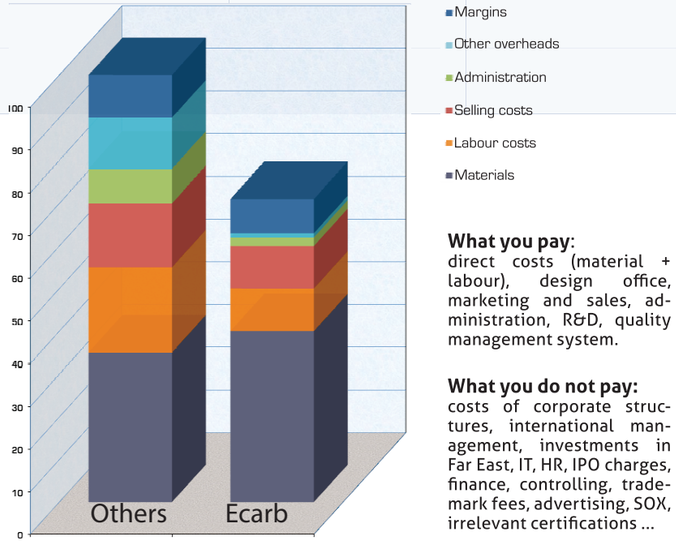
Ecarb Srl

Production site: Via Flaminia Ternana 500 - 05035 Narni - Italy
Sales Office: Via Pietro Rondoni 11 - 20146 Milano - Italy

Price: technology, nothing else!



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

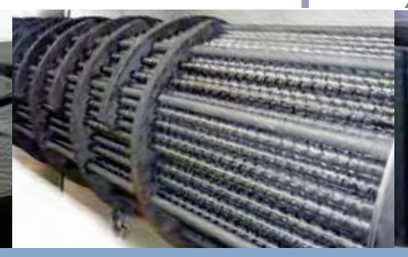
What you do not pay:
costs of corporate structures, international management, investments in Far East, IT, HR, IPO charges, finance, controlling, trademark fees, advertising, SOX, irrelevant certifications ...

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). Only premium raw material suppliers: Ecarb selects just the material grade that better fits service requirements, to offer premium products at a smart price.

References

Process units made of Graphec graphite run with very aggressive substances in the most severe conditions. Detailed references are available on demand. Ecarb material portfolio includes exotic metals, plastic lining and coatings: our engineers will advice the best material for each specific case.



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

Product Technical Features

Graphec: Graphite for process equipment

Graphec®

www.ecarb.it • info@ecarb.it

Graphite: unique material!

Graphite has unique chemical and physical features. Raw graphite is porous and it is resistant to many aggressive chemicals in a wide temperature range. It is used up to 1800°C in process industry.

Impregnated graphite Graphec is fully impervious and inert to a wide range of aggressive chemicals up to 220 °C. Thermal conductivity (up to 160 W / mK) is significantly higher than any other industrial material.

Thermal conductivity of common industrial materials.

Optimal raw material selection

Ecarb is an equipment manufacturer, not a producer of raw graphite. We are free to select the best graphite grades, worldwide available from leading producers.

Only one criterion drives raw material selection: physical-chemical features must match specific process requirements. We use the most suitable material grades, in order to produce high quality products, with enhanced lifetime and higher reliability.

We use only certified graphite, manufactured for process technology applications, homologated according AD2000 N2. Quality is a must.

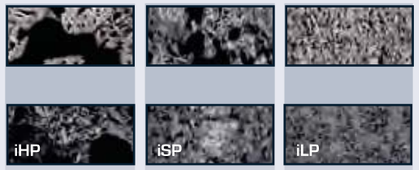
Corrosion resistance of common industrial materials.

Graphec material clusters

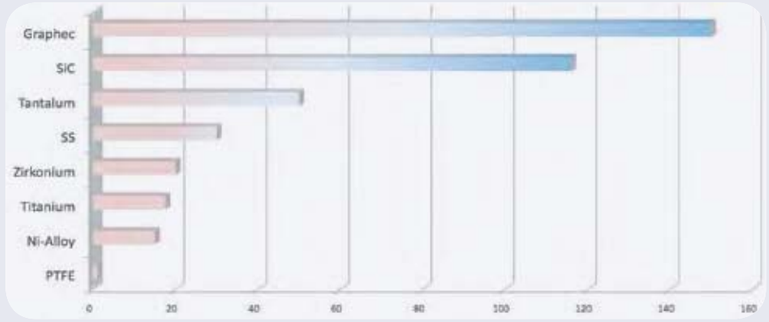
Impervious graphite is produced thanks to impregnation of raw graphite with phenolic resin or fluoropolymers. Ecarb uses a wide range of graphite grades suitable for impregnation, sourced by premium global suppliers. For commercial purposes, we classify graphite grades on the basis of MINIMUM requirements which are listed in the table below. Thus, we identify **three material clusters** - iHP, iSP and iLP - with increasing density, compactness and mechanical features.

