



Graphite India Ltd

IGE Division

Heat and Mass Transfer
Equipment, Systems and
Services for Corrosive
Chemical Applications

- Thermal and Process Design
- Engineering
- Project management
- Manufacturing
- After Sales Service

Everything under one roof

References in more than 50 countries

Overview

Since 1983, **Impervious Graphite Equipment (IGE) Division** manufactures impregnated graphite heat & mass transfer equipment as well as systems employed in corrosive chemical applications.



- GRAPHITE is an allotrope of carbon (softer than diamond but brittle) having crystalline form categorized as a non metal still conducts electricity.
- Synthetic graphite is impregnated (Phenolic, PTFE or Carbon impregnation) and is suitable for handling various corrosive applications.
- It offers excellent corrosion resistance to many chemicals, possesses good thermal conductivity and resistance to thermal and mechanical shocks.

Impregnated Graphite Properties

Properties	Blocks	Tubes
Density gm/cc	1.8-1.9	1.8-1.9
Thermal Conductivity W/m°C	170-213	74-89
Tensile Strength N/mm ²	20-24	27-33
Flexural Strength N/mm ²	30-36	45-56
Compressive Strength N/mm ²	60-70	75-90
Co-efficient of thermal expansion mm/mm/°C x 10 ⁻⁶	3-4	3-4
Permeability cm ² /sec x 10 ⁻⁶	2-3	3-4

General Suitability: Phenolic Impregnated Graphite: 190° C, PTFE Impregnated Graphite: 230° C

GRAPHITE INDIA LIMITED is based in India also having multiple product lines such as Graphite Electrodes for steel industry, Special Purpose Graphite, Glass Fibre Reinforced Plastics Pipes and Tanks, etc.

Product Range

Equipment

- Graphite Heat Exchangers (Block / Shell & Tube)
- Graphite Columns
- Graphite Ejectors
- Acid Dilution & Cooling unit
- Sulphuric acid Concentration unit

Process Systems

- HCl Synthesis unit
- HCl Absorption unit
- Dry HCl gas generation unit

Services

- Engineering
- Maintenance and Repair
- Supervision of Erection & Commissioning
- Troubleshooting

Specific Product Requirements can be met like:

- U stamp
 - "CE" marking as per PED/2014/68/EU
 - Japan Pressure Vessel Class
 - KOSHA
 - DOSH
 - SANS 347
- And many more

Products are well established in sectors like:

Chlor-Alkali	Chlorinated Organic Chemicals	Drugs and Pharmaceuticals (API)	Agrochemicals, Phosphate Fertilizer & Pure Phosphoric Acid
Rayon	Steel Pickling	Metal Processing	Polymers like VCM
Paper & Pulp	Dyes & Intermediates	Incineration	Batteries & Gelatin

Graphite Heat Exchangers

BLOCK HEAT EXCHANGERS

- Construction can be Monoblock, Cylindrical Polyblock, Cubical Polyblock
- Suitable material of construction can be offered for corrosive service on process and service sides
- Multi-pass arrangement enabling optimized design solution
- Process side hole diameter ranging from 8 mm up to 35 mm

Material:

- Impervious Graphite block and Graphite lateral chambers for process fluid
- Metallic Shell or Lateral chambers for service fluid. (Suitable Fluoropolymer or rubber lining can be provided if required)
- End chambers can be offered in Graphite and in different materials like Plastic, Fluoropolymer or Rubber lined carbon steel.

Monoblock Heat Exchanger

- Compact design resulting in less space requirement
- Simple construction resulting in ease in maintenance
- General design pressure rating : 8 bar G / Full vacuum

Applications as coolers, condensers and interchangers



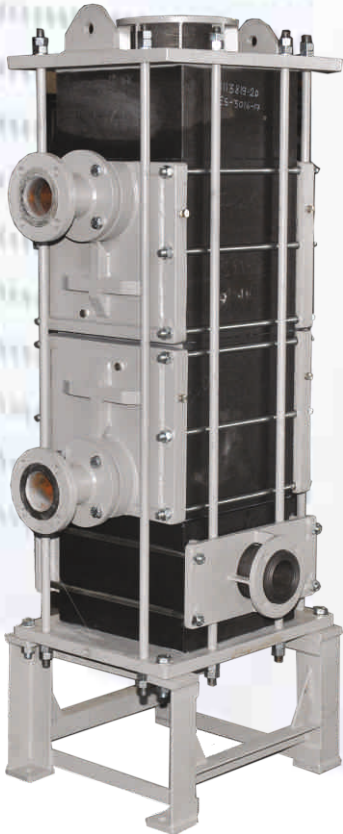


Cylindrical Polyblock Heat Exchanger

- Surface area can be offered from 0.1 m² up to more than 1000 m²
- Maximum surface area per block – 73 m²
- Application and Pressure rating wise around 170 block models to provide optimised solutions
- General design pressure rating up to 12 bar G / Full vacuum on process and service sides depending on block model.

