

THERMAL OXIDATION

FOR THE ABATEMENT
OF VOLATILE ORGANIC
COMPOUNDS (VOC)
AND ODOURS IN
GASEOUS EFFLUENTS

A POINT OF REFERENCE
IN ENVIRONMENTAL
TECHNOLOGY



Babcock Wanson
Groupe **ENIM**

BABCOCK WANSON SOLUTIONS TROUGHOUT THE WORLD



Italy

BABCOCK WANSON ITALIANA S.p.A.
Via Roma, 147
20040 Cavenago Brianza (MI)
Italy
Tel.: 0039 02 95912.1 r.a.
Fax: 0039 02 95019252
bwi@babcock-wanson.com
www.babcock-wanson.it

France

BABCOCK WANSON SA
106/110, rue du Petit Le Roy
94669 Chevilly Larue Cedex
France
Tél.: 0033 01 49 78 44 00
Fax: 0033 01 46 86 14 16
commercial@babcock-wanson.fr
www.babcock-wanson.fr

• Nerac:
7, bld du Midi - B.P. 52
47600 Nerac - France
Tél.: 0033 0553 65 19 00
Fax: 0033 05 53 65 17 33

United Kingdom

BABCOCK WANSON UK Ltd
7 Elstree Way
Borehamwood
Hertfordshire WD6 1SA
United Kingdom
Tel.: 0044 208 9537111
Fax: 0044 208 2075177
info@babcock-wanson.co.uk
www.babcock-wanson.co.uk

Spain

CALDERAS Y PROYECTOS BABCOCK WANSON SA
Barrio San Martin Avda. Pinoa S/N
48170 Zamudio (VIZCAYA)
Spain
Tel.: 0034 94 4523036
Fax: 0034 94 4523054
comercial@babcock-wanson.es
www.babcock-wanson.es

Central Europe

CNIM BABCOCK s.r.o.
Evropská 175/115
160 00 Praha 6
Czech Republic
Tel.: 00420 2 25 43 31 12
Fax: 00420 2 25 43 31 10
info@cnim.cz
www.cnim.cz

Portugal

BABCOCK WANSON Caldeiras Lda
Rua dos Transitários, 182
Salas BS e BT
4455 - 565 Perafita - Portugal
Tel.: 00351 22 999 94 90
Fax: 00351 22 999 96 59
bwc@babcock-wanson.com

Morocco

BABCOCK WANSON MAROC SA
Piste d'Ain Bordja
Ain Sebaa - 21600 - Casablanca
Morocco
Tél.: 00212 22340101
Fax: 00212 22352309
bwmoroc@menara.ma

BABCOCK WANSON

The companies forming our International Group combine unparalleled experience and expertise in Thermal Engineering applications gained over 60 years of progressive development. Group companies are active in Italy, France, United Kingdom, Spain, Portugal, Switzerland, Morocco and Central Europe.

Our Group activities are principally in the fields of process air treatment, steam and thermal fluid industrial boilers and water treatment.

With many hundreds of installations for VOC and Odour abatement we hold an ideal position to provide complete and tailor made solutions for each industry following the environmental and safety regulations in force in the country of installation.



*Babcock Wanson factory - Italy
Recuperative oxidiser of 45,000 Nm³/h under construction.*

A Complete Service for Industry

- Preliminary project study
- Gas effluent analysis
- System circuit proposals for pipework and ducting
- Installation design including pipework, thermal fluid systems, steam boilers and electrical and process and instrumentation design
- Equipment manufactured in our factories, utilising latest manufacturing techniques
- Complete pre-assembly and works testing
- Start up, commissioning, training, certification and approvals
- Planned maintenance or on call service
- Spare parts

The Babcock Wanson Thermal Oxidiser Range

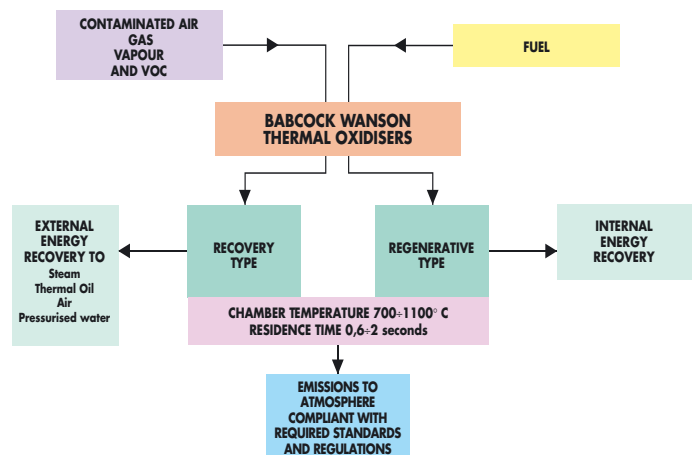
Gas and VOC effluents produced by various manufacturing processes have to be treated in order to achieve the quality required by prevailing regulations before discharge to atmosphere.

