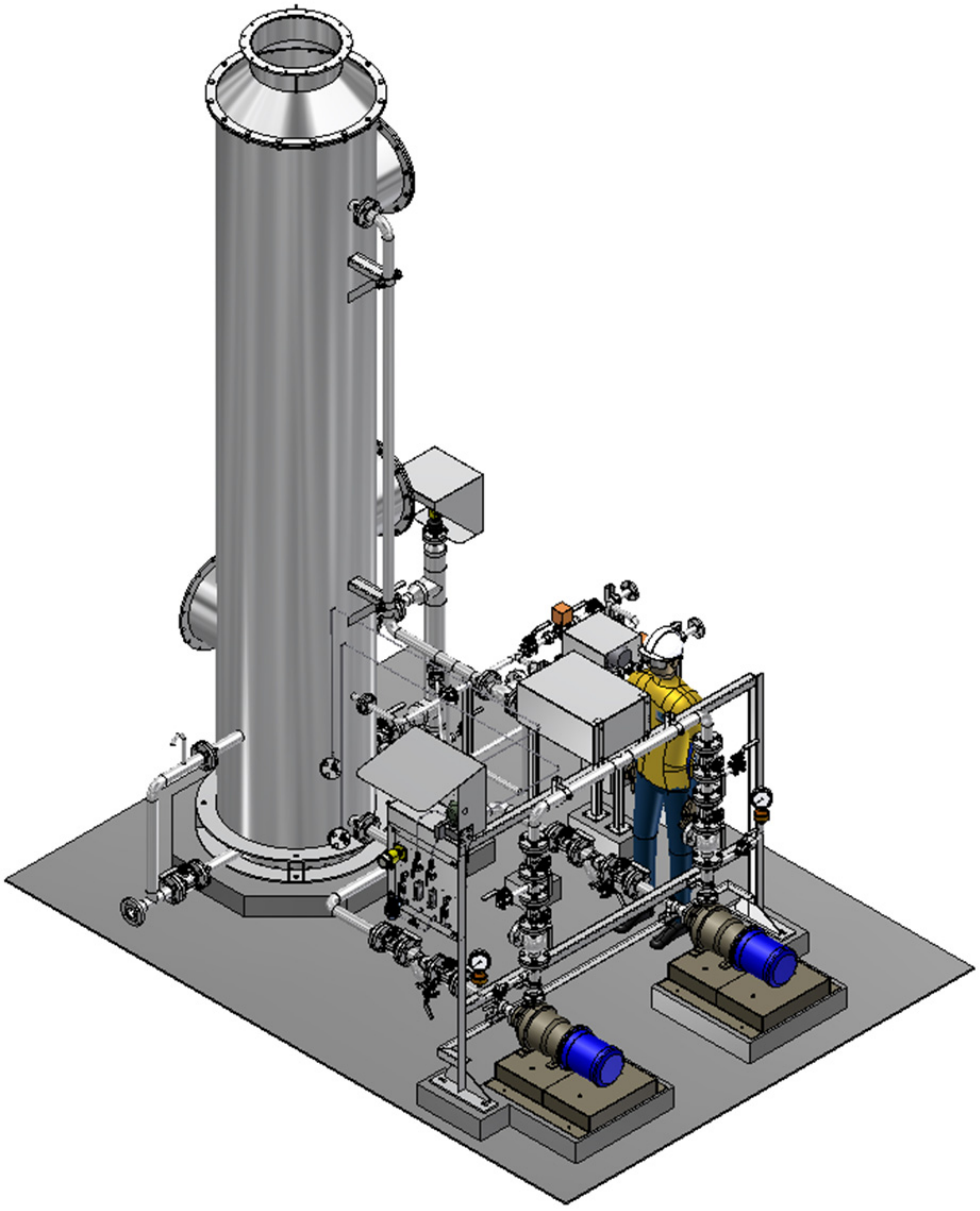
Product Description - c-SORB™ Gas Scrubber

c-SORB™ Gas Scrubbers



Cutting edge design without compromise.

TAPC (previously trading as “EGL” and “Horizon APC”) has been designing and building gas scrubbers since 1968.

With over 200 plants successfully supplied and installed, no other air pollution control company has this depth of experience and expertise. When you buy a TAPC gas cleaning plant you are buying the world’s best technology backed by the assurance of almost half a century of installations and experience.