Applications as coolers, heaters, condensers, heat interchangers, isothermal falling film absorbers, reboilers, evaporators

Cubical Polyblock Heat Exchanger



- Application and Pressure rating wise around 20 block models to provide optimised solutions
- Easy maintenance
- General design pressure rating up to 11 bar G / Full vacuum on process and service sides depending on block model.

Applications as coolers, condensers, heat interchangers, isothermal falling film absorbers

SHELL & TUBE HEAT EXCHANGERS

- Tube sizes available – 7/8" ID x 1 ¼" OD
1" ID x 1 ½" OD
1 ½" ID x 2" OD
- Surface area can be offered from 1.5 m² up to 1600 m²
- General Design pressure rating: 9 Bar G / Full vacuum on process and 8 Bar G / Full vacuum on service side depending on requirement. Higher pressure rating can be offered if requested.
- Tubes with carbon fibre reinforcement for improved strength
- Tube sheets with chromium oxide coating to resist erosion due to solid content in Phosphoric acid evaporators
- Impervious Graphite tubes, tube-sheets
- Metallic or Impregnated graphite baffles
- Domes in Impervious graphite or exotic materials (suitable Fluoropolymer or rubber lined carbon steel can be offered if required)
- Metallic shell (suitable Fluoropolymer or rubber lining can be offered if required)

Applications as coolers, heaters, condensers, heat interchangers, isothermal falling film absorbers, reboilers, evaporators, quenchers



Graphite Column

- Columns are available in Tray type or Packed type or Combination of both
- Tray types – bubble cap, turbo grid, sieve type
- Packed columns with variety of suitable internals (Ceramic Intalox Saddles, graphite raschig rings)
- Column internal diameter ranging from 100 mm ID to 2400 mm ID
- General design pressure: 5 Bar G / Full vacuum

Applications in absorption and distillation

Graphite Ejectors

- Single stage and multi stage depending on vacuum required
- Steam jet and liquid jet
- Capacity to ensure vacuum of 0.5 Torr
- The ejector system can be supplied with surface condensers or mixing condensers
- Skid mounted unit

Acid Dilution & Cooling unit

- Units are offered for dilution of Sulphuric acid and Hydrochloric acid
- Compact arrangement of mixer and cooler
- Cooler in Polyblock type or Shell and tube type
- Unit is supplied with necessary accessories

Sulphuric Acid Concentration Unit

- Units are designed and manufactured for producing sulphuric acid of around 70% strength from dilute acid having strength as low as 20%.
- Unit can be single stage or multi stage depending on inlet acid concentration
- Unit consists of thermosiphon reboilers, gas liquid separators, condensers, ejector system, product acid cooler.
- With multiple effect concentration, steam economy can be achieved thereby reducing operating cost.



