

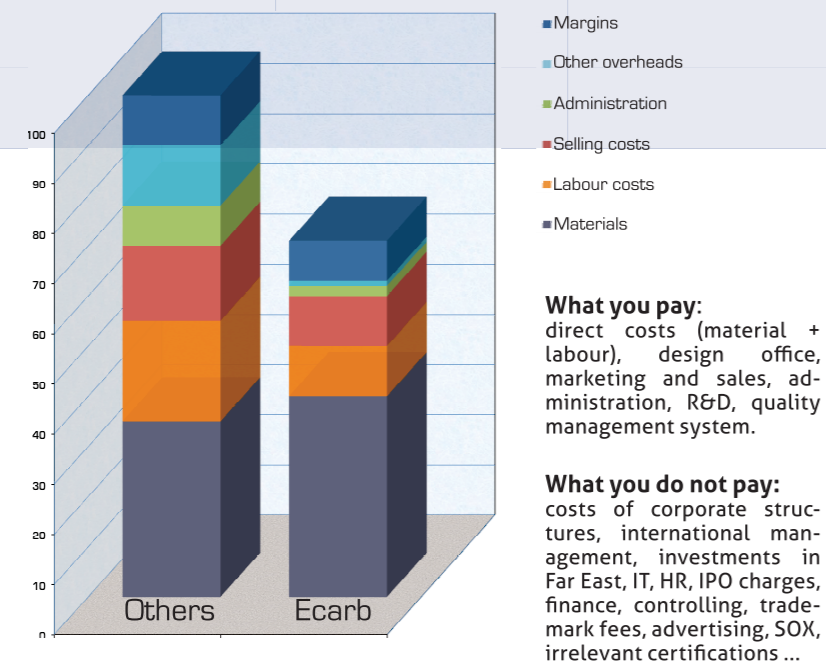
# Ecarb Srl

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## Product Technical Features

### Graphec Systems Turn-key packages

### Price: technology, nothing else!



### Quality by passion

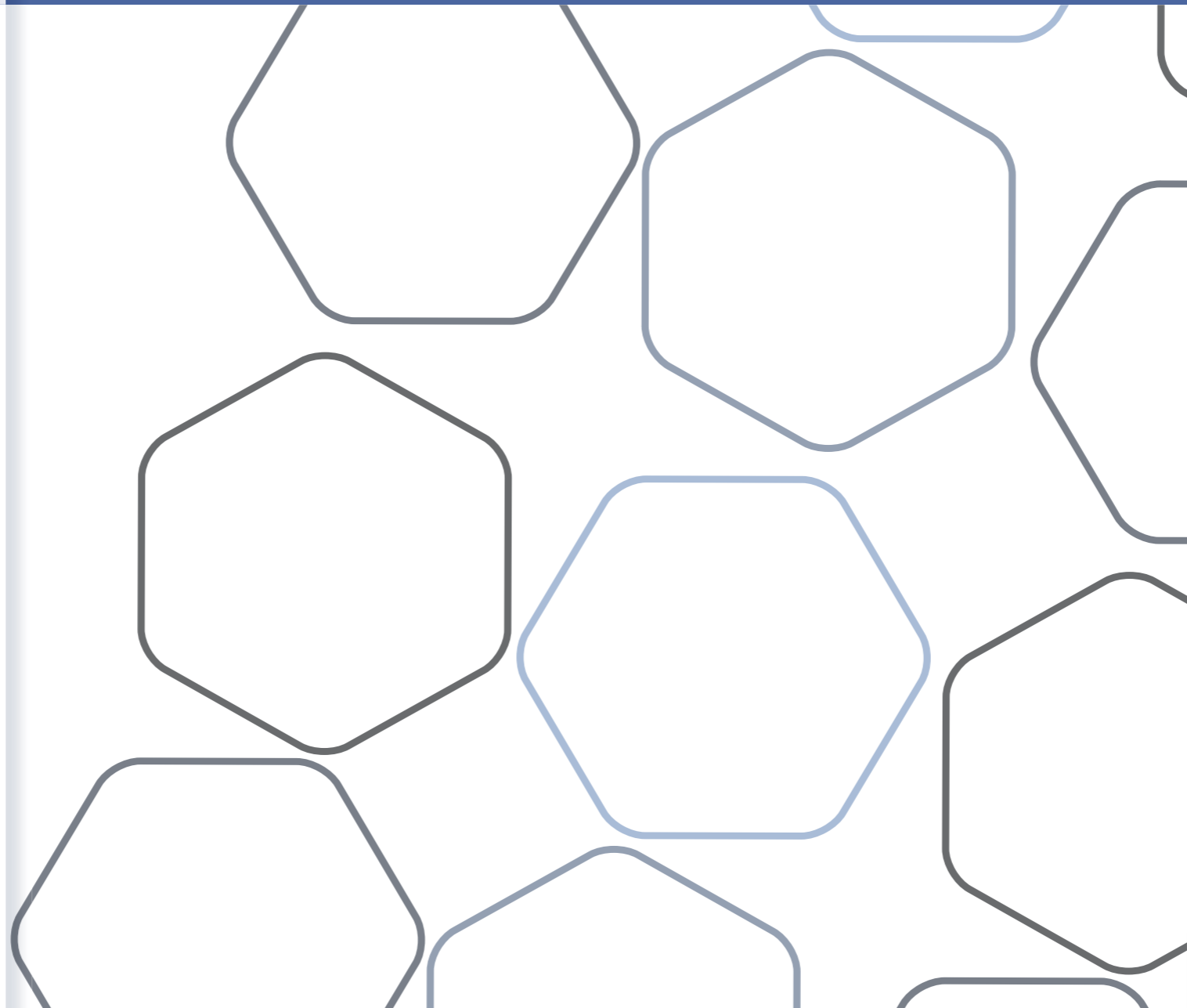
Ecarb Quality Management System is certified according to ISO 9001:2008.

Each single procedure was inspired by our core values: **engineering excellence and customer satisfaction.**

Graphec systems are designed in order to maximize lifetime and to ensure easy and safe operation. Ecarb's manufacturing system is certified according to European Pressure Directive (97/23/EC). Basic and detailed engineering are carried out internally, under full control of expert project engineers and project managers.



### Industries



## Graphec 1button

### Graphec, graphite process equipment

Block and shell&tubes heat exchangers • Crossed tubes condensers  
Mixers • Rupture disks • Columns • HCl synthesis units • Systems

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Ecarb® offers engineered packages, including process performance guarantee. Ecarb's scope of work will depend on the technical-economic requirements of each investment, varying from feasibility study up to turn-key complete plant delivery. Optimal process design is possible thanks to our expertise in corrosion science and equipment sizing.

Beside its own graphite main items, Ecarb manufactures internally all steel components (like steel structure, vessels and piping), necessary to assembly a complete package. This integrated production allows cost saving and it enables us to keep under control every task during project delivery.

### Optimal process set-up

Process set up of our packages is arranged in order to minimize total cost of ownership, according to following criteria:

- Proper material selection allows a long and cheap service, especially when corrosive substances are involved;
- Lay out is designed in order to ensure easy operation and maintenance;
- Instrumentation is studied to ensure a strict and safe control of main process parameters;
- Each item is carefully designed to match specific requisites of its own service;
- Utilities consumption is optimized on the basis of complete cost-benefit analysis;
- Process conditions are adjusted to maximize yield and to reduce waste streams and by-products.

## SYSTEMS PORTFOLIO

### Sulphuric Acid Dilution

Ecarb designs simple turnkey skid mounted systems for sulphuric acid dilution, providing acid at desired concentration. Graphec® 1Button dilution units include:

- Graphite S&T heat exchanger with static mixer made of graphite and PTFE;
- acid resistant PTFE lined piping and valves;
- control system with safety instruments and concentration measurement device;

On demand, our systems may include: pumps, storage tanks, cooling tower, DCS interface, additional instrumentation.

Graphec® 1button dilution units ensure:

- safe dilution in a wide range of concentrations;
- extreme precision of product concentration;
- control of all critical process parameters, especially during start up and shut off.

