

UK Water Treatment Engineers Specialising in Design, Manufacture, Project Management,
Servicing and Commissioning of Water Purification Systems Worldwide



Sand and Carbon Filters

Water Softeners

Dealkalisers

Demineralisers

Reverse Osmosis

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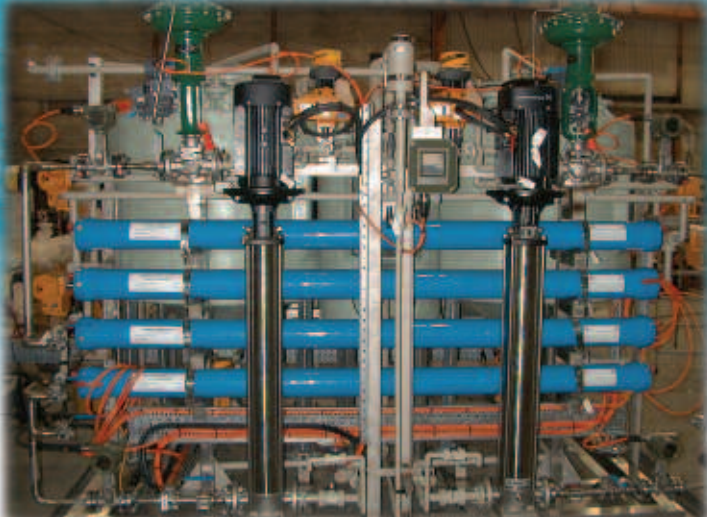
Introduction

Since inception in 1974 the company's expertise has placed AWE Ltd as a leader in the UK and worldwide in the field of water purification and water purification systems, including water softeners, demineralisation, reverse osmosis and dealkalisation plants.

AWE's experience in water purification systems over the past 30 years extends to all types and sizes of water treatment plant from domestic water softeners to the supply and

installation of large demineralisation plants to all industries from power stations through to the brewing and beverage industries.

AWE is an ISO 9001:2000 registered company and all of its water purification systems are of the highest quality and designed to exacting standards, including pressure vessels manufactured to PD 5500 and control panels to the latest IEE regulations.



The Technology-in-Progress Approach

With an in-depth knowledge of all aspects of water treatment, we place great emphasis on the supply of reliable, efficient equipment, professionally designed to suit each specific application.

AWE's flexible design strategies allow a client to standardise equipment throughout the works without losing the cost advantage of a standard plant.

Designs are constantly being revised to incorporate the ever increasing range of new materials and products available to our engineers.

This 'technology-in-progress' approach enables our clients to keep one step ahead of the competition. When required, we also provide installation and commissioning of our equipment and arrange after sales service contracts.

Project Management and Control

AWE carry out complete projects including all the necessary civil, mechanical and electrical work required for a 'turnkey' contract. We will advise clients at the scheme conception stage of a project and then carry a project through the design and planning stages, into fabrication in our local workshops. We can then arrange transport, site erection, installation and commissioning. AWE can also provide after sales services contracts on request.

Spares and Services



AWE Limited offer comprehensive service and maintenance contracts for all types of water purification equipment.

Additional services offered by AWE Ltd include the following:



- **Filter sand media removal, disposal and replacement**
- **Carbon media removal, disposal and replacement**
- **Ion Exchange media removal, disposal and replacement**
- **Automation of existing manual plant**
- **Repair / replacement of pressure vessels and storage tanks**
- **Modifications to pipework**
- **Valve repair and replacement service**
- **Pump repair and replacement service**
- **Eductor / ejector repair and replacement service**
- **Supply, install and commission bulk acid and caustic chemical tanks**



AWE has contracts for clients who are based across the length and breadth of the United Kingdom utilising the skills of our strategically placed water treatment engineers.

Coagulation

Coagulation/Settling Vessels are used for a wide variety of applications which require the addition of chemicals to the water being treated to form precipitates and settle suspended solids in the raw water. Such applications include the addition of lime to raw water in the cold lime softening process, which also reduces the alkalinity of the raw water; and the addition of lime or other alkalis to effluents to effect precipitation of insoluble hydroxides.

The raw water is chemically dosed and, over time, the suspended solids precipitate out and settle at the bottom of the coagulator whilst the clean water is collected at the top of the vessel.

Coagulation is the primary step in treating poor quality surface water before other forms of treatment such as ion exchange, reverse osmosis or even filtration can be used. It is also used extensively in the soft drinks industry where alkalinity reduction is required. AWE coagulators are specifically designed for each application taking into account raw water quality and equipment requirements.



Ion Exchange Equipment



Ion Exchange forms the basis of several types of treatment which although utilising very similar equipment, by the use of different resins and chemicals, produces very different quality waters.

