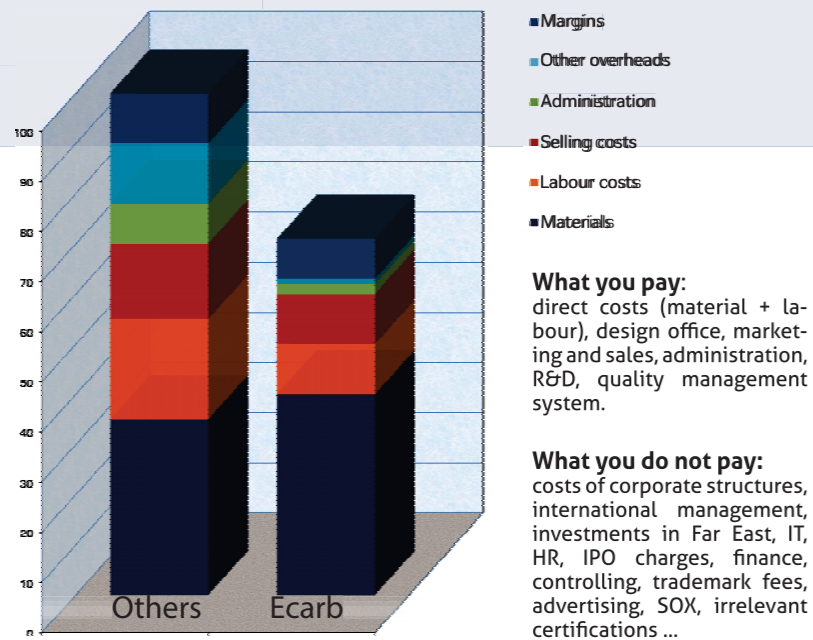


Price: technology, nothing else!



