Advanced Hotgas Filtration System

Hotgas Filters removes 99% of dust particle size < 1 micron

Self Cleaning Flue-gas Filtration System for Clean Energy Solutions
Why use Hotgas Filters?

Today the use of flue gas emissions control systems is paramount, as many governments worldwide are reducing emissions limits and imposing stringent particulate and dust emission control.

- Fine dust particles are harmful to health
- Industrial processes produce emissions
- At high temperatures bag filters can be a fire risk
- Composite candle filters are 100% fire retardant
- It ensures emissions control accuracy
- World wide environmental compliance

Future proof your emissions control, Composite Candle Filters are the ultimate in fine gas filtration technology.

Emission control standards / legislation
Combustion pollution control in the UK is regulated under two main legislative acts, the Clean Air Act (1993) and Medium Combustion Plant Directive (MCPD). Supporting these are the Pollution Prevention Control Act (PPC) and the Waste Incineration Directive (WID).

The statutory bodies responsible for implementing these regulations are Local Authorities and the Environment Agency. Boilers located in an air quality management area are required to meet limits for, particulate matter, PM10 and PM2.5. For biomass boilers burning clean biomass the RHI boiler emissions standard requires an EN303-5 emissions certificate stating it is compliant with PM 30g/Gj and Nitrogen Oxide (NOx) 150 g/GJ, if using recycled wood, grades B and C have to be WID compliant.

Modern Automation, Efficiency & Compliance

Hotgas Filter’s systems are well designed, developed and tested with many intelligent features built in.

- Standard No-dust composite candle filters
- None refractory ceramic fibres in candle filters
- Safe to handle and dispose of organic fibre candles
- Removing 99.9% of ultra fine dust particles < PM 10
- Option for reduction in NOx, HCl, SO2, HF
- Robust and compact design
- Wide temperature range 80°C to 1000°C
- Low differential pressure
- Differential pressure control & auto by-pass valve
- Automatic air pressure jet filter cleaning
- Hopper trace heating
- Rotary cell lock valve
- Over pressure protection relief panels
- Long life for filters, typically 5 to 10 years
- Intelligent design with low life cycle costs
How our Hotgas Filtration System works

Hotgas Filter’s, development team have for many years been manufacturing filter units. Our filter media partner Tenmat, have over a hundred years experience. They have long since mastered the manufacturing technique of making a robust filter candle that withstands high temperatures, can be automatically cleaned and typically lasts from five to ten years before requiring replacing.

How does the system work?
The Hotgas Filter candle effectively blocks particulates typically <2mg/m³, similar to conventional filters. The cartridge is tubular in shape with the bottom sealed to create an inner clean gas cavity and a smooth outer dust surface.

Draft fan draws cleaned air through the filter
The Hotgas Filter housing is populated with many candle elements, all are secured in the vertical position above the fly-ash hopper. On entering the filter housing, the dirty flue gas is evenly distributed between the filter cartridges, in order to mitigate system over pressure, the filter housing is fitted with pressure protection relief panels. The flue gas is drawn by the negative pressure of the draft fan, drawing filtered gas through the filter walls and up into the top of the filter housing. The filtered gas flows out and up through the chimney. Particulates and fly-ash dust is deposited on the outer wall of the filter candle.

Automatic filter cleaning and soot removal
When the dust builds up to the set ΔP, the differential pressure switch signals to activate the high pressure, air jet cleaning system. This allows for the reverse air flow through the filter elements to remove caked dust from the outer surface of the filter, in turn depositing the dust into the fly-ash hopper. Here the fly-ash passes through an air tight, rotary cell lock valve transferring the ash into a wet ash conveyor or auger screw for disposal in a portable bin or skip.

The Hotgas Filter system emissions, exceeds all UK local authority compliance limits.

Typical fibre filter emissions performance

| Average performance | 1 mg/m³ |
| PM10 between | 0.10 & 0.38 µg/m³ |
| PM2.5 between | 0.69 & 0.98 µg/m³ |

UK Local authority emissions requirements

| Upper limit | 50 mg/m³ |
| PM10 | 50 µg/m³ |
| PM2.5 | 25 µg/m³ |

Who uses Hotgas Filtration Systems?
- Biomass boilers in urban areas
- Recycled wood chip heating plants
- Virgin wood chip heating plants
- Cement processing plants
- Glass processing plants
- Waste incineration plants
- Coal fired power stations
- Anaerobic digestion plants
- Biomass gasification plants
- Air purification systems
Hot Gas Filter Material Science & Technology

Hot gas filtration technology has been developed over the past twenty years. Our Tenmat filters are made from a low density porous materials, which are highly effective and efficient when handling sub micron, particulate particles from biomass boilers and industrial waste gas.

The filter elements are formed so as to retain strength and integrity when exposed to heat. We have selected and tested the most advanced filters available, it is these filters, which ensures that your plant continues to run effectively and is emissions compliant day after day.

**Advanced Fine Particle Filter Medium**

The all new hot gas filtration system encompasses a new composite candle design. Designed and manufactured with safe to handle organic fibres, the new filter medium’s operational performance far out weighs both bag or electrostatic filtration.

