

FIRE HOSE HOT AIR AGING CHAMBER



Fire Hose Hot Air Aging Chamber - ToronFT™ FH-HA

ToronFT™ FH-HA is a Fire Hose Hot Air Aging Chamber designed for accelerated thermal aging evaluation of fire hoses and fire hose materials. By exposing fire hose specimens to elevated temperatures in a controlled hot air environment for defined periods, the instrument simulates the long-term thermal degradation that fire fighter hose experiences during storage, deployment near heat sources, or prolonged service in high-temperature environments — providing a reproducible, accelerated assessment of the fire hose's remaining service life and thermal resistance.

The ToronFT™ FH-HA features a large 1,000-liter (1,000L) test chamber with internal dimensions of 140 cm (width) × 85 cm (height) × 85 cm (depth), accommodating long fire hose specimen sections and multiple test samples simultaneously. An electric heating system with 9 kW installed power raises and maintains the chamber temperature across a range from room temperature to 200°C, with center temperature uniformity of $\pm 1.0^{\circ}\text{C}$ at 100°C — ensuring that all specimens within the chamber are exposed to the same thermal environment throughout the aging cycle.

APPLICATIONS

Fire Hose Hot Air Aging Chamber - ToronFT™ FH-HA Applications

The ToronFT™ FH-HA Fire Hose Hot Air Aging Chamber is used in fire hose material qualification, service life assessment, and performance degradation research across the following areas:

- Fire hose thermal aging performance qualification: evaluation of lined fire hose and fire fighter hose material durability under accelerated thermal exposure for standard certification programs
- Fire hose rubber compound and polymer formulation testing: accelerated aging assessment of new rubber, thermoplastic, or composite fire hose materials and formulation variants
- Fire hose storage degradation simulation: accelerated thermal exposure to simulate the effect of long-term storage at elevated ambient temperatures on fire hose performance

- Fire hose service life assessment: thermal aging trials to support service life recommendations and periodic replacement interval specifications for fire fighter hose in service
- Fire hose material research: systematic thermal aging studies for fire hose liner, jacket, and coupling seal materials in academic and industrial R&D programs
- Manufacturing quality control: hot air aging performance verification as part of production-batch release testing for fire hose products



FEATURES

Fire Hose Hot Air Aging Chamber - ToronFT™ FH-HA Key Features

The ToronFT™ FH-HA hFie Hose Hot Air Aging Chamber delivers a purpose-built combination of large chamber volume, precise temperature control, and uniform heating for reliable fire hose thermal aging testing:

1. Large 1,000-Liter Test Chamber

The 1,000-liter chamber (140 cm wide × 85 cm high × 85 cm deep) accommodates long fire hose specimen sections and multiple samples simultaneously, enabling efficient batch testing of fire fighter hose specimens at a single aging temperature and exposure time.

2. Wide Temperature Range — Room Temperature to 200°C

The apparatus operates from room temperature (RT) to 200°C, covering the full range of aging temperatures specified in fire hose thermal performance and rubber aging standards, including the 70°C, 100°C, 120°C, and 150°C test temperatures commonly referenced in NFPA 1961, UL 19, and ISO rubber aging standards.

3. High Temperature Uniformity — $\pm 1.0^{\circ}\text{C}$ at 100°C

Center temperature uniformity of $\pm 1.0^{\circ}\text{C}$ at 100°C ensures that all fire hose specimens within the chamber — regardless of position — are exposed to the same thermal aging environment, producing comparable aging results across all specimen locations in a single test run.

4. 9 kW Electric Heating System

The 9 kW electric heating power provides rapid chamber heat-up from ambient to the target aging temperature, minimizing the time required to reach thermal equilibrium before the timed aging cycle begins and ensuring consistent start conditions for each test run.

5. Forced Air Circulation

Forced hot air circulation within the chamber distributes heat uniformly throughout the test volume, maintaining temperature uniformity across the chamber cross-section and eliminating localized temperature gradients that could produce inconsistent aging exposure across the specimen array.

6. Compliant with International Rubber and Fire Hose Aging Standards

The instrument's temperature range, uniformity specification, and chamber design are aligned with the requirements of NFPA 1961, UL 19, ISO 188, ASTM D573, and EN 14540, supporting test programs that require data to be submitted against these internationally recognized fire hose and rubber aging standards.

THEORY & METHOD

Theory and Method

Hot air aging testing subjects fire hose specimens to a thermally controlled environment at elevated temperatures for a specified exposure duration. Elevated temperature accelerates the thermal and oxidative degradation mechanisms — chain scission, crosslink breakdown, plasticizer volatilization, and surface oxidation — that occur in rubber, polymer, and textile fire hose materials over time in service. The rate of thermal aging follows Arrhenius behavior, allowing the accelerated aging exposure at elevated temperature to be correlated to equivalent service life at lower ambient temperatures using established polymer aging models.

In the ToronFT™ FH-HA, fire hose specimens are placed within the chamber and the temperature is raised to the specified aging temperature. Forced air circulation within the chamber ensures uniform temperature distribution across all specimen locations, maintaining the $\pm 1.0^{\circ}\text{C}$ temperature uniformity at 100°C across the full chamber volume. After the specified aging exposure period, the fire hose specimens are removed and subjected to the relevant post-aging performance tests — such as pressure burst, elongation, kink resistance, or surface cracking inspection — to quantify the extent of thermal degradation

relative to unaged control specimens.

TECHNICAL SPECIFICATIONS

Fire Hose Hot Air Aging Chamber - ToronFT™ FH-HA Technical Specifications

Parameter	Specification
Model	ToronFT™ FH-HA
Application	Hot air aging test of fire hoses and fire hose materials
Chamber Volume	1,000 L (1,000 liters)
Chamber Internal Dimensions	Width 140 cm × Height 85 cm × Depth 85 cm
Electric Heating Power	9 kW
Temperature Range	Room temperature (RT) - 200°C
Temperature Uniformity	±1.0°C at 100°C (center of chamber)
Heating Method	Electric heating with forced air circulation



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