

# Density of Smoke from the Burning or Decomposition of Plastics

firetesting  
technology

(ASTM D2843)



This reaction to fire test method covers a laboratory procedure for measuring and observing the relative amounts of smoke obscuration produced by the burning or decomposition of plastics. It is intended to be used for measuring the smoke-producing characteristics of plastics under controlled conditions of combustion or decomposition. The measurements are made in terms of the loss of light transmission through a collected volume of smoke produced under controlled, standardised conditions. This test is used by model code organisations in controlling the use of plastic materials in light transmitting applications. It can be used as an alternative to the ASTM E84 smoke measurement because this test method can

readily be performed on thermoplastic materials that may drip and fall out of the E84 test apparatus. Other smoke test apparatus, for example, ASTM E1354 Cone Calorimeter, E662 Smoke Density Chamber, etc. are also available from **FTT**.

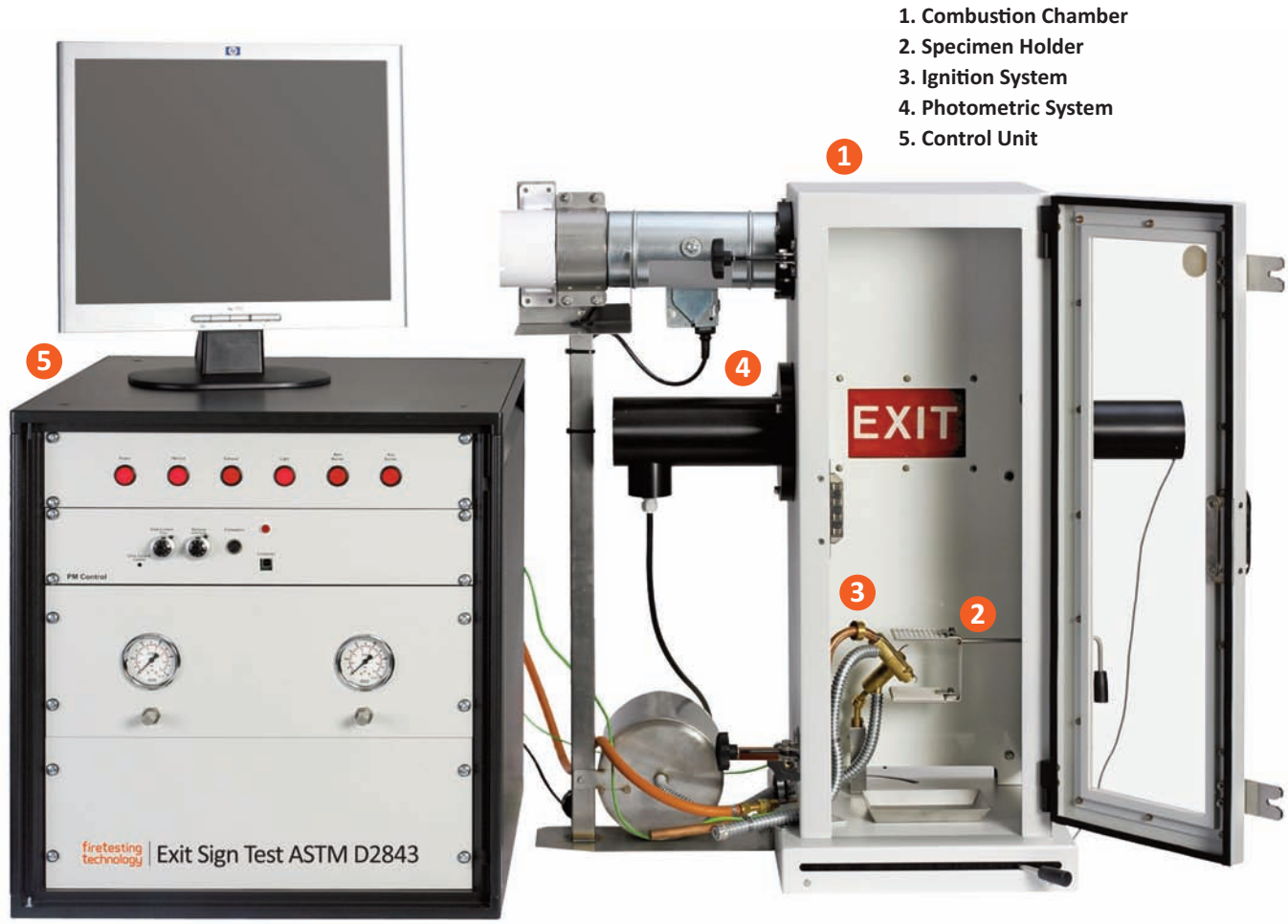
### FTT ASTM D2843 Exit Sign Test Apparatus