### Sulphuric Acid Concentration

Sulphuric acid distillation needs a strict control of process conditions and the selection of premium material, as Tantalum, to reach high concentration.

### Pickling solution recovery / Ferric chloride production

Ferric chloride may be produced by synthesis or by oxidation and concentration of spent pickling solution, rich of ferrous chloride.

Oxidation from ferrous to ferric chloride is performed ensuring an accurate dosing of reagents, to avoid formation of chlorine and chlorates, which may lead to dangerous or pollutant mixtures. Concentration of weak ferric chloride solution is carried out in a multiple stage evaporator, whose process arrangement enables strong reduction of steam consumption. Intercoolers and preheaters further reduce operation costs and break even period of the investment.

### Heating and circulation of pickling baths

Ecarb designs automatic packages to be installed beside pickling tanks, to provide continuous circulation and heating of pickling solution.

### Hydrochloric acid distillation

This process produces concentrated HCl or pure HCl gas, starting from weak or dirty solutions. Ecarb proposes pressure swing distillation systems to concentrate HCl over azeotropic point (20,2 % w/w at atmospheric pressure). A first distillation unit, running at high pressure, is combined with a second distillation unit, working in a vacuum, where azeotropic concentration increases over 24%.

### Hydrochloric acid absorption

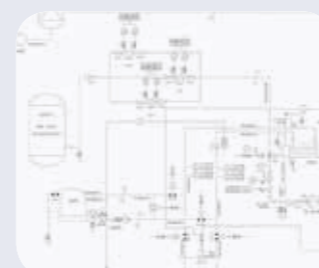
HCl absorption is an exothermic process, generating a huge quantity of enthalpy. Gas absorption takes place inside the tubes of an isothermal falling film absorber, where temperature is kept under control by cooling water, flowing on shell side. As alternative, an adiabatic column may be combined with a forced circulation cooler.

After absorption, spent gas with low content of acid can be washed in an adiabatic scrubber, to limit content of HCl in vents. When inlet gas is hot, i.e. because it comes from combustion or roasting section, a Graphec® quencher is integrated in the absorption system.

### Hydrochloric acid regeneration

Combining distillation, adsorption and desorption stages, it is possible to configure a wide range of packages, aimed to purify dirty HCl solutions, contaminated by inorganic or organic compounds.

### Hydrochloric acid synthesis unit *(See dedicated brochure).*



### Maintenance and operation

Graphec systems take into consideration every aspect connected with everyday operation:

- *Easy maintenance:* main items, valves and instrumentation are easily accessible and steel structure is designed to allow a simple and quick disassembling, during maintenance jobs.
- *Safety:* every single detail is studied to avoid dangers. Accurate hazop study is carried out during engineering. Fail-safe control system is aimed to ensure a reliable and regular service. Critic instruments are always redundant.
- *Comfort:* "1button" philosophy minimizes human operations during running.

### 1 button philosophy

Start up, shut off and emergency sequences are designed in order to avoid unsafe and dangerous situations due to human mistakes.

"1Button" logic is our guideline: operator must only press one single button to start up production and one button to shut it off.

Nothing can be easier.

### Material selection

We are expert in processes involving corrosive substances like HCl, HF, H<sub>2</sub>SO<sub>4</sub>, etc.

Correct material selection enable us to propose the optimal package. We investigate in a wide range of materials and corrosion protection techniques, in order to identify the cheapest effective solution.

Control systems is designed to avoid that each component works always far from the limit conditions typical of its construction material.

This approach lead to smart solutions: long lasting, reliable and efficient units having limited investment cost.

### Components selection

Ecarb manufactures internally most of the equipment, piping and steel structures, on the basis of our Quality Management System. Instruments, valves, accessories and rotary machines are purchased from primary producers, with recognized reputation of premium suppliers.

### Standards & codes

Our packages can be designed respecting most diffused standards or particular project specifications.

Our technicians take care of formal and substantial compliance, with competence and passion.

Main items can be designed according VSR95, AD2000 or ASME. PED and ATEX certifications are available on demand.