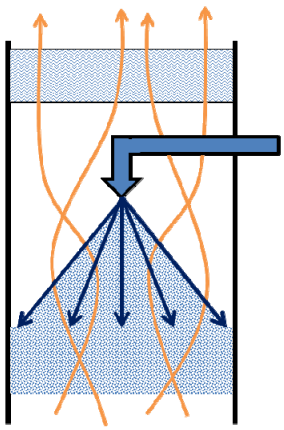
Total Air Pollution Control Pty. Ltd.
Toll free (Australia only): **1800 424 269**
International: **+61 2 4272 5233**
Email: **sales@tapc.com.au**
www.tapc.com.au

Total Air Pollution Control

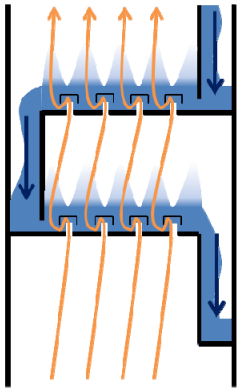
Operating Principles

Absorption

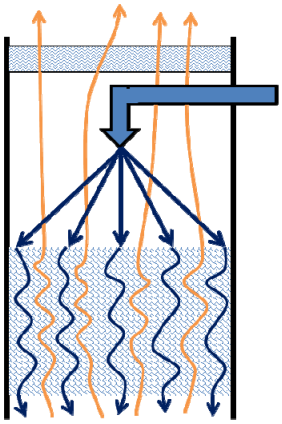
The basic process involved in "wet scrubbing" is the contacting of a polluted gas stream with a scrubbing liquid, with the intention of transferring a sufficient amount of the pollutants from the gas stream into the liquid stream to allow the cleaned gas to be discharged to atmosphere. Chemicals such as caustic or acid are added to the scrubbing liquid to react with the dissolved gas and form stable salts. This allows the scrubbing liquid to be recycled and increases the pollutant removal efficiency.



Spray Tower
☑ Low Pressure Drop
☒ Low Efficiency



Bubble Tray
☒ High Pressure Drop
☑ High Efficiency



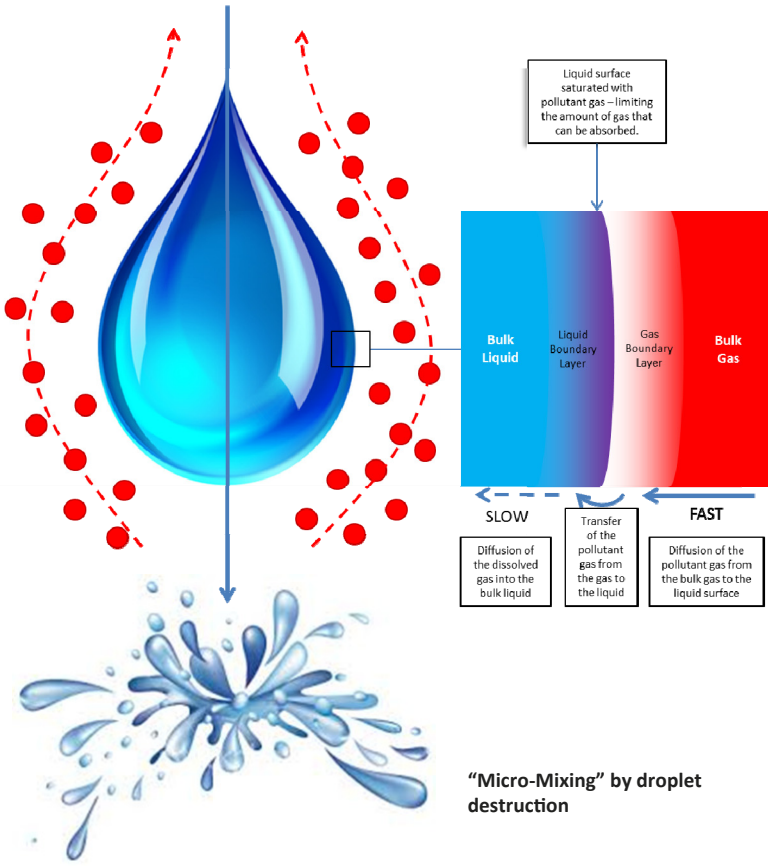
Packed Tower
☑ Low Pressure Drop
☑ High Efficiency

There are three major arrangements of absorption scrubbers: Spray Towers, Bubble Trays and Packed Towers. The TAPC c-SORB™ Scrubber is based on the Packed Tower arrangement. However, we also build Spray Towers and Bubble Trays. Please consult with our engineers to determine which arrangement is best for your application.

