



# Ash Fusion Determinator

## EATC16 Series



EATC16 Manual



EATC16



EATC16plus

## Ash Fusion Determinator

- a step towards an improved Ash Fusibility Analysis

When any fuel is burned, an incombustible waste material is produced, commonly known as ash.

As the burning process progresses, the temperature of the combustion environment reaches a point where the ash particles start to melt.

This melting occurs because the heat energy breaks down the chemical bonds holding the ash particles together, causing them to transition from a solid state to a liquid state. Once the ash has melted, it begins to undergo a cooling process. As the melted ash cools down, it solidifies and forms clinkers.

Clinkers are hard, stony residues composed of the solidified ash particles, which frequently stick to the inner surfaces of the combustion chamber.

Clinker build-up poses challenges for large coal furnaces, often requiring furnace closure for maintenance. Understanding the fusibility properties of coal ash facilitates temperature management to mitigate clinker formation.

The Ash Fusion Temperature serves as an indicator of the point at which the ash undergoes a transition from a solid to a liquid state through melting. This temperature is a crucial parameter in the planning and execution of gasification systems.

## Ash Fusion Determinator | EATC16 Series

Elite Thermal's EATC16 Series Ash Fusion Determinator for four critical temperatures:

- | Initial Deformation Temperature (IDT)
- | Softening Temperature (ST)
- | Hemisphere Temperature (HT)
- | Fluid Temperature (FT)

### EATC16 Series key features

- | Bench-mounted Ash Fusion Determinators
- | Maximum Furnace Temperature: 1600°C
- | Types of samples: Coal ash, coke ash, biomass ash, refuse-derived (RDF) ash, and solid biofuel ash
- | Analysis parameters: Fusion points (IDT, ST, HT, and FT) of ash samples
- | Type of analysis: Manual in EATC16 Manual Model  
Automatic in EATC16 & EATC16*plus*
- | Precisely controlled high-temperature horizontal resistance furnace
- | Furnace is capable of operating in both oxidising and reducing atmospheres
- | Programmable temperature ramp rates
- | Up to 6 samples can be analysed simultaneously for each batch
- | Capture images of the samples at every 1°C increase temperature in EATC16 & EATC16*plus*
- | Grid feature for accurate comparison of sample height and width in EATC16 & EATC16*plus*
- | Quick cooling facilitated by low thermal mass insulation allows for the completion of multiple tests within a day
- | Automatic gas switching between oxidizing and reducing gases based on selected test conditions (Available in EATC16*plus*)



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## EATC16 Manual

- | EATC16 Manual Ash Fusion Determinator with Manual interpretation software, with 2 flow meters
- | The operator must manually interpret the fusion points of each sample
- | The system includes gas inlets for reducing, oxidizing, and purge gases. It supports the use of either premixed or individual gases for reducing
- | Alarms are fitted to indicate when supply gas pressures are running low
- | The furnace has three gas connections on the rear of the furnace: Individual ports for Air/CO<sub>2</sub>, CO/H<sub>2</sub> and one for Purge gas.  
Note: the preferred gas configuration (H<sub>2</sub>-CO<sub>2</sub> or CO-CO<sub>2</sub>) must be specified when placing the order.
- | Pressure switches are fitted to all three gas lines, purge gas, CO<sub>2</sub> gas and H<sub>2</sub> gas



EATC16 Manual

## EATC16



EATC16

- | EATC16 Ash Fusion Determinator with automatic interpretation software
- | Up to 6 samples can be analysed simultaneously for each batch
- | Automatic and continuous recording of images
- | Capture images of the samples at every 1°C increase in temperature
- | The furnace has three gas connections on the rear side of the furnace: Individual ports for Air/CO<sub>2</sub>, CO/H<sub>2</sub> and one for Purge gas.  
Note: the preferred gas configuration (H<sub>2</sub>-CO<sub>2</sub> or CO-CO<sub>2</sub>) must be specified when placing the order.
- | EATC16 Ash Fusion Determinator used 2 flow meters for oxidising, reducing and purge gases
- | The system includes gas inlets for reducing, oxidizing, and purge gases. It supports the use of either premixed or individual gases for reducing
- | A grid overlay feature is provided within the software for each sample
- | The grids are positioned to identify the samples for automatic analysis or are used to assist manual analysis
- | They ensure accurate comparison of the height and width of the sample melt points
- | The position and scale of each grid is easily adjustable

