

**Activated carbon** is a porous carbonaceous material with a very high (internal) surface area. The manufacturing of activated carbon from non porous charcoal is called activation. During this process a large number of pores of various sizes is generated by interaction of steam and carbon dioxide with the raw material at high temperatures (700-900°C). The structure of the remaining carbon-framework depends on the type of raw material, which characterizes the pore size distribution as well as the mechanical stength of the activated carbon. Therefore a very hard raw material, like coconut shells, makes a very hard and abrasion resistant activated carbon.

Silcarbon activated carbons are mainly manufactured from coconut shells. However, Silcarbon also supplies activated carbons made from charcoal (wood) or coal as alternatives for special applications.

### Adsorption

The term "adsorption" is defined as the enrichment of materials on the surface of a solid. This enrichment is caused primarily by physical forces, the so-called "Van der Waals forces". Due to the enormous internal surface area activated carbon is an excellent and efficient adsorbing substance, which binds (mainly organic) materials from its surrounding media.

### External form of activated carbons

Activated carbon exists as: powder: powdered carbons granules: granular carbons (fine, medium and coarse) pellets: pelletized carbons

### Powdered carbons

Powdered carbons are used for the purification of liquids in the chemical, pharmaceutical and food industry as well as for water treatment and catalyst carriers.

Powdered activated carbon can be divided into two types depending on their pore size distribution:

- Silcarbon TH90,
- a fine porous carbon
- · Silcarbon CW20,

a wide porous carbon.

Fine porous carbons are applied to adsorb micro-pollutants such als chlorinated hydrocarbons. The wide pore structured carbons are used for decolorization.

To determine the optimum amount and reaction time for use we recommend (laboratory) testwork being carried out.





# GRANULAR CARBON OUR QUALITY-ASSURANCE



### Granular activated carbon

Granular activated carbons with fine and medium particle sizes are mainly applied in water treatment processes. Granular carbons of high quality have a long lifetime. This corresponds with activated carbons with.

- · high density,
- high activity.

Additional low ash and low moisture content ensure that the activated carbon really consists of effective carbonaceous material.

Silcarbon activated carbons have these properties. A typical analysis for our granular carbon is e.g.:

apparent density: 500 g/l ash content: 3%

moisture: 5%

iodine number: 1000 mg/g.

The iodine number corresponds with the activity (i.e. the internal surface area) of the carbon.

A carbon with a high iodine number can adsorb a higher amount of pollutants than one with a low iodine number. Activated carbons with high iodine numbers have the advantage of a prolonged life time.

Activated carbons, made form coconut shells, can be produced with high activity without becoming brittle or soft. Silcarbon activated carbons with iodine numbers of at least 1000 or 1200 mg/g are one of our standard products.

## PELLETS FOR YOUR BUDGET



### Pelletized carbon and coarse granular carbon

Coarse granular coconut shell as well as pelletized carbons are used for air purification and solvent recovery because of their low pressure losses and great hardness. The pore size distribution and the activity of the carbon determine the possible applications of such a carbon. We help to choose the right type for the specific requirements of each adsorption system.

### Impregnated activated carbon

Various impregnations can be put on Silcarbon activated carbons. The impregnating substances act here either as chemical co-reactants or as catalysts. Silver impregnated carbons are used for preventing bacteria growth on activated carbons used in household potable water filters. Iodine impregnated carbons are applied to remove hydrogen sulfide from biogas.

### **Quality control**

Apart from the regular laboratory investigations at the production site the quality of Silcarbon activated carbon is also controlled by an independant and stately recognized German laboratory. Therefore it is guaranteed that each lot Silcarbon activated carbon meets its specifications. On request a certificate of analysis is issued.

### **Technical advisory service**

Our technical advisory service is based on years of experience with activated carbon. We help to calculate the design of adsorption plants.

