Coal and Coke Testing Equipment

Minimum Free Space Oven, MFSU; MFSO-ISO; MFSO-ASTM

Volatile Matter Furnaces, VMF / ASTM

Volatile Matter Furnaces, VMF / ISO

Ashing Furnaces, BMF11 & BSF12/A

Free Swelling Index Furnace, FSI

Gray King Coke Test Furnace, GKF

Over the years, the variety of coal and coke tests that may be performed in a furnace or oven has been expanded. Elite Thermal has responded to the demands of each new standard by creating furnaces that are tailored to the particular needs of each test technique.

The scope covers international testing and evaluation of test techniques for coal and coke, such as ISO and ASTM.

Minimum Free Space Oven, MFSU/MFSO-ISO/MFSO-ASTM

Minimum Free Space oven is utilized for drying process which features a compact heated chamber that provides the lowest practical volume, or minimum free space.

The MFSO-ISO operates with a regulated flow of moisture free nitrogen gas which removes the moisture released by the coal at 105 °C as per BS 1016-104.2:1991, BS ISO 687:2010 & BS ISO 11722:2013.

The MFSO-ASTM operates with a regulated flow of air as per ASTM D3173-11.

MFSU is a Universal Minimum free space oven as per above ASTM, ISO & BS test methods.

Standard Features:

- Maximum Temperature: up to 210°C
- Maximum Continuous Temperature: up to 210°C
- Chamber dimensions (mm): 43 x 195 x 300 (H x W x D), 2.5 Litres
- The ovens have an aluminum chamber that resists oxidation and corrosion, resulting in excellent temperature uniformity over the working volume
- Before accessing the front of the work chamber, the nitrogen or air flow passes through a preheating chamber and is adjustable via a flow meter mounted on the control panel
- 2 Flow meters to monitor gas flow of Nitrogen & Chamber seal integrity in MFSO-ISO
- 2 Flow meters to monitor gas flow of Air & Chamber seal integrity in MFSO-ASTM
- 3 Flow meters to monitor gas flow of Nitrogen, Air & Chamber seal integrity in MFSU
- Aluminum loading tray is supplied as standard accessory

MFSU

MFSO-ISO

Optional Features & Accessories:

- Over temperature protection
- Multi segment, multi program storage Controllers
- Silica or Alumina crucibles with well-fitted lids
- Vacuum desiccator with gas inlet & gas outlet


Crucibles & Lids


Sample loading tray

Note: Analytical balance with 0.01g readability is required for weighing.

Model	Atmosphere	Max. operating temp.(°C)	Chamber dimensions H x W x D (mm)	Volume (litres)	Max. power (W)
MFSU	Nitrogen & Air	210	43 x 195 x 300	2.5	500
MFSO-ISO	Nitrogen	210	43 x 195 x 300	2.5	500
MFSO-ASTM	Air	210	43 x 195 x 300	2.5	500

Volatile Matter Furnace (VMF /ASTM)

The VMF/ASTM is a bench mounted furnace specially designed for determination of volatile matter in coal and coke samples as per ASTM D3175.

Specification:

- Maximum temperature: up to 1000°C.
- Continuous operating temperature: up to 1000°C.
- Top opening furnace as per ASTM D3175.
- Residual current device (RCD) is fitted to provide enhanced operator safety.
- High grade resistance wire wound heating elements.
- Energy efficient, high quality, low thermal mass insulation.
- A rugged metal sheathed control thermocouple is protected from accidental damage and allows full use of work tube bore.
- Temperature measurement with 'N' type thermocouple
- High end microprocessor PID temperature controller to maintain the required temperature as per ASTM D3175.
- Wire crucible holder along with Inconel crucible & lid are supplied as standard.

VMF/ASTM
(N2 gas port with flow meter option)

Optional Features & Accessories:

- N_2 gas port with a flow meter.
- Over temperature protection controller.
- Metal cooling block for cooling the crucibles.

Inconel crucible wire

Inconel crucible with lid

Note: Analytical balance with 0.01g readability is required for weighing.

Volatile Matter Furnace, VMF / ISO

This is a chamber furnace designed for Volatile Matter Analysis as per ISO 562. This furnace offers temperature and response times to perform Volatile matter determination.

