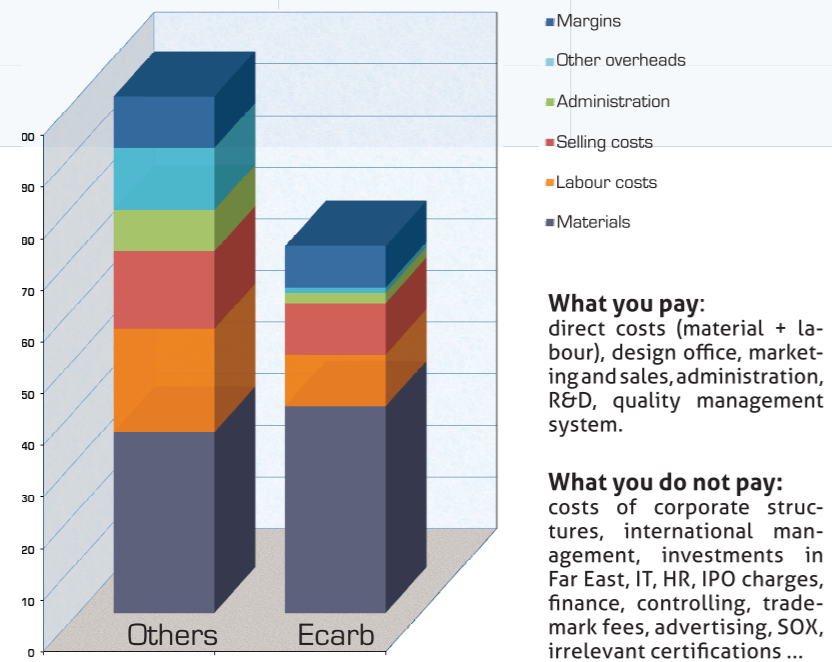


Price: technology, nothing else!



Quality by passion

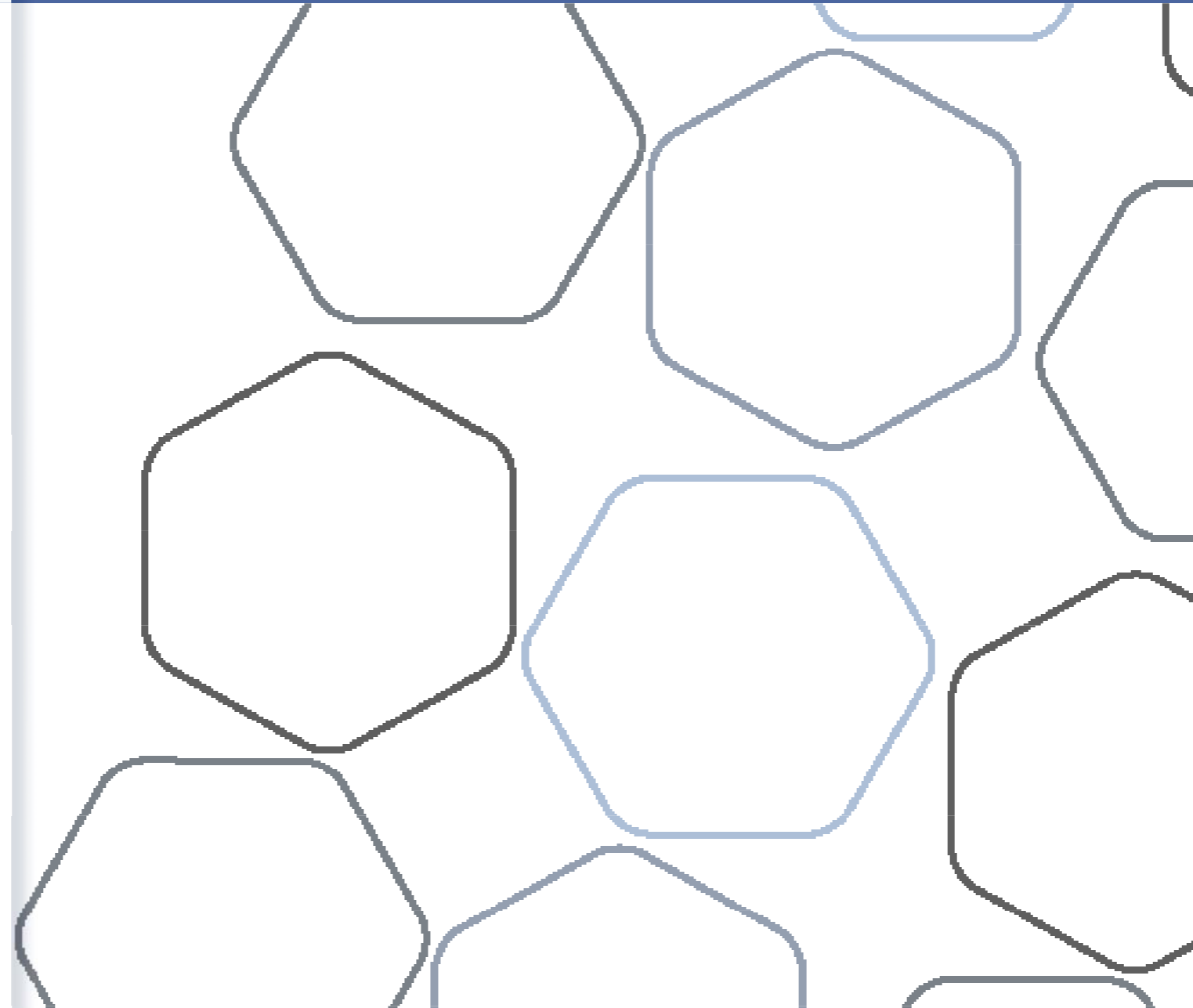
Ecarb Quality Management System is certified according to ISO 9001:2008. Each single procedure was inspired by our core values: **engineering excellence and customer satisfaction**. Graphec® columns are designed in order to maximize lifetime and to ensure easy and safe maintenance and operation. Ecarb's manufacturing system is certified according 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. Graphec® columns are designed using most diffused and reliable mechanical codes and standards.