The **FTT** Exit Sign Test is designed for the measurement and observation of the smoke-producing characteristics of plastics under controlled conditions of combustion or decomposition according to ASTM D2843-10 but not to be used for measuring any other characteristics of the plastic combustion.

The apparatus consists of:

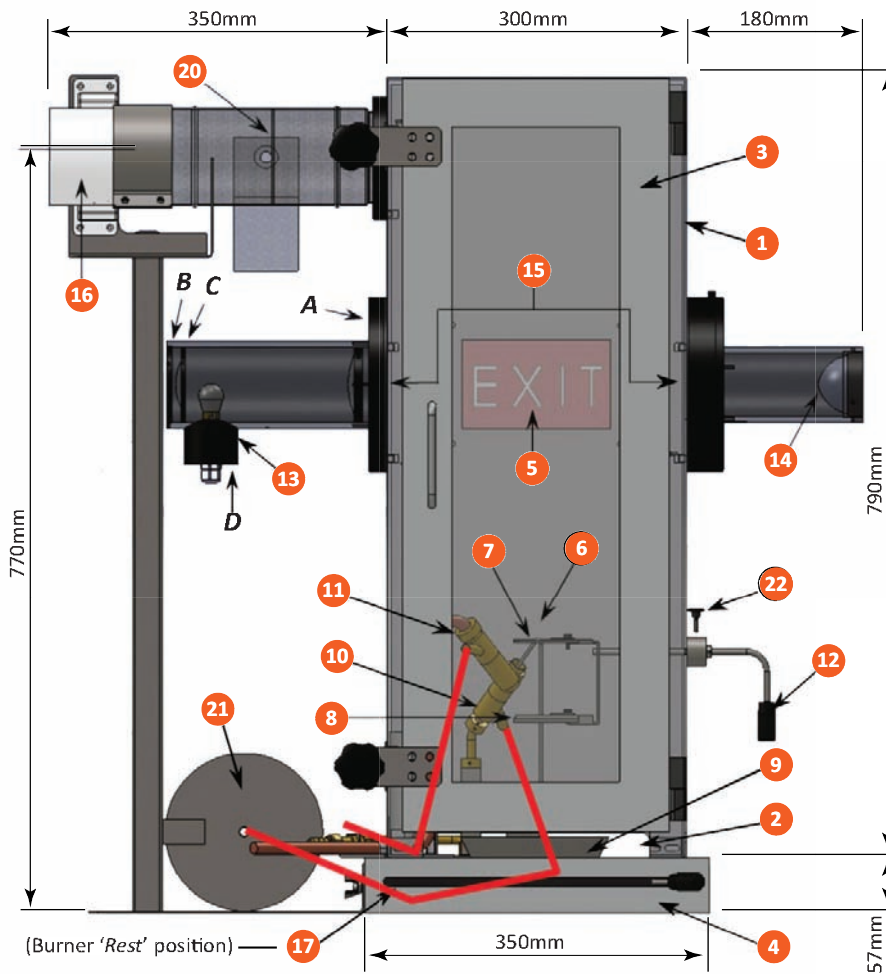
- Combustion Chamber
- Specimen Holder
- Ignition System
- Photometric System
- Control Unit (incl. Smoke Meter)

