Radiant Panel Flame Spread Apparatus

(ASTM E162; ASTM D3675)

firetesting technology

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ASTM E162, ASTM D3675: Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

The Radiant Panel Flame Spread Apparatus measures the surface flammability of building products (ASTM E162) and cellular plastics (ASTM D3675) by using a gas-fired radiant heat panel. It is intended to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and the results of this test may be used as elements of a fire risk assessment that takes into account all of the factors that are pertinent to an assessment of the fire hazard of a particular end use. An index, Is, is determined from the flame spread and heat evolution factors. This radiant panel index is a required parameter in various specifications, especially for the mass transit industry (buses and trains).

The test is made on specimens of small size that are representatives, to the extent possible, of the material or assembly being evaluated. The rate at which flames will travel along surfaces depends upon the physical and thermal properties of the material, its method of mounting and orientation, the type and level of fire or heat exposure, the availability of air, and properties of the surrounding enclosure.

Summary of Test Method

This test method of measuring surface flammability of materials employs a radiant heat source consisting of a 12" × 18" (300 × 460mm) panel in front of which an inclined 6" × 18" (150 × 460mm) specimen of the material is placed. The orientation of the specimen is such that ignition is forced near its upper edge and the flame front progresses downward.

A factor derived from the rate of progress of the flame front and another relating to the rate of heat liberation by the material under test is combined to provide a flame spread index.

The flame spread index, I_s, of a specimen as the product of the flame spread factor, F_s, and the heat evolution factor, Q, as follows:
$I_s = F_s Q$

FTT E162 Test Apparatus

The **FTT** Radiant Panel Flame Spread apparatus is supplied as a complete easy-to-use system.

Features include:

- Porous cement and cast iron gas operated radiant panel (12" × 18") with electric spark igniter and automatic safety flame out detector.
- Stainless steel specimen holder, with observation marks every 75mm (3") for assessing the progress of the flame front.
- Stainless steel specimen support.
- Stainless steel pilot burner assembly.
- Pyrometer to determine the surface temperature of the radiant panel, including mounting bracket.
- Air flow meter and gas control valve to control the mixture to the radiant panel.
- Stainless steel exhaust stack with a removable panel to enable easy cleaning of thermocouples.

- The stack is provided with 8 thermocouples as required by the standards.
- Calibration burner with methane gas flow meter.
- Safety gas controls and cut off circuitry.
- 1Data logger and analysis software 162Soft.

162Soft Data Analysis Software

This test apparatus is complemented with the 162Soft software package to make the calibration and use of the instrument extremely easy.

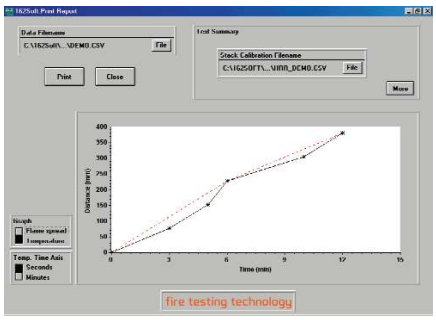
162Soft is a Windows based software which enables simple data acquisition, analysis and storage via a 22-bit data logger. All parameters are displayed. The software interface can be retrofitted to any existing ASTM E162 apparatus. The versatile data logger may be used in other applications and is supplied with software that allows the data stored in the logger to be downloaded to a PC for further analysis.

The Status Panel displays the signals from all the transducers (the eight thermocouples in the stack and the pyrometer) on the left to indicate when the stack temperature and pyrometer meet the test criteria. On the right of the Status Panel is a stack calibration graph and the value of as used in the calculation of the heat evolution factor which is equal to Heat Release Rate recorded for a change in temperature of 100°C. The calibration and test routines are very easy to conduct by following the option menu on the 162Soft software.

