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Q-PAC[®]

U.S. Patent #5,458,817

Wet Scrubbers / Packed Towers Optimized Packing Design

Patented in 1996, **Q-PAC[®]** is specifically designed to optimize the performance of wet scrubbers.

Q-PAC[®] offers superior efficiency as measured by HTU (height of transfer unit) in wet scrubbers. Mass transfer of example species such as SO₂ and other acid gases, H₂S, alcohols, NH₃ and amines is therefore improved and optimized when a scrubber is designed using **Q-PAC[®]**.

Additionally, the very low pressure drop of **Q-PAC[®]** vs. traditional packings means that new scrubber towers can be designed at higher gas velocities compared to what has been standard industry practice for the past several decades. This represents a major advance in design of wet scrubbing towers used for air and odor pollution control. Improved efficiency, which equals improved air quality, can now be achieved in smaller scrubber towers – which are far less capital intensive compared to what was standard industry practice as recently as 1995.

Advantages

Smaller Diameter Towers

Lower Capital Expenses

Smaller System Footprint

Lower Pressure Drop

Smaller, Less Expensive Fan

Reduced Power Costs

Reduced Capacity Recirculation Pump

Reduced Cost

Additional Savings

Smaller Mist Eliminator

Reduced Costs

Additional Savings

Less Total Packing Volume per Tower

Additional Capital Expense Reduction

Q-PAC Costs Less per ft³ (or per m³)

Project Savings Compound

Fouling and Plugging Resistant

All Rounded Elements – Self Cleaning Design

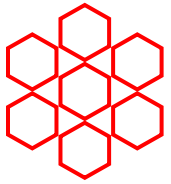
Retrofits Increase Capacity

Avoid Capital Intense Rebuilds

Lower Operational Costs

These benefits are demonstrated in the design example on the following page!

Project savings of 33 to 50% are common!



Sample Project – Odor Control at Municipal Waste Water Treatment Plant

Air Flow	=	50,000 cfm	(~85,000 m ³ /hr)
Odor Source	=	H₂S	
Inlet Concentration	=	50 ppm_v	
Scrubbing Liquor	=	caustic and sodium hypochlorite	
Required Efficiency	=	99.5%	

Tower Design

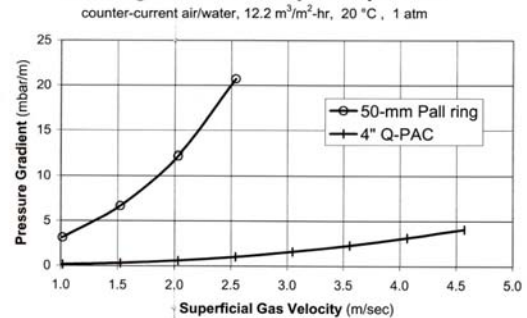
	Q-PAC[®]	50 mm Pall Rings	
	ONE TOWER	TWO TOWERS	
Diameter	=	10 ft (3000 mm)	12 ft (4300 mm)
Packed Depth	=	8 ft (2440 mm)	10 ft (3660 mm)
Gas Velocity	=	637 fpm (3.9 m/s)	221 fpm (1.1 m/s)
Liquid Flow	=	390 gpm (89 m³/hr)	565 gpm (128 m³/hr)
Liquid Flux	=	5 gpm/ft²	5 gpm/ft² (12.2 m³/m²-hr)
Pressure Drop	=	1.6 in WC (4 mbar)	4.9 in WC (12 mbar)
Sump pH	=	9.5	9.5
ORP	~	+600 mV	+600 mV

Q-PAC[®] Physical Properties

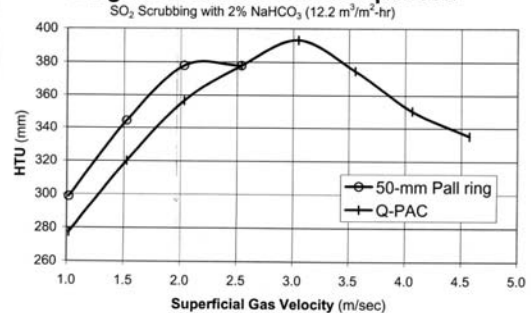
Nominal Dimensions	3.5" (90 mm) wide 3.0" (76 mm) high
Void Fraction (%)	96.1
Weight	
Polypropylene	2.1 lb/ft ³ (33.6 kg/m ³)
PVDF	4.1 lb/ft ³ (65.7 kg/m ³)
Effective Surface Area	90 ft ² /ft ³ (295 m ² /m ³)
Number of Pieces	33 per ft ³ (1165 per m ³)
Packing Factor	7/ft (23/m)
Number of Drip Points	11,000 per ft ³ (388,000 per m ³)

