



Ground Remediation Systems Limited

## Water Treatment

Soil and Groundwater Remediation

Water Treatment

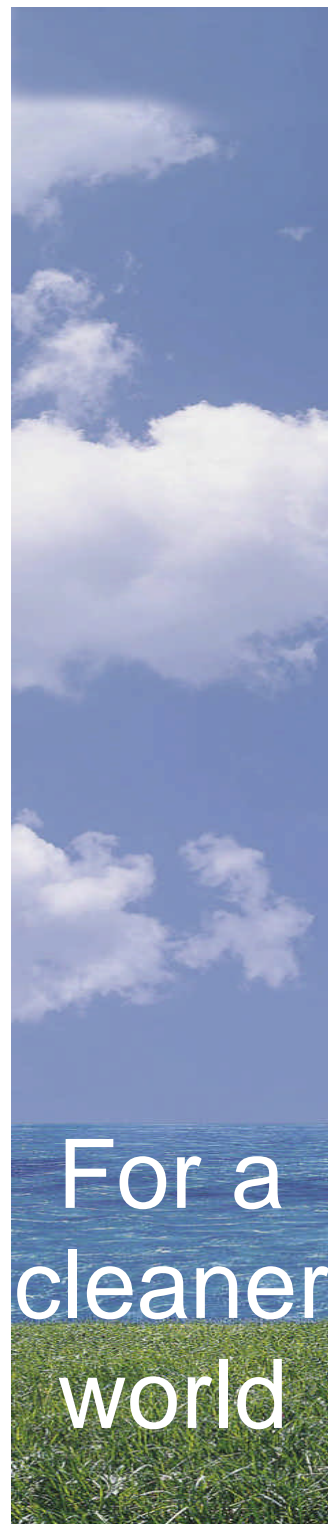
Vapour Treatment

Design & Supply

Installation & Commissioning

Operation and Control

Project Management





## Aqueous Phase Activated Carbon & Ion Exchange



GRS probably has the largest range of aqueous phase activated carbon treatment vessels within the United Kingdom.

Where the carbon in a competitors vessel may have to be changed once or several times during a project, the GRS range enables the purchaser to evaluate the most cost effective and efficient vessel for the project.

Selection of the appropriate sized carbon treatment vessel is typically based on four parameters:

1) Physical capacity to handle a given flow rate. It is not good practice to operate at a flow rate near the maximum

hydraulic capacity of a vessel for more than a few days;

2) The contact time required for efficient adsorption of a given contaminant and/or inlet concentration. Phenols for example (common on old gaswork sites) require a minimum 20 mins residence time.

3) The duration of the project

4) The mass of contaminant anticipated to be adsorbed during the project. If you know the anticipated mass of contaminant will lead to a requirement for 5 or 10 tonnes of carbon, why hire 1 tonne vessels which require frequent changing? even if the flow rate is low.

Furthermore, the faster the flow rate passing through a given vessel, the deeper the concentration gradient within the carbon bed. As this advances through the bed (as the carbon above becomes exhausted) the tail will reach the outlet faster, potentially leading to concentrations above the consent and the need to change carbon, even though the carbon still has adsorption capacity. As such, a lower flow rate with a shallower concentration gradient is more efficient. the potential wastage of carbon is also a key reason why a second vessel in series with the first is a good idea as it allows the operator to use the first vessel to the maxi-

mum without risk of a breach of the discharge consent.

All GRS vessels are available for rental for as little as 1 week up to 3 years or more.

The GRS Range of Vessels:

HY1 (95Kg drum/<math>1\text{m}^3/\text{hr}</math>)

SAK400 (200 Kg/<math>2\text{m}^3/\text{hr}</math>)

SAK600 (300 Kg/<math>4\text{m}^3/\text{hr}</math>)

SAK1000 (500kg/<math>4\text{m}^3/\text{hr}</math>)

BI 25 (1 tonne/<math>10\text{m}^3/\text{hr}</math>)

BI 50 (2 tonnes/<math>20\text{m}^3/\text{hr}</math>)

BI 120 (5 tonnes/<math>40\text{m}^3/\text{hr}</math>)

BI 250 (10 tonnes/<math>100\text{m}^3/\text{hr}</math>)

BI 500 (20 tonne/<math>200\text{m}^3/\text{hr}</math>)

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## Air Strippers & Vacuum Strippers



### Air Strippers

Air strippers are a cost effective method of volatilising volatile organic compounds from the liquid phase into the vapour phase. In many cases, such as for benzene or some chlorinated hydrocarbons such as 1,1,1-TCA, stripping efficiencies in excess of 99% can be achieved.

