

# The 3 Metre Cube

(IEC 61034; BS 6853; BS 6724; BS 7622)

firetesting  
technology



**FTT 3M Cube comprises:**

- 3 Metre Cube assembly
  - Photometric system, stands, fans and sample mounting frames
  - Extraction fan and ducting
  - Windows Software.
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The 3 Metre Cube is used for measuring smoke emission when electric cables are burned under defined conditions, for example, when several cables are burned horizontally. The tests are carried out in a cubic enclosure, a photometric system is used to measure increase in smoke density.

This unit was developed by London Transport scientists in England and is designed to replicate the fire conditions found in enclosed spaces (such as an underground tunnel).

These units are produced to meet the specification used in many electric cable tests including IEC 61034. It permits the comparison between the standard absorbance of airborne particulates evolved under the specified conditions of each test method. The variables include thermal characteristics, form, dimensions and positions of the test piece.

The unit can be supplied in a self-assembly kit form or can be fully installed by **FTT** Engineers. The unit is made of steel sheet panels and can be supplied with customised extraction facilities and all instrumentation, fans, stands and sample mounting frames. The photometric system has a horizontal optical path of 3 m between two opposite faces of the cube and the attenuation of light transmitted through the chamber is measured during the test.

**Features and Benefits**

The enclosure is constructed from Zintec sheet steel of 0.8 mm thickness fixed to a steel framework. A door with a window enabling observation is placed at the front of the cube, with sealing at all appropriate joints.

Sealed windows (100mm × 100mm) are provided in the two laterally opposed faces for the transmission of light from the horizontal photometric system (source and receiver). The centres of these windows are situated at a height of 2.15m.

The photocell receiver is mounted at one end of a 150 ± 10mm tube with a dust protection window at the other end. The inside of the tube is matt black to minimise reflections. The signal from the photocell is proportional to the transmission of light and is recorded continuously during the test, using a chart recorder or data acquisition system.

The walls of the cube at floor level have orifices for atmospheric pressure equalisation. In order to avoid stratification of smoke, homogenisation is achieved by a fan placed on the floor inside the cube which blows horizontally throughout the test.

The method was developed for electric cables, but can be adapted also to materials, equipment and components.



Detail of door with viewing panel and control box at the front of the cube



Detail of light source and detector at opposing apertures

## 3M Cube Software (CubeCalc)

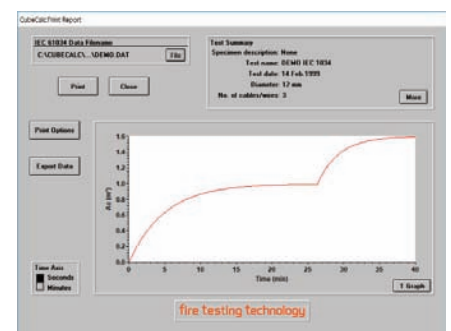
A Microsoft Windows based user-friendly software interfaces with the 3 Metre Cube Chamber via a multi-channel A/D board. One channel monitors the transmission output from the photocell via an interface box.

The Software has the following features:

- Calibration of the Photometric System
- Specimen Information such as:
  - laboratory name
  - specimen description, diameter and number of cables tested
- test name
- data file name
- time interval for processed data
- conditioning environment
- Test Run: Data is collected and displayed during the course of the test. The information is displayed in both graphical and textual form.
- The following experimental data is processed after the test:
  - time,  $t$
  - transmission at  $t$
  - absorbance at  $t$
- A test report can be produced and printed after a test.

## Software

Instrument supplied with software at no extra charge. Software updates provided free of charge.



**TECHNICAL SPECIFICATIONS**

Measuring principle	Comparative measurement of airborne particle absorbance using photometric detection
Chamber	<ul style="list-style-type: none"> <li>• Volume 27m<sup>3</sup></li> <li>• Galvanised Steel Sheet</li> <li>• Supplied in a self-assembly kit form</li> </ul>
Chamber Dimensions	3m (W) × 3m (D) × 3m (H)
Photometric System	The photometric system comprises of a light source and a photocell placed horizontally in the mid vertical plane of the cube at a height of 2.15 ± 0.10 m Optical path – 3.00 ± 0.03m
Photometric System – Light Source	A halogen lamp with a tungsten filament and a clear quartz bulb with the following characteristics: <ul style="list-style-type: none"> <li>• Power: 100W</li> <li>• Stabilised Voltage: 12V</li> <li>• Luminous Flux: 2000 lumens</li> <li>• Colour Temperature: 3000K</li> </ul> It is supplied with a stabilised voltage adjusted to 12.00 ± 0.01V.
Photometric System – Receiver	Selenium type with an S4 spectral response or similar.
Fire Source – Alcohol Tray	Galvanised sheet metal with joined edges, pyramidal trunk of rectangular section.
Interior dimensions:	<ul style="list-style-type: none"> <li>• Bottom Base: 210mm × 110mm</li> <li>• Top Base: 240mm × 140mm</li> <li>• Height: 80mm</li> </ul> 1.00 ± 0.01dm <sup>3</sup> of 95% alcohol. Protected from the fan by a sheet metal screen of 1.5m × 1.0m, curved along its length and put on the floor.
Fan	Flow rate 10 to 15m <sup>3</sup> /min, and a blade diameter of 300 ± 30mm.
Stands and Specimen Supports	Vertical supports with horizontal brackets.
Extraction System	Ducting leading from high in the cube fitted with a valve to seal the opening during a test.

Due to the continuous development policy of **FTT** technical changes could be made without prior notice.

**SERVICES**

Electrical power	220-240VAC 50/60 Hz
Extraction	An extraction duct and fan motor assembly is supplied for connection to a 140mm diameter extraction outlet
Environment	In order to obtain the best possible repeatability it is recommended that the air surrounding the outside of the cube should be still and of a temperature of 20 ± 5°C. The chamber should be located away from direct sunlight and not subject to climate variations.

## Unrivalled Experience in Design and Manufacturing

FTT's site in East Grinstead, is home to the largest group of fire scientists and instrumentation design engineers working on fire testing instrumentation, and is at the heart of our design and manufacturing. For more than 30 years FTT has provided the highest quality instruments and service for fire testing and research professionals worldwide, directly and through its extensive global sales and support network.



### Quality

- World-class manufacturing in accordance with multiple international and national standards, including: EN, ISO & ASTM
- ISO 9001, ISO 14001 certified

### Integrity

- A dedicated team passionate about fire testing instrumentation and continuous product improvement
- Delivering reliable, robust and easy-to-use instruments for the past 30 years

### Excellence

- A world-class team made up of qualified fire scientists, mechanical, electrical and electronic fire instrument design engineers and production, installation and maintenance engineers

### Global

- World-wide distribution network for global sales, installations, training, maintenance and technical support
- Leading global supplier of the Cone Calorimeter, Large Scale Calorimeter, NBS Smoke Chamber and Oxygen Index