OSU Rate of Heat Release Apparatus

(FAR 25.853 (a-1); ASTM E906)

Fire Testing Technology Limited
Charlwoods Road, East Grinstead, West Sussex RH19 2HL, UK
+44 (0)1342 323600 | sales@fire-testing.com | www.fire-testing.com
A Judges Scientific plc company

FAR 25.853 (a-1):
FAA Fire Test Handbook – Chapter 5

ASTM E906:
Configuration A Standard Test Method for Heat Release Rate for Materials and Products

The OSU Rate of Heat Release Apparatus is used to expose aircraft interior cabin materials to an incident radiant heat flux of 35kW/m^2. This will determine if the material complies with FAR 25.853 [a-1] requirements.

FTT OSU incorporates comprehensive safety features and is fully equipped to provide reliable test data for both FAA and ASTM tests. The apparatus, built in accordance with Chapter 5 of the FAA Fire Test Handbook, is provided in four parts: test chamber, control unit, air distribution system and data acquisition and analysis system.

The heat release is measured by the temperature difference between the air entering and leaving the environment chamber by a thermopile with five hot and five cold Type K junctions.

OSU Main Unit

Test Chamber
Stainless steel insulated test chamber, with gasketed door and viewing window. The Test Chamber consists of:

- Four silicon carbide elements Type LL 508mm by 16mm with nominal resistance 1.4 Ohms as a heat source with corrosion-resistant stainless steel housing.
- A reflector made from stainless steel is situated behind the elements.
- In front of the elements, a truncated diamond-shaped mask, constructed of stainless steel, this provides uniform heat flux density over the area occupied by the 151 × 151mm vertical sample.
- Dual 110VAC transformers at 5.5kVA are provided for separate control of the upper and lower element pairs.
- Wand Assembly for lighting the upper pilot and calibration burners.
- Dual globar power controllers for ease of heat flux uniformity adjustment.
- Upper pilot and lower pilot (with spark ignition) and calibration methane gas burners.
- Thermopile for heat release rate measurement, with five hot thermocouple junctions in the chimney and five cold thermocouple junctions in the air chamber.

Air Distribution System
The air entering the apparatus is controlled to 21-24°C (70-75°F) and set at approximately 0.04m^3/s (85ft^3/min) using an orifice meter.

- The orifice meter comprises of a squared-edged, circular plate orifice, 0.024 inch (0.5mm) thick, and is located in a circular pipe with a nominal diameter of 1.5 inch (38mm). There are two pressure measuring points located 1.5 inch (38mm) upstream and 0.75 inch (19mm) downstream of the orifice and connected to a mercury manometer. (Mercury not supplied)
- The air entering the environmental chamber is distributed by an aluminium plate which has eight holes, and mounted at the base of the environmental chamber. A second plate having 120 evenly spaced holes is mounted 152mm above the aluminium plate.

- The air supply manifold at the base of the pyramidal chimney section has 48 evenly spaced holes, resulting in an airflow of approximately three to one within the apparatus.

Specimen Holder and Drip Pan

- Two specimen holders are provided with each OSU.
- Each specimen holder and the drip pan are fabricated from stainless steel.
- Each holder has two studs top and bottom which allows two wires to be attached vertically in front of the holder to secure the face of the specimen.

Control Unit

Stand-alone Control Unit housed in 19" Rack, with flow control for both burners

Calibration Flow Rate Control

- This is only used when a Calibration is required.
- There are 5 latching push-button switches which allow accurate control of calibration gas flow rates.
- Under each flow control switch is a 10 turn potentiometer for fine adjustment of the calibration gas flow rates.

Lower Burner Ignition

- Lower burner ignition button allows the gas to the lower and upper burners to flow.
- In the event of a power failure the solenoid will automatically stop the flow of gas and hence extinguish any burner flames.
- Five On/Off ball valves for controlling the Lower and Upper pilot burners and Calibration.
- Four flow meters are fitted with needle valve adjustment for controlling the lower and upper pilot burner's gas and air mixtures.

Calibration Heat Flux Meter

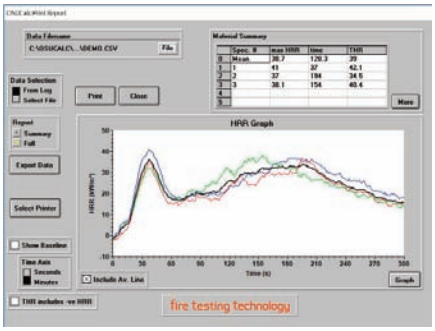
Two water-cooled, heat flux sensors are supplied to measure the heat flux density at the centre and each corner.

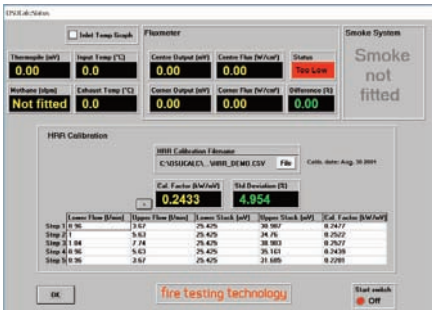
Software

FTT offer a data acquisition and analysis stand-alone software package for the OSU that can be used either with our instrumentation or with existing equipment.

The OSU Apparatus is a sophisticated instrument, designed to make the calibration and use of the instrument user-friendly. The OSUCalc software package acquires test data, assists with calibration routines and automatically generates test reports.

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





The software interfaces with the OSU apparatus via a data logger system, into which all the required signals are connected

The user interface is a Microsoft Windows based system with push button actions and standard Windows data entry fields, drop down selectors, check boxes and switches.

The Software has the following features:

1. View of Transducer Signals
2. Heat Release Rate Calibration
3. Automatic File Naming
4. Data Collection
5. Data Presentation.

TECHNICAL SPECIFICATIONS	
Measuring principle	Exposure of materials to incident radiant heat flux
Main body dimensions	1500mm (L) × 1200mm (D) × 2260mm (H)
Main body weight	250kg
Control rack dimensions	600mm (L) × 600mm (D) × 1700mm (H)
Control rack weight	40kg

SERVICES	
Extraction	The exhaust stack 133mm by 70mm in cross section and 254mm tall is fabricated from stainless steel and mounted on the outlet of the pyramidal section. Inside the exhaust stack is a baffle, this is perpendicular to the airflow, 76mm above the base of the stack. An exhaust hood system with the following criteria is required: • Recommended hood size 60cm wide × 150cm long. • The bottom of hood should be 15-20cm above the apparatus exhaust stack. • Adjustable to produce a maximum volume 70m^3/min (2470 CFM) • Pressure 1.4mmHg
Power	230VAC 50A 50Hz for the OSU Main Unit 230VAC 8A 50Hz for the Control Unit 400VAC 3Ph 16A 50Hz + Neutral 3.5kW for Air Handling Unit
Gas	Bottled Methane is required, at a pressure of approximately 250mBar (4 psi)
Air supply	For OSU: 4 psi, flow rate of 0.04m^3/s at 21-24°C For Control Unit: Filtered compressed air to rack, at a pressure of approximately 20psi
Water	200-300 ml/min water flow through the system at room temperature, i.e. 15-30°C (To cool heat flux meter assembly)
Mercury	100ml for the manometer

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