We design, build and supply air strippers for sale or rental for periods of as little as 1 month and up to 3 years or more. Flow capacities range from **5m<sup>3</sup>/hr to 200 m<sup>3</sup>/hr**. Rental systems can typically be supplied "Off the shelf" or custom designed for a variety of applications in steel, stainless steel, PE or PP.

Systems can be supplied "stand alone" but are typically fully equipped with discharge pumps, level control systems and blowers and, frequently, mounted as part of a complete water treatment system within an insulated & heated shipping container;

The systems shown above are all examples of integrated remediation systems comprising vacuum or pumping systems and associated aqueous and vapour phase treatment. The off-gas from an air stripper can be treated with vapour phase granular activated carbon (GAC) or with a catalytic oxidiser (see separate brochure sheet). Although the use of GAC for treatment of the off-gas

might seem strange (why not use aqueous phase GAC instead?) vapour phase GAC is considerably more efficient than aqueous phase GAC. Also, some contaminants such as vinyl chloride cannot be adsorbed readily by aqueous phase GAC but can be air stripped and then adsorbed to vapour phase GAC.

When using GAC to treat the off-gas from an air stripper it is important to reduce the relative humidity of the air such as by using a process gas heater.

**Vacuum Strippers**  
Vacuum strippers are designed to facilitate the air stripping of less volatile contaminants from the liquid

phase. Mass transfer of volatile compounds from the liquid to the vapour phase is significantly increased under conditions of lower absolute pressures. An applied vacuum to the air stripper column therefore enhances the stripability of compounds which are not readily stripped under normal conditions.

Advantages include the requirement for only 1/5th of the air flow required for a normal stripper and the high concentration of the discharge vapours. Vacuum strippers work well with catalytic converters. Vacuum stripping is especially suitable for vinyl chloride contamination.

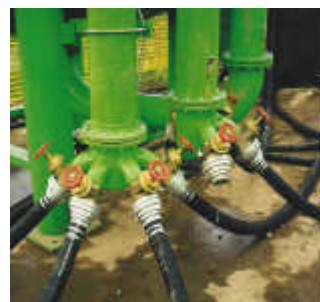
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## Settlement/Filters/Oil-Water Separation/Ion Exchange



For construction sites, the solids component of a water stream is usually the most problematic.

GRS has a huge range of rental plant available for the settlement and filtration of solids including tanks and sand filters of various sizes.

The standard GRS settling tank is a combination vessel designed specifically for construction/land redevelopment projects. The tanks have a 10 or 20m<sup>3</sup> capacity and can be configured to operate both as a settling tank and simple oil/water separator vessel. Where appropriate, coalescent units can be fitted to enhance the oil/water separation efficiency.

The GRS sand filters are all steel vessels rated to a minimum 6 Bar pressure. Vessels are available for rental in the following sizes:

- GS 400 (15 m<sup>3</sup>/hr)
- GS 600 (20 m<sup>3</sup>/hr)
- GS 1000 (20 m<sup>3</sup>/hr)
- GS 1750 (35 m<sup>3</sup>/hr)
- GS 3000 (50 m<sup>3</sup>/hr)

In addition to the sand filters, we also have a range of filters for finer solids fitted with polypropylene particulate filters and another range of vessels equipped with disposable fine micron filter bags.

A typical water treatment plant for a construction site may comprise:

- Settling/separation tanks
- Sand filtration
- Activated carbon vessels
- Clean water backwash tank
- Dirty water backwash tank
- Duty & standby pump set
- Pressure backwash pump

Failure to provide effective backwash facilities including clean & dirty tanks can hamper site operations and increase labour requirements.

In addition to basic water treatment plant, we offer:

**Flocculation**  
Site specific schemes including automatic coagulant dosing and mixing systems

**Dissolved Air Flotation Systems**

pH Control

Air Strippers

Oleophilic Filtration

Ion Exchangers

GRS has a range of ion exchange systems for the treatment of heavy metals & nitrates and for water softening with a variety of cationic and anionic resins. Systems available stand alone or as part of a modular treatment package. Some vessels may be available "off-the-shelf".

Telemetry

Where required full remote monitoring and autodialing systems are available.

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