The pollutants concerned contain mainly carbon, hydrogen and oxygen linked as compounds dangerous to the natural ecosystem.

In order to make these compounds safer, it is necessary to break up the links which keeps groups of atoms chemically together to produce more acceptable products such as water (H₂O), Carbon Monoxide (CO), Carbon Dioxide (CO₂), Oxygen (O₂) and Oxides of Nitrogen Oxide (NO_x).

Among the options offered by technology and regulation, the most effective and widely used is thermal oxidation where pollutant gases are treated by heating them in a combustion chamber at high temperature.

Babcock Wanson has a very wide and successful experience of VOC and Odour Thermal Oxidation using a variety of thermal methods combined with heat recovery systems.



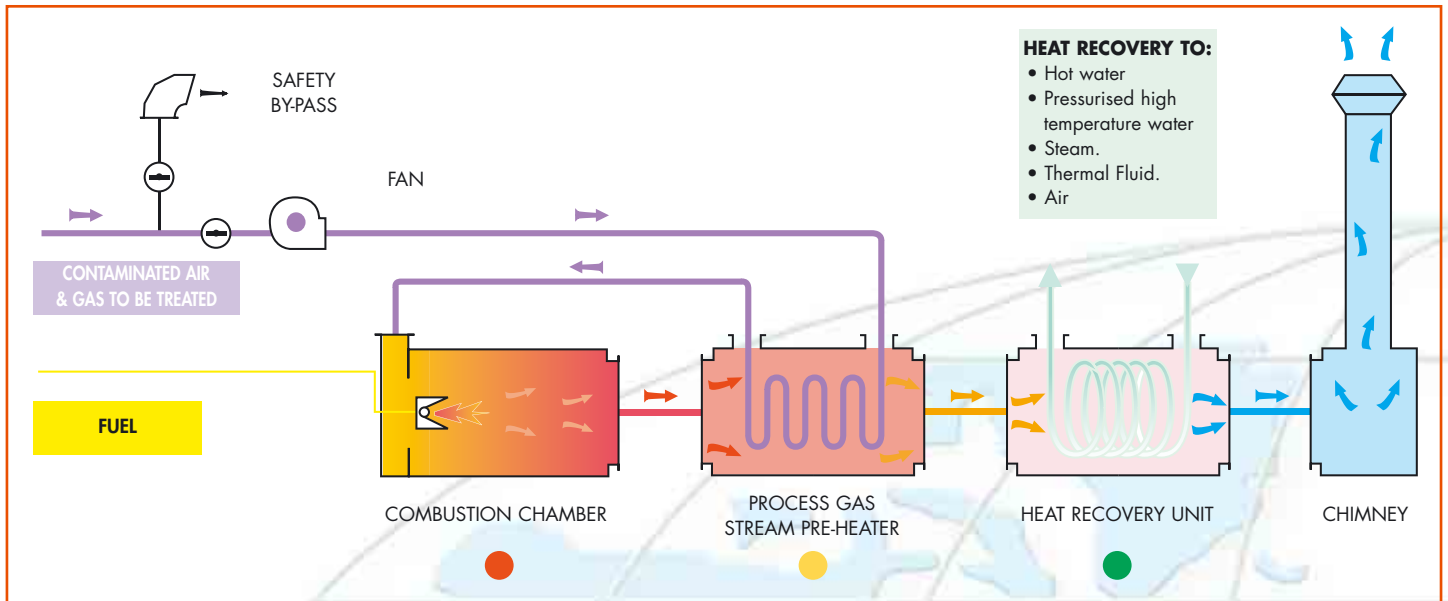
The local and national regulations developed from European Directives concerning emissions to atmosphere of VOC and Odours are progressively being enforced by all member countries of the European Community.

Babcock Wanson Oxidisers are designed to comply with these directives and to provide the answer to many process problems with both classical and advanced innovative solutions amongst which include Regenerative Oxidisers for deodorisation, Regenerative Oxidisers for high VOC concentrations and Combined Regenerative/Recuperative plants.



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Recuperative Thermal Oxidisers



The simplest and safest method of treating polluting VOCs is to oxidise them by heating in a combustion chamber at a temperature in the range 700÷1100 °C (typically about 750 °C) with a residence time of between 0.6 and 2.0 seconds (typically about 0.8”).

The process plant includes:

- A fan with inverter speed regulation to vary the input flow.
- A pre-heater for the effluent air.
- The Oxidiser.
- Control panel for system regulation with PLC for the management of the operating cycles plus operator interface panel with LCD touch screen and temperature recorder/controller.
- Heat recovery units which can recover heat into thermal fluid, steam hot water or high temperature pressurised water and/or air.

