



# NBS Smoke Density Chamber



THE BENCHMARK IN FIRE TESTING



## NBS Smoke Density Chamber

The NBS Smoke Density Chamber is widely used in all industrial sectors for the determination of smoke generated by solid materials and assemblies mounted in the vertical orientation within a closed chamber.

It measures the specific optical density of smoke generated by materials when an essentially flat specimen, up to 25 mm thick, is exposed to a radiant heat source of 25 kW/m<sup>2</sup>, in a closed chamber, with or without the use of a pilot flame. The radiant heat source can be easily replaced with the Conical Radiant Furnace for testing of specimens in the horizontal orientation according to ISO 5659 and IMO FTP Part 2 requirements.



ASTM E 662 Standard test method for specific optical density of smoke generated by solid materials

BS 6401 Method for measurement, in the laboratory, of the specific optical density of smoke generated by materials

NFPA 258 Recommended practice for determining smoke generation of solid materials

And options for:

ISO 5659 Plastics Smoke generation. Determination of optical density by a single chamber test

IMO FTP Part 2 Smoke and toxicity test

ABD0031 (ATS 1000.001) for smoke emission for non-metallic components

NES 711 Determination of smoke index



### Features of the FTT NBS Smoke Density Chamber (SDC)



- Test chamber with full width opening door; allowing easy access for sample loading and chamber cleaning.
- Photomultiplier control unit with manual zero and span controls designed to be used with the FTT software to perform automatic control of the test procedure on the SDC
- Controls are mounted beside the chamber for convenient operation. They are not obstructed when the door is open.
- Three term temperature controller for radiant heat source with digital display.
- Chamber walls are pre-heated for easier start-up and convenient equipment operation.



- Safety blowout panel, easily replaceable, allows for safe operation of test method.
- Gas measurement ports are available, for optional measurements of toxic gases.
- Cabinet designed with a standard 19" rack, for simple addition of gas analysers, chart recorder and other control units.
- Air cooled radiometer for furnace flux calibration



ASTM E 662



ISO 5659 / IMO

The FTT SDC has been designed specifically to incorporate the ISO 5659 Conical Radiant Furnace. This extends the potential of the SDC by allowing testing at heat fluxes up to 50 kW/m<sup>2</sup>, horizontal orientation of the specimen and the measurement of mass loss rate of the specimen. It takes approximately 15 minutes to change from ASTM E 662 to the ISO 5659 configuration and the equipment conforms to the recent IMO test protocols.

## Software

The FTT SDC is supplied with a software package called SmokeBox, which was designed as a data acquisition and presentation package allowing either manual or automatic control. This enables a more efficient use of the instrument, leading to larger daily throughput of testing and enhanced quality graphical data presentation. 'SmokeBox' is a Microsoft Windows based package which collects test data and assists with all calibration routines. It can be used for several applications including standardised testing to ASTM E 662, ISO 5659 and BS 6401 etc.



## SmokeBox enables: -

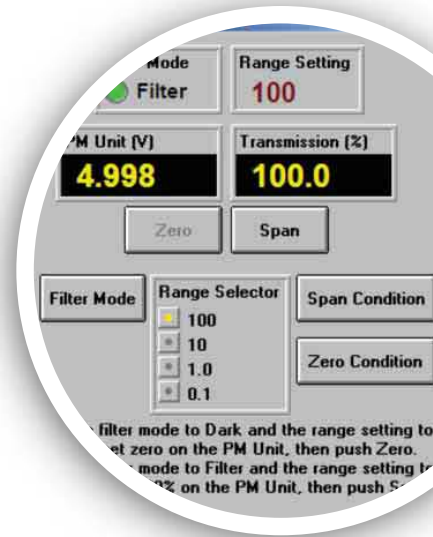
Calibration of the photomultiplier amplifier: - Full scale and zero transmission values are calibrated into the software. All recorded and displayed transmission values are corrected, in real time, by the software for calibration, whatever the amplifier range setting.

Automatic file naming - SmokeBox will save the data to a file name automatically generated from the date and test number. This is to prevent any valuable data being overwritten. Alternatively the user can manually enter a file name.



## Data collection: -

The start of an experiment is initiated by the activation of a footswitch or the push of a button on the computer screen. Information about the test and the sample is entered prior to the run. This is stored to disk, together with the numerical data generated during the test. Data is collected and stored at user defined intervals. The intervals can be defined over a range from 1 to 60 seconds. Real time data is displayed on the VDU during the course of a test. The information is displayed in graphical and textual form. The graphical form is an auto-scaling graph with time on the x-axis and transmission (%) and specific optical density on two y-axes.