### Disposal / Recycling

After-sales service includes taking care of your spent activated carbon. We change out filter units or replace the activated carbon bed. Upon request we investigate the possibilities of disposal or recycling the used carbon.





# **SILCARBON - KNOWS HOW!**



### Survey of types and their most important fields of application

Applications	powdered Silcarbon		granular Silcarbon			pelletized Silcarbon			impregnated Silcarbon			
	TH90	CW20	K48S	K835	K814	C46	SIL15	SIL40	SC40	SC44	AG03	J42
Air cleaning						•		•				
Aquarium water			•				•					
Biogas									•			•
Catalyst support	•									•		
Condensate deoiling			•									
Dechlorination/Deozonization				•	•							
Decolorizing		•					1000					
Edible oil	•											
Electroplating	•				•		•					
Food industry	•	•										
Glycerin			•									
Pharmaceuticals	•	•										
Potable water	•			•	•						•	
Solvent recovery						•						
Sugar refining		•										
Tobacco filters							•					
Waste Water	•	•		•	•		•					
Water treatment	•			•	•							

This list only shows a part of our vast range of activated carbons and a part of many other possible applications. Please contact us to assist you in choosing the right type Silcarbon for your specific application.



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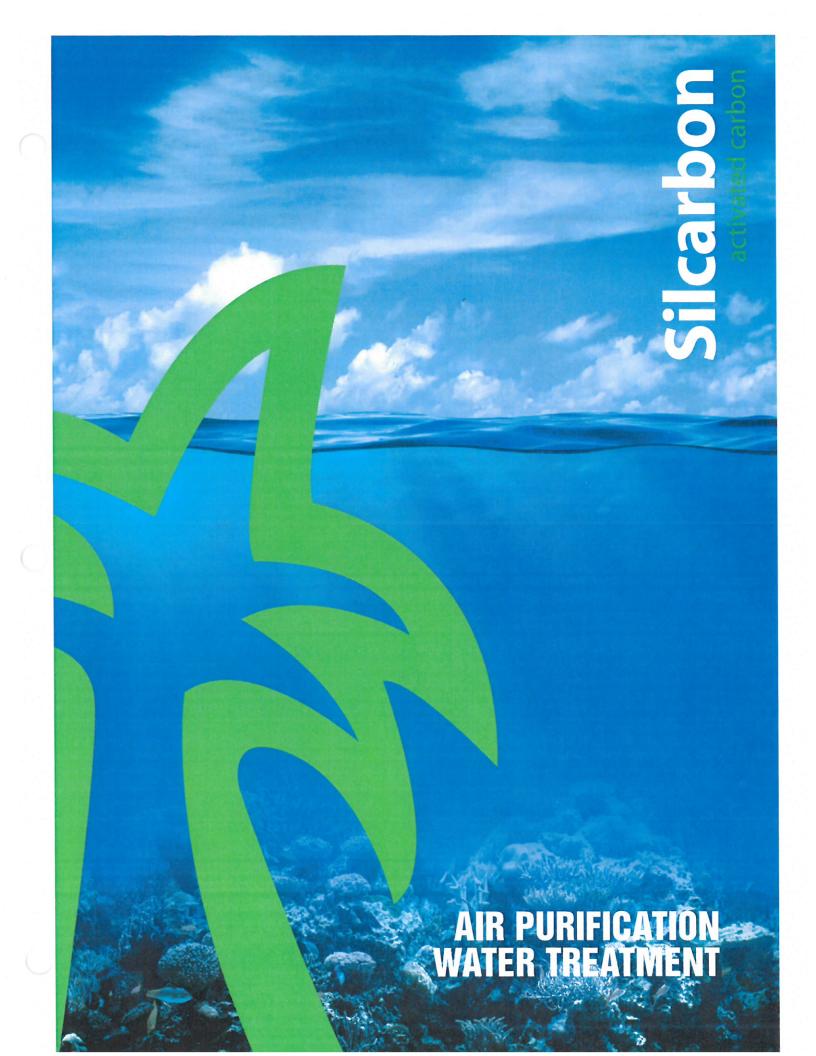


