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AFFORDABLE WATER SUPPLY AND SANITATION



## Package effluent treatment plant

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THE NEED FOR newer technologies combined with savings in energy and investment has grown wider in recent times. The paucity of land availability for ETP, the growing demand for stringent pollution control, the need to reuse the wastewater and other factors, has forced technology to go for package plants for treating domestic and industrial wastewater. Package plants are an ideal choice for colonies, housing complex, hospitals, farm houses etc.

### Need for package plants

Hospitals etc., have fewer sewerage lines and seldom have effluent treatment facilities. Package plants are designed to be modular and compact, thereby occupying less area and can be installed in the groundfloor of a multistoreyed buildings or in an aesthetic location. Higher reduction of biological matters can be achieved with a smaller area and it makes package effluent treatment plants a necessity.

### Description

The package effluent treatment plant consists of two chambers with one acting as attached growth biological treatment section and the other as settling section. The biological section is fitted with PVC fixed packing having a specific surface area of around 100 sq.m/cu.m and a voidage of 95%. The settling tank is fitted with parallel plate/tubesettler separators, inclined at 60° and having a specific surface area of 8-11 sq.m/cu.m. The effluent is pumped to the bottom of the media and flows upwards. The biologically treated effluent overflows from the top to the adjoining settling tank, where the suspended matters, the dead biological matters etc are separated, to give a clear effluent suitable for discharge to irrigation, gardening, cooling tower makeup, toilets etc. This package plant is preceded by bar screen and grit chamber to remove all the floating matters and grit. This plant is equipped with wheels for easy mobility, and can be used to treat effluents having a BOD (biological oxygen demand) less than 1000 mg/l to have a reduction of 90% and above. The sludge from the settling tank is drained once a while for drying and disposal.

The most modern package plants utilise biofilters and settling tanks or clarifiers. These can be ideally used where there is a scarcity of area like small scale industries, hospitals, hotels.

### Techno-commercial

Tables 1 and 2 show the techno-commercial details of the package effluent treatment plant. It can be seen that the cost of reused water increases with decrease in inflow. A balance has to be struck to obtain the ideal selection of the treatment plant.

### Advantages

1. It can be used for higher BOD reduction (>90%) from an inlet level of 1000 mg/l.
2. It can be used for all types of biological treatment.
3. It can be used for nitrification with less modification.
4. It can be used for on-site water treatment with minor modifications.
5. It can be tailor made or made to size in a very short span of time.
6. It can handle batch flow.
7. It is mobile in nature.
8. The media is inert to most chemical and biological attacks.
9. Power requirement is less and low maintenance cost.

### Disadvantages

1. Startup of the treatment plant will vary from 3 to 15 days and may be a problem if package plants are in mobile in operation.
2. Inconsistent flow may lead to solids accumulation and foul smelling in the biological section of the treatment plant.
3. Cleaning may be required frequently.

### Conclusion

Package effluent treatment plants can be implemented at a very nominal cost and for better utilisation of the effluent.

**Table 1**

Flowrate litres/d	A mm	B mm	C mm	D mm	Cost of the plant INR	Cost/litre INR
25,000	900	450	900	900	14,000	0.56
50,000	1150	450	1150	900	20,500	0.41
75,000	1500	600	1500	1200	34,500	0.45
100,000	1750	600	1750	1200	45,800	0.48

Note: 1. Cost of the treatment plant excludes primary treatment, pump and land.  
2. INR = Indian Rupees (Currency)

**Table 2**

Flowrate litres/d	Media vol	Overall size LXBXH	Pump rating	Cost of the plant INR	Cost/litre INR
15,000	8	2.5 x 2.5 x 3.0	0.50	43,600	2.90
37,500	20	3.0 x 3.0 x 3.5	0.50	74,500	2.00
75,000	35	4.0 x 4.0 x 4.5	0.75	116,500	1.55
112,500	50	4.0 x 5.0 x 5.0	0.75	151,500	1.35

Note: 1. Media volume is in cubic metres.  
2. All dimension in metres.  
3. 31 INR = 1US\$.  
4. Cost of the plant excludes cost to the land, primary treatment.