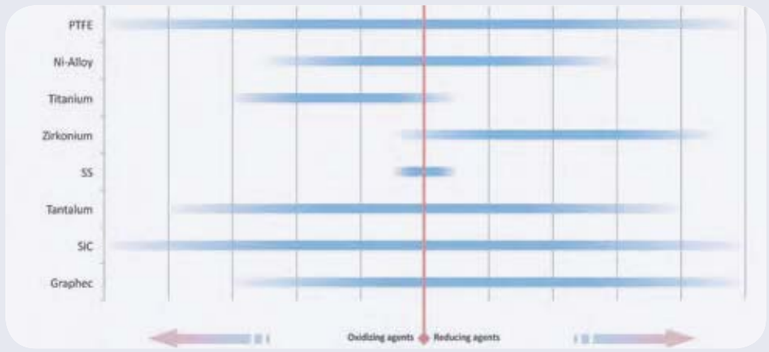
Micrograph of graphite before impregnation.

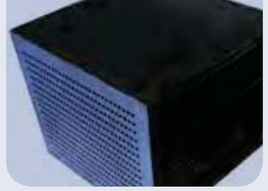
Impregnated graphite

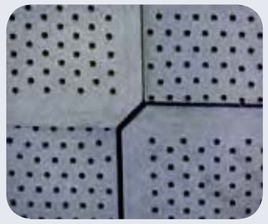


MATERIAL CLUSTER	iHP	iSP	iLP
Min. material homologation acc. AD2000 N2	G 12 5 170	G 14 5 200	G 20 4 200
Tensile strength, MPa@20°C	≈ 14	≈ 16	≈ 20
Tensile strength average % variation over 100°C	max 15	max 5	max 4
Max design temperature [°C]	180	200	220
Density before impregnation, Kg/m^3	1600	1700	1750
Thermal conductivity of blocks [W/mK]	120	140	150
Radial thermal conductivity for tubes [W/mK]			> 50
Block height [mm]	2500	2100	1830
Max Porosity, %	20	15	12
Max rod diameter, mm	2100	2100	910









CFx

Ecarb has developed a carbon fibre reinforcement technique, to manufacture graphite components with superior mechanical resistance. A carbon fibre wrapping of carbon fibre (CFx) is applied around tubes, blocks, column segments, tube sheets or headers, to limit risk of cracks and minimise leakages in case of damages.

Carbon fibre cords are pretensioned during wrapping operation. Because of they thermal behaviour (dilatation coefficient is negative), carbon fibre wrapping increases resistance to thermal shock end enhances lifetime of the unit.

Cracking and bursting pressure of tubes increase up to 100%. In case of heavy accident CFx will prevent from a large fragmentation of graphite, avoiding further damages.

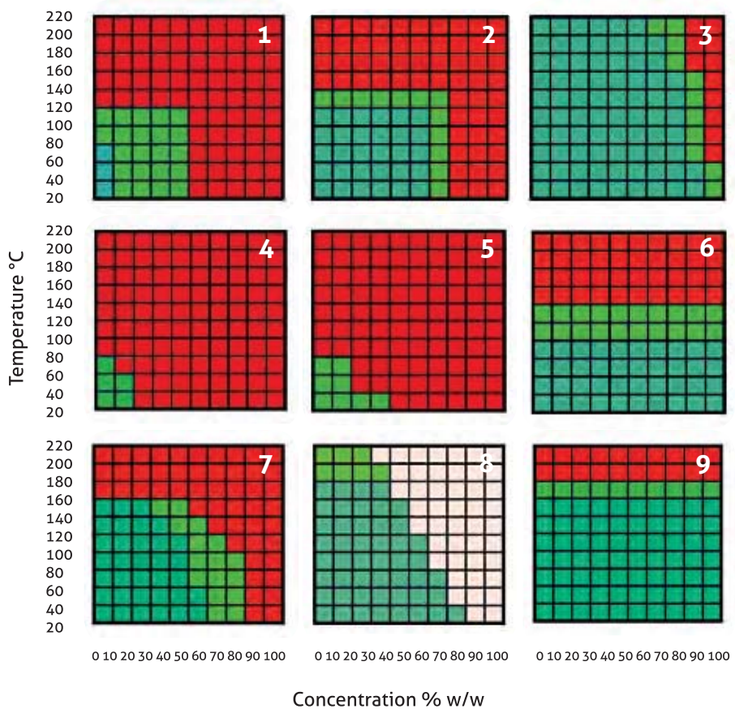
Ecarb CFx reinforcement systems is smart and flexible: we use various filament densities and wrapping pathes, depending on criticity of each specific application.

Graphec corrosion resistance

Impervious graphite Graphec is resistant in the full range of concentration and temperatures to a wide group of chemicals, including mont diffused acids (i.e. HCl, HBr, H_3PO_4, ...).

Graphec is partially resistant to some substances (see corrosion charts below).

Only few substances strongly corrodes Graphec: nitric acid (> 2% w/w), chromic acid, chlorosulphonic acid, organic amides, dioxane, THF, oleum.



Graphec corrosion charts: 1. caustic soda and potash, 2. Hydrofluoric acid, 3. Sulphuric acid, 4. Na and Ca hypochlorite, 5. Wet alogens (F_2, Cl_2, Br_2, I_2), 6. Dry alogens, 7. Amines, 8. Ferric chloride, 9. Formic acid.