The Importance of Contact Area and Micro-Mixing

Traditionally the amount of surface area created by the packing elements has been regarded as the most important parameter in obtaining good scrubbing efficiency. Hence packing materials have been designed to have very large geometric surface areas (i.e. the amount of surface area on the packing per cubic metre of packing). While this is an important factor it disregards the fact that pollutant gases typically move (diffuse) thousands of times quicker through the carrier gas than through the scrubbing liquid. Hence in a typical scrubber, the surface of the droplets and rivulets saturate quickly and hinder more absorption from occurring.

The solution is to incorporate "micro-mixing" into the design of the packing elements by creating continuous formation and destruction of droplets. This allows the surface of the liquid to be constantly mixed with the bulk of the liquid—removing the barrier to further gas absorption and pollutant removal.



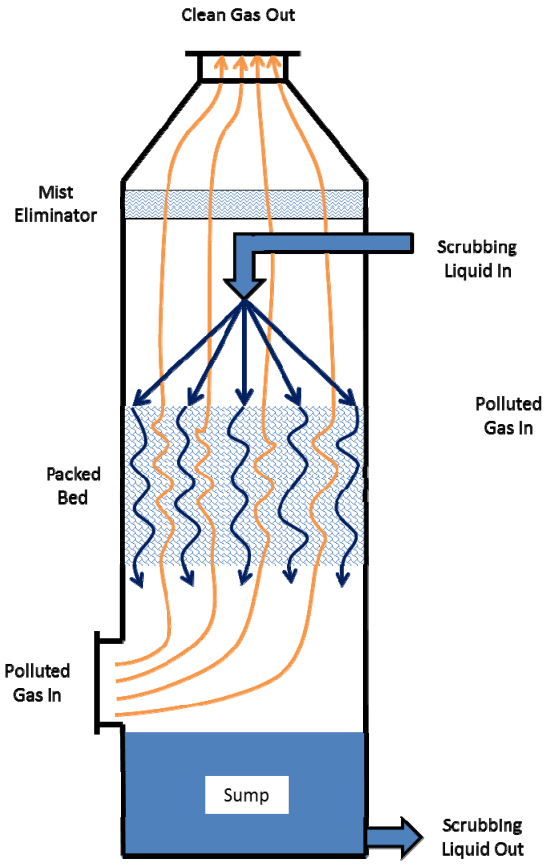
"Micro-Mixing" by droplet destruction

TAPC uses the world-leading LANTEC technology in our scrubber design with geometric areas of up to 100 m^2/m^3 and up to 388,000 drip points per cubic metre of packing—more than anyone else. This revolutionary design allows us to create the most efficient scrubbers on the market today.

LANTEC PRODUCTS INCORPORATED

Arrangements

Our c-SORB™ Packed Bed scrubbers can be supplied in two standard arrangements; Vertical and Horizontal. Please discuss with our engineers to determine which is the best arrangement for your application.

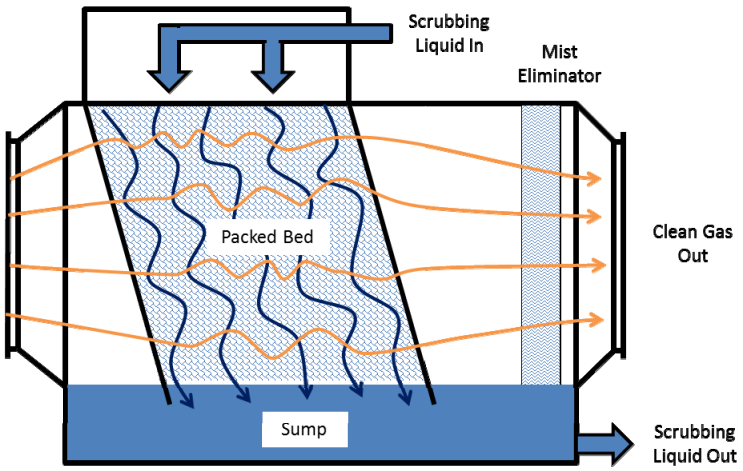


Vertical c-SORB™ Packed Bed Scrubber

☑ Small footprint
☑ High removal efficiencies
☑ Can handle high gas volumes

Munitions Factory

Multi-stage vertical c-SORB™ Packed Bed Scrubbers removing HNO_3, NOx and SO_2



Horizontal c-SORB™ Packed Bed Scrubber

☑ Low head height
☑ Can have multiple scrubbing beds in series in the one casing
☑ Readily transportable

Rendering Plant

Two stage horizontal c-SORB™ Packed Bed Scrubber removing odours.

