About Biwater:

Biwater provides water and wastewater treatment solutions for clients across the World. Since its inception in 1968, Biwater has gained recognition for innovative approaches aimed at overcoming the World's most pressing water-related challenges. Throughout its history, the company has grown to meet the demands of many water-stressed countries and their burgeoning populations. It has a successful record of accomplishment, having completed over 25,000 projects in over 90 countries – financing, consulting, process engineering, designing, constructing, operating, maintaining and owning water and wastewater facilities – in both rural and urban environments.

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Bipak 3D Model

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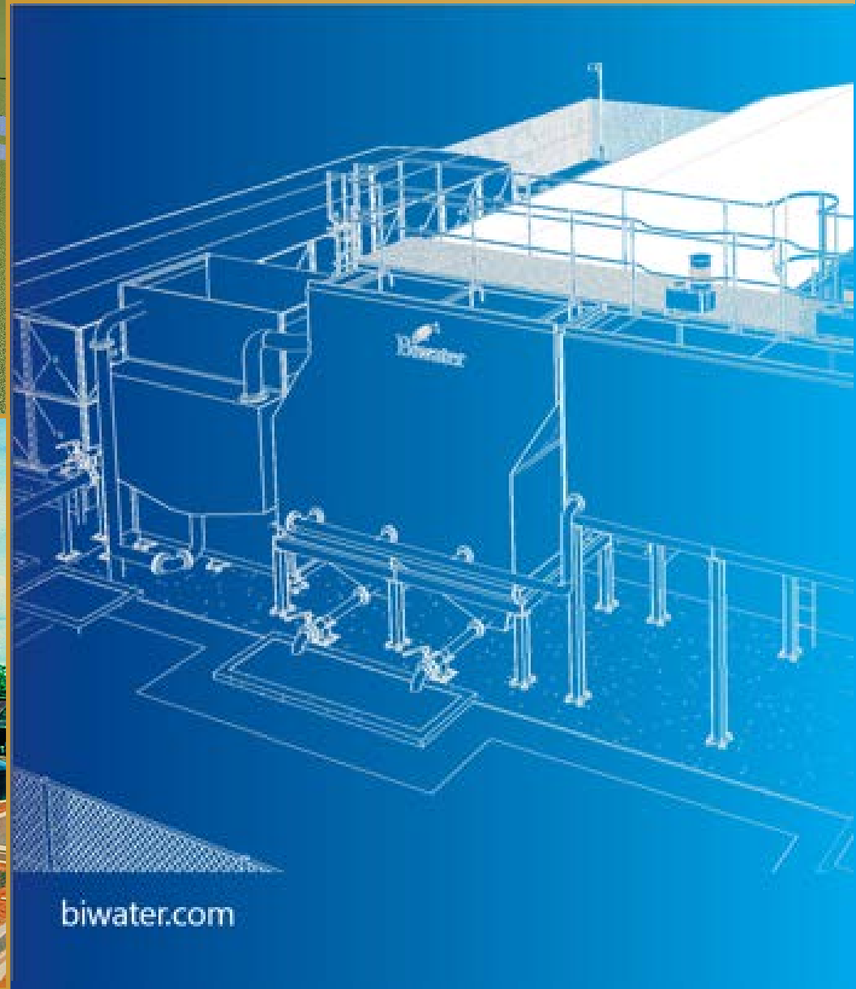
Biwater

Bipak

Biwater Modular Water Treatment Plant



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Bipak – Biwater Modular Water Treatment Plant

Introduction:

Biwater Modular Water Treatment Plants (Bipak) have been developed to provide an economical, simple and reliable method of treatment for drinking water. The water treatment is based on conventional settling and filtration processes.

The design is standardised on a range of prefabricated and factory built units to enable fast installation on site.

There are six standard model sizes catering for a population equivalent range of 3,600 to 72,000. Populations for larger communities are catered for with a combination of standard models or the Biclear standard range.

Bipak has been successfully installed in a number of countries and has evolved over the years to todays advanced modular treatment system.

Specific benefits:

- Total water treatment solution
- Meets World Health Organisation drinking water standards
- Designed and built to British / EU / AWWA Standards
- Compact footprint ideal for small to medium sized communities
- Rapid installation with prefabricated factory built and tested modules

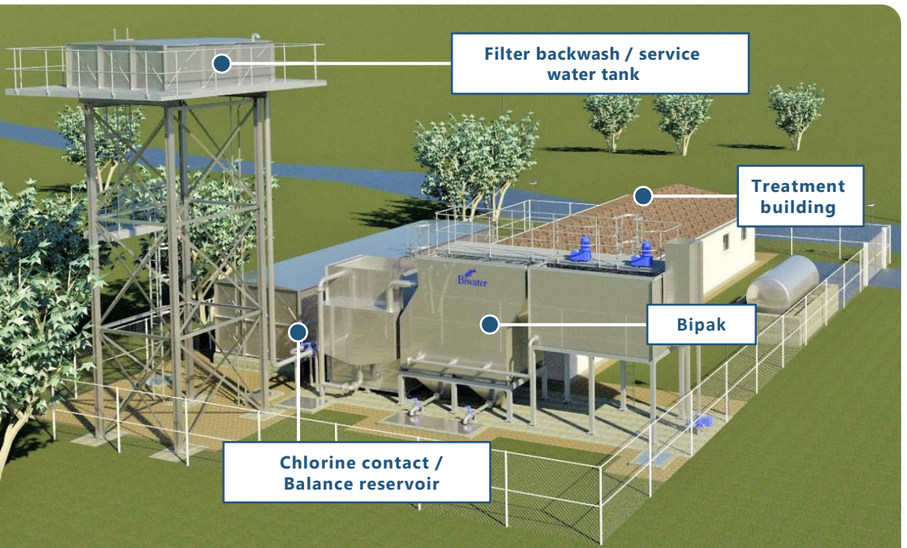
General features:

- Modular approach allows flexibility to achieve client specific requirements
- Reliable and simple operation with minimum maintenance requirements
- Proven, simple and reliable process elements

Bipak ***

Model range	Model number	Treated water flow	Population equivalent**	Raw water	Installed power requirement*	Power consumption	Balance tank storage (onsite)	Nominal site area
		m^3/hour	up to	NTU	kW	kWh/m^3	m^3	m^2
1	Bipak15	15	3,600	120	5.2	0.08	15	500
2	Bipak30	30	7,200	120	8.8	0.06	30	600
3	Bipak50	50	12,000	120	12.3	0.06	50	700
4	Bipak75	75	18,000	120	17.0	0.05	75	1,000
5	Bipak150	150	36,000	120	22.6	0.05	150	1,200
6	Bipak300	300	72,000	120	35.4	0.04	300	1,800

* Sizing requirement of the incoming power system
** Based on 100 litres per head treated water flow and 24 hour run-time
*** Based on core Bipak system



Process description:

The core Bipak system comprise four modular sections:

- Raw water pumping system
- Treatment system
- Chemical system
- Disinfection system

1. Raw water pumping system

A pump station is constructed to receive raw water. A fixed bar coarse screen is installed at the inlet to the pumping station. The raw water is lifted to the inlet of the elevated aerator by duty/standby submersible pumps, operating automatically by level control.

2. Treatment system

The treatment system module comprises four main interconnecting process sections, namely aeration, flocculation, lamella clarification and rapid gravity filtration.

Raw water enters the top of a **single drop cascade aerator**. Aeration removals odour and carbon dioxide and encourages the oxidation of soluble ferrous and manganese, while also facilitating nitrification and other biological processes. At the nape of the aerator, via a notched weir, Aluminium sulphate is dosed into the raw water for coagulation. Pre hypochlorite is dosed if required, in the aerator outlet pipe to control growth of slime and algae in the process units. Optional pH correction would be dosed via the aerator inlet pipe.

The aerated water passes through a two stage **flocculation tank**, separated by a submerged weir. Each flocculation stage is equipped with a variable speed mechanical flocculator, whose speed can be adjusted to accommodate seasonal changes in raw water quality. Flocculated water is ducted to the lamella clarifier.

Water enters into the **lamella clarifier** through a number of inlet orifices set in the side walls, and passes up through inclined lamella tube modules to the suspended clarifier outlet troughs. Clarified water is drawn into the outlet troughs over V-notch weirs before flowing into the rapid gravity filter.

As the water passes through the lamella tubes the flocculated particles settle into the lower face of the tubes where their accumulated mass causes the sludge to slide down the tubes and into the sludge hoppers. These are designed with sloping sides to aid the concentration of the sludge at the base of the hopper. Each hopper is equipped with a manually operated desludging valve. The sludge is drawn out by the hydrostatic level in the tank and discharges by gravity to appropriate disposal.

Rapid Gravity Filtration is a physical process for separating the small amount of flocculated particles that may be carried over from the lamella clarifier. The filter is configured as a down flow, open, rapid gravity type operating at a constant rate and level. The filter will be charged with a single layer of silica sand supported by a layer of gravel. The underdrain system comprises nozzles set in the floor.

Filter washing is performed using a simultaneous air and wash water regime, in order to minimise backwash water use. Final treated water will be used for backwashing the filter and will be delivered directly to the filter by gravity from a filter backwash / service water elevated storage tank. Air scour is provided by a roots type air blower.

3. Chemical system

A stand-alone coagulant system, designed for either powder or liquid as per local availability, provides preparation, storage and dosing of the necessary coagulant to the aerator. The dosing pumps have variable speed control to allow for dosing to be adjusted to accommodate seasonal changes in raw water quality.

4. Disinfection system

Filtered water will flow from the rapid gravity filter into the chlorine contact balance tank. Hypochlorite solution (post disinfection) will be dosed into the filtered water outlet pipe. A retention time of 30 minutes is provided within the chlorine contact tank. The treated water weirs over into the balance reservoir where optional pH correction chemical can be added in order to suit the requirements of the distribution system.

Optional modules

There are various optional modules which can be included in the core Bipak system in order to tailor the treatment plant to specific requirements.

Process components	Optional modules		
	Chemical system	Distribution system	General system
pH Correction dosing (alkaline or acid)	▲		
Treated water pumps		▲	
Anti-surge protection		X	
Elevated distribution reservoir (12 hours storage)		▲	
Distribution Kiosks		X	
Earth Sludge Settlement Pond			▲
Prefab. admin building			X
Prefab. operations building			▲
Laboratory equipment			▲
Lifting equipment			▲
Standby power generation & fuel tank			X
Supervisory Control & Data Acquisition			X

Recommended optional modules ▲
Other optional modules X

Bipak Typical Flow Schematic