## EATC16plus

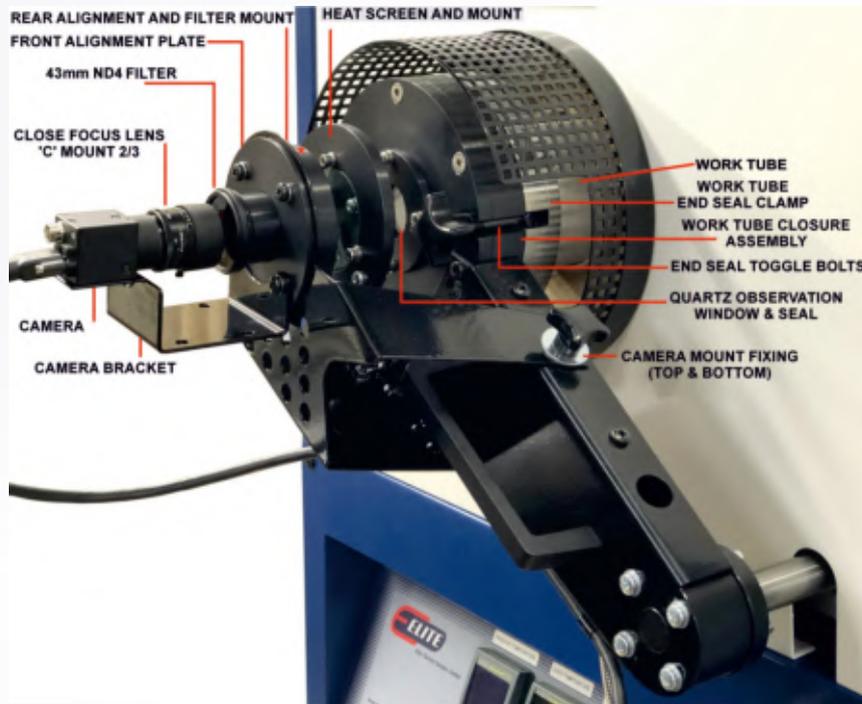
- | Similar to EATC16, EATC16plus uses the same software
- | The furnace has five gas connections on the rear side of the furnace: Individual ports for CO, CO<sub>2</sub>, H<sub>2</sub>, and Air and one for Purge gas
- | A significant advantage of the EATC16plus is its four flow meters, which allow automatic switching between oxidising and reducing gases in response to selected test conditions
- | EATC16plus includes separate gas inlets for CO, CO<sub>2</sub>, H<sub>2</sub>, N<sub>2</sub> and Air



EATC16plus

## High-Resolution Integrated Camera System

The high-resolution integrated camera system is designed for the EATC16 series to enhance the precision and efficiency of sample analysis during testing. It features a manually adjustable lens mounted on a suitable arm, allowing for optimal positioning and flexibility to ensure accurate and reliable observations throughout the testing process.



## Camera Features

- | A high-resolution camera with a manually adjustable lens mounted on a suitable arm is used to view the samples being tested
- | This setup allows for easy movement away from the furnace to access the work tube
- | The video image is sent to a high-end computer system where it is recorded and displayed in a specially created logging program
- | Accepts specimen shapes in accordance with ASTM, ISO, and DIN standards, including cylinder, pyramid, upright pyramid, and truncated pyramid
- | The camera in EATC16 and EATC16<sup>plus</sup> allows viewing a complete video of the analysis
- | Adjustable grid scale for each test specimen (EATC16 & EATC16<sup>plus</sup>)
- | Grid overlay feature for accurate comparison of sample height and width (EATC16 & EATC16<sup>plus</sup>)
- | Accepts specimen shapes as per standards
- | Direct specimen capturing without using mirrors for accurate and precise fusion temperature measurements
- | Continuous recording of sample images
- | Real time monitoring of the samples and test process
- | Auto identification of fusion temperatures (IDT, ST, HT & FT) (only for EATC16 & EATC16<sup>plus</sup>)