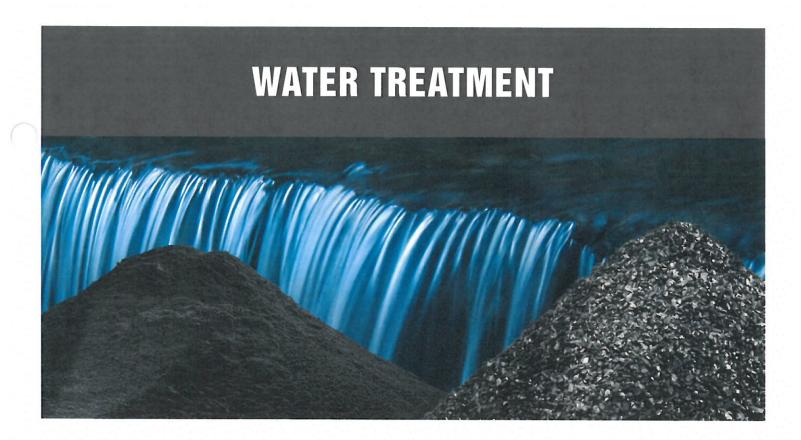
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**DIN EN ISO 9001:2008** 

HALAL Kosher

Member ACPA
Activated Carbon Producer Association





One of the main applications of Silcarbon activated carbon is the treatment of liquids, especially water. Basically a distinction is made between: **Drinking water purification, Groundwater treatment** and Waste water treatment. The pollutants found by treating water with activated carbon mostly manifest themselves as solvents, hydrocarbons and halogenated hydrocarbons. The activated carbon removes these organic substances from the water. Treatment of swimming pool water by means of activated carbon does not fit in this scheme. In fact it is more a matter of dechlorination or deozonization then of removing adsorptive pollutants. The activated carbon catalytically breaks down the chlorine and ozone respectively. Activated carbon made of coconut shells, like Silcarbon K 835 or Silcarbon K 814. is very hard and therefore extremely resistant to the aggressive chlorine or ozone and so exceptionally suitable for dechlorination and deozonization. For water treatment Powdered carbon, Granular carbon, Fine pelletized carbon are used.

Usually powdered carbons are applied for processes that require the carbon to be dosed in the polluted water. The activated carbon loaded with the pollutants has to be separated by suitable filter equipment. Our powdered carbons Silcarbon TH 90 and Silcarbon CW 20 are applied for water purification. The granular or fine pelletized carbons are applied in fixed bed adsorption equipment. The polluted water should pass the stationary layer of activated carbon in one direction (mostly downward). So the activated carbon will adsorb the pollutants. The life time of the activated carbon is determined by its loading capacity, which again is fixed by the pore structure and the specific surface area. Silcarbon granular carbons stand out for their very large specific surface area (mostly more than 1000 m2/g). We shall be pleased to help you finding the right activated carbon to suit your requirements. Of course the most economic solution will be our guide line.





# AIR PURIFICATION



Pelletized carbons and coarse-grained granular carbons are mainly used for gas and air purification.

Many industrial processes discharge smoke and vapours with more or less toxic matter as e.g. (chlorinated) hydrocarbons. The majority of these toxics are prohibited to blow off in the open. The outstanding properties of activated carbon realize the adsorption of the pollutants by its hydrophobic nature.

