



For more information: Sweden +46 480 41 75 50. Finland +358 9 643 602.
Germany +49 69 7191070. United Kingdom +44 151 6498344. United States +1 215 546-3900.
www.jacobi.net



Jacobi
CARBONS

Activated Carbon for Vapour Phase Adsorption





Jacobi Carbons manufactures the EcoSorb® range of activated carbons from coal and coconut shell raw materials, using the latest production techniques in modern purpose built facilities. EcoSorb® activated carbons are supplied as cylindrical extruded pellets and irregular shaped granules, which have been specifically designed for use in vapour phase adsorption systems. These materials are proven adsorbents which are used extensively in solvent recovery, air treatment and process gas purification.

- Coal and coconut shell activated carbons designed to meet individual process requirements
- Highly developed internal surface area
- Strictly controlled pore size distribution for selective adsorption
- High density adsorbents for maximum volume activity
- Excellent mechanical strength and sophisticated de-dusting during manufacture ensures that all materials are clean to handle

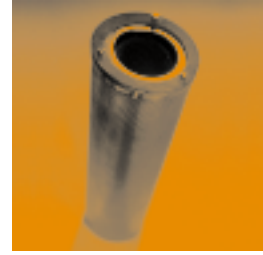


PROPERTIES OF ECOSORB® VAPOUR PHASE ACTIVATED CARBONS

Grade	Type	Form	CTC %	Density g l ⁻¹	Ash %	Hardness %	Application
GXK	Coal	Extruded	45	550	6	99	General air purification
GXB	Coal	Extruded	65	500	6	99	General air purification
BXA	Coal	Extruded	75	460	7	99	Recovery of low boiling point solvents
BX-Plus	Coal	Extruded	85	430	7	98	Recovery of medium boiling point solvents
BX-Super	Coal	Extruded	95	390	8	98	Recovery of high boiling point solvents
BX-Ultra	Coal	Extruded	105	360	8	98	Recovery of high boiling point solvents
HX-Plus [†]	Coal	Extruded	85	430	4	98	Recovery of problematic solvents
BS	Coal	Granular	55	510	11	96	General air purification
CH	Coconut	Granular	40	570	2	99	Nuclear delay beds
CS	Coconut	Granular	55	510	2	99	General air purification, solvent recovery
CX	Coconut	Granular	65	470	2	99	General air purification, solvent recovery
MB-series	Coconut	Granular	35-65	470-580	2	99	Cabin air filtration

[†] Indicates acid washed product. All extruded products are available in a variety of particle diameters including, but not limited to 0.9, 1.2, 1.5, 2.0, 3.0, 4.0 and 5.0 mm. All granular products are available in a variety of mesh sizes including, but not limited to: 30x70, 30x60, 20x50, 12x20, 8x16, 6x12, 4x8 and 3x6. Please consult individual product datasheets for full details.

Annular cylinders and panel filters are used for the treatment of large volumes of air containing volatile organic compounds (VOC).



The Air Treatment Process

In the air treatment process the EcoSorb® activated carbon is packed into thin bed filters which can be constructed from perforated sheet metal or moulded plastic. The thin bed filters can take the shape of annular cylinders, flat panels or pleated cells that are fixed into filter housings.

The filter housings are arranged in filter banks and placed at the required point in the duct work system. As the air flows through the filter banks the contaminants are adsorbed by the EcoSorb® activated carbon.

On saturation of thin bed filters, the spent activated carbon is removed and replaced with virgin EcoSorb® activated carbon in order to optimise the economics of operation.

STANDARD DESIGN CONDITIONS

PARAMETER	TYPICAL VALUE
Concentration	< 1 g m ⁻³
Adsorption efficiency	> 90% – single pass
Adsorption efficiency	> 95% – multiple pass
Linear velocity	15–35 m min ⁻¹
Bed depth	> 2.5 cm
Contact time	0.2–1.0 s
Temperature	< 50°C
Relative humidity	< 90%
Pressure	Atmospheric
Comment	Data based on EcoSorb® GXB

For easy conversion to imperial units, please visit www.jacobi.net and use FastConvert™.

Thin bed filters are designed to provide a high filtration efficiency whilst maintaining a low air flow resistance. To optimise the performance of thin bed filters it is critical to ensure that maximum bed packing and uniform bed depths are achieved.

The bed depth and contact time are determined by the physical characteristics of the contaminant and the concentration present in the air stream. EcoSorb® activated carbon has been proven to provide an economic solution in air filtration systems containing a wide range of concentrations of various compounds.