The number and position of the heat recovery units in each plant varies according to specific individual design requirements. These recovery devices are also designed and manufactured by Babcock Wanson.

Advantages

- Continuous regulation of emissions.
- Simplicity of control and management.
- Quick start up.
- Heat energy recovery.
- Safety and reliability with full hazard audit.
- Range of effluent 1,000 to 60,000 Nm³/h.



*Aluminium foil printing.
Effluent gas • 45.000 Nm³/h
Thermal fluid heat recovery.*



*Flexible Packaging Printing
Effluent gas • 18,000 Nm³/h • Thermal Fluid Heat Recovery*



*Petro-Chemical Plant
Oxidiser with integrated thermal fluid
heat recovery*



*Pharmaceutical Industry • Twin Oxidisers with recovery to
air and water • Effluent gas • 6,000 Nm³/h*



*Leather cloth Manufacturing • Effluent gas
20,000 Nm³/h • Thermal Fluid Heat Recovery*

B A B C O C K W A N S O N

Ceramic Regenerative Oxidisers

Ceramic Regenerative Oxidisers are used in cases where the requirement for heat recovery does not exist or is too small to justify employing a Thermal Recovery Oxidiser.

The Regenerative Oxidiser includes:

- Effluent fan with automatic output control system.
- Heat storage towers filled with ceramic, which may be saddles or honeycomb structures selected to suit the requirements of the application.
- A system of automatic valves for effluent distribution through the towers. These are of exclusive Babcock Wanson design and manufacture. The valves can be fitted under or next to the towers, according to technical and site space requirements.
- Combustion chamber with one or more modulating automatic gas/fuel burners.
- Control panel with: PLC for the management of the operating cycle, operator interface panel with LCD touch screen and temperature recorder.

Advantages

- The effectiveness of the abatement of VOC emissions is equal to that of a thermal recovery oxidisers, whilst the NOx emissions results are lower
- Continuous regulation of the emissions
- Simplicity of management
- Reduced maintenance
- Reduced gas/fuel consumption: the Regenerative Oxidiser can achieve auto-thermal conditions with low concentrations of VOC
- Self contained plant which does not produce waste heat for reuse in the production cycle and therefore does not need an additional heat distribution system
- Range from 1,000 to 150,000 Nm³/h.



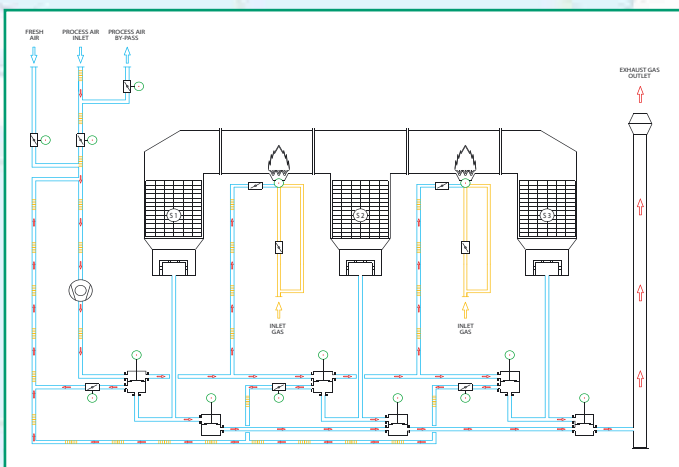
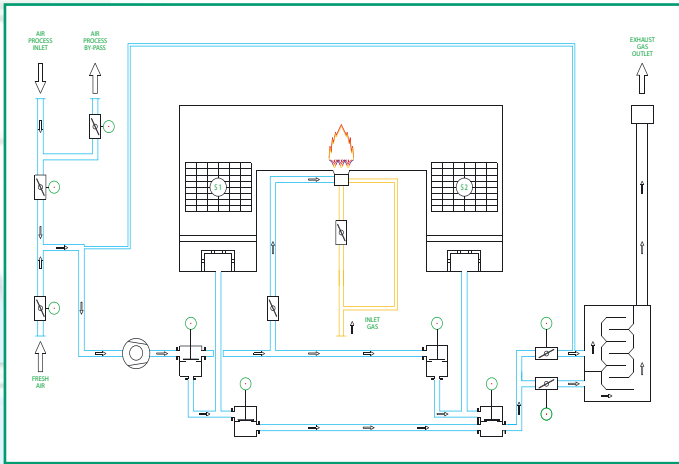
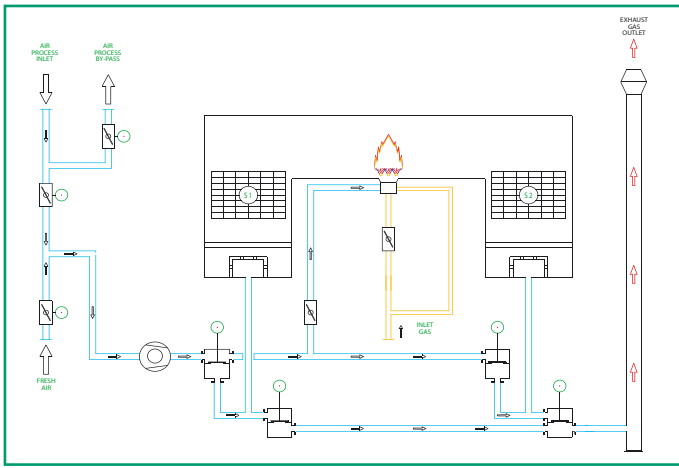
*Superficial coils treatment • Twin regenerative oxidisers
45,000 Nm³/h installed in different period of times*