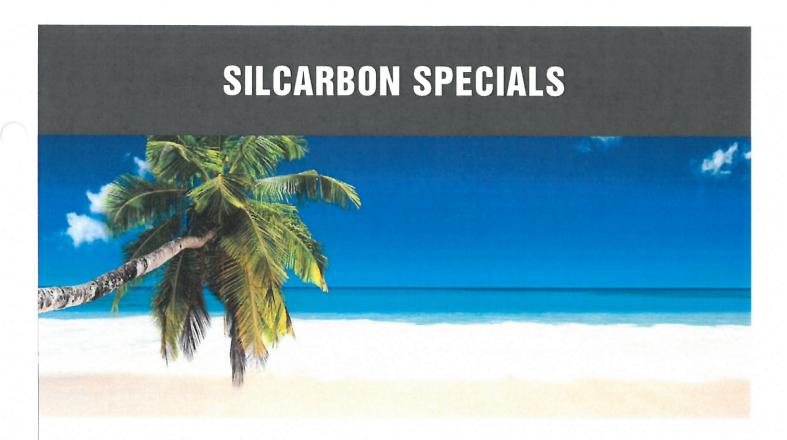
Basically exhaust air treatment should be distinguished from solvent recovery when dealing with air purification. Usually the distinction is evident from the concentration and quantity of the pollutants. Large quantities make it economically possible to desorb and recover solvents from the activated carbon (e.g. with steam). However, low concentrations or

mixtures of pollutants which cannot be recycled require the application of pelletized carbon for single use only. Depending on the type of pollutant it might be possible to clean the used activated carbon in our reactivation plant.

Our pelletized Silcarbon SIL 40 as well as granular Silcarbon C 46 are perfectly fitted for exhaust air purification. Pelletized Silcarbon SC 40 is successfully applied to recover solvents with a high boiling point, or is also used as high quality one-way activated carbon to adsorb substances as e.g. siloxanes from biogas or other organic volatile contaminants from waste air streams.

Pelletized Silcarbon SC44 is one of the highest quality activated carbons to recover solvents with a medium or low boiling point.





Impregnated activated carbon. Many high-tech processes produce exhaust air containing pollutants that can only incompletely be adsorbed by common activated carbon. Often it concerns low molecular and polar substances that, even in low concentrations, have a toxic effect or may otherwise be a problem. In such cases activated carbon is used, that has especially been prepared, i.e. impregnated in order to react to the relevant pollutants. On the basis of a more or less complicated chemical reaction between the pollutants and the impregnation the pollutants are removed from the exhaust air (chemisorption).

Silcarbon activated carbons are impregnated to suit your requirements:

For example iodine impregnated activated carbon Silcarbon J42 is successfully used for the adsorption of hydrogen sulfide from biogas. Another specialty, silver impregnated carbon Silcarbon AG03, is used in small drinking water units to prohibit bacteria growth on the carbon.

### Acid washed activated carbon with low ash content

The non-carbonaceous part of activated carbon is described as ash content. Basically our granular activated carbons made from coconut shells have very low ash content and are therefore very pure. Typical ash contents of Silcarbon K 835 and Silcarbon K 814 are about 2 % by weight. In many cases, e.g. for condensate oil removal, a very pure and neutrally reacting activated carbon is required: granular Silcarbon K48 special, a low ash content, acid washed specialty, has a pH-value between 5 and 7, with very low water soluble silica content suitable for deoiling steam condensate.





# **SILCARBON - KNOWS HOW!**



### Survey of types and their most important fields of application

Applications		dered irbon	granular Silcarbon		pelletized Silcarbon				impregnated Silcarbon			
	TH90	CW20	K48S	K835	K814	C46	SIL15	SIL40	SC40	SC44	AG03	J42
Air cleaning						•						
Aquarium water			•									100
Biogas									•			•
Catalyst support	•											1
Condensate deciling			•				133					
Dechlorination/Deozonization				•								
Decolorizing		•										
Edible oil	•											
Electroplating	•				•							199119
Food industry	•	•										
Glycerin			•									7000
Pharmaceuticals	•	•										
Potable water	•			•	•		•					199
Solvent recovery						•						
Sugar refining		•										200
Tobacco filters												03200
Waste Water	•	•		•	•							7
Water treatment	•			•	•							1993

This list only shows a part of our vast range of activated carbons and a part of many other possible applications. Please contact us to assist you in choosing the right type Silcarbon for your specific application.