**No-dust Filter Elements**

Manufactured from organic composite fibres with low resistance while trapping 99.9% of particulates and dust, down to 2mg/m³. They are also resistant to acid gases. Typical operating temperature is > 120°C and effective to below PM < 1 micron.

Intelligent Modern System Design

The Hotgas Filter system is based a proven and well tested design concept, incorporating the latest in filtration media materials, pulse jet cleaning system and control technology.
Composite Candles v Bag Filters - the comparison

- Potentially Composite Filter Candles can achieve total particulate removal as low as 0.5μm effectively removing particulate particles, in practice <2mg/m³ emissions, much lower than bag filters.

- Composite Filter Candles are fire resistant and do not require spark arrestors, pre cyclones or reaction towers.

- Working temperature of the Hotgas Filtration system is 450°C, Composite Filter Candle is >1000°C where the bag filters are in some cases restricted to <180°C.

- Composite Filter Candles efficiency is consistently 99.9% removing virtually all PM10 and PM2.5 particulates, where bag filters require cake build up to ensure efficiency is maintained. i.e. dust obstruction to assist fibre filtration, resulting in efficiency varying between cleaning intervals.

- Composite Filter Candles are completely tolerant to moisture and chemical attack where temperature variance in the filter housing may result in condensation building up, causing bag filter fibres to mat, resulting in requiring frequent cleaning or replacing the bags.

- Structural durability is in favour of the ridged Composite Filter Candle, as bag filter fibres tend to stretch when the pulse jet cleaning takes place, resulting in inefficiency until the dust cake builds up again.

- Composite Filter Candles operate at less pressure than bag filters resulting in less electricity cost per hour. The pressure drop across the filter is very important as it relates to the energy cost for the induced draft fan.

- Composite Filter Candles last 5 to 10 years with enhanced economic benefit over the life of the boiler / filter system. Where Bag filter service life is low due to fire risk, mechanical wear on the fibres and intolerance to chemical attack. They require replacing every 2 -3 years.

- Hotgas Filtration systems are more compact and better suited to retrofitting into existing plant rooms, compared to the Bag filter housing generally is required to be oversized to remove sub micron particulates.

Intelligent Modular System Manufacture

Filter housing design and construction
Filter housing is insulated with glass fibre wool insulation and is clad in galvanised sheet aluminium with a hammerite finish. The filter housing internal body and lower support legs are coated in high temperature heat resistant paint. Galvanised steps and rails provide access for service and inspection through openings on the top of the filter casing.

System pressure & control
Automatic ΔP pressure control is maintained by the fully automatic high pressure jet cleaning system, ensuring the filter system is operates at optimum performance.

Modular design,
The filter casing unit is of a modular design, fully factory assembled, effectively plug and play ready to work when it is connected on site.
Why HG Filtration Ltd?

Our engineering team's expertise in the commercial and industrial combustion engineering industry means we can support you on every step of your journey.

Right solution for your needs
We understand Biomass, our 20 years of Biomass industry knowledge for ensuring that you have the right solution for your needs is core to our business. Our long-term client relationships are testament to this.

Future proofed system design
We have developed our hot gas filtration system by combining our industrial engineering expertise with the UK’s leading manufacturers and long-term supply partners. The result is a proven, robust, extremely well and flexibly designed filtration system that will ensure your biomass installation remains compliant for years to come.

Design, Manufacture,
Sales, Service & Technical Support

The design and build doesn’t stop there
During installation our cost conscious approach at the design stage means that we will only change what is necessary for upgrading the existing plant. Our expert installation, commissioning and service teams can deliver, install, commission and maintain your hot gas filtration system.

The name to trust
All of our filtration systems are designed and built to suit your particular needs and everything we do is backed by a two-year comprehensive UK warranty.

Even after the sale
Our engineers are approachable, conscientious and most of all supportive - your never on your own, every component we use in our filtration system is either designed and engineered by us or is available from our stock in the UK.
Technical Details

Hotgas Filter’s standard 1MW advanced flue gas filter system, is designed for a biomass fuelled boiler to handle a peak flow rate at a filtration velocity of 2.0 cm/s. The filter assembly is modular design, it is plug and play, factory assembled and is delivered in two modular units to your site.

Technical Data

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<td>Model</td>
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Specification includes:

- Air jet cylinder, valves and pipes
- Cell lock and flange connections
- System pressure switch and control
- Platform, rails and ladder
- Body manufactured in mild steel
- Glass wool insulated doors and panels
- Panels finished in alloy zinc paint
- Set of chimney flange connections
- Filter bypass valve and ducting
- Designed for indoor use, outdoor optional

Options:

- Optional flue exhaust fan
- Economiser
- Chimney in various lengths
- Container for outdoor use
- Service and maintenance spares kit

Hotgas Filter’s range is available from 50kW upwards. The filter unit can be duplicated many times over and mounted in a single frame or within a weather proof container for external use, 1MW to 5MW.

Typical Dimensions: