Ecarb Srl

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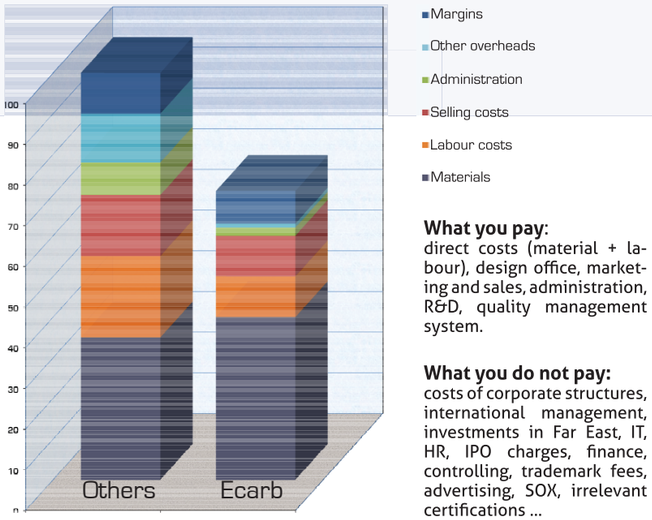
Product Technical Features

Graphec RB and SB • Graphite Block heat exchangers



What you pay:
direct costs (material + labour), design office, marketing and sales, administration, R&D, quality management system.

What you do not pay:
costs of corporate structures, international management, investments in Far East, IT, HR, IPO charges, finance, controlling, trademark fees, advertising, SOX, irrelevant certifications ...

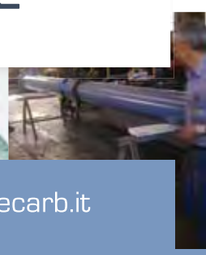
Quality by passion

Ecarb Quality Management System is certified according to ISO 9001:2008. Each single procedure was inspired by our core values: **engineering excellence and customer satisfaction**.
Graphec products are designed in order to maximize lifetime and ensure easy and safe maintenance and operation. Ecarb's manufacturing system is certified acc. to European Pressure Directive (97/23/EG). ATEX and GOST certificates are available on demand.
Only premium raw material suppliers: Ecarb selects just the material grade that better fits service requirements, to offer premium products at a smart price. Graphec RB and SB are designed using most diffused and reliable mechanical codes and standards.

References

Graphec block heat exchangers run with very aggressive media in the most severe conditions. Detailed references are available on demand.

Graphec®



Graphec, graphite process equipment
Rupture disks • Shell&Tubes heat exch. • Crossed tubes condensers
Mixers • Columns • Quenchers • HCl synthesis units • Systems

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Graphec® Block Heat Exchangers are the result of stacking drilled graphite blocks inside a metallic envelope. Corrosive process media flows through longitudinal holes, while service media crosses the blocks on the radial direction. Service media is collected in the shell (for cylindrical RB heat exchangers) or in metallic plates (for SB, cubical ones).

RB Exchangers have cylindrical blocks. Diameter varies from 160 mm to 910 mm. Blocks are sealed by fluoropolymer gaskets and surrounded by a cylindrical shell. Graphec® RB are strong, cheap, compact and easy to operate.

SB Blocks Heat Exchangers have cubic blocks (side from 200 mm to 610 mm) and they are suitable when it is necessary to segregate the process circuit from service circuit, reducing contamination risk.

Model selection: the best solution in a wide range.

Graphec® RB and SB product range covers almost all common heat exchange service requirements. Exchange surface varies from 0,1 m² to 520 m². Maximum design conditions are 220°C @ 20 barg. Ecarb performs accurate thermal sizing to define the heat exchanger that better fits with specific process conditions. Block diameter and number, holes diameters, process and service flow pattern: we cross all possible parameters to identify the optimal design. Just the best possible combination to minimize price, providing easy-to-use and problem-free unit. We study each project as a unique case. Our flexibility becomes a tangible value for our customers.

Maintenance and operation

Ecarb's block heat exchangers (Graphec RB and SB) are compact as they have large exchange surface within limited dimentions. They are easy to operate and fully cleanable. Headers and blocks may be quickly disassembled and each block can be replaced when damaged. Ecarb applies a fair price policy for spare parts, to limit maintenance costs.
Accurate mechanical design is carried out to ensure safe operation and long lifetime. Every details is designed to minimize exposure to damages. Each unit is fully drainable, easy to vent and it may be equipped with a wide range of accessories.

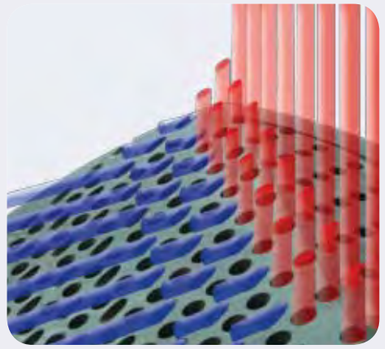
Ecarb's model designation

RB (D) — Model (double drilling path) • 200 — Blocks Ø • 16 — Process Holes Ø • 6 — Block number • CS — Shell Material

Example: Graphec® RB heat exchanger , with six blocks (external diameter 200 mm, with 16 mm holes, double path) and carbon steel shell.

Graphite blocks: a matter of quality!

It is possible to choose among twenty block diameters and six holes diameters, from 8 mm up to 20 mm (for dirty fluids). Single or double drilling pathes are possible. Being not a raw material producer, we are free to select the most suitable material grade from premium global suppliers, just on the basis of the requirements of each specific application, to provide high quality unit at a smart price. Graphec blocks are made of three possible graphite grades, iHP, iSP and iLP. Material selection depends on process media. Tensile strength varies from 12 MPa (iHP) up to 25 MPa (iLP). Standard graphite is impregnated by phenolic resin. Fluoropolymer impregnation is available to enhance corrosion resistance.



	RB	RB D	SB
Process side drilling path	single	double	single
	○○○○○○	○○○○○○	○○○○○○
Block height [mm]	255		-
Block main size (diameter or side) [mm]	160-910		200-610
Graphite Thermal conductivity [W/mK]	150		150
Holes diameters, process side [mm]	8•10•12•16•20		8•16
Holes diameters, service side [mm]	8•10		8•10
Max design pressure [barg]	20		5
Max design temperature [°C]	220		200
Max number of blocks	20		12

Shell

Ecarb manufactures internally shells of Graphec® RB and lateral conveyor of Graphec® SB, thereby controlling quality and lead times. Shells options:

- CS - Carbon Steel
- SS - Stainless Steel
- RL - Rubber Lined Carbon Steel
- TL - PTFE Lined Carbon Steel
- GL - Glass Lined Carbon Steel

Gaskets

Gaskets sealing headers, shell and blocks are expanded PTFE cords supplied by Gore®.
Viton O-ring or a PTFE stuffing box is installed between floating header

Tightening system

To compensate differential thermal dilatation between steel and graphite, the floating header is free to move inside the shell.
Tightening is ensured by coil springs, whilst sealing between shell and floating header is given by an O-ring.

Headers

Available construction materials: graphite (Graphec® iHP, iLP or iSP) and rubber, glass or PTFE lined steel. Headers design is adapted to specific service requirements. Special long headers are designed as separation chamber for partial condenser. Headers may be equipped with mixer or anti-erosion baffles.

CFx (carbon fibre wrapping) is applied around blocks or headers to provide superior mechanical strength and to minimise leakages in case of damages. Carbon fibre cords, with variable filaments density, are pretensioned during wrapping operation. Because of their thermal behaviour (dilatation coefficient is negative), carbon fibre wrapping increases resistance to thermal shocks end enhances lifetime of the unit.
CFx is used to build block heat exchangers where metallic shell si replaced by a carbon fibre reinforced graphite one.

Special design for condensers

Blocks heat exchangers offer a suprising range of design options, which are ideal solution for specific process needs.

Two-stages condenser. In pharmaceutical or regenerations plants, organic solvents are condensed using cold water as cooling media. Afterwords, uncondensate gases are further cooled down in a second condensation step (post condensation). SB cubic blocks heat exchangers may be arranged to have two cooling circuits, working in cross current. This geometry enables to have condensation and post-condensation into one unique items, using two different cooling media, for istance water and chiller, for the two different circuits.

Two-passes condenser. Another design specific for condensers is the two-passes vertical arrangement of RB cylindrical blocks heat exchanger. Inlet gases flow through a primary pass with large cross section, entering from top nozzles, and they are condensed inside the process holes. Condensate is collected at the bottom of the unit. Uncondensate gases are vented through a second auxiliary pass, with a smaller cross section area, being further cooled down. Uncondensed finally run out through a nozzle, located on the top of the unit. In such a way, liquid and gas phases are efficiently separated.