

# *Activated Carbon for Flue Gas Cleaning*

## *Donau Carbon*

Since the early days of the 1920ies, large-scale activated carbon production has steadily increased in importance to industry. Continual improvement and optimisation of production processes and new raw materials have led to the advanced level of adsorption technology in use today.

**Donau Carbon**, a company of Donau Chemie Group, has been involved for more than 90 years with the production, sale and industrial use of activated carbon and application in which it is used.

Activated carbon is used in a number of different processes in industry. Environmental problems affecting air and water are solved through the use of activated carbon, and new applications are being continually developed in rapid succession.

This brochure provides an overview on the use of activated carbon in flue gas cleaning. Our application engineers and our special laboratory for adsorption technology are ready to provide further information and consultation on specific technical problems.



## Flue Gas Cleaning

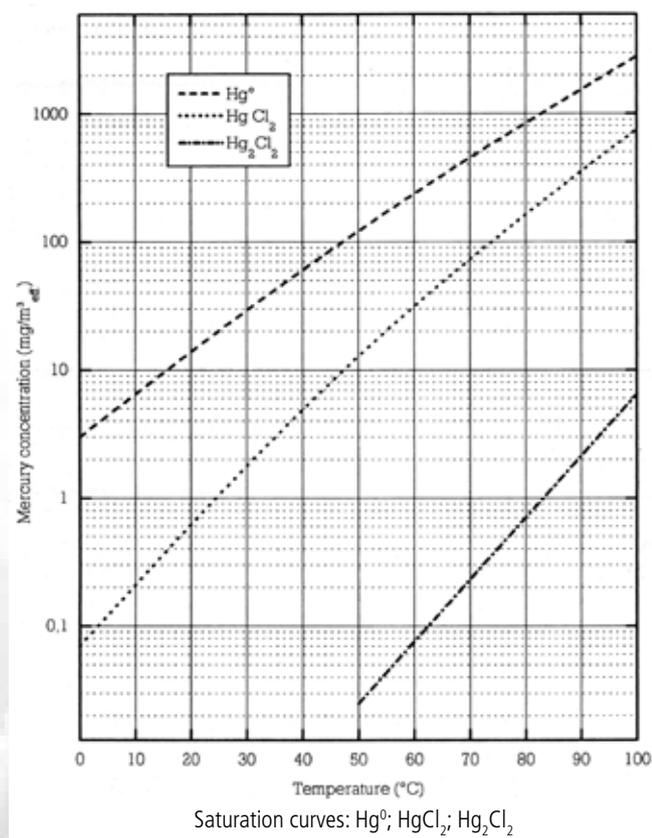
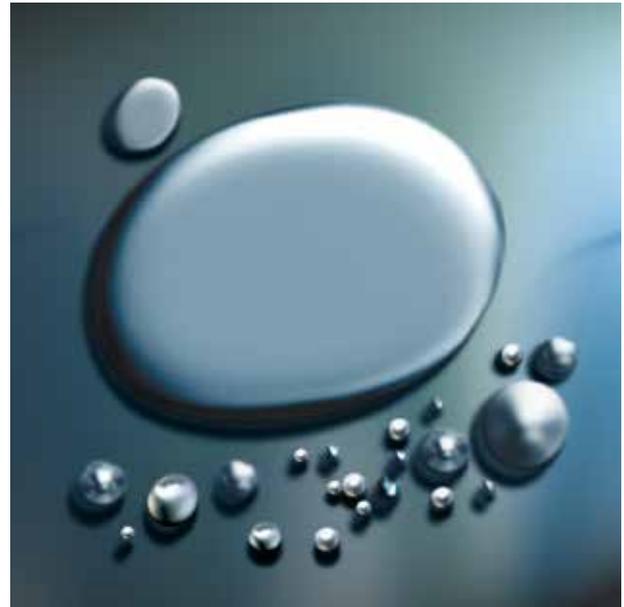
In flue gas cleaning processes, powdered activated carbon is used for the removal of dioxins/furans and heavy metals from waste incineration plants.

Powdered activated carbon from **Donau Carbon** can be dosed, depending on the concentration of the impurities. Flexible dosing rates assure optimal efficiency of activated carbon consumption and economic utilization.