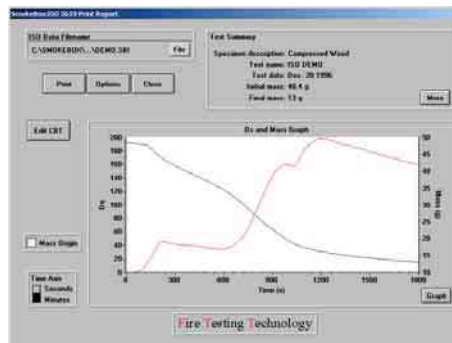
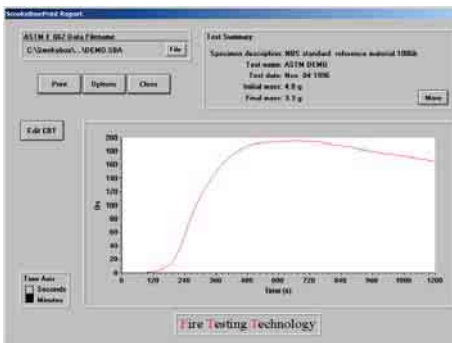
### Textual data includes:-

- Instantaneous transmission (%) and specific optical density ( $D_s$ )
- Time from start of test
- Maximum  $D_s$  and time to maximum  $D_s$
- Current range setting and filter position
- Mass (ISO 5659)
- Prompts (visual and audio) when the range setting or filter position requires changing when operating in manual mode. When operating under software control the range setting is automatically changed.

### The experimental data stored during a run includes: -

- Time (seconds),  $t$
- Transmission (%) at time  $t$
- Specific optical density at time  $t$
- Range and filter positions at time  $t$
- Mass (g) at time  $t$  (ISO 5659)

On completion of the test, the clear beam transmission is recorded to correct the data for deposits on the optical system. A report including a graph and table of specific optical density ( $D_s$ ) against time is produced. The report can be printed on any device with a Windows driver.



# Options



## AITM 3.0005 - Airbus ABD 003 I: -

The ABD003 I (formerly ATS 1000.001) option is a gas sampling system which includes a vacuum chamber; vacuum pump, hand metering pump and gas analysis detection tubes. Provision is made for gaseous/volatile test products to be drawn through three ports on the top of the chamber at any time for subsequent analysis. One of these ports is used to connect to the ABD003 I vacuum box



## Heated Line: -

FTT also offers a heated gas sampling system. The system includes a heated filter, 2m heated line and 2 x temperature controllers.

## NES 711: -

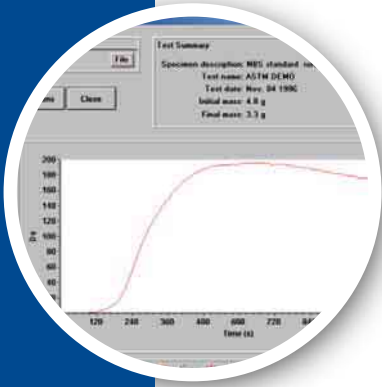
The NES 711 attachment comprises a spark ignition burner and stirrer fan. The FTT SmokeBox software is compatible with this option.

## FTIR

### CEN TS 45545-2 and ISO 19702

The FTT FTIR system can be used with the SDC or other instruments to measure the concentration of toxic species in accordance with these standards to aid in providing data for use in combustion toxicity assessment.





## Technical Specifications

Measuring principle	Specific optical density - white light source and photomultiplier tube
Light source	6.5 V 2.75 A tungsten filament lamp
Operating heat flux of radiant heat furnace	25 ± 0.5 kW/m <sup>2</sup> (standard furnace) up to 50 kW/m <sup>2</sup> for ISO 5659/IMO fire model
Dimensions (mm)	1900 (H) × 1630 (L) × 660 (D)
Internal dimensions of chamber (mm)	914 (H) × 914 (L) × 610 (D)

## Services

Power Supply	110/230 VAC - 50/60 Hz - 13 A
Extraction system	Flow rate of at least 50l/s
Gas supply	Propane at 1 bar (14.5psi) Filtered compressed air at 2 bar
Water (ISO 5659 only)	Flow rate of 200-300ml/min
Mass Balance	Accurate to 0.5%

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



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