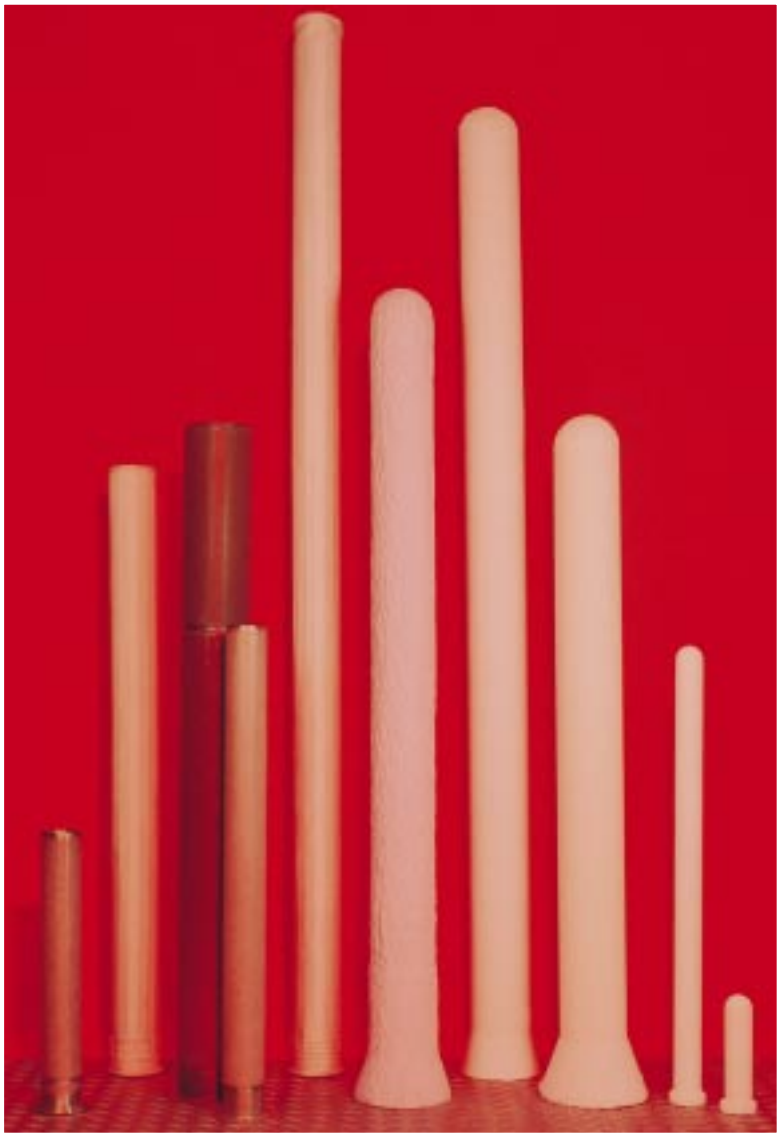
HIGH TEMPERATURE FILTRATION



MIKROPUL

DUST COLLECTION
GAS CLEANING
PRODUCT RECOVERY
ENGINEERING
SERVICES

High Temperature Filtration Applications

Filter elements and tubesheet assembly being removed from high temperature filter

With the introduction of reliable, high temperature filter media, there has been increasing interest in high temperature filtration. In general, high temperature filtration is defined as filtration above an operational temperature of 260°C (500°F), where the use of conventional filter media is no longer possible. Initially developed for electric power generation, this technology is now receiving considerable attention from process industries.