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DIN EN ISO 9001:2008

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### Silcarbon S124

### Technical data sheet

SILCARBON S124 is a granular activated carbon, manufactured by the steam activation process.

### Fields of application:

- potable water plants
- waste water treatment
- DEA/MEA cleaning plants

### Technical data

Appearance:
Apparent density
Density backwashed and drained
Particle size
Effective size
Mean particle diameter
Uniformity coeeficient
Water content, as packed
Ash content
Iodine number
Specific surface area

Standard packing

granular carbon
530 +/- 30 kg/m3
480 +/- 30 kg/m3
90 % within 0,425-1,7 mm / 12x40 mesh
0,55 mm typical
1,0 mm typical
1,6 typical
5 % max.
12% typical
900 mg/g minimum
approx. 950 m2/g

pp bags, 25 kgs net each bigbags, 500 kgs net wt. ea.







### Silcarbon S835

### Technical data sheet

SILCARBON S835 is a granular activated carbon, manufactured by the steam activation process.

### Fields of application:

- potable water plants
- waste water treatment
- DEA/MEA cleaning plants

### Technical data

Appearance:
Apparent density
Density backwashed and drained
Particle size
Effective size
Mean particle diameter
Uniformity coeeficient
Water content, as packed
Ash content
Iodine number
Specific surface area

Standard packing

granular carbon
520 +/- 30 kg/m3
470 +/- 30 kg/m3
90 % within 0,6-2,4 mm / 8x30 mesh
0,75 mm typical
1,6 mm typical
1,7 typical
5 % max.
12% typical
900 mg/g minimum
approx. 950 m2/g

pp bags, 25 kgs net each bigbags, 500 kgs net wt. ea.





### Filteranthracite N

-Technical data sheet-



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### **General information**

**Filteranthracite N** is an anthracite mined from depth of about 1,500 m. The resources in the northernmost German coal deposit are sufficient to provide an anthracite of constant excellent quality for many future decades. Especially favourable geological processes formed an anthracite with a particularly special structure. As a purely natural product in its original form, **Filterantracite N** is used for the filtration of drinking water.

**Filteranthracite N** meets the purity requirements of the European standard EN 12909 and Germany Drinking Water Ordinance TrinkwV 2001 which specifies the harmlessness to human health. This has been confirmed with thorough examinations conducted by the Insitute for Hygiene, Gelsenkirchen 2008.

### **Fields of application**

**Filteranthracite N** in rapid gravity and pressure filters serves to filter water containing suspended solids and turbidity in the fields of drinking-water, process water and wastewater treatment. It is also used in the water purification process for swimming pools.

### Filteranthracite N promotes

- · an improvement in the filtration efficiency
- a decrease in the uncertainty of filter break-throughs
- a saving of backwash water
- an increase in the filtration velocity
- a lengthening of the filter run

### **Advantages**

The natural product already possesses the properties which are necessary for an ideal filter medium:

- high resistance to abrasion
- Excellent separation of the filter layers after back-washing
- Low tendency to clump
- No adhesion of precipitated iron, calcium or manganese compounds
- No release of silicic acid or heavy metals into the water

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Revisonsstatus: 01.01.2014

Our Silcarbon-information is based upon extensive investigations and can be regarded as reliable advice, however without any obligation.