Biomass Ash

RDF Ash

Fly Ash

Petroleum  
Coke Ash

Coal Ash

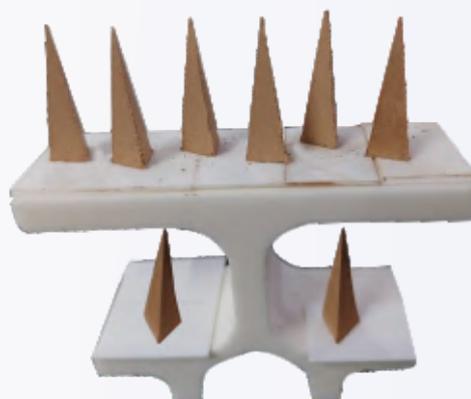
Low ash  
metallurgical coke

## Ordering Information

Item Name	Part Number
EATC16 Manual, Ash Fusion Determinator	EATC16 Manual
EATC16, Ash fusion determinator	EATC16
EATC16plus, Automatic Ash Fusion Determinator	EATC16plus
EATC17, Ash Fusion Determinator	EATC17
Gold Wire, 0.5mm Diameter15mm, Pack of 1	eatc16-509200
Nickel wire, 0.5mm diameter, 15mm, Pack of 1	eatc16-509220
Palladium Wire, 0.5mm Diameter, 15mm, Pack of 1	eatc16-509210
Sample Carrier / Holder, Ceramic, EATC16	eatc16-509305
Alumina Fusion Tray, 38x30x1.5mm, Pack of 100	eatc16-509115
Alumina Fusion Tray, 18x12x0.5mm, Pack of 100	eatc16-509120
Alumina Work Tube:1600 deg C, 76mm (ID) x 675mm length, OBE	a16-76-90-675
Thermocouple, EATC16	eatc16-509220
Ceramic Plug, Front, EATC16	eatc16-509320
Ceramic Plug, Rear, EATC16	eatc16-509321
Lamp, EATC16	eatc16-509420
Mold for Cylinder, EATC16	eatc16-509520
Mold for Pyramid, EATC16	eatc16-509620
Heating Elements, Pack of 6, EATC16	eatc16-509720
O-ring kit for EATC16 / EATC16plus	eatc16-509120

For more details, please check EATC17 technical data sheets.

## Sample holder with Ash Samples





# Ash Fusion Determinator | EATC16 Series

General Specifications	EATC16 <sub>plus</sub>	EATC16	EATC16 Manual
Ash Fusibility Determination	Automatic	Automatic	Manual
Fusion Points	IDT (Initial deformation Temperature), ST (Softening/Sphere Temperature), HT (Hemisphere Temperature) & FT (Fluid/Flow Temperature)		
Test Method	ASTM D 1857; ASTM E953; BS ISO 540; BS ISO 21404, CEN/TS 15370-1; CEN/TR 15404:2010. DIN 51730; ISO 540; ISO 21404		
Capable to Analyse	Cube/Cylinder, Pyramids/Cone, Upright cone/Upright Pyramid and Truncated cone/Truncated Pyramid.		
Sample shape identification	Automatic - Cube/Cylinder, Pyramids/Cone, Upright cone/Upright Pyramid and Truncated cone/Truncated Pyramid.		Manual - Cube/Cylinder, Pyramids/Cone, Upright cone/Upright Pyramid and Truncated cone / Truncated Pyramid.
Analysis atmosphere	Oxidizing Atmosphere/Reducing atmosphere		
<b>Furnace Specifications</b>			
Temperature range	up to 1600°C		
Temperature Ramp Rate	programmable 1°C to 12°C per minute		
Temperature precision	±5°C as per standard test methods at 1064°C (99.98% pure gold wire sample melting point)		
Number of heating elements	6 nos - High temperature resistance type heating elements		
Working tube dimensions	90 x 76 x 675mm		
Material of construction of working tube	High grade RCA Alumina work tube		
Analysis Time	4 hours typical cycle time (depending ramp rate and temperature range)		
<b>Stand by Temperature</b>			
Stand by Temperature	Room Temperature	Room Temperature	815°C
<b>Ventilation</b>			
Ventilation	Forced air ventilation		
Exhaust	Pipe to be vented into a separate fume hood		
CO Monitor (Optional on request)	Integrated CO monitor with auditory alarm, Gas flow shut off on alarm. This is factory installed option. Need to order along with main EATC16 Instrument.		NOT AVAILABLE
<b>Gas requirements</b>			
Gas requirements	Integrated <b>four gas</b> flow meters to enable <b>automatic</b> switching of the gases based on the selected test conditions, such as oxidation or reduction.	Integrated <b>two gas</b> flow meters to enable <b>automatic</b> switching of the gases based on the selected test conditions, such as oxidation or reduction.	Integrated <b>two gas</b> flow meters for <b>manual</b> switching of the gases based on the selected test conditions, such as oxidation or reduction.
	<b>Note:</b> At the time of ordering, the user must specify the required gases for their analysis, choosing either CO <sub>2</sub> /H <sub>2</sub> or CO/CO <sub>2</sub> for the reduction mode.		
<b>Electrical requirements</b>			
	380 – 415 V, 50/60 Hz two phase 25 A		
<b>Environmental Conditions</b>			
Operating Condition	15°C to 35°C		
Relative Humidity	20% to 80%, non-condensing.		
<b>EATC16 External Dimensions</b>			
Dimensions- H x W x D in mm	770mm x 660mm x 1010mm	700mm x 505mm x 970mm	700mm x 505mm x 970mm
Weight in kg	Approx. 160kgs	Approx. 95kgs	Approx. 90kgs
<b>PC specifications</b>			
Required PC Specifications	Processor: i3 or i5, RAM: Minimum 8GB, Memory: 512GB HDD or SSD, PCIe slots: PCIe 2.1 x 4, RS232 Ports: 1, OS: Windows 10 or higher		Processor: i3 or i5, RAM: Minimum 8GB, Memory: 512GB HDD or SSD PCIe slots: Minimum 1, RS232 Ports: 1, OS: Windows 10 or higher



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