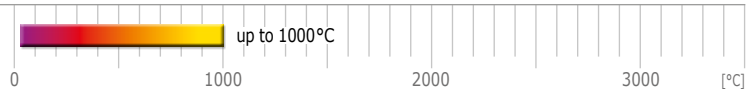

VMF – Volatile Matter Furnaces

Volatile matter in coal, ie, the matter given off before oxidisation, refers to the volatile components of coal, except moisture, which are removed at high temperature in the absence of air. This is usually a mixture of short and long chain hydrocarbons, aromatic hydrocarbons and some sulphur.

Volatile matter is determined as the loss in mass, less that due to moisture, when coal or coke is heated out of contact with air under standardised conditions. The test is empirical and, in order to ensure reproducible results, it is essential that the rate of heating, the final temperature and the overall duration of the test be carefully controlled. It is also essential to exclude air from the coal or coke during heating to prevent oxidisation. The fit of the crucible lid is, therefore, critical.

The moisture content of the sample must be determined at the same time as the volatile matter so that the appropriate correction can be made.

The Carbolite Gero VMF furnaces are specifically designed for testing the volatile matter of coal and meet the test methods of International Standards:

Furnace	Standard	Description
VMF 10/6	BS ISO 562:2010	Hard coal and coke – determination of volatile matter
VMF/ASTM	ASTM D3175-11	Standard test method for volatile matter in the analysis sample of coal and coke

VMF 10/6 (BS ISO 562:2010) – 'Hard coal and coke – Determination of volatile matter'

This test method determines the volatile matter of hard coal and of coke. It is not applicable to brown coals and lignites. A portion of the sample is heated out of contact with air at 900 °C for 7 minutes. The percentage mass fraction of volatile matter is calculated from the loss in mass of the test portion after deducting the loss in mass due to moisture. The VMF 10/6 offers temperature and response times to meet the requirements of BS ISO 562:2010.

VMF 10/6 (ISO)

Standard features

- 1000 °C maximum operating temperature
- 2132 controller fitted as standard
- Fast heating - typically 20 mins to 900 °C. Open spiral elements located in the chamber roof and under the hearth supported in low thermal mass insulation ensure the rapid heating required by the Standard
- Fast recovery of temperature after loading samples – less than 4 mins to return to 900 °C ±5 °C
- Chimney at back of the chamber
- Hardwearing refractory bricks in chamber entrance for resistance to abrasion
- Calibration ports allow insertion of unsheathed probe thermocouples from the back of the chamber as required by the standard
- Suits crucibles measuring 21 mm id / 25 mm od x 38 mm high and close fitting lid

Options (specify these at time of order)

- 4 or 9 crucible stand
- Loading handle
- Crucibles and lids
- Digital communications or paperless nanodac recorder for documentary evidence of test procedure
- Over-temperature control

Options part numbers

Option	Item number
Crucible & lid	40-209-460-0025
4 crucible stand	00037-3-2003
9 crucible stand	00037-3-2004
Crucible stand handle	00125-3-1007

Optional Crucible with lid (VMF 10/6)

Optional 4 crucible stand + 4 crucibles with lids (VMF 10/6)

VMF / ASTM (ASTM D3175-11) – 'Standard Test Method for Volatile Matter in the Analysis Sample of Coal and Coke'

This test method determines the percentage of gaseous products, exclusive of moisture vapour, in the analysis sample which are released under the specific conditions of the test. As the test is empirical strict adherence to basic principles and permissable procedures is required to obtain valid results.

Standard features

- 1000 °C maximum operating temperature
- 2132 controller fitted as standard
- Top loading 50 mm diameter x 100 mm deep with hinged lid
- Corrosion and oxidisation resistant Inconel crucible & lid
- Crucible holder included as standard
- 30 mA (RCD) residual current device, for additional protection

VMF / ASTM

Options part numbers

Option	Item number
Inconel crucible & lid (VMF/ASTM)	40-209-010-0020
Wire crucible holder (VFM/ASTM)	00329-3-2001

Options (specify these at time of order)

- Over-temperature protection

Corrosion and oxidisation resistant Inconel crucible & lid (VMF/ASTM)

Standard wire crucible holder shown with crucible & lid (VFM/ASTM)

Technical data

Model	Max. operating temp. [°C]	Continuous operating temp. [°C]	Heat-up time to 900 °C [mins]	Internal dimensions H x W x D / Ø x D [mm]	External dimensions H x W x D [mm]	Number of samples	Thermocouple type	Max. power [W]	Weight [kg]
VMF 10/6 (ISO)	1000	900	20	100 x 210 x 260	655 x 435 x 260	1, 4 or 9	K	3000	47
VMF/ASTM	1000	900	20	50 x 100	330 x 410 x 300	1	N	950	9