Revision: 01.01.2014



DIN EN ISO 9001 2008

### Filteranthracite N

-Technical data sheet-



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### Grain size combinations for Filteranthracite N multi-layer filtration

Filter material		Grain grade combinations (mm)					
			11	III			
Filteranthracite N		0,8 - 1,6	1,4 - 2,5	2,0 - 4,0			
Quartz sand		0,63 - 1,0	0,71 - 1,25	1,0 - 2,0			
	or	0,4 - 0,8					
Support layers consist.		2,0 - 3,15	3,15 - 5,6	5,6 - 8,0			
of filter gravel		3,15 - 5,6	5,6 - 8,0	8,0 - 12,0			

### Single layer filter

Height of layer in case of	closed plants	500 - 2.500 mm		
	open plants	500 - 1.500 mm		

### Filter speed

open plants	up to 15 m/h			
closed plants	up to 30 m/h			

### **Backwash techniques**

The procedures described hereafter are recommendations based on our own test and a lot of practical experiences. Nevertheless backwashing has always to be optimized regarding the individual situation. The instructions of the filter supplier have to be observed.

### Washing with air and water (separated)

1.	Backwashing with water	2-5 min
	combination I	35-40 m/h
	combination II	50-60 m/h
	combination III	80-95 m/h

2. Lowering the water level to few centimetres above the filter material

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DIN EN ISO 9001 200

### Filteranthracite N

-Technical data sheet-



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- a) The water level has basically to be lowered to few centimetres above the filter layer.
- b) The retention time has to be long enough to assure that the nozzle floor is completely deaerated.
- c) The water washing after the retention time has to be executet with maximum speed from the beginning. To start slowlier will lead to an increase and not to a reduction of the material output!
- 2) A long period of washing is of less importance for the cleaning effect. Better results are obtained by repeating the whole wash programme: lowering -air washing- retention time water washing as described above.
- 3) In case of filters used for removing flocs, it can be of advantage to perform a washing with water only (step 1 of the above backwash programme) before air washing takes place. During washing with water only a great part of the flocs from the upper filter layer is removed. Herewith a distribution of the particles in the filter bed during air washing is avoid.
- 4) In the case the filter materials are mixed to a great extent, for example caused by a combined washing with air and water at the end of the washing a re-arrangement of the filter layers by an increase of approx. 15 % wash water speed is reached.
- 5) Especially in case of biologically assisted filtration processes, a period of preparation or seeding of the filter with prepared material may be necessary. Following such preparations, it may be useful to control the washing conditions (speed of washing, duration of washing etc.) and if necessary to optimise them. In the case of wastewater filtration, the required bed expansion will often be achieved with lower washing speeds than expected with fresh material.

A fully automatic process of the backwash programme is helpful in many cases. However there must be the possibility of easy adjustment if the main parameters.

### **Delivery**

### Filteranthracite N is delivered

- in 50 l plastic bags
- in 1.2 t big bags (about 1.65 m³)
- as bulk in silo lorries

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Revision: 01.01.2014



DIN EN ISO 9001 2008

http://www.silcarbon.eu/engliscl iffcates/index.html



You can download all certificates nere also as a PUF (upload/downloads/slicarbon\_certificate\_2019.pdf).

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Silcarbon Aktivkohle GmbH - M



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### Silcarbon K835

### Technical data sheet

SILCARBON K835 is a granular activated carbon, manufactured by the steam activation process. SILCARBON K835 is specifically designed for the purification of drinking water. Because of its very large internal surface, specified by the iodine number, SILCARBON K835 can adsorb large quantities of (chlorinated) organics, polyaromatic hydrocarbons or other dissolved organic contaminants. Due to the combination of a high apparent density and the large internal surface, the loading of contaminants adsorbed on the SILCARBON K835 is generally higher than any competitive carbon. Advantage: longer lifetime of the activated carbon.

Furthermore SILCARBON K835 is applied in waste water plants as well as swimming pools to remove chlorine and ozone from the water.

### Fields of application:

- -potable water plants (removal of (chlorinated) organics, pesticides, herbicides)
- -swimming pools (decomposition of chlorine and ozone)
- -waste water treatment

Technical data

Appearance: granular carbon

Apparent density 500 +/- 25 kg/m<sup>3</sup>

Particle size 95 % within 0,6 - 2,35 mm

Water content, as packed 5 % max.

