TORONTECH

VERTICAL FURNACE

Vertical Furnace for Fire Resistance Testing of Fire Doors, Rolling Shutters, and Fire Dampers — ToronFT™ VF

ToronFT™ VF Vertical Furnace for Fire Resistance Testing is a large-scale fire resistance test furnace engineered for the fire resistance limit testing of vertical partition members — including fire doors, rolling shutters (fire shutters), fire windows, fireproof glass assemblies, aluminum alloy doors and windows, and fire dampers — that have lost their structural integrity and thermal insulation capability under fire conditions.

Designed for a service life exceeding 15 years, the ToronFT™ VF is constructed using American GOVMARK technology and features a five-layer furnace wall architecture that delivers the extreme temperature conditions, structural stability, and thermal uniformity required for standard-compliant fire resistance qualification testing.

The vertical fire resistance test furnace accommodates fire doors, rolling shutters, fire windows, fireproof glass, and fire dampers for simultaneous or individual evaluation, making it one of the most versatile fire resistance test furnaces available for building product qualification laboratories.

APPLICATIONS

Vertical Furnace for Fire Resistance Testing of Fire Doors, Rolling Shutters, and Fire Dampers — ToronFT™ VF Applications

- Building product manufacturers: fire resistance limit testing of fire doors, rolling shutters, fire shutters, and fire dampers for product certification
- Third-party fire testing laboratories: fire resistance performance qualification per ISO 834, ASTM E119, UL 10C, and related international standards

- Fire windows and fireproof glass manufacturers: integrity and thermal insulation performance testing under standard fire exposure
- Aluminum alloy door and window manufacturers: fire resistance qualification for building code compliance
- Standards and regulatory bodies: fire resistance performance data generation for building product approval programs


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FEATURES

Vertical Furnace for Fire Resistance Testing of Fire Doors, Rolling Shutters, and Fire Dampers — ToronFT™ VF Key Features

- Designed for fire resistance limit testing of fire doors, rolling shutters, fire shutters, fire windows, fireproof glass, aluminum alloy doors/windows, and fire dampers — all in one versatile furnace
- Service life: greater than 15 years — long-term investment for certification laboratory infrastructure
- Constructed using American GOVMARK technology for proven, internationally recognized furnace design standards
- Five-layer wall construction (outside to inside): steel structure frame, red brick, fire-resistant high-temperature asbestos, refractory brick, zirconium-containing fire-resistant high-temperature cotton
- Inner temperature capability: up to 1300°C — with normal outer temperature maintained at ambient
- Consumable inner insulation layer (zirconium-containing high-temperature cotton): easy to replace, extending furnace service life
- Refractory bricks: max use temperature 1750°C; long-term high-temperature resistance 1600°C; volume density 1.0 g/cm³; compressive strength > 3.2 MPa
- Thermal conductivity of refractory bricks: better than 0.4 W/m·K at 1400°C
- High-temperature cotton inner insulation: 50 mm thickness, long-term refractory temperature 1600°C — industrial furnace grade material
- Industrial refractory adhesive bonding: rated operating temperature 1400°C for all bonded interfaces

THEORY & METHOD

Theory and Method

Fire resistance testing subjects a full-scale specimen of the building element (fire door, rolling shutter, fire window, etc.) to a standardized time-temperature fire curve applied by the furnace on one face of the specimen. The test evaluates three key performance criteria: integrity (resistance to the passage of flames and hot gases), thermal insulation (resistance to excessive temperature rise on the unexposed face), and load-bearing capacity where applicable.

The ToronFT™ VF achieves the standard fire curve using high-temperature combustion within the furnace chamber, maintained by refractory materials that retain and distribute heat uniformly across the specimen surface. The five-layer wall construction — steel frame, red brick, fire-resistant and high-temperature asbestos, refractory brick, and zirconium-containing high-temperature cotton (50 mm thick, rated to 1600°C) — provides the thermal mass and insulation required to sustain temperatures up to 1300°C at the inner surface while maintaining safe outer temperatures. Refractory bricks are rated to 1750°C maximum use temperature and 1600°C long-term high-temperature resistance.

TECHNICAL SPECIFICATIONS

Vertical Furnace for Fire Resistance Testing of Fire Doors, Rolling Shutters, and Fire Dampers — ToronFT™ VF Technical Specifications

Parameter	Specification
Model	ToronFT™ VF
Test Applications	Fire doors, rolling shutters, fire shutters, fire windows, fireproof glass, aluminum alloy doors/windows, fire dampers
Furnace Technology	American GOVMARK technology
Design Service Life	> 15 years
Furnace Wall Layers	5-layer (steel frame / red brick / fire-resistant asbestos / refractory brick / high-temperature cotton)
Maximum Inner Temperature	1300°C (inner layer)

Parameter	Specification
Inner Insulation Material	Zirconium-containing fire-resistant high-temperature cotton, 50 mm thick
Inner Insulation Long-Term Rating	1600°C
Refractory Brick Max Use Temp	1750°C
Refractory Brick Long-Term Rating	1600°C
Refractory Brick Volume Density	1.0 g/cm³
Refractory Brick Compressive Strength	> 3.2 MPa
Refractory Brick Thermal Conductivity	< 0.4 W/m·K (at 1400°C)
Refractory Adhesive Rating	1400°C operating temperature

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