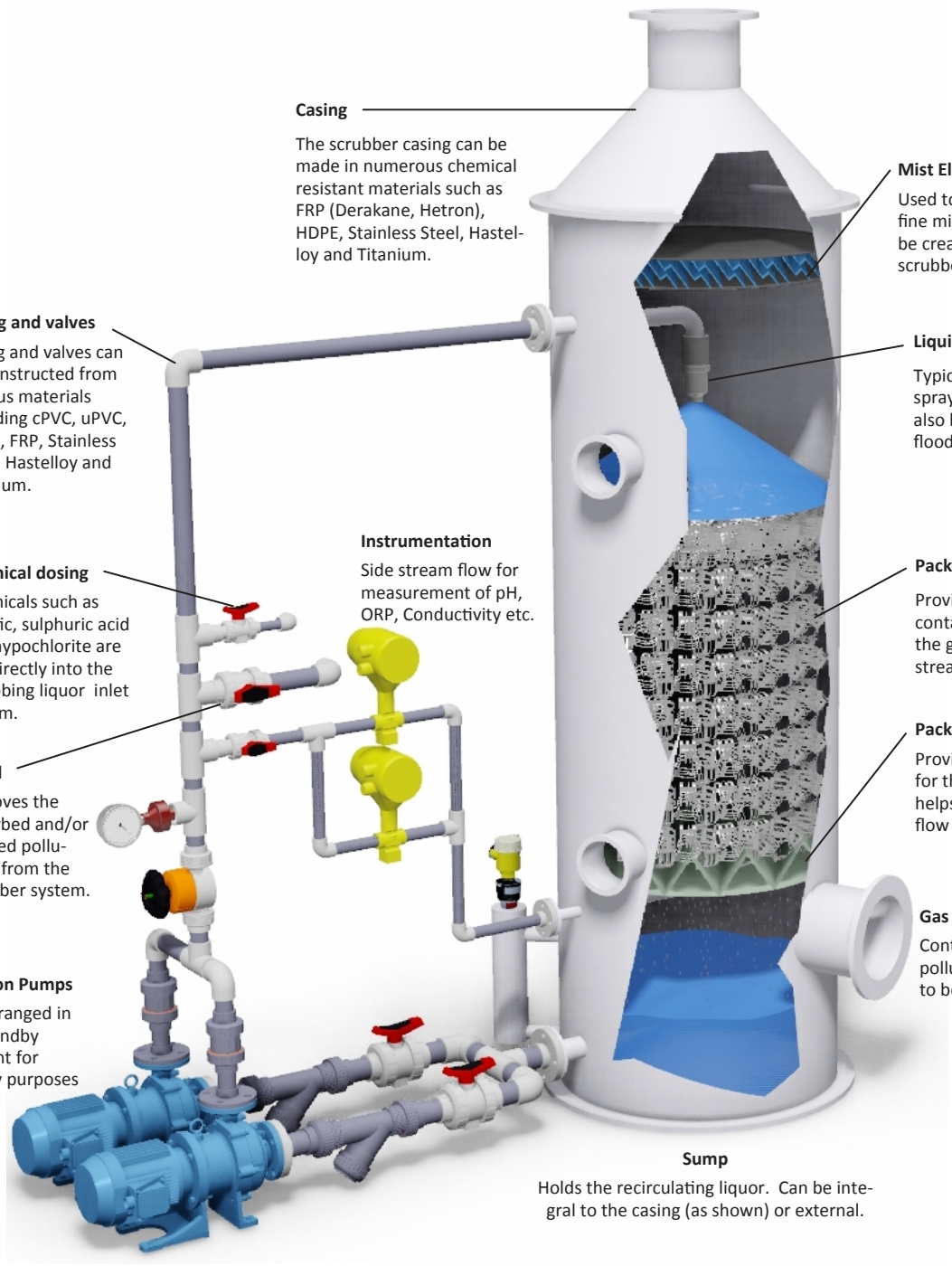
Complete Services

Consult—Design—Build—Install—Commission—Maintain

At TAPC we pride ourselves on being able to help you with your air pollution control issues from identifying the problems right through to building and implementing the solution. On top of that we have a complete crew of skilled service engineers and technicians that can keep your equipment running over the life of your plant.

