GBA®

ENCLOSED COMBUSTION SYSTEMS

www.gba.com

GBA operates from three main locations: Milan, London and Houston to cover all world markets.

GBA are represented in most countries through a network of established and professional agents, duly selected to meet the high expectations of GBA and our Clients.

Please contact our offices to know which agent is applicable to your location.

www.gba.com
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GBA ENCLOSED COMBUSTION SYSTEMS PRODUCT LINE

For any application and industry, **GBA** designs combustion units and associated packages to help our customers to safely dispose hazardous compounds, contained either in gaseous or liquid wastes, resulting into clean gaseous flue gas emissions fully complying with the most rigorous standards and most stringent environmental regulations worldwide.

GBA is committed to reduce the Carbon footprint on the planet, and therefore all our units are designed to be smart, highly energy-efficient, always operated with minimum consumptions of plant's utilities, such as fuel gas, electricity, steam, instrument air, etc.

Our thermal oxidizers can be equipped with staging systems to lower the unit's turn-down and thus consumtions of support gas as well. They can be associated to downstream recuperative sections, such as, for instance, waste heat boilers, steam generators, oil heaters, air pre-heaters, etc. and other heat recovery solutions.

SRU Tail gas incinerators, SRU Claus Reaction Furnaces, Regenerative Thermal Oxidizers (RTOs), Vapor Combustion Units (VCUs), Catalytic oxidizers, Combustors, and Enclosed Flares are just some examples of our wide product line for combustion units.

To comply with the most stringent regulations, our burners can be designed for low NOx and – when required by process conditions - flue gas treatment packages, such as de-NOx systems, quenchers and scrubbers, etc. can be designed and supplied through our system integrators and included in our packages upstream flue gas stacks.

GBA thermal oxidizers can provide high destruction efficiencies (99.99% or higher, depending on regulations), low NOx, ultra-Low NOx burners, nearly zero emissions of VOCs, CO, H2S, Mercaptans, and flue gas treatment packages, which may include de-NOx systems (SNCR, SCR), filtration units, scrubbers to remove Sulfur Dioxide, HCl, Cl2, and other chemicals.

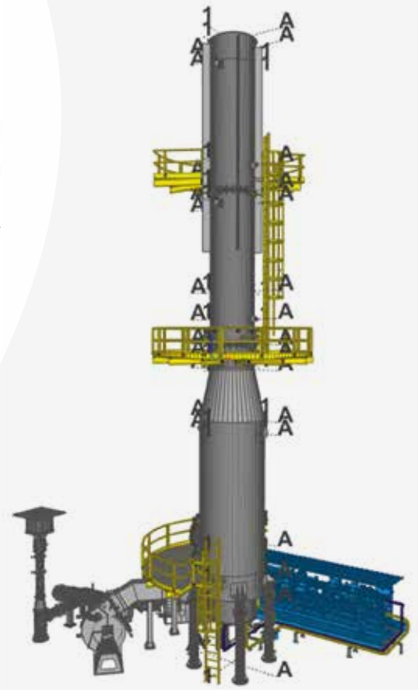
All of our units are carefully chosen and built to satisfy the most rigorous standards, and they may be modified to suit any additional particular project specifications.

Combustion may take place in forced draft, natural draft, or induced draft design choices, in a vertical or horizontal configuration. To better handle liquid streams, vertical down-firing option is also available.

In presence of forced draft systems, we can include rotating equipment (fans, blowers) that complies with API 673, AMCA and a variety of other codes, directives, and international standards.

GBA's technology for burners and pilot burners is well-proven, constantly up to date with the latest technological R&D's advancements, and designed to combine at the same time a top-class reliability & availability, with very low emissions and fuel gas consumptions.

For structural verification of vessels, structures, and other items, we provide equipment that complies with Eurocodes, ASCE, ASME (ASME VIII Div. 1, ASME I, ASME STS-1, etc.), GOST R, CICIND, or a variety of other codes.