Standard Features:

- Maximum Temperature: 1100°C
- Continuous Temperature: 1050°C
- Chamber dimensions (mm): 110 x 200 x 254 (H x W x D)
- Heating elements (embedded in ceramic slabs) located on 4 sides of the chamber ensure rapid heating required for analysis as per ISO 562
- The chimney has a provision to restrict airflow/convection through the furnace
- Provision for inserting external thermocouples (three positions) to check the temperature under the crucibles
- Protection of the elements from carbon build-up or corrosive atmosphere, inherent in the slab design, makes it ideal for volatile matter analysis
- Vertical lifting door keeps the hot face away from the operator when the door is opened
- Positive break door safety switch isolates heating elements from power supply when door is opened
- High-end micro-processor PID controller

VMF/ISO

VMF/ISO

Crucible Rack

Crucible with Lid

Optional Features & Accessories:

- Over temperature protection controller
- Multi segment, multi program storage controllers with audible alarm & timer
- 4, 6 & 9 crucible rack with loading handle available
- Crucibles and lids are available as per ISO 562
- Calibrated thermocouple probe with digital indicator

Note: Analytical balance with 0.01g readability is required for weighing.

Ashing Furnaces, BMF11 & BSF12/A

BMF11 & BSF12/A furnaces are designed specially for Ashing applications.

Please refer **page numbers 12 & 13** for more details.

Free Swelling Index Furnace, FSI

The Swelling Index Furnace, often simply called the free swelling Index (FSI) or Crucible Swelling Number (CSN), measures the swelling behaviour of materials.

The cokeability of coal is an important technological parameter of coals during the reduction process. Coking properties of coal are evaluated using the FSI. It is a test that determines the ability of coal to form a coherent mass, or "coke," when heated in the absence of air. This property is crucial for the steel industry, where coking coal is used in the production of coke, a key ingredient in blast furnace operations.

FSI is determined by comparing the size and shape of the coke button with a chart of standard profiles and scaling a value from 0 to 9 at an interval of 0.5.

Standard Features:

- Maximum temperature: 900°C
- Continuous operating temperature: Up to 850°C
- Top opening furnace as per ASTM D720, BS ISO 501 & ISO 501
- Residual current device (RCD) is fitted to provide enhance operator safety
- Uses high power resistance heating element
- Excellent temperature stability and quick temperature ramping
- Energy efficient, high quality, low thermal mass insulation
- Temperature measurement with 'N' type thermocouple
- High end Microprocessor PID temperature controller to maintain the required temperature
- A set of Crucible and lid supplied as standard for swelling test as per the dimensions given in the test standard
- Wire Crucible holder supplied as standard

Free Swelling Index Furnace, FSI

Standard Supply:

- Free Swelling Index Furnace, FSI
- Silica Crucible – 1 No.
- Silica Crucible lid – 1 No.
- Crucible Holding wire – 1 No.
- Instructions manual – 1 No.


Crucible & Crucible Lid


Inconel crucible wire

Optional Features:

- Over Temperature controller
- Silica crucible & lid with hole for calibration
- Ceramic Cooling block for cooling crucibles

UPCOMING LAUNCHES OF ADDITIONAL COAL AND COKE TESTING EQUIPMENT

- Combustion Tube Furnace
- CO_2 Reactivity Test Furnaces

Gray King Coke Test Furnace, GKF

The Gray King coke test furnace evaluates the caking properties of coal or coal blends by carbonising them under standard conditions.

This test data can be easily compared with industrial practices, allowing for a reliable prediction of how the coal will behave during large-scale carbonisation.

The GKF furnace is designed and complies with standards BS ISO 502:2015, BS 1016-107.2, AS 1038.12.2, IS 1353.

Elite Thermal systems offer the choice of two Gray King coke test furnaces, GFK-1 & GFK-4.

Specifications:

- Continuous operating Temperature: 600°C
- Both the models have two zones
- GFK-1 can hold a single retort tube whilst the GFK-4 can hold up to 4 retort tubes
- Aluminum bronze stabilisation block which gives improved uniformity of temperature
- Two thermocouples are located inside the stabilisation block, protected by ceramic sheaths
- Energy efficient, high quality, low thermal mass insulation
- High end Microprocessor PID controller & slave controller to maintain the required temperature
- The furnace is equipped with a wheel and rail system that allows it to be retracted from the retort tubes for cooling, as specified by the Standard
- Horizontal models are supplied as standard with controls in the base

(Retort tubes should be ordered separately)

Retort tube

Standard Supply:

- Gray King Coke Test Furnace, GFK
- Instructions manual - 1 No.

Optional Features:

- Multi-segment, multi-program storage controller
- Over temperature protection controller