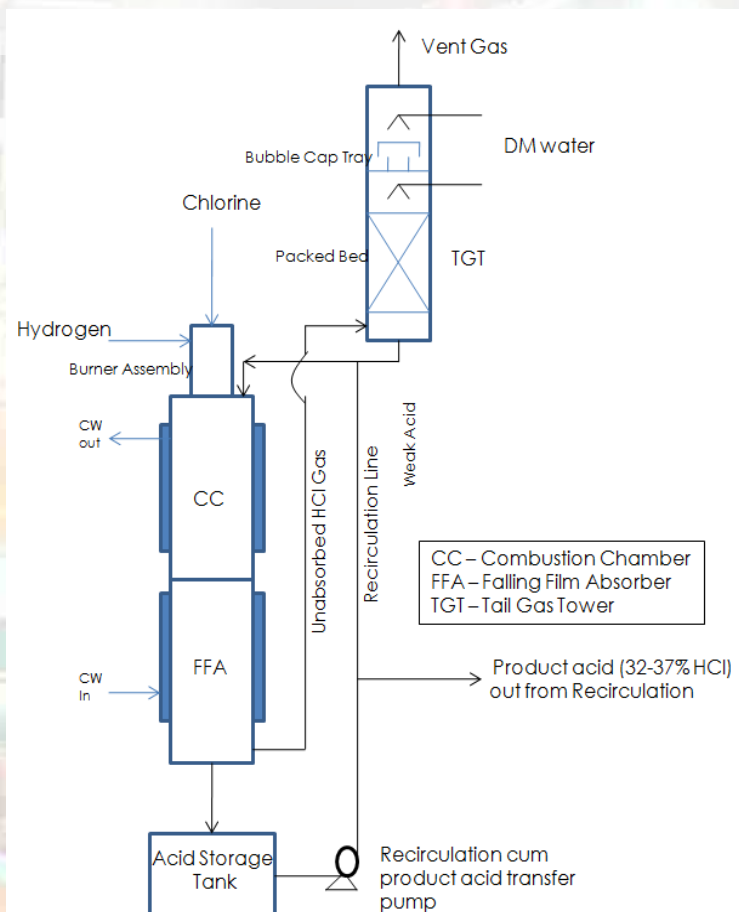
HCl Synthesis Unit

- Top fired unit to produce commercial grade 30% to 37% Hydrochloric acid with minimum free chlorine content OR Dry HCl gas in Chlor alkali, Paper & pulp, Metal extraction industry.
- Complete skid mounted system consisting of equipment, ancillary equipment, interconnecting piping, instrumentation and necessary automation
- Capacity ranging from 1 TPD up to 200 TPD (100% HCL basis)

- Efficient burner design to ensure smooth functioning with Chlorine purity as low as 21%
- Suitable for moist feed conditions
- HCl in vent < 5 ppmv
- Heat recovery in the form of Steam generation
- Online cleaning / washing facility of burner
- Automatic start-up
- Start-up with compressed air
- Turn-down capacity of 25%
- Supplied more than 100 HCl Synthesis units worldwide

Material:

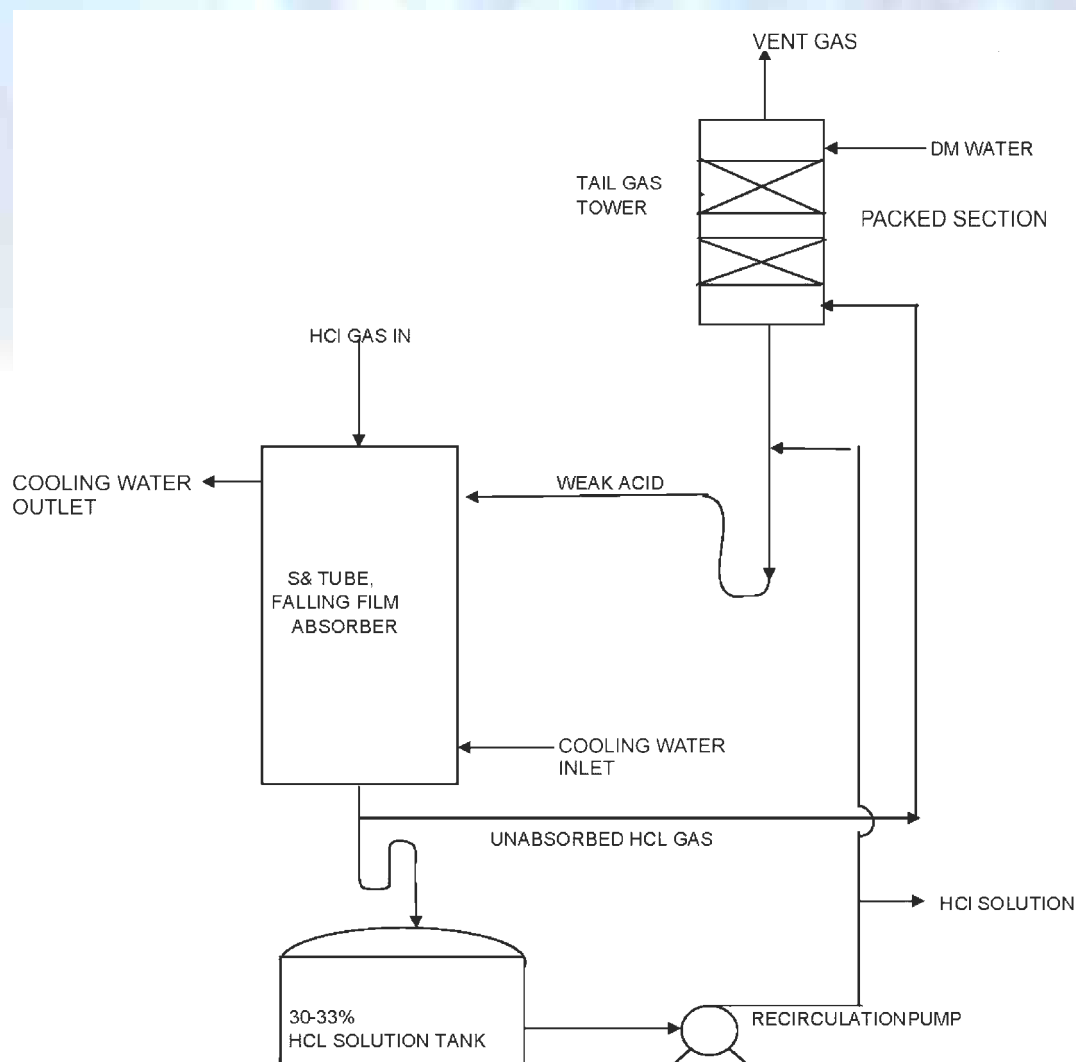
- Combustion chamber (furnace), falling film absorber & **Burner too** in – Impervious Graphite (Steel jacketed)
- Tail Gas Tower – Impervious Graphite