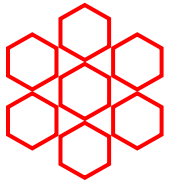
Real Examples!
See Q-PAC[®] Case Studies!
Next Page!

Packing Pressure Drop Comparison



Height of Transfer Unit Comparison





Q-PAC[®] Case Studies

*Type the url into your Internet browser window to download the full article.
Alternately – please visit www.lantecp.com and click on the Case Histories.*

www.lantecp.com/casestudy/casestudy27.html

2K Tellerettes fouled every 3 to 4 months. Since repack with *Q-PAC[®]* in April, 1998, this scrubber system has operated with no fouling and no pressure drop increase. Annual power cost to operate the scrubber was reduced \$8300 per year

www.lantecp.com/casestudy/cs31.pdf

3.5” Tri-Packs fouled frequently in an odor control scrubber at a rendering plant forcing the plant into an air permit violation condition. Since repack with *Q-PAC[®]* in March, 1999 the scrubber has operated continuously with no pressure drop increase and no loss in air handling capacity, allowing the plant to operate within all permit requirements. Additionally, scrubber air handling capacity increased 34%.

www.lantecp.com/casestudy/cs35.pdf

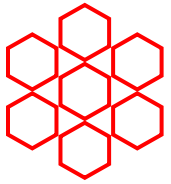
A chlorine dioxide scrubber at a large pulp mill was retrofitted from 2” (50 mm) saddles to *Q-PAC[®]* in PVDF resin. When the saddles were new pressure drop in this scrubber was 30” WC (75 mbar) and historically this rose to 36” WC (90 mbar) every two years due to fouling. Then a load of new saddles, at a cost of \$250,000+, would be installed into the tower. Since the retrofit to *Q-PAC[®]* in October 2001 there has been no pressure drop increase in the scrubber, so the 2003 repack did not take place. Additionally, the scrubber is operating at 4” WC (10 mbar) pressure drop, which represents a power savings of \$80,000+ per year. ClO₂ stack emissions also became less than detectable with *Q-PAC[®]*.

www.lantecp.com/casestudy/cs37.pdf

An aluminum foundry repacked two triethylamine scrubbers with *Q-PAC[®]* in July 2003. With no loss in scrubbing efficiency, lower pressure drop resulted in a yearly estimated power savings of \$40,000. Results were so impressive, the plant repacked two additional scrubbers with *Q-PAC[®]* in July 2004, with identical results.

www.lantecp.com/casestudy/cs46.pdf

A new odor control dual train, two stage odor control system was designed and built near Perth, Western Australia. By utilizing *Q-PAC[®]*, towers of 1500 mm (~ 5 ft) diameters were very practical for the system. Had a traditional tower packing been used, tower diameters of 2000 mm (~ 6 ft) would have been required.



Two stage, dual train odor control scrubbing system using *Q-PAC*[®]

1st Stage Caustic Only with pH = 11.5

2nd Stage Caustic / Bleach with pH = 9, ORP ~ +600 mv

Air Flow = 45,000 cfm (76,460 m³/hr)

Tower Diameters = 12 ft (3658 mm)

Packed Depth = 10 ft (3050 mm)

Liquid Flux = 4.5 gpm/ft² (10.6 m³/hr/m²)

Inlet H₂S Concentration ~ 50 ppm_v

Outlet H₂S Concentration = 0.01 ppm_v

Scrubbing Efficiency = 99.98%

Pressure Drop Per Tower < 1 in WC (2.5 mbar)

**Photo and Data provided courtesy of Peter Navin, Head Operator
York River WWTP, Hampton Roads Sanitation District**