Lithography on metal support • 36,000 Nm³/h



Chemical industry • 18,000 Nm³/h



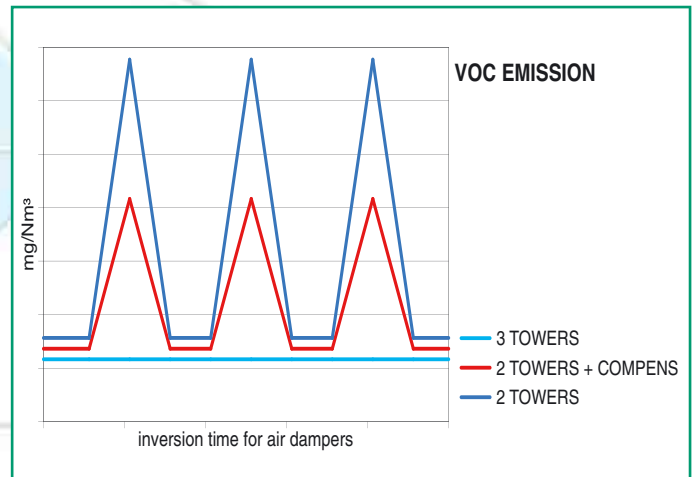
Regenerative Oxidisers can be constructed in the following configurations:

- 2 tower
- 2 tower plus compensation tower to reduce the emission peaks
- 3 tower to achieve lowest emission levels
- 5 tower for high volumes of effluent

The choice depends on:

- Concentration and nature of the VOC to be treated
- Available space

The following chart indicates the rate of VOC emission for the different arrangements.