The test specimen is exposed to flame for the duration of the test, and the smoke is substantially trapped in the chamber in which combustion occurs. A 25mm x 25mm x 6mm (1" x 1" x ¼") specimen is placed on a supporting metal screen and burned in the test chamber under active flame conditions using a propane burner operating at a pressure of 276 kPa (40 psi). The 300mm x 300mm x 790mm (12" x 12" x 31") test chamber is instrumented with a light source, photoelectric cell, and meter to measure light absorption



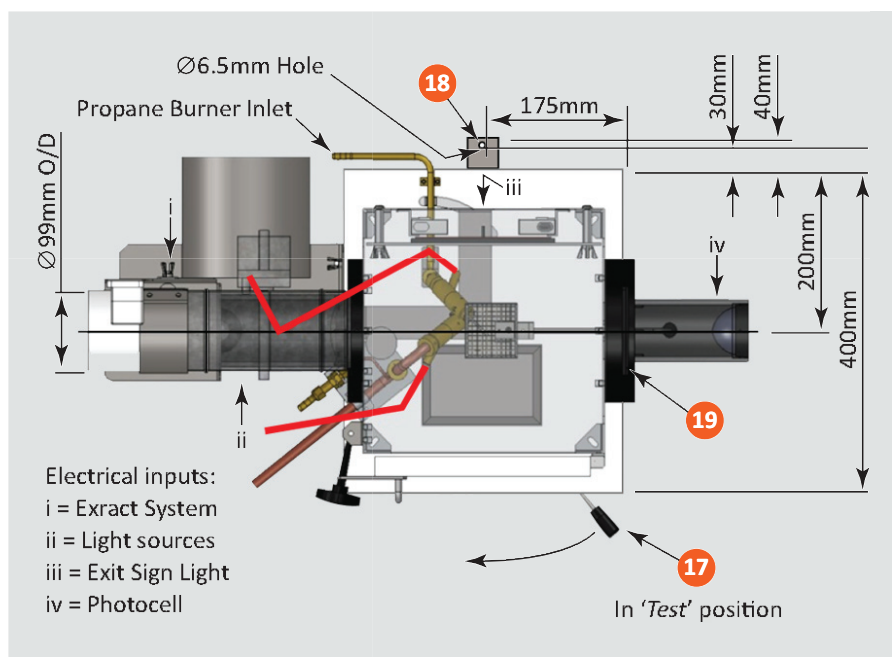
## Front View (partial section)

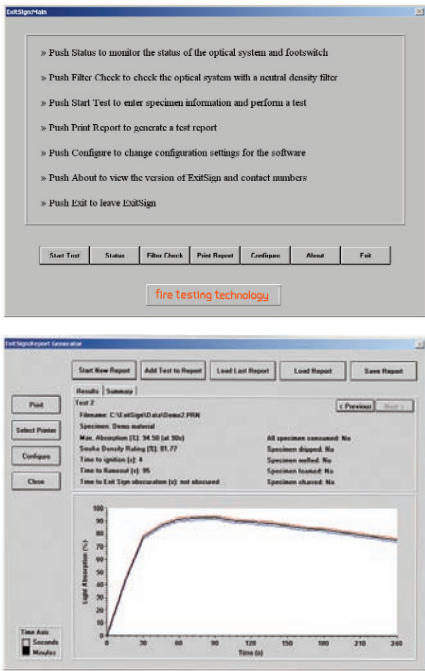
— Air supply flexi-hose to burner (not drawn)



1. Combustion Chamber: 300mm × 300mm × 790mm
2. Chamber Ventilation Slots (all 4 sides)
3. Heat Resistant Glazed Door
4. Base: 350mm × 400mm × 57mm
5. White on Red Illuminated Exit Sign: 90mm × 150mm
6. Test Specimen: 25.4mm × 25.4mm × 6.2mm (not shown)
7. Specimen Holder: 64mm<sup>2</sup> of 6mm × 6mm, 0.9mm gauge
8. Calcium-silicate Sheet or Collector Tray
9. Quench Pan (filled with water when in use)
10. Main Burner: Propane (operating at 276kPa (40psi))
11. Aux Burner: Propane (operating at 138kPa (20psi))
12. Sample Adjusting Handle
13. Light Source
14. Light Receiver
15. Heat Resistant Glazed Windows for Light Beam 2 × Ø70mm (int.)
16. Extraction Fan: 1700ℓ/min
17. Main Burner Adjustment Handle
18. Anti-tilt Bracket
19. Filter Assembly
20. Butterfly Valve
21. Air Flow Device
22. Specimen Holder Clamp Screw (used only with the aux. burner)

## Top View (partial section)





horizontally across the 300mm (12") light beam path. The chamber is closed during the 4 minute test period except for the 25mm (1") high ventilation openings around the bottom of the chamber.