Components

Typical c-SORB™ Packed Bed arrangement.



TAPC c-SORB™ Packed Bed Scrubbers

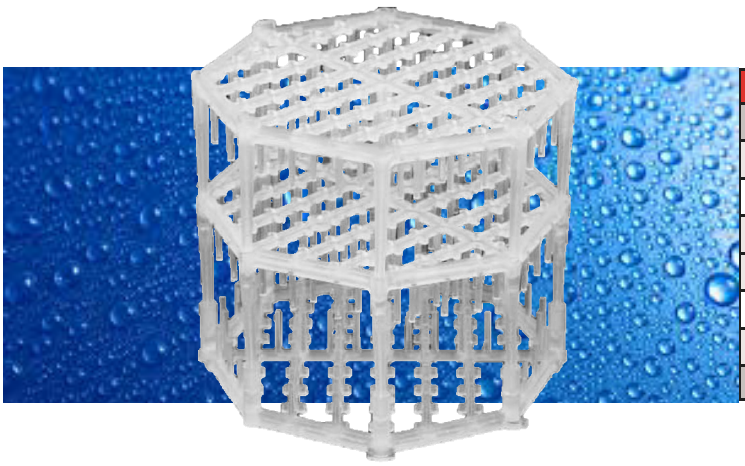
Many years of experience have provided the basis for our latest generation c-SORB™ Packed Bed Scrubbers, creating what we believe is the best and most efficient gas scrubbing system available anywhere in the world today. In designing our latest generation units we have combined state-of-the-art 3D design with real world field testing and over 45 years of installation experience. The culmination of this is a range of gas scrubbers that are not only economic to build, but are also uncompromising in engineering design, quality and efficiency.

When you buy a TAPC c-SORB™ Packed Bed Scrubber you can be assured that you are buying the best, most robust, industrial scrubber on the market today.

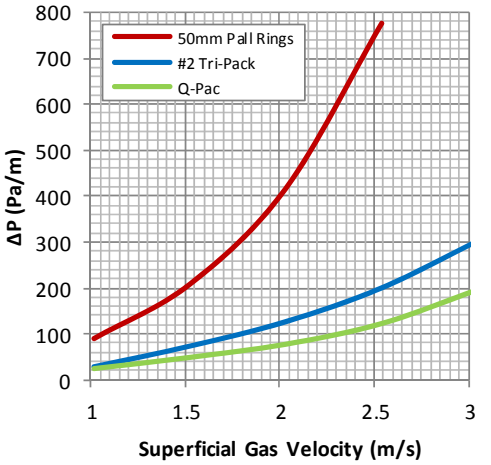
Product Description - c-SORB™ Gas Scrubber

Total Air Pollution Control

Lantec Packings



- Physical Properties -			
	Q-PAC®	#2 Tri-Pack	50mm Pall Rings
Void Fraction	96.3%	93.5%	95%
Geometric Surface Area	98.4 m^2/m^3	48 m^2/m^3	100 m^2/m^3
Weight – polypropylene	33.7 kg/m^3	67.4 kg/m^3	45 kg/m^3
Number of Pieces	1165/m^3	9,200/m^3	5,960/m^3
Packing Factor	23/m	52/m	45/m
Number of Dripping Points	388,000/m^3		
Note: Q-PAC® is available in a number of thermoplastics.			



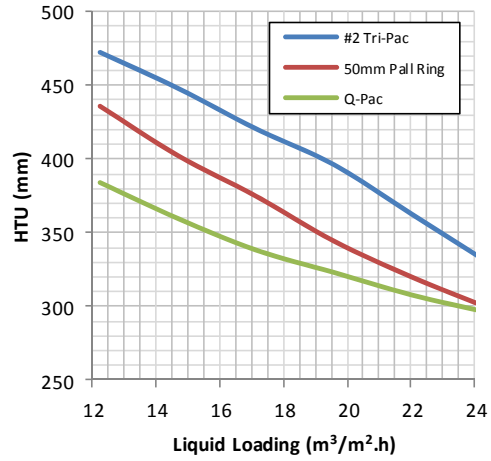
Low pressure drop design

Being an open filamentous structure, Q-Pac® provides the lowest pressure loss of any of the major packings on the market today. At the same time Q-Pac® retains a very high structural strength allowing for tall packing heights.

At typical 2.5m/s bed velocities, Q-Pac® is 42% lower in pressure drop than the #2 Tri-Pack and a whopping 84% lower than the 50mm Pall Rings!