Ink production • 50,000 Nm³/h



Rubber vulcanising • 30,000 Nm³/h

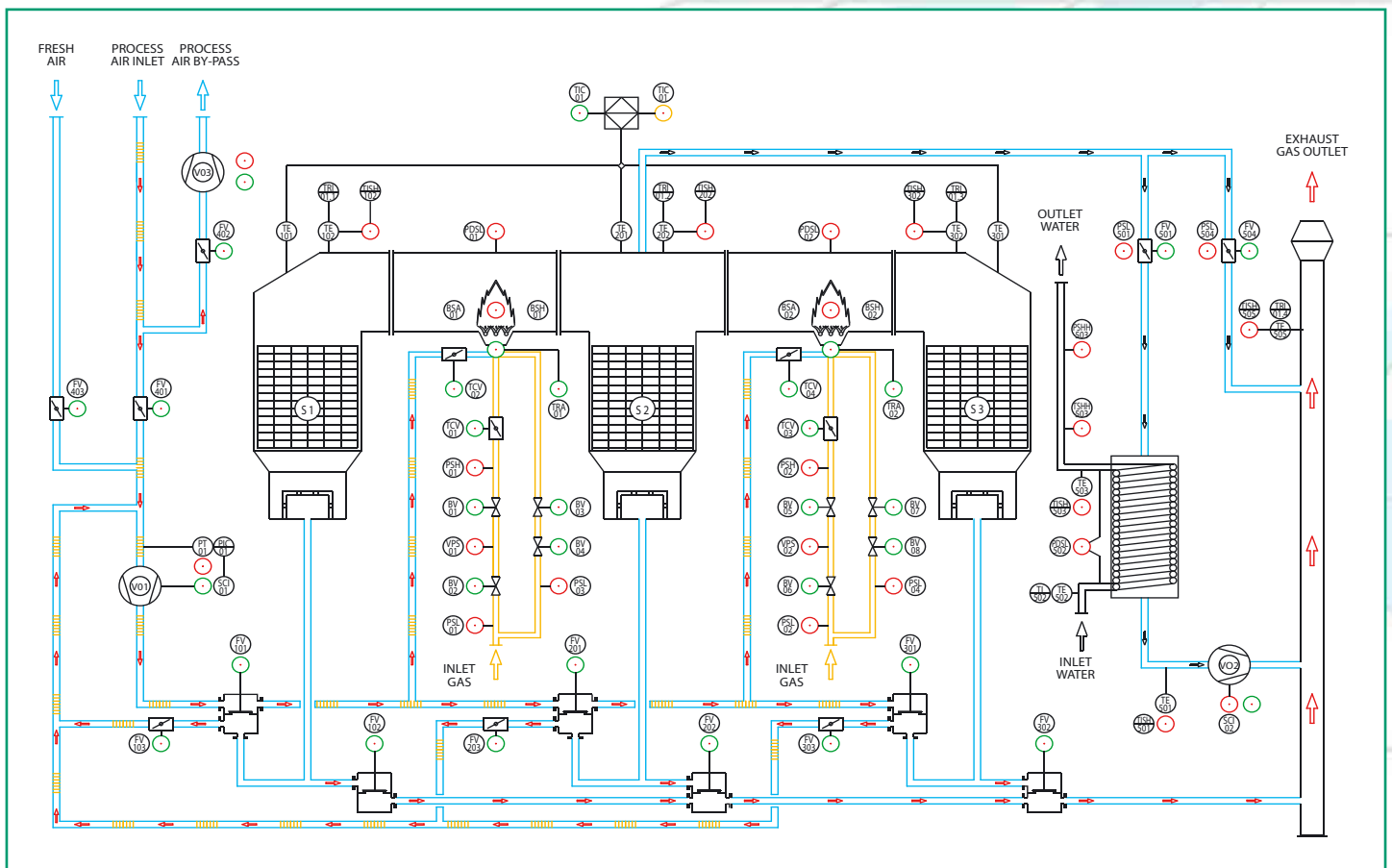
Regenerative Oxidiser with heat recovery

In many cases the polluted air contains very high concentrations of VOC demanding the disposal of large quantities of heat. It is therefore essential to provide a control system for the temperature in the combustion chamber (hot gas by-pass) and sometimes it can be beneficial to fit an additional heat recovery unit to heat air, water or thermal oil.

Babcock Wanson specialise in the design and manufacture of these heat recovery systems, which have been part of our production programme for many years.



Fabric coating • 50,000 Nm³/h
Thermal fluid heat recovery



Adesive tape production • 13,000 Nm³/h



Rotogravure printing on flexible support • 40,000 Nm³/h

Rotoconcentrator

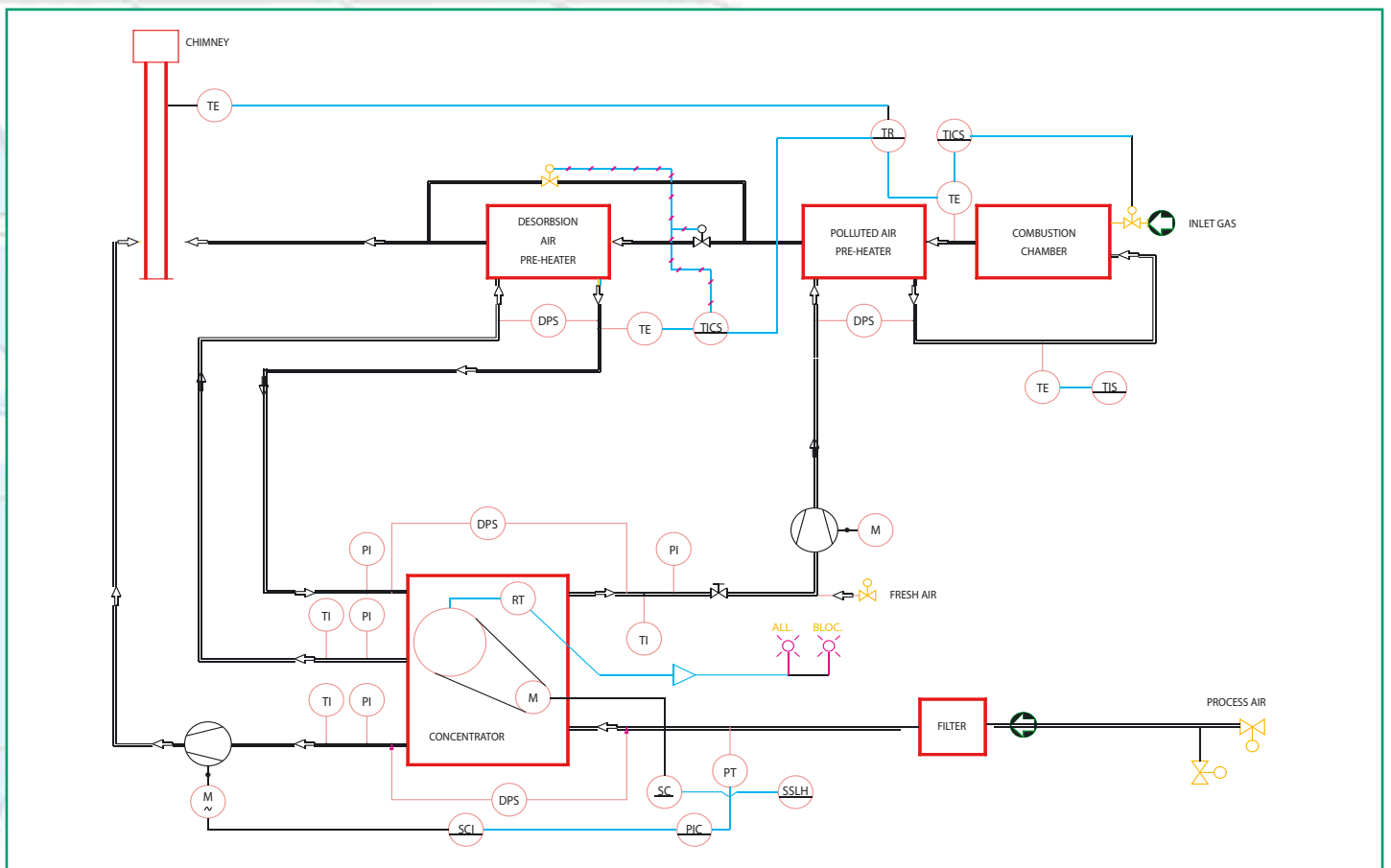
When the quantity of the air to be treated is very high and the concentrations of VOC very low, it is necessary to employ a design which reduces the volumes of air to be treated in the Oxidiser and at the same time increases the concentration of VOC in order to reduce operational and capital costs.