Skid mounted unit

HCl Absorption Unit

- Absorption of HCl / HF / HBr gases required in Monochloro benzene / Sulphate of Potash production / MDI-TDI/ CPW etc
- Falling film absorbers in Shell & tube and Polyblock construction
- Product Hydrochloric acid concentration ranging from 5% to 37%
- Absorbers can be designed to handle dilute gas (for less than 2% to 3%)
- Absorption can be continuous as well as in batch operation
- Complete skid mounted system consisting of Falling film absorber, Tail gas tower (Packed bed scrubber), Intermediate tank, Recirculation cum product transfer pump, interconnecting piping, instrumentation and necessary automation



Dry HCl Gas Generation Unit

- Commercial grade 30% to 38% Hydrochloric acid is used to produce dry HCl gas via 2 routes based on byproduct:
 - 22% HCl Azeotropic Solution Byproduct
 - OR
 - 1% HCl solution Byproductrequired in API, chloro-sulphonic acid & speciality chemicals
- Dry HCl gas purity is more than 99.9%
- Capacity ranging from 25 Kg/hr to 5000 Kg/hr of HCl gas
- Maximum operating pressure of HCl gas produced by 22% HCl solution byproduct route is 3 bar G
- Maximum operating pressure of HCl gas produced by 1% HCl solution byproduct route is 1 bar G
- Complete skid mounted system consisting of equipment, ancillary equipment, interconnecting piping, instrumentation and necessary automation



Services

Wide network ensuring prompt and effective services comprising:

- Supervision of Erection and Commissioning activities
- Trouble-shooting and Technical support
- Maintenance and repairing of Graphite equipment and systems (on site or GIL workshop)
- Training programs for operating Process systems
- Supply of spare parts



OUR GLOBAL CUSTOMER BASE

Asia

- Bangladesh
- China
- India
- Indonesia
- Japan
- Jordan
- Malaysia
- Oman
- Philippines
- Qatar
- Saudi Arabia
- Singapore
- South Korea
- Taiwan
- Thailand
- Turkey

Europe

- Austria
- Belgium
- Denmark
- France
- Germany
- Greece
- Hungary
- Italy
- Netherland
- Norway
- Poland
- Portugal
- Spain
- Sweden
- Switzerland
- UK

America

- Argentina
- Brazil
- Paraguay
- Peru
- Uruguay
- USA

Africa

- Egypt
- Morocco
- Senegal
- South Africa
- Tunisia

Australia

- Australia



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Graphite India Ltd

IMPERVIOUS GRAPHITE EQUIPMENT DIVISION

C-7, MIDC, Ambad, Nashik, Maharashtra, INDIA 422010

Tel.: 00 91 253 2302100 Fax: 00 91 253 2302300

E-mail: mktgamd@graphiteindia.com

Visit us at: <http://www.graphiteindia.com/View/ige.aspx>

Registered Office & Head Office: 31, Chowringhee Road, Kolkata 700 016