The operating capacity of thin bed filters containing EcoSorb® activated carbon can be calculated from vapour phase isotherm studies available on request.

APPLICATIONS IN AIR TREATMENT

INDUSTRIAL APPLICATION	TYPICAL CONTAMINANTS
Automobile industry	Aliphatic and aromatic solvents
Food industry	Odour compounds
Airport air intake	Kerosine and hydrocarbons
Solvent storage tanks	Organic solvents
Contaminated land	BTEX and halogens
Cooker hoods	Odour compounds
Cigarette filter tips	Tars and phenols
Fruit storage	Control of CO ₂ levels

Manufacturing industry is required by legislation to control emissions of volatile organic compounds, odours and toxic contaminants.

Many buildings have special requirements for the quality of the air intake in order to protect valuable artifacts, sensitive computer equipment and employees.

Following the initial treatment of the air intake, recirculated air within the building will often require additional filtration.

EcoSorb® activated carbons are used for the production of high purity industrial gases in the petrochemical industry.



The Gas Purification Process

Industrial process gas streams will often require purification to prevent the poisoning of down-stream catalysts or in order to meet specification requirements.

A typical process gas plant will involve several filtration stages. Initially particulate matter is removed using mechanical filtration techniques, followed by the removal of moisture using molecular sieves. Compression is then used to reduce the volume of process gas to be treated.

Adsorption of organic contamination from the process gas takes place in deep packed bed columns of EcoSorb® activated carbon, designed to meet the required gas purity and adsorption cycle times.

Desorption of the organic contaminants is often made by reducing the pressure of the system.

STANDARD DESIGN CONDITIONS

PARAMETER	TYPICAL VALUE
Concentration	< 1000 g m ⁻³
Adsorption efficiency	> 99%
Linear velocity	5–15 m min ⁻¹
Bed depth	0.05–0.50 m
Contact time	1.0–60.0 s
Temperature	< 80°C
Relative humidity	< 99%
Pressure	1–50 atm
Desorption	
• Technique 1	Pressure swing
• Technique 2	Low pressure steam
• Technique 3	Hot inert gas

For easy conversion to imperial units, please visit www.jacobi.net and use FastConvert™.

The purification of process gas is often undertaken at high pressure, to reduce the volume of gas to be treated, thus minimising the size of the adsorption system. Pressurising the gas also has the effect of reducing the volatility and increasing the concentration of organic compounds, significantly improving the adsorption kinetics and adsorption capacity of the EcoSorb® activated carbon.

The high concentration of organic compounds and relatively low volume flow rates are ideal for treatment in deep bed packed columns.

Extended contact times are used to maximise the length of the adsorption cycle, reducing the frequency between regeneration (desorption) of the columns.

Regeneration of the columns is made using pressure swing, low pressure steam or hot inert gas techniques.

TYPICAL APPLICATIONS

INDUSTRIAL APPLICATION	TYPICAL CONTAMINANTS
Pressure swing adsorption	Removal of N ₂ and CO from H ₂
De-oiling of compressed gas	Compressor oils (hydrocarbons)
Brewing – CO ₂ production	Alcohols, amines and mercaptans
Natural gas – CH ₄ production	Hydrocarbons and organic sulphur
Sulphuryl chloride plants	Phenols from HCl gas
Landfill gas – CH ₄ production	Mercaptans and halogens
Electrolysis – H ₂ production	Mercury vapour
Ethylene gas production	Organic sulphur compounds

Large scale process gas purification plants are often operated in petrochemical complexes and by multi-national chemical manufacturing companies, as an integral part of a bulk chemical manufacturing plant.

High value specialist gases are often produced using pressure swing adsorption techniques to minimise the cost of manufacture.

Organic solvents are adsorbed from air streams in many industrial processes and recovered for re-use with EcoSorb® activated carbon. Applications include the recovery of cyclohexanone and MEK for the manufacture of magnetic tape.



The Solvent Recovery Process

The solvent recovery process involves the collection of solvent laden air (SLA) from a production area. Particulate material is removed using mechanical filtration and the SLA is directed to the adsorption plant. The adsorption cycle continues until breakthrough of the solvent is detected, at which stage the unit is saturated with solvent.

The SLA is subsequently directed to a second adsorber, whilst the solvent is recovered from the saturated unit. Desorption is undertaken using low pressure steam or hot inert gas. The recovered solvent is separated from the condensate or hot inert gas for re-use.