Test Conditions:
Air/Water counter-current system

Column cross section:	**0.56 m^2**
Packing height:	**914 mm**
Liquid loading	**24 $m^3/m^2.h$**
Temperature:	**21°C**
Pressure:	**101.3 kPa**



Higher Mass Transfer Efficiency

Q-Pac's hybrid structure combines the regularity and efficiency of structured packings with the convenience and economy of random packings. Its flow-through design minimizes frictional drag over flat surfaces, while 388,000 drip points per m^3 enhance micro-mixing: using gas turbulence to break a liquid stream into smaller droplets with more surface area for rapid mass transfer

Results vary, but in a typical SO_2 scrubbing system at typical liquid loading rates of 20 $m^3/m^2.h$, Q-Pac® requires 21% less packing than #2 Tri-Pack and 5% less packing than 50mm Pall Rings!

Test Conditions:
SO_2 removal with buffered caustic pH~9.0 counter-current system

Column cross section:	**0.56 m^2**
Packing height:	**914 mm**
Superficial Gas Velocity	**2.0 m/s**
Temperature:	**21°C**
Pressure:	**101.3 kPa**

Here's why we recommend and use Lantec packings:

☑ Low Pressure Drop

- Reduced diameter in new gas scrubber towers.
- Reduced energy consumption when used as a replacement in existing towers.

☑ High Efficiency

- Lower packing depths in new scrubber towers.
- Higher absorption efficiency in when used as a replacement in existing towers.

☑ No Flooding

Classic packings like saddles and rings are prone to flooding—the temporary hold-up of liquid in the column. Q-Pac® has shown to be almost impossible to flood, even at very high Liquid to Gas ratios.

☑ No Distribution Problems

Due to the open design of the packing and multiple drip points, Q-Pac® is not prone to either gas or liquid channelling. In fact, where other packings need redistribution in tall beds, Q-Pac® does not.

☑ Extreme Resistance to Plugging

When particulate matter is present in the gas stream, or is formed as part of the process (calcite, sulphur etc.), Q-Pac® continues to operate where other packings block. No other packing can match Q-Pac® for plugging resistance.

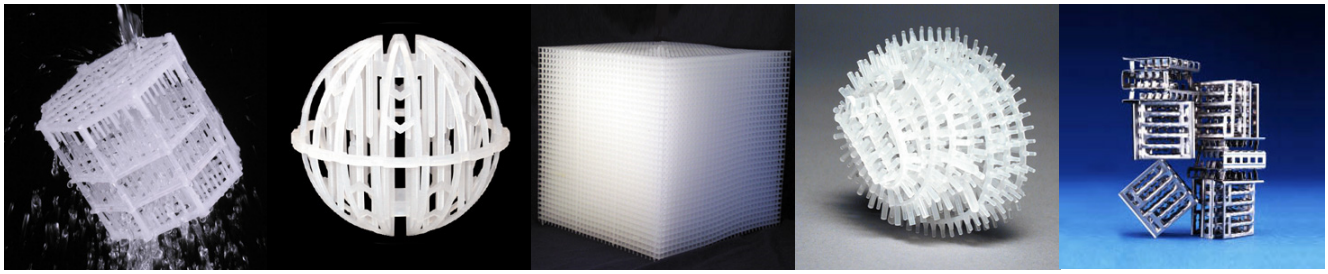
LANTEC PRODUCTS INCORPORATED

Q-Pac, LANPAC-XL, GLOBE-PAC, HD Q-PAC, NUPAC and Metal Q-PAC are all registered trademarks of Lantec Products Inc.

Tri-Pack is a registered trademark of Tri-Mer Corporation.

Pall Rings are a registered trademark of the Pall Ring Company

Other Lantec Products:



LANPAC-XL®

- Air Strippers and Degasifiers
- High Efficiency Air Strippers
- Biological Treatment Systems
- NSF approved

GLOBE-PAC®

- Suitable for dinking water systems (NSF approved)

HD Q-PAC®

- Oil Water Separators
- Biotrickling Filters

NUPAC®

- Ideal for mass/ heat transfer applications that require the absolute highest quality engineered surface.

Metal Q-PAC®

- High temperature applications
- Maximum contacting efficiency and moderate pressure drop.