The rotoconcentrator with zeolite allows this to be achieved, reducing the volume of air and increasing proportionally the concentration of VOC.

The rotoconcentrator is coupled to a Thermal Recovery Oxidiser or a ceramic Regenerative Oxidiser with reduced flow, which treats an effluent gas stream with high VOC concentration and therefore consumes very little support fuel. The quantity of effluent delivered to the oxidiser falls to approximately 1/10 to 1/15 of the total amount of effluent from the process.



Paint production • 70,000 Nm³/h



Car industry • 120,000 Nm³/h



Special paper • 10,000 Nm³/h



BABCOCK WANSON Deodorising Oxidisers

Recovery and Regenerative Oxidisers are also utilised to eliminate odours and vapour emissions generated by many production processes.

These are specially designed plants tailored to meet the particular requirements of these industrial processes.

Babcock Wanson is the leading company in Europe in this field having completed many successful installations operating in the following industries:

- Animal tallow production (rendering).
- Industrial frying processes (potatoes, meat products etc.).
- Food industries.
- Various chemical processes.
- Coffee and barley roasting.
- Rubber vulcanising and moulding.

Babcock Wanson technicians are available to offer the most suitable solution for each specific case.

These applications can use traditional fuels and/or in many cases, special burners. An example of this is the burning of **animal tallow** as the support fuel.

Rendering industry • Recuperative oxidiser



Rendering industry • Regenerative oxidiser



Frying • Recuperative oxidiser



Rubber industry • Regenerative oxidiser



RENDERING

Our Deodorising Oxidisers are well known all over Europe as the best technology to eliminate the odours from the effluents of: cookers, sterilisers, presses, decanters, material storage hoppers, etc. The option to select a system with heat recovery or a ceramic regenerative oxidiser is determined by the specific requirements of each customer and according to the quantity of vapour and air to be treated.