The heart of any ion exchange plant is the resin, which is specially selected by AWE to give the required capacity and quality of treated water. AWE only use the best quality resins to ensure optimum and long lasting performance.

Because of the wide choice of resins now available, AWE have designed and supplied ion exchange equipment to carry out functions not covered by the information documented in this literature.

Applications such as organic scavengers or traps for removing organics or colour from water; nitrate removal using special nitrate specific resins are becoming more common as water supplies deteriorate and industrial standards increase.

Sand Filters



Moderately turbid waters can be clarified in the simplest way by being passed through a medium such as a bed of graded sand. The degree of filtration depends on the grain size of the sand used in the filter and this in turn is a function of the filtration rate used in the filter vessel. The gradual build-up of the suspended solids in the filter raises the backpressure and when the resulting pressure drop from the filter inlet to the filter outlet reaches a predetermined level, the filter has to be cleaned by backwashing.

products



Backwashing is carried out by reversing the flow through the bed, thus lifting and expanding the filter bed. The grains of sand collide with each other and, in doing so, free the accumulated suspended solids which are swept away to drain with the backwash water. Sometimes air is injected prior to backwash water to break up the bed. This reduces the flow rate of backwash water required to effectively clean the filter bed.

Selection of sand filter sizes can only be performed after careful examination of the water analysis, flow rates and required purity of filtered water.

Iron Removal Filters



These filters contain a special iron removal media. The media catalyses the oxidation of the iron in the water which is then filtered out on the media. Backwashing of the filter removes the iron and rejuvenates the media. Iron removal filters are used sometimes to protect ion exchange and reverse osmosis equipment, and sometimes separately, where the unpalatable taste and staining characteristics of iron is causing a problem.

Carbon Filters



These are similar in design to sand filters, but use a bed of activated carbon as filtration media. The activated carbon has the property of being able to remove chlorine, odour, colour and organic matter from water. They are often used ahead of demineralisation and reverse osmosis equipment in order to pretreat the water.



Softeners

Base Exchange softeners utilise cation resin to change scale-forming calcium and magnesium ion (total hardness) into non scale-forming (soft) sodium ions. When the resin is exhausted it must be regenerated with a common salt solution.

Softeners are the most common type of ion exchange equipment and find numerous applications in the UK, where the majority of the water is hard.

Applications:

- **Basic boiler water treatment**
- **Laundries**
- **Bottle and dish washing machines**
- **General hot water duties where scale formation could give rise to problems**

AWE have various ranges of softeners. The 'packaged plant' range covers the domestic up to the small industrial size. These can handle hardness levels up to 600 mg/l and flow rates up to 50m³/hr. The vessels are manufactured from GRP and regeneration is fully automatic via a multiport valve. The industrial range handles all flow rates in excess of 50m³/hr and utilises carbon steel pressure vessels, industrial valves and microprocessor controlled regeneration. Automatic regeneration is normally initiated by time clock or water meter. Where necessary, AWE can supply a range of sizes of bulk salt saturator tanks. These are fabricated in GRP, are suitable for indoor or outdoor use and take salt deliveries directly from road tankers.

Dealkalisers



Dealkalisers use weak cation resin to convert the bicarbonates (alkalinity) in the water to carbonic acid. To remove the carbonic acid, the water is passed through a degasser tower. When exhausted, the resin is regenerated using acid.

The total dissolved solids (TDS) content of the water is reduced by an amount equivalent to the alkalinity present in the raw water and therefore a partially demineralised water is produced. This is very useful as the capital and operating costs of the treatment are very low.



Typical applications are for pretreatment of boiler feed water where lowering of the feed water TDS enables the boiler blowdown to be reduced. Also, dealkalisation by ion exchange is finding widespread acceptance and use in the soft drinks and brewing industry. Both of these industries require low alkalinity water for certain products and dealkalisation by ion exchange is a clean, easily automated, low cost process with many advantages over the more traditional cold lime treatment or direct acid injection methods.

AWE have two ranges of dealkalisers similar to the range of base exchange softeners. The small 'packaged plant' range utilises special vinyl ester pressure vessels and all plastic multiport valves. The large industrial range features specially lined mild steel pressure vessels, individually lined valves and pipework and microprocessor control. Automatic regeneration is normally initiated by a pH controller.



Demineralisers

Demineralisers use both cation and anion resin to remove dissolved solids in the water. The cation resin must be regenerated using acid and the anion resin using caustic or brine.

A wide range of demineralisers is available including our D series, which has two ion exchange columns containing separate beds of cation and anion exchange resins, M series single column mixed bed demineralisers, in which the cation and anion resins are mixed, and variations of these types.