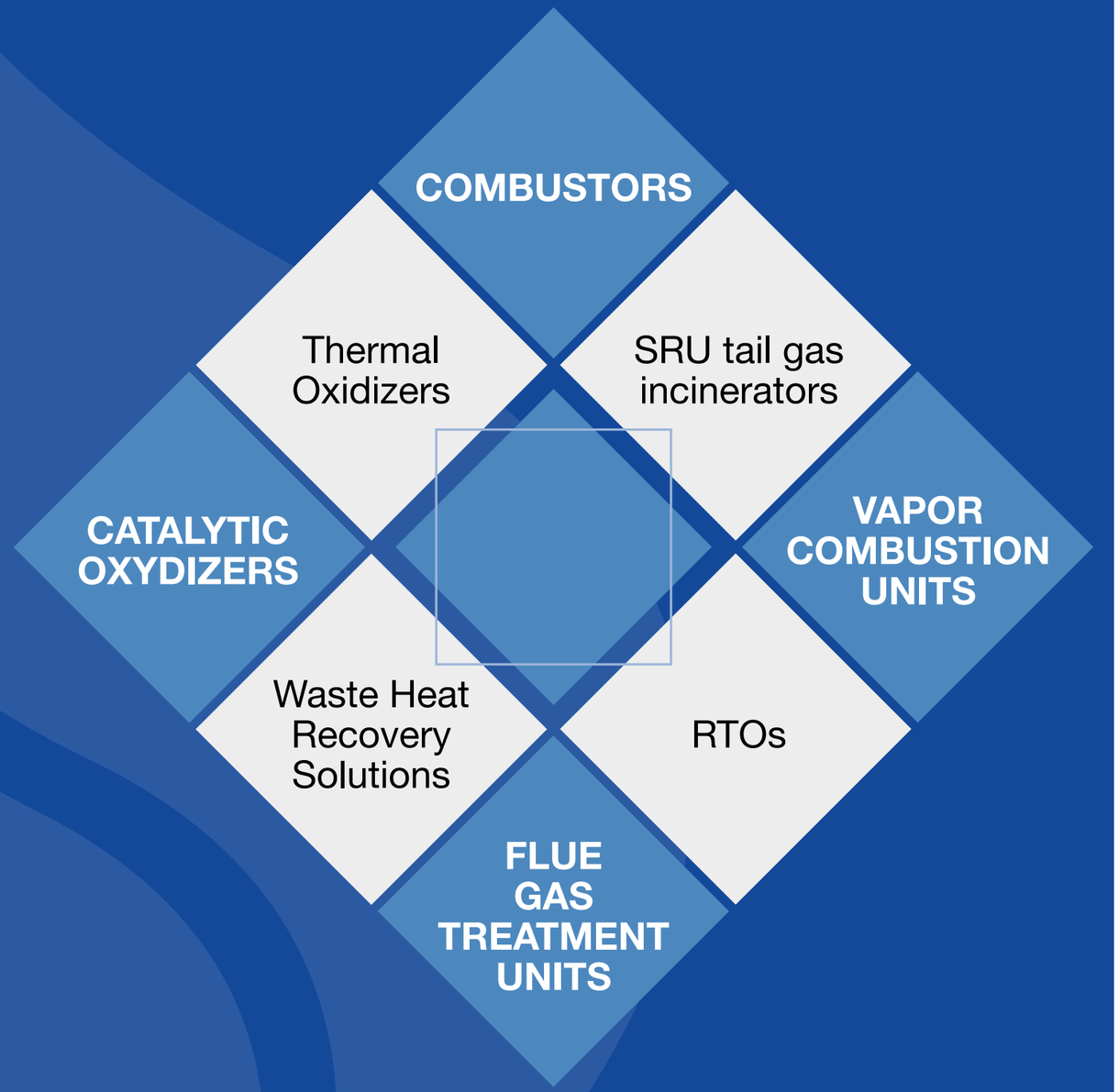


Our fuel gas skids/trains can be designed conforming to EN 746-2 or NFPA-85&86 latest editions and may contain detonation arrestors, emergency shut-down valves meeting EN 161 (for gases) or ISO 23553-1 (for liquids), features for periodic automatic leak test on shut-off valves, and all necessary instrumentation for safety and process control.
When needed by your process, we can also include gas/vapor blowers, designed to meet not only the hazardous area classification of the area where they are installed, but also per ATEX 1G/2G [or Zone 0, Zone 1 per IEC 60079-1], as internal classification when in contact with explosive process fluid.

All safety instrumented systems (SIS) in our PLCs may be built to the project's required Safety Integrity Level (SIL) according to functional safety standards IEC 61508 and IEC 61511, with complete segregation between safety and controls.
PLC cabinets, instruments, valves, and other items may be provided for any area categorized according to the current edition of IEC 60079-10-1 and comply with ATEX, CSA, KOSHA, and other standards.

We can provide a wide range of accessories, including Burner Management Systems, continuous emission monitoring (CEMS), flame detection by optical pyrometers, or other devices, and a variety of additional turnkey solutions.

GBA is an excellent business partner, highly competent, dependable, and trustworthy.