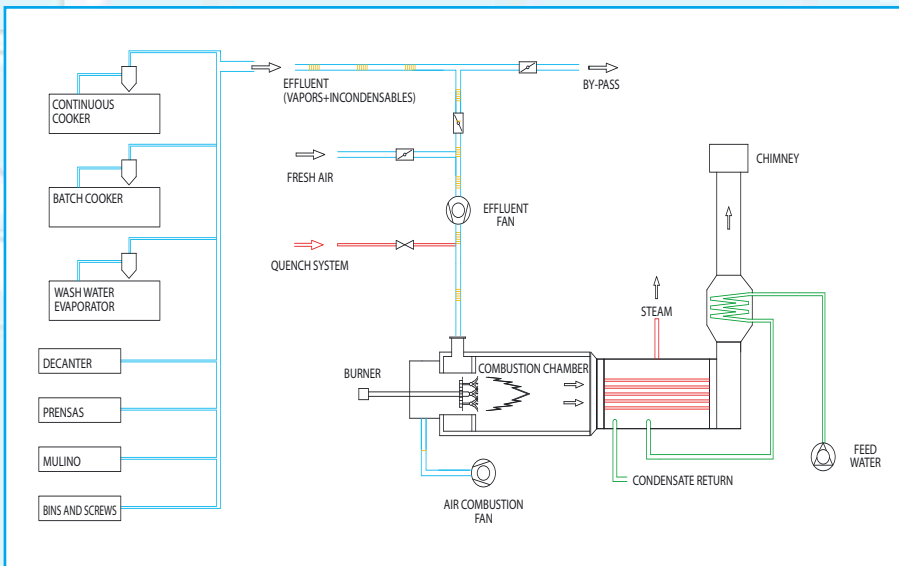
A major factor in the choice is the type of fuel that is available e.g. gas, heavy fuel oil or tallow.

Industrial frying of vegetable oils and meats

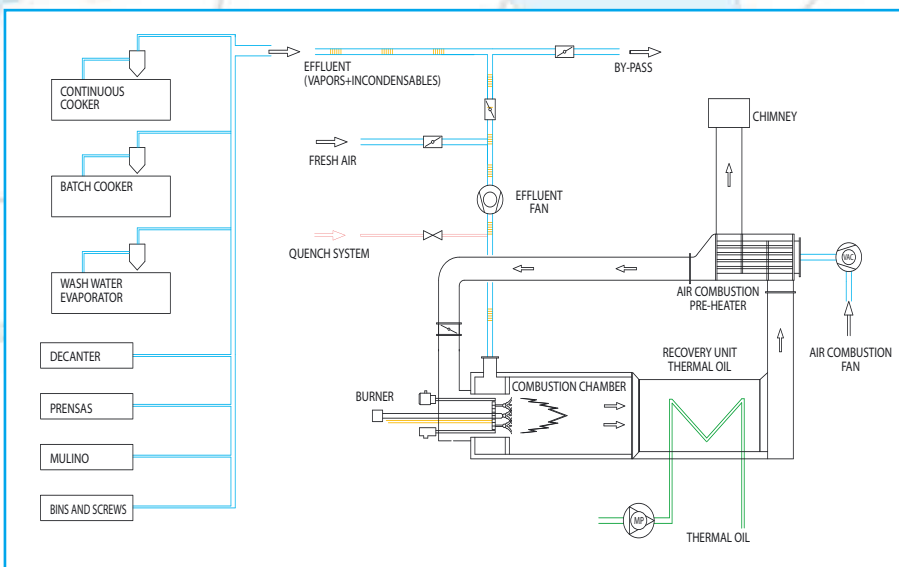
These normally use COMBI oxidisers for relatively low effluent input, serving one or two deep-fryers. For large industrial operations where multi cookers may be installed and the volume of polluted air to be treated is large, an installation incorporating Recuperative Oxidisers with separate heat recovery units or Regenerative Oxidisers would usually be required.



Rendering industry • Heat recovery oxidiser for steam production



Rendering industry • Heat recovery oxidiser for steam production



Rendering industry Thermal fluid heat recovery oxidiser

Application fields

Babcock Wanson plants, which have been shown to achieve emission levels (TOC, CO NOx) in line with diverse European regulations are employed in a wide variety of applications, such as:

- Printing on metal cans and containers with products containing ketones, acetates and hydrocarbons.
- Flexible packaging manufacture (paper, carton, plastic films and aluminium), where coating, laminating and printing take place with inks containing acetates, glycols and hydrocarbons, together with solvent based laminate adhesive.
- Timber composite production using solvent based sprays and lacquers containing VOCs of several classes and concentrations.
- Plastic laminating and forming processes with resins containing phenol, formaldehyde, methanol, MEK, MIBK, glycol and various other VOCs.
- Adhesive tape coating lines and adhesive production containing toluene, acetates, alcohols, silicones, hydrocarbons and other VOCs
- Metal treatment industries, which utilise systems for the spraying, immersion or impregnation application of solvent products (epoxy, alkyd and polyurethane) containing VOCs of several types.
- Glass-resin and/or reinforced manufactured goods where resins containing styrene and ketones are used.
- Textile and clothing where surfaces are chemically treated with resins containing various VOCs.
- Simulated leather production using printing lines with inks containing acetates, ketones, glycol and hydrocarbons.
- Production of printed paper by roto-off-set and rotogravure processes using products containing ketones, acetates, alcohols and hydrocarbons.
- Various applications in the pharmaceutical and related industries including dyestuffs and rubber manufacture. High temperature vitreous enamelling of household articles, the production of expanded hydrocarbons based material and other chemical industries. These emissions can contain VOCs of a number of different types.
- Automotive spray finishing booths where spray application of solvent products containing VOC of various classes takes place.



