



Oxygen Bomb Calorimeter



THE BENCHMARK IN FIRE TESTING



FTT Oxygen Bomb Calorimeter

The bomb calorimeter is a widely used device for measuring the heat of combustion or calorific value of a material. With this apparatus a test specimen of specified mass is burned under standardised conditions. The heat of combustion determined under these conditions is calculated on the basis of the measured temperature rise while taking account of heat loss.

The combustion process is initiated inside an atmosphere of oxygen in a constant volume container; the bomb, which is a vessel built to withstand high pressures. It is immersed in a stirred water bath, and the whole device is the calorimeter vessel. The calorimeter vessel is also immersed in an outer water bath. The water temperature in the calorimeter vessel and that of the outer bath are both monitored.

The FTT Oxygen Bomb Calorimeter is a versatile instrument and can be used to measure the heat generated from several applications and has been designed to conform to current ASTM, ISO, EN, BS and DIN standards.

The calorific value of the following groups of materials can be measured: -

- Building materials (EN ISO 1716)
- Coal, coke (ASTM D 5865)
- Fuel (ASTM D 240: gasoline, kerosene, fuel oil, No's 1-D and 2-D diesel fuel and No's 0-GT, 1-GT, and 2-GT gas turbines fuels and ISO 1928)
- Fuel derived from waste material (ASTM E 711)
- Hydrocarbon fuels (ASTM D 4809)
- Food, supplements, crops
- Waste and refuse
- Chemical and pharmaceutical samples

EN ISO 1716: Reaction to fire tests for building products – Determination of the heat of combustion

ISO 1928: Determination of gross calorific value by the bomb calorimetric method and calculation of net calorific value

ASTM D 240: Standard test method for heat of combustion of liquid hydrocarbon fuels by bomb calorimeter

ASTM D 4809: Standard test method for heat of combustion of liquid hydrocarbon fuels by bomb calorimeter

ASTM D 5468: Standard test method for gross calorific and ash value of waste materials

ASTM D 5865: Standard test method for gross calorific value of coal and coke

ASTM E 711: Standard test method for gross calorific value of refuse-derived fuel by the bomb calorimeter



Isoperibolic Operating Mode

An isoperibolic bomb calorimeter is a calorimeter where the jacket temperature is kept at a constant temperature while the calorimeter vessel (bomb and bucket) temperature rises as heat is released by the combustion of a sample. The jacket and bucket temperatures are continuously measured enabling the heat loss to be corrected for after the test.

An embedded control computer, keypad and LCD enables instrument automation, data acquisition and analysis via user friendly menu driven software.



Automatic Temperature Control of Outer Bath

The embedded control computer automatically sets the outer bath temperature. The temperature is measured using a high precision, high resolution platinum resistance thermometer (PRT). An external thermostatic controller, bath, circulator and cooler is supplied as standard together with a pipette for temperature controlled filling of the calorimeter vessel. This removes human error increasing repeatability and significantly reduces the preparation time between tests.

Oxygen Filling System

To simplify instrument operation the FTT Bomb Calorimeter is fitted with a semi-automatic filling system. The user merely connects the push on coupling and presses the key to fill the bomb with oxygen. The bomb fills to the desired pressure and automatically switches off. If this pressure is not reached an error message is shown.

Automatic Firing

The embedded computer controls the temperature of the outer bath and shows when the calorimeter vessel temperature has stabilised. At this point the bomb is automatically fired.

Calibration

The FTT bomb calorimeter is calibrated by burning certified benzoic acid to determine a constant called the 'water equivalent'. The instrument can record the water equivalent for several bomb/bucket combinations. For each bomb/bucket combination five calibrations are performed. The software calculates the average of these five calibrations and uses this value as the water equivalent when testing a sample.



Thermostatic controller, bath, circulator, cooler and pipette supplied as standard with every apparatus



The FTT Bomb Calorimeter consists of: -

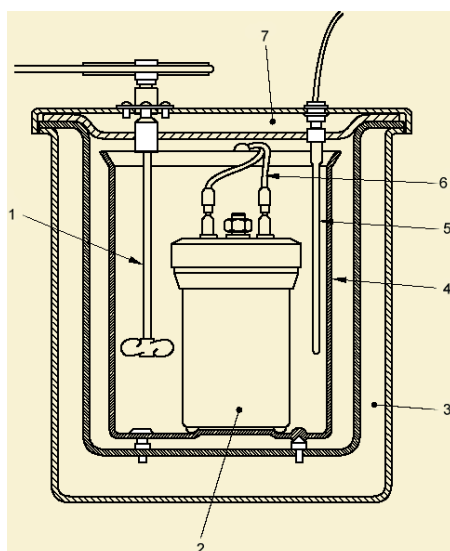
- Bomb calorimeter with embedded computer control, user-friendly interface, LCD graphics display, high accuracy / resolution PRTs, RS232 interface port for printer and programming.
- Oxygen bomb and bucket (calorimeter vessel)
- Thermostatically controlled bath, circulator, cooler, pipette (2L)
- EN ISO 1716 sample preparation device, firing wire & cotton, cigarette making device

Technical Specification

Working temperature range	20-30°C
Measuring range max.	102,000 J
Measuring time approx.	22 minutes
Reproducibility (1g benzoic acid)	<0.2%
Temperature measurement resolution	0.001° C
Cooling medium temperature min	10°C
Cooling medium temperature max	30°C
Cooling medium	De-ionized water
Oxygen operating pressure max	30 bar
Oxygen filling	Semi-auto
Permissible relative moisture	<55%
Permissible ambient temperature	<30°C
RS232 Interface for printer	x1
Weight	30 kg
Dimensions (mm)	420(L) × 360(W) × 540(H)
Voltage	220-240 VAC 5A/100-110 VAC 10A
Frequency	50/60 Hz

Due to FTT's continuous development policy, specification is liable to change without prior notice

- 1 Stirrer
- 2 Calorimeter bomb
- 3 Jacket
- 4 Calorimeter vessel
- 5 PRT
- 6 Ignition lead
- 7 Jacket lid



Optional accessories: -

- Spare oxygen bomb
- Corrosion resistant oxygen bomb
- Printer
- Bucket
- Benzoic acid, 100g
- Nickel chrome crucible
- Nickel chromium firing wire 25m length
- Analytical balance
- Firing cotton