For further information, please visit our website or contact one of our application engineers.
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SRU TAIL GAS INCINERATORS (SRU)

GBA develops and manufactures **SRU Incinerators**, suitable to thermally oxidize tail gases, and other streams, associated to SRU Claus units, which convert Sulfur compounds (such as Hydrogen Sulfide, Carbonyl Sulfide, Carbonyl Disulfide, Mercaptans, and others) to Sulfur Dioxide and Sulfur Trioxide at equilibrium.

In the presence of excess Oxygen levels in the gaseous flue gas effluents – minimum 2-3 percent vol – this thermal oxidation process is usually performed in the temperature range 650-850°C [1200-1562°F], with its final selection based upon the emission levels of Carbon Monoxide and VOCs, to be guaranteed at stack outlet.

SRU tail gas incinerators are most often used in conjunction with a heat recovery system to make the whole installation more energy efficient, with the advantage to produce steam, that could be used in the steam utility network of the plant or – when provided at high purity – to feed steam turbines for electrical power generation.

For the Claus SRU process, **GBA** also designs and supplies Direct Fired Air Heaters, Reducing Gas Generators, Acid Gas Burners, Reaction Furnaces, and can include downstream waste heat boilers (WHB), through system integrators/sub-suppliers.

THERMAL OXIDIZERS

GBA designs and supplies **Thermal Oxidizers** to safely dispose of hazardous and non-hazardous wastes, whether they are in **gaseous** or **liquid** form, using a high-temperature oxidation process in excess air.

Our thermal oxidizers can be designed for the greatest destruction efficiencies on abatement of VOCs, BTEX (Benzene, Toluene, Xylenes) and many other compounds are achieved with cost-effective solutions and low utility consumptions thanks to our design expertise and field's experience.

Our thermal oxidizers include heat recovery equipment that allow energy recovery via steam production, (saturated or superheated), hot thermal oil, and flue gas treatment units, as required, to further decrease operating costs.

The thermal oxidation process is kept at a specific destruction temperature by control loops based on feedback control (temperature, and Oxygen) and feed-forward control (combustion air to combustible gas ratios).
The feedback control, based upon temperature, can be used either to control fuel gas, to be added to support combustion, or to add quench air to the products, whilst the one based upon Oxygen can be used for fine tuning/trim of combustion air.
Thanks to our experience, we can provide proprietary design of control loops for an efficient and smart combustion in every condition.

VAPOR COMBUSTION UNITS

The Vapor Combustion Units (**VCU**) from **GBA** are expressly designed to conduct thermal oxidation of hydrocarbons and volatile organic compounds (VOCs), which might result from vapors expelled by “end-of-pipe” activities, such as storage tank out-breathing, ship loading, truck/rail car loading, etc. or coming from vapor recovery units when cannot meet emission guarantees.

Waste gas/vapor streams are routed via a gas blower, passing through one or more staging butterfly valves, including a detonation arrestor near burners, and delivered to our proprietary gas burners, in correspondence of which the mixture is ignited by pilot burners, permanently lit to ensure flame stability and safety.

The burners are internally equipped with anti-flashback devices, suitably designed to prevent flash-backs at low loads, and/or when high hydrogen content is present in the gas mixture.
To minimize electrical power consumption, **GBA** designs VCUs as **Natural** draft units, wherein the combustion/quench air are provided through air louvers, located at stack base. A small air blower is generally added to ensure safe pre-purge operation and to support combustion at minimum firing.

In our proven technology, the destruction rate efficiency (DRE) on VOCs is achieved by appropriate residence time, effective mixing, and constant temperature monitoring of the exhaust gas exiting the stack.

CATALYTIC OXIDIZERS

GBA selects and designs **Catalytic Oxidizers** when the VOC (and/or any other gaseous pollutants) laden stream, is present in tiny amounts in a carrier (air, or other inert).

When allowed by gas characteristics, and waste stream’s constituents (composition), the catalytic oxidation represents the best option to process lean streams with low Lower Heating Values, typically in the range of 10-20 BTU/SCF [~0.37 to 0.74 MJ/m3], because the small organic load may be effectively oxidized on a catalyst at low temperatures, resulting in significant savings in support gas usage.

The basic concept uses a Platinum group metal-based catalyst on a monolithic honeycomb substrate in stainless steel or ceramic to induce oxidation at 300°C–400°C [572-752 °F], which is extremely low compared to a direct thermal oxidizer (850°C–1100°C, 1562°F-2012°F, or more). Destruction efficiencies of up to 99.9% may be obtained with just a little amount of support fuel, lowering total emissions.

RECUPERATIVE SOLUTIONS

GBA designs and supplies recuperative solutions from “waste heat” - associated with hot flue gases generated by thermal oxidizer’s processes - to improve overall plant efficiency, combining at the same time low **OPEX** (Operating expenditure) and low Carbon Dioxide emissions because the waste heat recovery allows production of plant utilities, or just usable heat, without any use of additional fuel.

