

IEC 60332-1 Single Cable Flame Propagation Tester

Cable Flame Test Chamber for Vertical Flame Propagation Evaluation



Standards: IEC 60332-1-1, IEC 60332-1-2, IEC 60332-1-3 (Vertical flame propagation for single cable)

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1. Product Overview

The KingPo IEC 60332-1 Single Cable Flame Propagation Tester is used to assess the vertical flame propagation performance of a single insulated wire, cable, or optical fibre cable. It applies a calibrated 1 kW pre-mixed propane-air flame to the lower portion of a vertically mounted specimen and evaluates flame spread, afterflame behavior, and the production of flaming droplets or particles.

This test determines the fire performance of cables in vertical installations, helping manufacturers verify that cables can limit flame propagation for product development, quality assurance, and compliance with international safety standards.

2. Applicable Standards

- **IEC 60332-1-1** — Tests on electric and optical fibre cables under fire conditions – Part 1-1: Test for vertical flame propagation for a single insulated wire or cable – Apparatus
- **IEC 60332-1-2** — Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame
- **IEC 60332-1-3** — Part 1-3: Procedure for determination of flaming droplets/particles

3. Test Purpose

The purpose of this test is to evaluate the resistance of a single vertical insulated wire, cable, or optical fibre cable to flame propagation. A standardized 1 kW pre-mixed propane-air flame is applied to the lower section of the vertically mounted specimen for a duration determined by the cable's overall diameter.

After flame removal, the test records charring or flame spread along the cable, afterflame duration, and flaming droplets or particles. This assesses the cable's fire performance and ability to limit vertical flame spread, especially for cables in vertical risers, shafts, and building applications.

4. Key Features

- **Precise 1 kW Pre-mixed Flame** — Brass burner with $\Phi 7 \pm 0.05$ mm opening and accurate gas flow control (Propane 650 ± 30 mL/min + Air 10 ± 0.5 L/min).
- **Flame Calibration with Copper Block** — Temperature rise from $100 \pm 5^\circ\text{C}$ to $700 \pm 3^\circ\text{C}$ within 45 ± 5 s for repeatable flame conditions.
- **Adjustable Test Angle** — $0\text{--}90^\circ$ adjustable specimen positioning for flexible testing.
- **Controlled Combustion Chamber** — Approx. 1 m^3 volume with observation window and ventilation system.
- **Automatic Ignition & Digital Timing** — High-resolution timing control for precise test cycles.
- **Safety Design** — Tempered glass window and exhaust system for operator protection.
- **Professional Technical Support** — Assistance for installation, calibration, and test setup available.

5. Technical Specifications

Parameter	Specification	Notes
Applicable Standards	IEC 60332-1-1, IEC 60332-1-2, IEC 60332-1-3	Vertical flame propagation for single cable
Test Flame	1 kW pre-mixed propane-air flame	Per IEC 60695-11-2
Burner Type	Brass burner, opening $\Phi 7 \pm 0.05$ mm	Per IEC 60695-11-2 Annex
Gas Flow	Propane 650 ± 30 mL/min + Air 10 ± 0.5 L/min	For stable 1 kW pre-mixed flame
Flame Calibration	$100 \pm 5^\circ\text{C}$ to $700 \pm 3^\circ\text{C}$ within 45 ± 5 s	Using 1000 W copper block
Specimen Position	Bottom edge 50 mm above burner	For vertical cable flame application
Test Angle	$0\text{--}90^\circ$ adjustable	Based on current product configuration
Combustion Chamber	Approx. 1 m^3 with observation window and ventilation	Controlled combustion environment

Control System	Automatic ignition with digital timing control	Programmable test cycles
Safety Features	Tempered glass window and exhaust system	Operator protection
Power Supply	AC 220V / 50Hz	Subject to final configuration

6. Testing Principle

The IEC 60332-1 series evaluates the resistance of a single vertical insulated wire, cable, or optical fibre cable to flame propagation. A standardized 1 kW pre-mixed propane-air flame is applied to the lower section of the vertically mounted specimen for a duration determined by the cable's overall diameter.

After flame removal, the test records charring or flame spread along the cable, afterflame duration, and flaming droplets or particles. This assesses the cable's fire performance and ability to limit vertical flame spread, especially for cables in vertical risers, shafts, and building applications.

7. Typical Test Procedure

1. Mount the cable specimen vertically in the chamber with the bottom edge positioned 50 mm above the burner.
2. Adjust gas flows to achieve the calibrated 1 kW pre-mixed flame (verify with copper block if required).
3. Apply the flame to the specimen for the specified duration based on cable diameter.
4. Record afterflame time, char length, and any flaming droplets/particles after flame removal.
5. Document results and clean the chamber for the next test.

8. Applications

- Cable Manufacturers — Flame retardancy verification for power cables, communication cables, and building wiring
- Testing Laboratories — IEC 60332-1 single cable vertical flame propagation testing for compliance services
- Certification Bodies — Evaluate vertical flame performance during product certification
- Quality Assurance Departments — Incoming material inspection and production monitoring
- Research Institutions — Development and comparative evaluation of new flame-retardant cable designs

9. Standard Configuration

The standard system typically includes:

- Controlled combustion chamber with observation window and ventilation system
- Precision brass burner with $\Phi 7 \pm 0.05$ mm opening
- Accurate gas flow control for 1 kW pre-mixed flame
- Adjustable specimen positioning and test angles (0–90°)
- Digital control system with automatic ignition and precise timing
- Safety features including tempered glass window and exhaust system

Note: Factory inspection and functional verification provided. Regular flame calibration recommended.

10. Ordering Information

To provide the most suitable configuration, please confirm the following when requesting a quotation:

- Cable types and diameter range to be tested
- Need for specific test angle adjustment or automation features
- Any integration requirements with data logging or exhaust systems
- Calibration or extended documentation needs

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