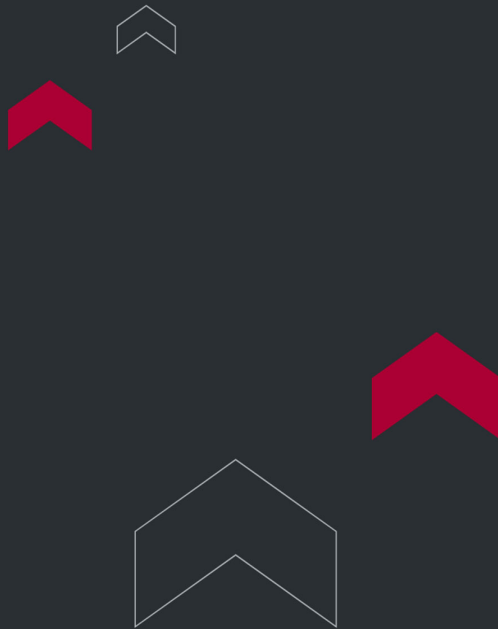
Standard Delivery

Item	Description
Main Unit	Three-station thermal shrinkage and shrink-force instrument
Computer	Dedicated control PC
PCIe Acquisition Card	Data acquisition interface for the control PC
Control Software	Shrinkage-analysis and reporting software
Communication Cable	Connects the instrument to the control PC

Item	Description
Precision Pressure Regulator	Regulates the air supply pressure
Sample Cutter (15 mm)	Prepares 15 mm specimens

Optional Accessories

Item	Description
Gas Super Filter	Additional filtration for the air supply
Printer	Prints test reports



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