GBA’s recuperative solutions can be supplied in ranges from 1 to 80 MWatts and typically can recover up to 70-80% of the theoretical heat available in the flue gas, being the main limitation for further heat recovery given by flue gas’ minimum temperature to be maintained at stack inlet.

The transfer of heat occurs from the hot flue gases to another medium, such as water, steam, thermal oil, air, waste gases, etc. and occurs in economizers, steam boilers, circulating thermal oil systems, air/waste gas pre-heaters, etc.

REGENERATIVE THERMAL OXIDIZERS

GBA selects and designs Regenerative Thermal Oxidizers (RTOs) to properly dispose **VOC** laden lean streams, characterized by a **very modest Lower Heating Value**, in a very energy-efficient manner, through an effective energy recovery in a ceramic heat exchanger package, guaranteeing at the same time regulatory compliance to flue gases emission limits.
Typical applications refer to gaseous waste effluent from a Vapor Recovery Unit (VRU), or streams generated from vessel tanks’ breathing and/or any other emission sources, characterized vapor/gaseous streams with very low concentrations of VOCs.
Our RTOs are designed to attain a minimum DRE of at least 99.5% on VOC emissions and, thanks to the very high heat recovery from hot effluents, with minimal support gas usage in a single forced draft burner – which provides heat to the regenerator beds during the start-up cycle and as needed during the operation to maintain thermal equilibrium at balance temperature.
VOC oxidation occurs at high temperature, typically in the range 800-925°C [1472-1697°F], with 1 second residence time as minimum.
The selection of use three canisters, instead of two as some other suppliers do, is based upon the design optimization done by **GBA** with the aim to avoid fluctuations (read as discontinuity and/or intermittence) in the emission levels during automatic switch-over of operation from one canister to another.
Moreover, this design choice has the advantage to build a unit, ready for future more severe legislations and able to guarantee that emissions are always in compliance with laws without discontinuities/emission picks, that may occur during transition of operation.

FLUE GASES TREATMENT UNITS

GBA may provide flue gas treatment units as part of a thermal oxidizer package, depending on the relevant requirements, in co-ordination with our system integrators, highly specialized on these types of units.

When low NOx burners themselves do not allow to meet Nitrogen Oxide emission standards, we may provide de-NOx systems based on selective non-catalytic reaction (SNCR) or selective catalytic reaction (SCR).
The SNCR reactor is based upon the injection of Ammonia or Urea aqueous solutions into the hot flue gas (~1000°C, 1832°F) and promotes the homogenous reduction of Nitrogen Oxides into Nitrogen and Water Vapor with abatement efficiencies of up to 90%.
When the emission limits are more stringent, and the process allows, **GBA** designs and supplies SCR reactors, which are characterized by very high abatement efficiencies.
These catalytic reactors support the heterogeneous reaction on a Vanadium pentoxide catalyst bed (V2O5) or other active catalitic component, between Ammonia or Urea water solutions, sprayed in the hot gas (about 300°C, 572°F) few straight diameters upstream the unit, and Nitrogen Oxides, which are reduced to molecular Nitrogen.

GBA can also associate other flue gas treatment units based on quencher/wet scrubbing, dry scrubbing, bag houses for filtration, and other technologies when the gaseous effluents from the thermal oxidizer acid gases (such as Sulfur Dioxide, Hydrogen Chloride, Chlorines, etc.) or particulate matter, solid inorganic particles, and need further treatment before being discharged into the atmosphere.

GBA ENCLOSED COMBUSTORS

Compact Enclosed combustors by **GBA** are a cost-effective and efficient option for customers that need to flare excess gases - which might be present, for instance, in pipelines that need to be isolated and accessible for maintenance – in compliance with emission standards while disposing them to atmosphere.

Typically our units are internally lined with soft ceramic fiber layers, suitably selected to withstand the flame and hot temperatures, preventing heat radiation and light to the surroundings.
GBA's enclosed combustors are suitable for thermal outputs in the standard ranging from 0.5 to 25 MW [1.7 to 85 MMBTU/h] and meet EPA regulation requirements destroying and removing hazardous pollutants with an efficiency of up to 99.9%.
Larger thermal loads are possible by adopting a custom design and by combining several units in a multi-array arrangement with a minimal plot plan area engagement.

Based upon your requirements, we can combine these units on a trailer package, which could be transported and relocated to different sites depending on the needs.
The package can be designed to accommodate all valves, instrumentation, blowers, and any kind of control/safety system, in a single trailer ready for mobilization.

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