Ash content 4 % max.

Iodine number 1.050 mg/g min.

Specific surface area approx. 1100 m<sup>2</sup>/g

Half value thickness for chlorine 5 cm max.

Hardness 98 % min.

Standard packing paper bags with pe bag inside, 25 kgs net each bigbags, 500 kgs net wt. ea.

Our Silearbon-information is based upon extensive investigations and can be regarded as reliable advice, however without any obligation Revision status: 01.01.2012







### Silcarbon S124

### Technical data sheet

SILCARBON S124 is a granular activated carbon, manufactured by the steam activation process.

### Fields of application:

- potable water plants
- waste water treatment
- DEA/MEA cleaning plants

### Technical data

Appearance:
Apparent density
Density backwashed and drained
Particle size
Effective size
Mean particle diameter
Uniformity coeeficient
Water content, as packed
Ash content
Iodine number
Specific surface area

Standard packing

granular carbon
530 +/- 30 kg/m3
480 +/- 30 kg/m3
90 % within 0,425-1,7 mm / 12x40 mesh
0,55 mm typical
1,0 mm typical
1,6 typical
5 % max.
12% typical
900 mg/g minimum
approx. 950 m2/g

pp bags, 25 kgs net each bigbags, 500 kgs net wt. ea.







### QUALITÄTSZERTIFIKAT Certificate of Analysis

Material:

Kornaktivkohle / granular activated carbon

Qualität / Quality:

Silcarbon S1240-200 Plus

Verpackung / Packing:

Säcke a 25 kg netto / bags, 25 kgs net ea.

Lot no.:

M038

Aussehen	Appearance			schwarzes Granulat black granulate	Spezifikation Specification
Feuchtigkeit	Moisture content	ASTM D2867	Gew.% / wt.%	3,1	< 5
Schüttgewicht	Bulk density	ASTM D2854	g/l	500	480-540
Aschegehalt	Ash content	ASTM D2866	Gew.% / wt.%	9,5	
Jodzahl	lodine no.	ASTM D4607	mg/g	1030	> 950
Methylenblau Adsorption	Methylene blue adsorption	Silcarbon MB		22,7	> 20
pH Wert	pH value	Silcarbon pH		7,3	5-8
Korngrößenverteilung	Size distribution	<b>ASTM D2862</b>	Gew.% / wt.%		
+ 1,7 mm	+ 12 mesh			0,0	
- 1,7 mm + 0,6 mm	- 12 mesh + 30mesh			91,5	> 95
- 0,6 mm + 0,425 mm	- 30 mesh + 40mesh			6,1	
- 0,425 mm	- 40 mesh			2,9	

Kirchhundem, 17.09.2018 Silcarbon Aktivkohle GmbH

> Silcarbon Aktivkohle GmbH Mühlenweg 15 D 57399 Kirchhundem Germany





typical

### Silcarbon SC40-60

pelletized activated carbon

### Technical data sheet

Appearance: pelletized carbon

Apparent density 490 +/- 30 kg/m3 490 kg/m3

Pellet diameter approx. 4 mm

Humidity, as packed 5 % max. 2 wt.%

Iodine number > 950 mg/g 1000 mg/g

CTC-activity > 60 % 67 %

Spec. surface area (BET) approx. 1050 m<sup>2</sup>/g

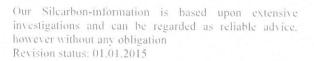
Hardness approx.. 98%

Ash content: approx. 12 wt.%

 $H_2S$  breakthrough > 0.01 0.02

Standard packing pp bags with pe sack inside, 25 kgs / 55 lbs net each

bigbags, 500 kgs / 1100 lbs net ea.





# NSF International

RECOGNIZES

# SILCARBON AKTIVKOHLE GMBH

GERMANY

PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE AUTHORIZED TO BEAR THE NSF MARK. AS COMPLYING WITH NSF/ANSI 61.





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