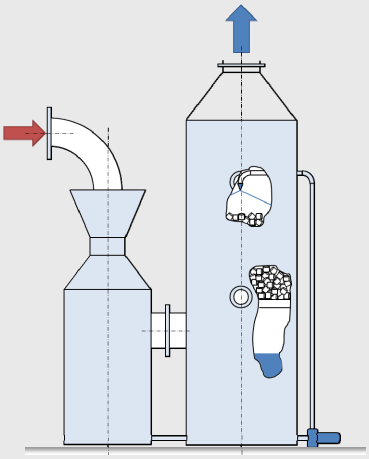
Multi-Pollutant Arrangements

Many applications involve multiple pollutants which cannot be removed in a single stage. At TAPC we have air pollution control devices for all airborne pollutants, hence we can tailor a multi-stage solution for your particular application. Below are three examples of multi-stage arrangements that illustrate the various approaches that we can take to clean your exhaust stream.

Metal Leaching

☑ Light particulate load

☑ Acid gases



TAPC v-SORB™ Venturi Scrubber Removing >90% of particulate matter

TAPC c-SORB™ Packed Bed Removing up to 99% of acid gases

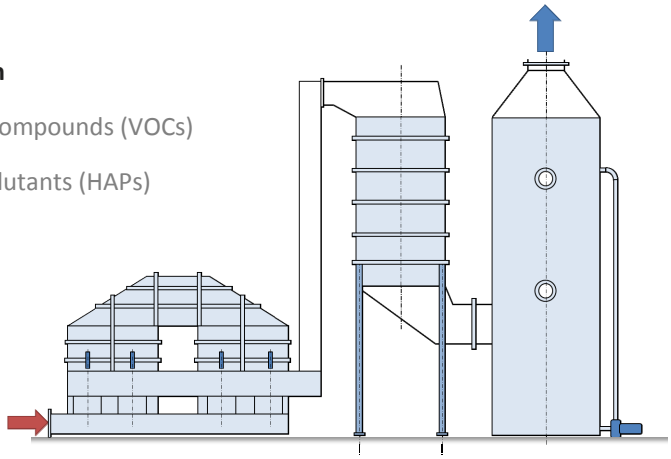
TAPC v-SORB™ Venturi Scrubber and **TAPC c-SORB™ Packed Bed** Scrubber removing particulate and H_2SO_4 mist in Vietnam

Chemical Production

☑ Volatile Organic Compounds (VOCs)

☑ Hazardous Air Pollutants (HAPs)

☑ Odours



Anguil Regenerative Thermal Oxidiser (RTO) Destroying >99% of VOCs and HAPs at high temperature

TAPC Quench Vessel Cooling gases to <80°C

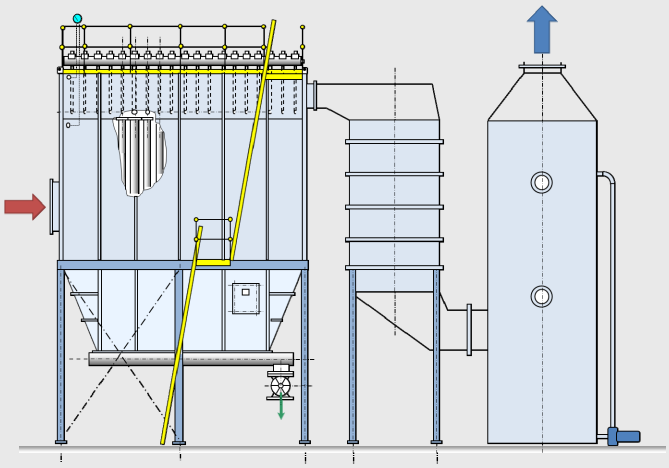
TAPC c-SORB™ Packed Bed Scrubber Removing up to 99% of acid gases

Anguil RTO plus Scrubber removing VOCs (USA)

Coal Fired Power

☑ High Particulate Load

☑ Soluble gases such as HCl and SO_2



TAPC PowerJet™ Fabric Filter Removing 99.99% of dust and particulate

TAPC Quench Vessel Cooling gases to <80°C

TAPC c-SORB™ Packed Bed Scrubber Removing up to 99% of SO_2 and HCl

TAPC c-SORB™ Scrubber and Fabric Filter removing flyash and SO_2 on a coal fired power boiler in Queensland

Case Histories

Case History

Chemical Plant Waste Gas Scrubbing System

Scope:
Design, manufacture, mechanical and electrical supply of a dust and acid vapour scrubbing system.