Applications & References

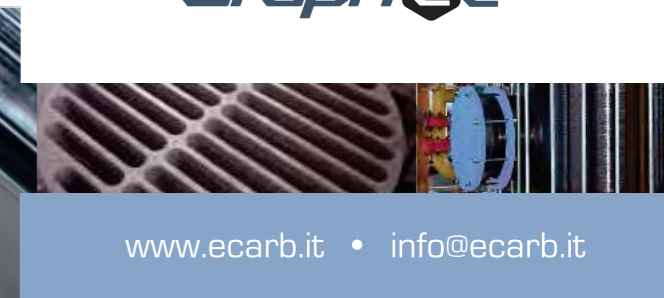
Hydrofluoric acid at high concentration and temperature, sulphuric acid up to 90%, pickling solution, chlorinated solvents, hydrochloric acid, etc.: Graphec® columns run with very aggressive media in the most severe conditions. Detailed references are available on demand.



Graphec®

Graphec, graphite process equipment

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





Ecarb manufactures columns and towers for mass transfer services, made of corrosion resistant materials: graphite, exotic metals and lined steel (PTFE, Halar®, PVDF, PFA, rubber or ebonite).

The drawing of each component is adapted to selected construction material, which will need specific design shrewdnesses and proper manufacturing cycle. Graphite, because of its mechanical properties and its good resistance against corrosion, is a valuable alternative to metals and plastics for construction of absorption/desorption, distillation, stripping and purification columns. Graphite's big advantage is absolutely longer duration. No corrosion, no diffusion, no ageing: Graphhec® columns actually have an unlimited expected lifetime.

Model selection: the best solution in a wide range

Graphhec® column product range covers almost all common mass transfer requirements.

Column diameter may vary from 160 mm up to 2000 mm. Actually no height limitation is given. It is possible to select among packed, plate columns or mixed geometries. An infinite number of internals, accessories and design options is available.

Ecarb performs accurate process sizing to define the column that better fits with specific process conditions.

Material grade, column type, diameter, height, plates geometry or packing selection: we combine all parameters to identify the ideal unit, ensuring perfect process compliance.

Maintenance and operation

Graphhec® columns are easy to install and to disassembly. In case of damage, cheap and quick repair of each graphite component is almost always possible. When replacement is needed, Ecarb applies a fair price policy for spare parts, to limit maintenance costs.