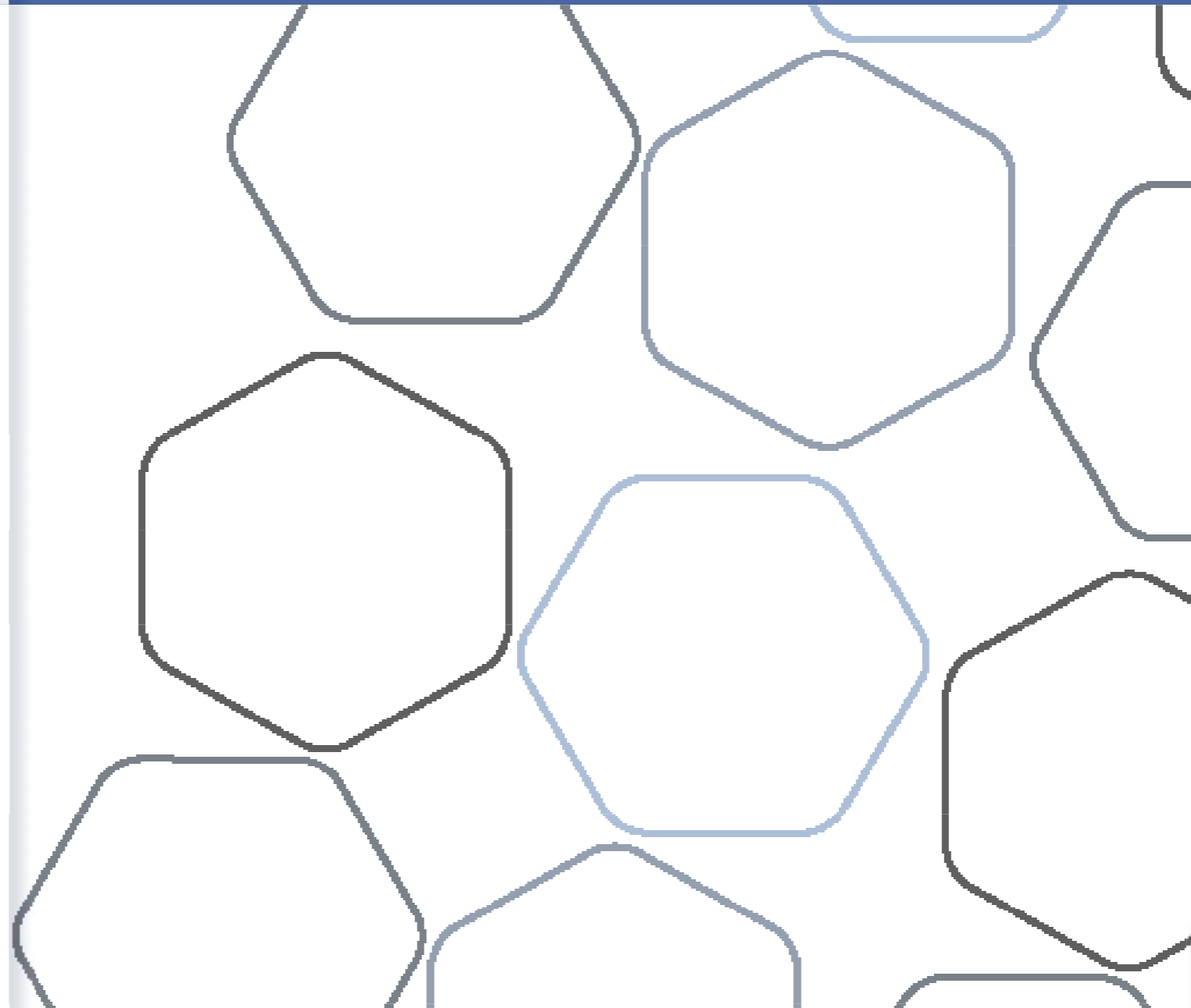
Quality by passion

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**. Vessels and columns are designed in order to maximize lifetime and ensure easy and safe maintenance and operation. Ecarb's manufacturing system is certified according to European Pressure Directive (97/23/EC). ATEX certificate is available on demand. We purchase raw material only from primary suppliers. Time by time, Ecarb selects just the material grade that better fits service requirements, to offer premium products at a smart price. Vessels and columns are designed using most diffused and reliable mechanical codes.



Applications & References

Plastic lined or coated steel vessels are largely used in many applications, involving aggressive substances (HF, HCl, H₂NO₃, H₂SO₄ etc.). Detailed references are available on demand.





Ecarb designs and manufactures ready-to-use engineered process units made of steel, protected by polymeric lining or coating: PTFE, PFA, ECTFE, PVDF, ebonite, rubber, epoxidic or phenolic based coatings. From the manifold to the most specific reactor, Ecarb offers its expertise in process equipment to provide the optimal solution.

Our know-how in graphite and metal equipment enables us to provide the best technical advice, in order to select always the optimal material to let process requirements match budget constraints. After proper material selection, each item is accurately sized in order to fit with process technical specifications.

All these valuable activities are carried out (free of charge) by our specialists, during pre-sales job.

On the basis of required standards and codes, mechanical design is performed, taking into consideration the specific construction method, typical of selected surface protection technique.

Material selection: the best solution in a wide range

Material selection is driven by a simple criterion: to identify the cheapest unit fully in compliance with process media and working conditions (temperature and pressure). We investigate in a very wide material portfolio, providing proper warranties to support our technical choice. On the basis of the selected material, we identify the most suitable lining technique and the proper manufacturing cycle.

PTFE

Polytetrafluoroethylene is ideal plastic lining, being universally corrosion resistant up to 240°C. Ecarb uses only virgin PTFE supplied by primary global producers. Our quality policy, aimed to excellence, never admits any compromise.

Lining techniques: Ecarb offer sheet lining and extruded PTFE lining. Selection of lining technology depends on diameter, vacuum grade and process media.

- Cylindrical **sheet lining** is made welding a PTFE sheet, with thickness from 3 to 5 mm. Sheets are manufactured starting from pre-sintered massive PTFE rods, thereby having higher density, compactness and resistance to permeation. Sheet lining permits to have a large variety of diameters, from 100 mm up to 2500 mm.
- **Extruded PTFE** liner is applied upon the inner surface of metallic shell directly by past extrusion, providing a seamless liner, with thickness from 4 to 8 mm. Lining is less compact but it adheres perfectly to metallic surface, providing superior resistance in case of light vacuum. For this kind of PTFE, standard diameters are imposed by extruder availability, from 200mm up to 1450 mm.

Conductive PTFE, charged with graphite, may be used when required by ATEX.