Measurement is by means of transmitting a beam of light through the smoke generated by the sample under test to a light measuring receiver. Results obtained are in units of light absorption (%). The light-absorption data are acquired by a user-friendly software tool and are plotted versus time. Two indexes, the maximum smoke produced and the smoke-density rating, are used to rate the material. A heat resisting glass door is fitted to allow observation of the test whilst it is in progress.

### ExitSign Software

**FTT** Exit Sign Test Apparatus is a sophisticated instrument and in

order to make the calibration and use of the instrument extremely easy, the ExitSign software package is specially designed to complement the instrument. ExitSign is a Microsoft Windows based application which assists with calibration routines, acquires test data and produces test reports.

The Main panel is used to access all the functions available in ExitSign software:

- Start Test
- Status
- Filter Check
- Print Report
- Configure
- About
- Exit

### Software

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





**TECHNICAL SPECIFICATIONS****Test Chamber**

Overview	Bench mounted draft free painted aluminium chamber with large lift-off door with window made from toughened glass giving a generous view of the specimen during a test. Mounted on a 360mm × 400mm × 57mm base.
Electrical power	96-264V 50/60Hz 1A
Internal dimensions (m)	0.3 (L) × 0.3 (D) × 0.79 (H)
Voltage	96-264V 50/60Hz 1A
Exhaust	In-Line axial industrial extraction fan with over temperature/current protection. Low noise plastic frame and plastic impeller. Outer diameter of exhaust fan: 104mm.
Exhaust flow rate (ℓ/min)	1700
Interior light	2 × 6W fluorescent lights, 240V 50/60Hz, 3400 K

**Burner, Gas Control System**

Burners	A burner in compliance with ASTM D 2843 with a 0.13mm diameter orifice Auxiliary burner with a 1100g weight constructed from stainless steel to prevent movement of the burner during testing.
Burner positioning system	Quick burner positioning system controlled via handle on the front of the chamber Air supply device 160mm diameter stainless steel duct providing air to main burner
Gas type and pressure	Commercial grade 85.0% minimum propane pressure regulated @ 40 psi for the main burner and @ 20 psi for the auxiliary burner Pressure displayed by two independent 63mm diameter bourdon tube gauges on front panel
PLC	Integrated safety and control system, 24V DC powered. <ul style="list-style-type: none"> <li>• Independent burner control</li> <li>• Thermocouple Type K interlock for main and auxiliary burners</li> <li>• Fan and exhaust damper control</li> <li>• Light source control 5V DC Switch Mode Power Supply <ul style="list-style-type: none"> <li>– Input voltage 85-265V 47-63Hz</li> <li>– Cooling convection cooling</li> <li>– Operating ambient temperature -10-70°C</li> <li>– Over voltage protection</li> <li>– Over current protection</li> </ul> </li> </ul>
Flash back arrestor	Safety precaution fitted on both burners
Photometric system	Optical system positioned on the right houses a selenium cell. The light source houses a 1493 compact filament microscope lamp running between 5.3V DC and 6.3V DC which is situated on the left hand side of the chamber. The signal is monitored and processed via a Smoke Meter in the control unit.

**SPECIMEN HOLDERS AND SUPPORT**

Specimen Holder (× 4)	64mm × 64mm stainless steel square of 6mm × 6mm, 0.9mm gauge wire
Quench Pan (× 1)	Stainless steel 150mm × 100mm × 20mm
Particles Boards (× 4)	¼" Thick x 64mm x 64mm square calcium silicate
Stainless Steel Collector Tray (× 1)	2½" × 2½" × 3/8" deep with ½" square bottom

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

## 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