The use of powdered activated carbon enables practicable handling and easy removing from flue gases with cleanable filter systems.

**Dioxins/Furans** are a group of persistent and extremely toxic compounds, which are almost completely destroyed under stable combustion conditions, but are re-formed during dust separation at temperatures above 200° C.

The use of powdered activated carbon from **Donau Carbon** results in a removal efficiency of 99.9% for dioxins.



Mercury is one of the rarest elements in nature. However, due to its high vapour pressure and easy dissolubility from chemical compounds, the danger of emissions to the environment is present in many industrial processes.

Due to the high toxicity of mercury and its compounds, every possible effort should be undertaken to prevent such emissions. Possible sources of mercury emissions to the atmosphere are metallurgical processes and production and disposal of products containing mercury. Mercury can be removed from gas flows using different washing processes. Adsorption on activated carbon from **Donau Carbon** results in a removal efficiency of 98 %.

Recharge emission values:

Dioxin/Furan: < 0,1 ng / Nm<sup>3</sup>

Quecksilber: < 0,05 mg / Nm<sup>3</sup>

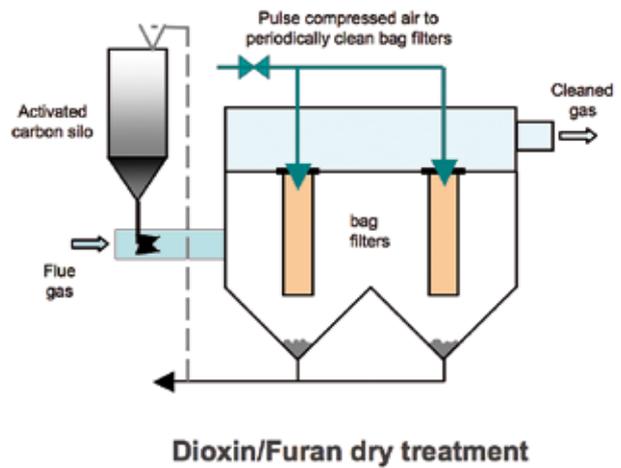
## Activated Carbon Characteristics

The manufacturing and activation process and the used basic raw materials have a determining influence on the adsorptive capacity of activated carbon products. Raw material can be charcoal, bituminous coal, wood, coconut shells, olive stones, fruit stones, peat etc.

In the **Gas Activation Process**, previously carbonised material is subjected to the oxidising action of gas, such as steam, carbon dioxide, air or a mixture of these. Activation temperatures typically range from 700 to 1.000 °C.

In the **Chemical Activation Process** non-incinerated carbonaceous material like sawdust are initially mixed with dehydrating or oxidising chemicals like zinc chloride or phosphoric acid and heated up to temperatures between 400 and 800 °C under exclusion of oxygen.

The selection of the most suitable type of activated carbon for a specific application depends on the physical and chemical properties of the substances to be adsorbed. Aside from this material data, other process-related factors also play a role in the adsorption process.



## Donau Carbon Activated Carbon Products for Flue Gas Cleaning

The requirements for suitable activated carbon types are especially high external surface and particle size distribution of the powdered activated carbon, as well as excellent adsorption capacity for dioxins and heavy metals.

### Recommended Activated Carbon Types (steam activated carbon qualities)

Type	Carbopal® CCM 60	Carbopal® CCM 70	Carbopal® CCM 80 FF	Carbopal® CCM 80 FG
BET-surface (m <sup>2</sup> /g)	600	700	800	800
Iodine number (mg/g)	600 - 700	700 - 750	800 - 900	800 - 900
Ash content (wt%)	< 18	< 15	< 12	<10
Moisture content (wt.%)	< 15	< 12	< 10	< 4
Granulation < 40 µm (Gew.%)	ca. 70	ca. 70	ca. 90	ca. 90
Suitable for ... of Dioxin/Furan, Mercury	low concentration	medium concentration	medium concentration	high concentration