Mechanical design is carried out according to AD2000 or VSR95. Each unit is fully drainable and self-venting to ensure safe operation and long lifetime.

Our graphite: a matter of quality!

Being not a raw material producer, we are free to select the most suitable material grade from premium global suppliers. Material grade selection is performed only on the basis of requirements of each specific application, to provide high quality unit at a smart price. Graphhec® columns 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 20 MPa (iLP). Standard graphite is impregnated with phenolic resins. Fluoropolymer impregnation is available to enhance corrosion resistance.

Ecarb uses only graphite homologated by primary notified body according AD 2000 N2.

Ecarb's model designation

C • 600 • 4000 • CFX-iLP
Model • Nominal Ø • Height • Material grade

Example: column, internal diameter 600 mm, height of approx 4 m, made of iLP graphite, Carbon Fibre reinforced.

Column internals

Graphhec® product line includes a comprehensive range of internals, made of not impregnated graphite, impregnated graphite or PTFE:

- distributor plates: they are massive graphite plates with crowns, having different diameters, in order to allow a regular liquid distribution along the section of a packing column. Graphhec® distributor have high rangeability, working perfectly starting from 30% of design flow.
- distributor pipes: graphite inlet pipes have single or double holes row to enable distribution of gas inlet stream.
- dip pipes, made of graphite or PTFE.
- tunnel cap, sieved and bubble cap trays: Graphhec® plates are designed to have high efficiency in mass transfer, for distillation or absorption column.
- downcomers and weirs: Ecarb provides full range of accessories for plates columns.
- chimney plates: they are designed to get full re-distribution of liquid phase coming down from a packing section.
- support grids: they ensure high flow cross section for gases, in order to support packing, providing low pressure drop.
- packing: graphite Raschig rings (from 1/2 " to 2").
- Vacuum support rings or grids: they ensure vacuum resistance to PTFE lined columns.



Columns geometry

Graphhec® columns, with packing or trays, are always customized according to each single project specifications.

Graphite columns are assembled tightening a variable number of graphite rings (column segments). Monolithic segment can be manufactured up to 2700 mm., but normally segments height is limited to enable easy installation of column internals.

Gaskets among column segments are expanded graphite rings or expanded PTFE cords, supplied by Gore®.



Actually there is no limitation to columns height. Tightening is ensured by a metallic tie rods set. Differential thermal expansion is compensated by coil springs. Columns may be installed on a metallic basement or using a metallic collar with lateral supports.

Graphite lateral nozzles are robust and easy to connect to UNI and ASA standard flanges. PTFE bellows are needed to avoid improper stress on connections.

Graphite can be reinforced by carbon fibers wrapping (CFx) or metallic armour, to ensure redundant protection.

Graphhec® advantages

Graphhec® columns provide relevant advantages:

- Superior resistance to gas permeation (i.e. versus PTFE).
- Full vacuum resistance without any additional safety device.
- High flexibility: it is possible to change Graphhec® columns, just adding new connections or new sections, without wasting existing segments.
- Graphite does not give any problem due to detachment or swelling, as lined or coated metals do (i.e. ebonite, rubber, fluoropolymers).



CFx (carbon fibre wrapping) is applied around each column segment to provide superior mechanical strength and to minimize leakages in case of damages. Carbon fibre cords are tensioned during wrapping operation. Because of their thermal behaviour (dilatation coefficient is negative), carbon fibre wrapping increases resistance to thermal shock and enhances lifetime of the unit.

We select among different carbon fibre cords to provide variable thicknesses (from 0,1 to 5 mm) on the bases of mechanical protection level required by the service.

Special column with integrated heat transfer units

- Falling film absorbers: a section dedicated to falling film absorption can be integrated into a graphite column. Absorption section consists of a graphite tube bundle, with upper tubesheet equipped with crowns, whose function is to form liquid film.
- Head condenser: tube bundle or drilled block can be integrated inside the top section, in order to have condensation of low boiling gases, directly inside the column.
- Bayonet reboiler: a bayonet heat exchanger, working as reboiler, can be integrated into bottom section of the column.