In cases where flow rates and daily consumption figures are high, selection of the type of demineralisation equipment best suited to the application being considered is arrived at by carefully examining several variations of demineralisation systems and several types of resin. Pretreatment of the water to be demineralised is often necessary in cases where the raw water contains appreciable quantities of suspended solids and organic matter. The pretreatment normally consists of a coagulation vessel followed by a sand and carbon filter or, in some cases, a carbon filter on its own suffices. Automatic and manual equipment is available.

Typical applications:

- **Electronics industry** - Certain specialised industrial processes in the electronics industry and related fields require water with minimum specific resistance of 18megohm/cm. This extremely high level of water quality is often referred to as 'electronic water' or 'ultra pure water' and represents a total dissolved solids content in the range of 0.01 to 0.05 parts per million.
- **Pharmaceutical & Cosmetic Production**
- **Chemical Manufacture**
- **Mirror Silvering - final rinse water**
- **Distilleries - deproofing of spirits**
- **High Pressure Boiler Feed Water**

AWE design and supply complete treatment systems to consistently deliver this very high level of water quality to work stations.

Reverse Osmosis



Reverse Osmosis is now an accepted and field tested process for the removal of both ionisable and non-ionisable impurities from water and other liquids, utilising hollow fibre or spiral wound modules. Units can be custom designed to suit all raw water conditions and capacities.



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As Reverse Osmosis is a departure from conventional water treatment processes, it has many unique advantages:

- **Capable of reducing ionisable solids content in the raw water to below 5%**
- **Capable of eliminating particulate matter larger than the 0.45 micron size**
- **Removes 99% of organic matter, bacteria and spores**
- **Does not employ mineral acids and alkalis, thus alleviating effluent disposal problems**
- **Low operating and maintenance costs**
- **Operates on water with a solids content beyond the economic level of ion exchange**

The complete plant generally includes the following components;

- **Pre-treatment to reduce the fouling tendencies of raw water**
- **Adjustment of the Langelier Index either by base exchange softening or acidification**
- **Reverse Osmosis Unit, designed to suit raw water conditions, capacity and quality specified**
- **Storage of treated water to meet flow demand to service**
- **Post treatment deionisers, if necessary, to polish treated water**



Control Systems

With the increasing levels of automation required by industry, AWE have continuously upgraded the type of control equipment which is used on automatic systems. Microprocessor controlled equipment is now available for the whole range of equipment, from the domestic softener to the large demineralisation plant. On the large custom designed plants, AWE work closely with the client, utilising the client's choice of microprocessor.

This enables clients to standardise on microprocessors throughout their factory and ensures ease of maintenance and training. AWE have designed and built control panels using all of the leading brands of PLC. All control panels are built to IP55 standards using the highest quality components. Each panel is individually designed and tested so that client selected components, features and alarms can be readily incorporated.



Chemical Dosing



Chemical dosing is used in conjunction with several types of equipment. It is used with coagulation vessels to create a 'floc' by dosing caustic soda. Chemical dosing can also be used separately e.g. hypochlorite dosing to sterilise water supplies. AWE have a range of chemical dosing sets using variable stroke diaphragm dosing pumps of PVC or stainless steel construction. These are mounted on top of a polyethylene tank and are complete with all necessary injection fittings and chemical hose. The dosing sets are available in single or 3 phase and can be supplied with a number of options e.g. manual or electric mixer; manual or automatic pump flushing and low level chemical alarm.

Some of Our Clients



- Air Products
- Alcoa (UK) Ltd.
- Allied Breweries
- Alpha Steel
- Anglian Water
- Arjo Wiggins
- Atomic Weapons Establishment
- Avecia
- Bass Brewery
- BPB Davidson
- British Airways
- British Petroleum
- British Steel Corporation
- Britvic Soft Drinks
- Budweiser brewery
- Coca - Cola
- Cognis Performance Chemicals
- Columbian Chemical
- Coors Brewers
- Costain
- Dalkia Limited
- Devonport Management Ltd.
- Dow Corning
- Enron
- Ford Motor Company
- Fife Power
- GE Industrial
- Georgia-Pacific
- Guinness Brewery
- H.P. Bulmer
- Hoover Limited
- Jaguar
- Kodak
- Kings Lynn Power Station
- L.G. Philips Displays
- Matthew Clark
- Nippon Electric Glass
- Penn Pharmaceutical
- Pepsi
- Pilkington Glass
- Proctor & Gamble
- Powergen
- Rechem International
- Rockwool Ltd.
- Rolls Royce Power Engineering
- Royal Mint
- Schweppes Beverages
- Shell Petroleum
- Sony
- St Regis Paper
- Sutton Bridge Power Station
- Tarmac Topblock
- Tetra Pak
- Thames Water
- United Distillers
- Vauxhall Motors
- Welsh Water





AWE Head offices and manufacturing facilities are close to excellent national and international transportation facilities including air, sea, motorway and rail links.

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