Metal finishing • 12,000 Nm³/h



Rotogravure printing • 20,000 Nm³/h

Other Babcock Wanson products and technologies

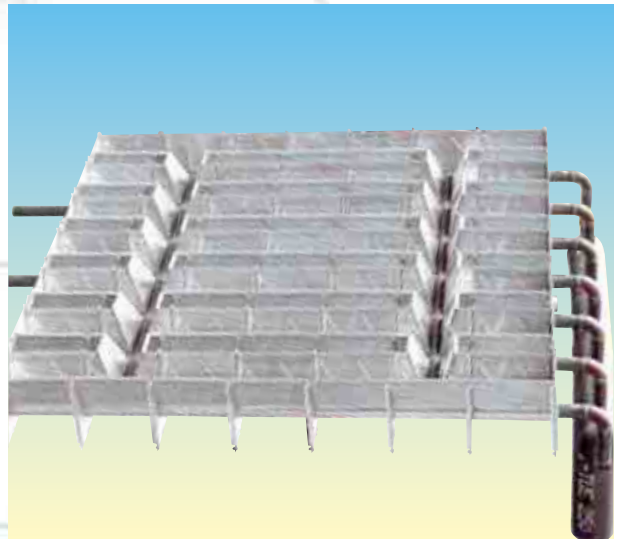
Industrial boilers

- Thermal oil heaters; vertical and horizontal coil or multi-tubular with high efficiency
- Heat exchangers
- Steam and high temperature hot water boilers; vertical and horizontal coil or fire tube, instant steaming and high efficiency
- Design and supply of thermal plants and turnkey installations



Air treatment

- VOC Recuperative and Regenerative Thermal Oxidisers.
- High temperature air generators for drying and curing.
- Oxidisers for exhaust treatment from gas turbines.
- Gas burners in air stream ducts.
- Heat recovery from process gas streams and from cogeneration plants, coil or multi-tubular.
- Supply only or turnkey plants



Water treatment

- Filtration and settling
- Total softening
- Decarbonisation
- Total demineralisation
- Reverse osmosis
- Thermal degassing
- Biological monobloc treatments
- Potable water plants
- Design and supply of thermal power plants and turnkey plants



Babcock Wanson Services

Preventive and corrective maintenance contracts to suit customer needs.
BABCOCK WANSON offers:

1 Customised annual technical assistance contracts:

- For Oxidisers and peripheral equipment
- With monitoring of operating parameters, safety systems, emissions and performance levels
- Advanced planning for scheduled inspections during operation or shutdown
- With or without supply of consumable materials, wear parts, and conditioning products

Performed by qualified teams within the scope of the **ISO 9001** QUALITY standard.

Advantages of these contracts

- **Greater savings:**
Regular checks and appropriate adjustments reduce consumable material consumption and the operating costs of the plant
- **Improved safety:**
Planned inspection of the regulating, control and monitoring systems helps prevent costly shutdowns.
- **Compliance with regulations is ensured on a continuous basis.**
- **Improved reliability and longer service life.**
With regular maintenance by professionals your plant will have a higher availability and a longer service life.
- **Training of your site staff.**
Operating and maintenance personnel can complete their technical knowledge and benefit from the detailed information and advice given by our technicians during their visits.

2 Annual maintenance contracts with extended burner guarantee:

- **Planned preventive maintenance**
- **Supply/installation of burner wear parts**

3 Water treatment follow-up contracts

- Performed by specialised teams
- Guarantee of water quality through regular checks
- Reduction of costs through optimised consumption of conditioning products and reagents
- Regulation and refinement of treatment regime as part of an ongoing contract.

4 Global offer total guarantee contracts

- A total guarantee.
- Peace of mind for the operator.
- Controlled, fixed costs.
- Improved standards of quality and safety.





Customer Support is a complete service extending from the design activity to the manufacture and management of the thermal equipment.

Services include

- **Design and proposals.**
- **Replacement of existing plants.**
- **Equipment optimisation.**
- **Water treatment installation management and service.**
- **Technical assistance and rapid response with technicians located throughout Europe.**
- **Spare parts.**
- **Maintenance contracts.**
- **Statutory inspections.**
- **Upgrading of existing plants.**
- **Training.**
- **Site installation and turnkey plants.**



Approved Training Centre

30 YEARS EXPERIENCE OF FORMAL TRAINING

An approved training establishment for your service, maintenance and operating personnel, either in-house or externally.





Babcock Wanson
Groupe **ENIM**