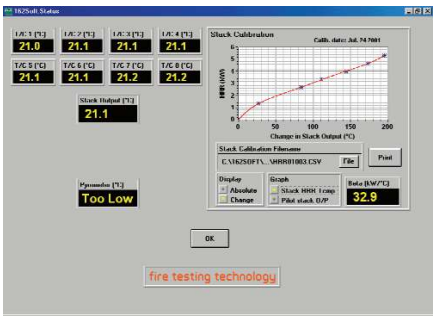
Result processing is very simple by using the available curve fit feature. The temperature rise Vs time graph can be displayed and printed. The calibration data used for processing the results can be changed and recalculated after the test run. Report can be generated and printed by one push of a button on the Print Report Panel.

Radiant Panel, Specimen Holder and Exhaust Stack

Gas Panel, Control Box and Data Logger



Print Report



Status Report

TECHNICAL SPECIFICATION	
ASTM E162 Test Chamber	
Overview	Test frame consisting of steel frame and outer panels which hold the control panel and stack assembly
External dimensions	1.2m (L) × 0.6m (D) × 1.9m (H)
Exhaust	Made from 1mm 304 stainless steel 8 type k thermocouples of equal resistance, supported with insulators End formed to 0.020" (0.5mm) Diameter Easy clean hatch
Exhaust flow rate	30-85m^3/min
Voltage	240VAC, 50/60Hz, 13A

Burner, Gas Control System	
Burner	In compliance with ASTM E162 and ASTM D3675 manufactured from a porous refractory material
Burner dimensions	12 × 18" (300 × 450mm) mounted in a metal frame
Pyrometer	Calibration pyrometer for confirmation of radiant panel output, meter 310°C, 600°C, 880°C, with 4m cable Measurement range: +300°C - +900°C Response time: ≤2ms for T>+600°C Analogue output: 4-20mA Rugged stainless steel housing Digital signal processing Precision lens non-hygroscopic
Air/Gas flow meters	Air Mass Flow Controller 0-10g/sec Gas Mass Flow Controller 0-0.6g/sec Powered via 15V 60W switch mode DC duel voltage power supply 47-63Hz Accuracy +/- 1% Start-up rise time <150ms Shock 15g, 11ms Ripple and Noise 50mV pk-pk
Venturi Mixer	Number 3 Air/Gas Venturi mixer
Pilot Burner	Stainless Steel Burner 203-229mm ID 3.2mm OD 4.8mm Porcelain tube ID 5.16mm, OD 6.84mm Methane flowmeter range 1-18L/min Viton seals Borosilicate glass tube ¼" Brass connections
Flash back arrestor	Safety precaution
Ignition system	Ceramic housed sparker powered by 230V ZT931 ignition device producing 15kV spark
Control system	Solid state gas control system with PLC control 24V switch mode DC 10A duel voltage power supply 47 – 63Hz Accuracy +/- 1% Start-up rise time <150ms Shock 15g, 11ms Ripple and noise 50mV pk-pk Thermocouple interlock safety system MFC control voltage 5V DC 0-100% F_S via high precision control circuits Adjustable 60-600 L/min air flow meter Gas solenoids 240VAC, 50/60Hz Temperature alarm module: • Sample rate 4Hz • Accuracy +/- 0.25% of reading • Linearization accuracy <0.1% of reading

SOFTWARE	
162Soft	Microsoft Windows based application that acquires test data and assists with several calibration routines
Data logger	A 3-slot cardcage with 6½ digit (22 bit) internal DMM enabling up to 120 single-ended or 48 double-ended measurements Scan rates up to 250 channels/s available
PCIe-GPIB	IEEE-488 interface converts any PCI express bus PC into an instrumentation control and data acquisition system making any PC equipped with a PCIe GPIB capable of controlling a GPIB instrument such as the Data logger with data transfer rates in excess of 300KB

Services Required

- A hood with exhaust blower placed over the stack is required
- Electrical power providing 230VAC, 50Hz, 13A
- Commercial grade propane, compressed air, acetylene gas, methane gas

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 almost 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 14001, ISO 9001 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