Ecarb provides **vacuum protection systems** for PTFE lined columns, in order to avoid lining implosion, when columns work under atmospheric pressure:

- low vacuum grade system: a graphite ring or cage is installed inside the column to provide mechanical resistance against vacuum.
- high vacuum grade system: the small gap between metallic shell and plastic liner is also kept under aspiration in order to compensate vacuum inside the column. This is done connecting a vacuum pump to many threaded nozzles, placed along column surface. Vacuum between liner and metal compensates eventual depression inside column, preventing from implosion.

PFA / ECTFE / PVDF

PFA, ECTFE and PVDF are fluoropolymers, derived from PTFE, having specific temperature rating and chemical resistance. They can be applied on the inner surface of metallic shells or plates. Perfect adherence is due to a thermal treatment which causes intimate contact between metal and plastic coating.

Coating thickness depends on selected material (from 800 µm to 1.5 mm). Diameter is limited to 1500 mm due to size of polymerization oven.

Dual protection system: taylor made and lifelong solution

Substances (like HF or HCl) have a strong permeation attitude. They slowly pass through PTFE liner, in spite of any caution on lining density or thickness. Ecarb designs and manufactures metallic columns and vessels with dual protection system. PTFE sheet lining is applied on a metallic shell, already protected by ECTFE or PFA coating. This solution leads to an indefinite lifetime, even when high aggressive media are processed.

Acids permeating through PTFE forms an aggressive condensate, which is entrapped between the two plastic layers of Ecarb dual protection system. Condensate is quickly removed through venting holes, constantly under aspiration.



PTFE lined columns



Ebonite lined columns



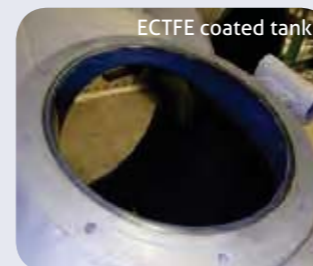
Ebonite lined columns



PTFE lined reactor



Vacuum protection system



ECTFE coated tank



PTFE 3K bellow



Dual protection system



Epoxy coating

Rubber and ebonite

Ecarb produces rubber and ebonite lined process equipment, like columns, towers, tanks, reactors. Rubber and ebonite are suitable for temperature up to 105°C and they perfectly work under full vacuum. Steel parts are produced in our workshop and they are lined by long term and reliable partners, in their autoclaves. Ecarb will be responsible for process design, proper mechanical calculation and perfect execution.

Phenolic based liners

Phenolic liner, charged with graphite particles, is applied in special autoclaves to provide superior chemical resistance to a wide range of substances, even at high working temperature (150°C). This lining has good thermal conductivity.

Epoxy coatings

Sometimes complicated process issues have simple and unexpected solutions. Ecarb selects many types of coatings, cheap and easy to apply, in order to ensure proper corrosion protection of items, exposed to corrosive environment.

Graphec® column internals

Our columns, with packing or trays, are designed and manufactured according to each single project specifications. Ecarb offers complete units, including a wide range of Graphec® internals:

- **distributor plate:** massive graphite plate with weir crowns, of different diameters, in order to have a regular liquid distribution along the section of a packing column. Graphec distributors have high rangeability, working perfectly starting from 30% of design flow.
- **deep pipes** and **distributor pipes**, made of graphite or PTFE.
- **graphite tunnel cap, bubble cap and sieve trays.**
- **downcomers** and **weirs.**
- **chimney plates.**
- **support grids** for packing with high cross section.
- **packing:** graphite **raschig rings** (from 1/2" to 2")

Piping systems

PTFE lined piping and fitting are available with DIN or ANSI standards. Lining technique may be paste extrusion or isostatic moulding, depending on the requirements of the process. Tees and fitting are available both PTFE or PFA lined, for clean applications. Heavy duty piping withstands full vacuum up to DN300 @ 200°C.

A wide and reliable range of expansion bellows, with two, three or five convolutes, is available to protect flanged connections from improper stresses.

Valuable partnerships

Ecarb is able to offer a wide range of plastic lined process items, thanks to an effective and flexible manufacturing system. Process and mechanical designs are accurately carried out by our technicians. Metallic parts are produced internally and many linings are applied in our shop.

Most specific lining technology, like thermal application of fluoropolymeric coatings or rubber lining, are carried out in cooperation with important and valuable european partners.