PARAMETER	TYPICAL VALUE
Concentration - inlet	1–10 g m ⁻³
Concentration - outlet	< 50 mg m ⁻³
Linear velocity	15–25 m min ⁻¹
Bed depth	0.5–2.0 m
Contact time	1.0–4.0 s
Temperature	< 35°C
Relative humidity	< 60%
Pressure	Atmospheric
Desorption	
• steam ratio	1 - 3 kg:kg
• steam velocity	5 - 15 m min ⁻¹
• desorption time	1 - 6 h
Comment	Data based on EcoSorb® BX-Plus

For easy conversion to imperial units, please visit www.jacobi.net and use FastConvert™.

INDUSTRIAL APPLICATION	TYPICAL CONTAMINANTS
Wallpaper manufacture	Pentane, white spirit
Rotogravure printing	Toluene, hexane
Viscose production disulphide	Acetone, ethanol, carbon
Magnetic film	Cyclohexanone, methyl ethyl ketone
Medical dressing	Tetrahydrofuran, toluene
Adhesive tape	Hexane, toluene
Coating industry toluene	Alcohols, esters, ketones,
Synthetic fibres	Alcohols, acetone, esters

STANDARD DESIGN CONDITIONS

The concentration of organic solvent present in the SLA is critical in the design and operation of a solvent recovery plant. Control of the concentration of organic solvent in combination with the approved EcoSorb® adsorbent can be used to optimise the cyclic capacity of the unit, consequently maximising the length of the adsorption cycle.

In practice the maximum concentration for flammable solvents is usually limited to 25% of the lower explosive limit (LEL). The cyclic capacity is defined as the mass of solvent which can be adsorbed and desorbed consistently with an economic steam consumption.

TYPICAL APPLICATIONS

Solvent recovery using EcoSorb® activated carbon has been successfully applied in a wide range of industrial processes and environmental applications. EcoSorb® activated carbons are supplied for the recovery of alkanes, aromatic hydrocarbons, halogens, alcohols, ketones, aldehydes, esters and ethers.

The range of applications includes the recovery of single and multi-component solvent mixtures.



Jacobi CARBONS

Jacobi Carbons AB – Sweden

Varvsholmen, SE-392 30 Kalmar.
Tel: +46 480 41 75 50. Fax: +46 480 41 75 59.
Email: info@jacobi.net. Web: www.jacobi.net

Jacobi Carbons GmbH – Germany

Feldbergstraße 21, D-60323 Frankfurt.
Tel: +49 69 7191070. Fax: +49 69 71910720.
E-mail: infode@jacobi.net. Web: www.jacobi.net

Jacobi Carbons (Suomen Siv.) – Finland

Ratakatu 1BA3, SF-00120 Helsinki.
Tel: +358 9 643 602. Fax: +358 9 642 900.
Email: infofin@jacobi.net. Web: www.jacobi.net

Jacobi Carbons, Inc. – United States

1518 Walnut Street, Suite 1100. Philadelphia,
PA 19102. Tel: +1 215 546-3900. Fax: +1 215 546-9921.
E-mail: infous@jacobi.net. Web: www.jacobi.net

Jacobi Carbons Ltd – United Kingdom

Niord House, Lord Street, Birkenhead,
Merseyside CH41 1HT.
Tel: +44 151 649 8344. Fax: +44 151 649 8345.
E-mail: infouk@jacobi.net. Web: www.jacobi.net

Sales and Marketing



Jacobi Carbons AB – Sweden

Headquarters of the Jacobi Carbons Group,
coordinating worldwide sales and marketing



Jacobi Carbons (Suomen Siv.) – Finland

Sales and marketing of activated carbon in
Finland and the Baltic States.



Jacobi Carbons GmbH – Germany

Sales and marketing of activated carbon in
Germany and Continental Europe.



Jacobi Carbons Ltd – United Kingdom

Sales and marketing of activated carbon in
the United Kingdom and Republic of Ireland



Jacobi Carbons, Inc. – United States

Sales and marketing of activated carbon in
the United States and Canada.



Jacobi Carbons Agents – Worldwide

A diverse network of agents and distributors
strategically located around the world.

Production and Engineering



Jacobi Carbons Co. Ltd. – China

The manufacture of extruded and granular coal
based activated carbons – ANSI/NSF 61 facility.



Jacobi Carbons (Pvt.) Ltd. – India

The manufacture of granular coconut shell
based activated carbon.



Jacobi Carbons AB – Sweden

Powdered activated carbon manufactured from
coal, coconut shell and wood.



Jacobi Carbons Ltd – United Kingdom

Specialist impregnation facility, technical
activated carbons, media handling and
adsorption equipment.



Jacobi Carbons operate
in full accordance with
approved ISO-9000 quality
control procedures