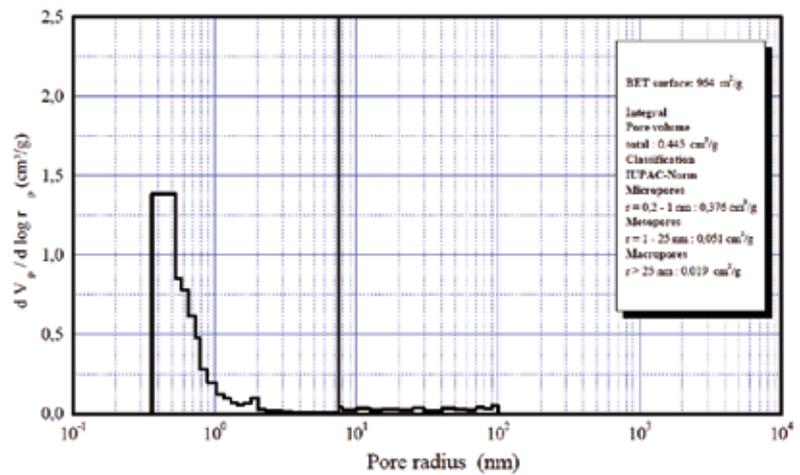
# Characteristic Data and Performance Testing

Depending on raw materials and activation method used, quality and adsorptive properties of the product vary widely. These differences are reflected in the characteristic data (quality features) of the various grades of activated carbon. In general, carbon properties are described on the basis of characteristic data. Apart from our own laboratory test procedures, international testing standards are given high priority, particularly the methods recommended by bodies as

- » ASTM (American Society for Testing and Materials),
- » AWWA (American Water Works Association)
- » CEFIC (Conseil Européen des Fédérations de l'Industrie Chimique)
- » European Standard (DIN EN / CEN Comité Européen de Normalisation) and
- » FCC (Food Chemicals Codex).



**Differential Pore Size distribution**  
**Activated carbon Carbopal CCM 80 FF**



# Donau Carbon world-wide



- Stammhaus / Headquarters
- Donau Carbon-Gesellschaften / Donau Carbon Subsidiaries
- Konzerngesellschaften / Group Companies
- Vertretungen / Representative offices, Agents & Distributors

## Americas:

Argentina  
Brasil  
Chile  
Columbia  
Ecuador  
Mexico  
Peru  
Venezuela

## Middle East:

Iran  
Israel  
Saudi Arabia  
United Arab Emirates

## Asia:

China  
India  
Indonesia  
Malaysia  
Pakistan  
Singapore  
South Korea  
Thailand  
Vietnam

## Africa:

Egypt  
Ghana  
Simbabwe  
South Africa  
Tanzania

## Australia:

Queensland

## Europe:

Belgium  
Denmark  
Finland  
France  
Greece  
Italy  
Luxembourg  
Netherlands  
Norway  
Portugal  
Russia  
Spain  
Sweden  
Switzerland  
Ukraine  
United Kingdom

## Represented by Group Company

### Donauchem in:

Austria  
Czech Republic  
Hungary  
Poland  
Romania  
Serbia  
Slovakia

## Donau Carbon GmbH

Gwinnerstraße 27-33  
60388 Frankfurt/Germany  
Tel.: + 49 (0) 69 40 11-6 50  
Fax: + 49 (0) 69 40 11-6 59  
www.donau-carbon.com  
e-mail: office@donau-carbon.com

## Donau Carbon Philippines Corp.

Zone 1  
Sitio Tagbak  
Bo. Cogon, El Salvador City  
Misamis Oriental, Mindanao  
Philippines  
e-mail: officephilippines@donau-carbon.com

## Donau Carbon US LLC

551 N. US Highway 41  
Dunnellon, FL 34432  
Tel.: + 1-352-465-5959  
Fax: + 1-352-465-0679  
www.donau-carbon-us.com  
e-mail: admin.us@donau-carbon.com

## Donau Carbon Pischelsdorf

3435 Zwentendorf/Austria  
Tel.: + 43 (0) 22 77 25 10-2 79  
Fax: + 43 (0) 22 77 25 10-3 26  
www.donau-chemie.com  
e-mail: donaucarbon@donau-chemie.com