Equipment Supplied
- Scrubbing vessels; v-SORB™ variable throat venturi & c-SORB™ packed tower
- Interconnecting ducting
- Recirculation pumps
- Valves and piping
- Fully skid mounted
- Installation of control instrumentation
- Wiring for power and control

Design specifications

Gas Flow rate	14,000 Am^3/h
NaCN inlet load	up to 250 kg/h
NaCN outlet load	30 mg/Nm^3
HCN inlet load	0.2 % w/w
HCN outlet load	10 mg/Nm^3

Case History

WA Water Treatment Plant

Scope:
Design, supply and commissioning of an odour control system comprising multiple stages at a Wastewater Treatment Plant in WA.

Equipment Supplied:
- Two Hypo-caustic c-SORB™ scrubbers
- Two Caustic c-SORB™ scrubbers
- Extraction ID (3) fans
- Recirculation pumps and piping
- Chemical storage tanks
- Instrumentation and dosing pumps
- Full installation
- Commissioning and training

Design specifications

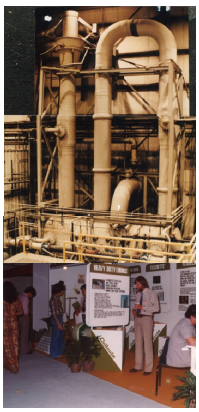
Ventilation rate	100,000 m^3/h
H_2S (equiv.) inlet load	up to 39 ppm
H_2S outlet conc.	< 0.05 ppm
Outlet odour conc.	< 1000 OU

TAPC has hundreds of successful reference sites, please contact us for details of other installations.

Product Description - c-SORB™ Gas Scrubber

Total Air Pollution Control

Air Pollution Control Experts since 1968

1960s	1970s	1980s	1990s	2000s	Today
					

History

In 1968 Ceilcote Tasmania was formed as a specialist producer of fibreglass packed bed scrubbers. Ceilcote became Transfield RPC in the 1980s and Horizon APC in the 1990s. In 1998 the Environmental Group (EGL) acquired Horizon APC to augment its existing air pollution control business that included activated carbon systems and flares. From 1998 until 2012, the business grew to become the largest in Australia at removing gaseous pollutants from industrial processes.

In 2001 TAPC was formed as the Australasian representative for BHA Group Inc (now GE Energy). TAPC quickly established itself as one of the region's leading industrial air pollution control companies in the field of particulate capture using electrostatic precipitators and fabric filters.

In 2007 the Environmental Group (EGL) acquired TAPC to add particulate capture technologies to its already substantial gaseous pollutant technologies. In 2012 it was decided to merge the two business units into one entity; Total Air Pollution Control (TAPC). In so doing, Australia's largest and most comprehensive air pollution control company was formed. No matter what the pollutant, TAPC has the technology, experience and capability to capture it.

EGL is listed on the Australian stock exchange under the code "EGL". TAPC is a wholly owned subsidiary of EGL. EGL The Environmental Group Limited

Australia's Leading Air Pollution Control Company.

Gas Scrubbing

Fabric Filters

Electrostatic Precipitators

Total Air Pollution Control Pty. Ltd.

ABN 79 097 531 416

Total Air Pollution Control Pty Ltd

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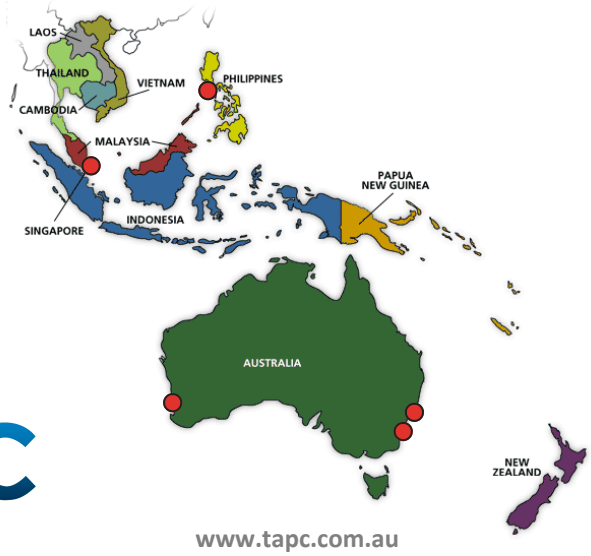

Certified System Quality ISO 9001 SAI GLOBAL

Certified System Environment ISO 14001 SAI GLOBAL

Certified System Health & Safety AS 4801 SAI GLOBAL

TAPC

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