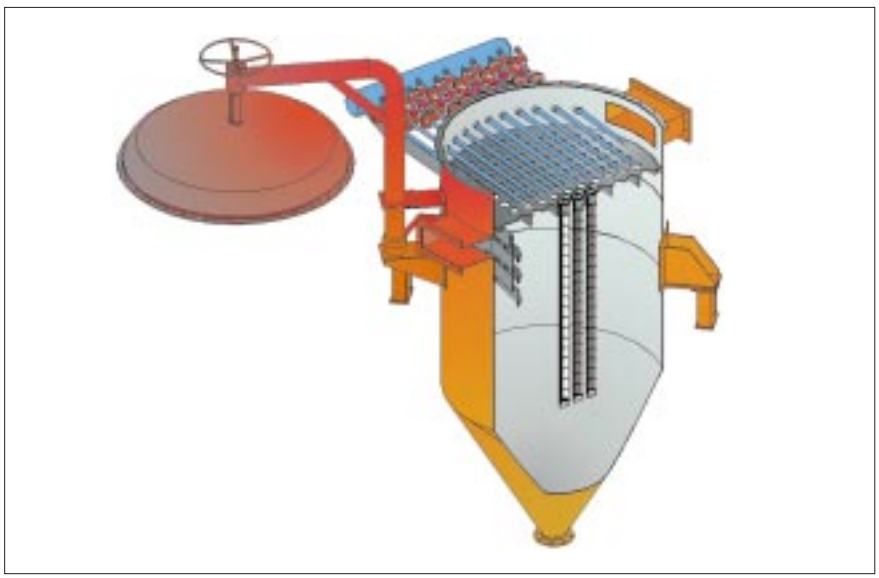
Dust collection at high temperatures offers the following advantages:

- Recovery of thermal energy of the exhaust gas
- Increased overall efficiency
- No repeated heating (e.g. before DeNOx catalytic converters)
- Protection of downstream installations (e.g. heat exchangers, catalytic converters)
- Avoidance of condensation and excursions below the acid dew point
- Better integration of filtration into entire process
- Separation of combustible dust
- Opportunities to reduce denovo-synthesis at temperatures above 500°C (932°F)
- Combined separation of gaseous components through sorption and catalytic processes

Our hot gas dust collectors are being used for:

- Soil remediation
- Waste incineration
  - hospitals
  - chemical industry
- Coal gasification
- Pyrolysis
- Calciners and kilns
- Product recovery in process technologies
- Recycling of variable materials
- Miscellaneous special applications

MikroPul high temperature filters use our proven technologies such as pulse-jet cleaning and top-removal fastening which are particularly suited for high temperature applications. Depending on the dust and filter media, our filters can achieve clean gas contrations significantly below 1mg/Nm^3.



Typical MikroPul high temperature filter

High Temperature Filtration – Filter Elements

The filter media used for high temperature filtration can be distinguished by structure, composition and operational behaviour.
MikroPul high temperature filters use a fiber matrix or a woven structure from either ceramic or metal materials. Besides these standard, commercially available media we have developed special filter structure for specific customer needs. Both the metal and ceramic fiber elements exhibit especially high capture efficiencies.

Ceramic Fiber elements

Our Ceramic fiber elements are rigid and self-supporting with a conical collar. They are suitable for high temperature filtration up to 850°C (1562°F) and for fireproof/sparkproof filter installations.

MikroTemp™

Stabilised glass fiber is a less expensive alternative to other high temperature filter media. Ceramic coating of the glass fibers, together with a special design of the bag houses (patent pending), allows a significant increase of the operational temperature level up to 500°C (932°F), which cannot be achieved by usual glass fiber bags. At the same time, the mechanical stress of common pulse-jet cleaning can be reduced.
High filtration efficiencies of more than 99,9% with clean gas concentrations significantly below 5 mg/m^3 can be achieved, adapting filtration conditions to the dust features. Existing dust collector installations can easily be retrofitted by a wide range of available filter element lengths and the employment of standard tube sheet fastenings.

Metal Fiber Elements

The metal fiber elements are self-supporting and rigid. A sintered metal fiber matrix is applied to a supporting wire mesh. This ensures that the elements retain their shape. A metal fiber element is an excellent choice for filtration applications with very high requirements for both product purity and gas cleaning such as product recovery/recycling applications.

Ceramic filter element (Al_2O_3/SiO_2)

MikroTemp™ glass fiber element

Metal fiber fleece element

Description of High Temperature Filter Elements

	Ceramic Fiber Elements	Metal Fiber Elements	MikroTemp™
Medium	Aluminium silicate	fiber of different temperature and corrosion resistant alloys	woven glass fabrics (720g/m²)
Porosity	ca. 85%	ca. 70%	40-50% (depending on weaving)
Element Length	0,95m/1m/1,40m/2m/ 2,50m	different grading between 1 - 3m, special length on request	any, maximum 3m, special length on request
Element Diameter	60mm/150mm/200mm	90mm/120mm/150mm, special diameters on request	115mm/150mm, special diameters on request
Operational Temperature	850°C (1562°F)	up to 600°C (depending on material)	up to 500°C (932°F) (depending on material)

Characteristics of High Temperature Filter Media

CHARACTERISTIC	STRUCTURE		
	Granular	**Fabric**	**Fiber**
Porosity	40 -60%	35 - 55%	80 - 90%
Permeability	Low	High, depending on fabric	High
Weight	High	Low	Higher than fabric
Pressure Drop	50 - 100mbar 20 - 40 in. w.g.	20 - 35 mbar 8 - 14 in. w.g.	< 30 mbar < 30 mbar
Separation Efficiency	High	Medium	High
Applications	• High temperature filtration up to 600°C (1112°F), depending on metal grade and gas atmosphere • Pharma Filters • Clean In Place Filters		

MikroPul High Temperature Filtration Technology

Experience

Design and engineering of high temperature filters depend upon dust characteristics and the dusts interaction with the filter media. As these effects are difficult to predict, testing to assess dust qualities and filtration behaviour are essential. MikroPul is one of the few companies with facilities that are fully equipped for hot gas filtration research and testing. Our lab has a high temperature research filter and devices for filter media characterization.

The first step in testing is to determine the most appropriate filter media for the specific application. We have successfully tested a wide range of filter media on high temperature applications.

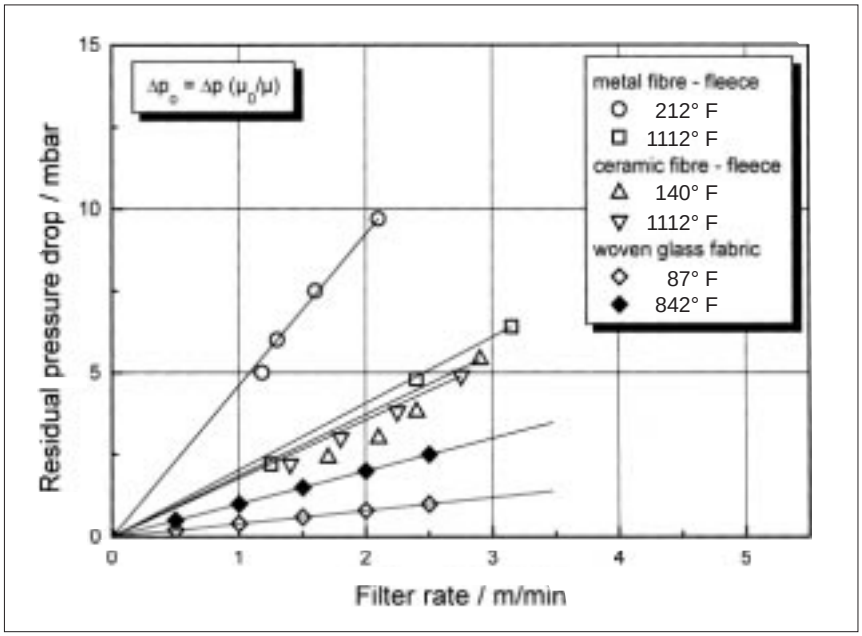
We are equipped at our facilities to conduct such tests at high temperature conditions up to 750°C (1382°F).

Often, these high temperature media filter are so effectively that traditional methods of measurement cannot be used for determining clean gas concentration. MikroPul is equipped with optical particle counters and other size determination devices to precisely evaluate filter media performance. Additionally, we use our analytical laboratory to determine dust characteristics, i.e. melting, sinter and conversion temperatures.

A prerequisite for the proper operation of a high temperature filtration system is reliable regeneration or cleaning of the filter elements. Therefore, during lab testing, we monitor the back pressure developed inside the filter elements to optimize the cleaning system. We used advanced computer simulations to optimize critical components of the cleaning system and filter housing. These are then tailored to fit the specific application.

All these methods and steps allow MikroPul to design and engineer high temperature filtration systems for a wide range of applications. Our pilot lab is available for testing your specific application. Talk to our experienced sales professionals for an analysis of your process requirements.

Hot gas test filter unit



Operational behaviour of different media relating to residual pressure drop

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