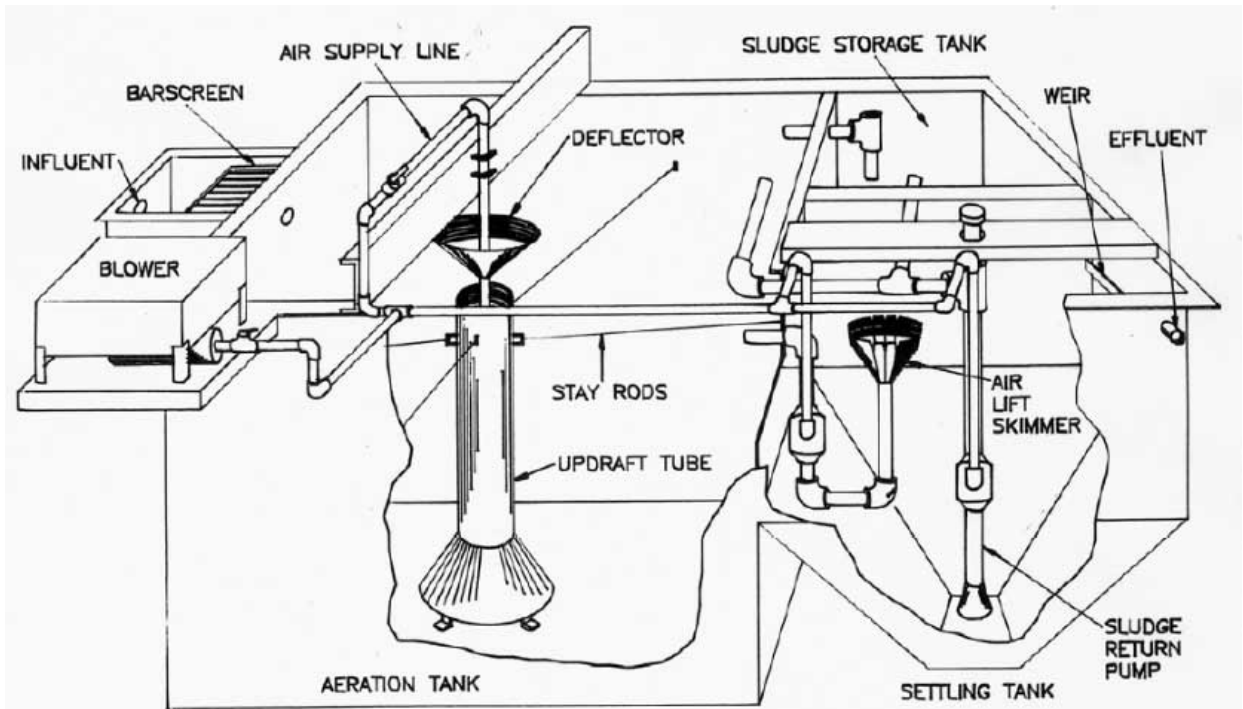


## ENVO-PACK (PACKAGED WWTP)

SMALL SEWAGE TREATMENT PLANT SIMPLICITY FOR MOTELS, SCHOOLS, SHOPPING CENTERS, INSTITUTIONS, SUBDIVISIONS  
EXTENDED AERATION (AEROBIC DIGESTION) PLANTS



**Aeration Tank** - This unique Surface Aerator consists of three components - an updraft tube, distributing manifold, and deflector. The updraft tube is supported by vertical legs and is further supported by tank walls through adjustable guy rod, and turnbuckles. The distributing manifold is located near the lower part of the updraft tube. The blower that supplies the air to the distributing manifold also provides the necessary air for the sludge and skimming air lifts. The adjustable deflector, centered above the updraft tube, insures maximum aeration by directing the surface pattern of high-efficiency turbulence.

**Final Tank** - Three units contribute to the efficiency of the final tank and greatly reduce the possibility of operating difficulties characteristic of many extended aeration plants. The center well minimizes scum formation and facilitates separation of the solids from the liquid. A 3 inch sludge return air lift provides positive sludge return to the aeration tank. The manually controlled skimmer is operated only when required to remove floating solids from the surface of the tank.

## SURFACE AERATION - SIMPLEST MOST POSITIVE AERATION EQUIPMENT

In recent years there have been several modifications of the activated sludge process offered to the field. The one most readily accepted has been termed "Extended Aerator" or "Aerobic Digestion", which involves continuous aeration over a 24 hour period. The prominent operating characteristics which have contributed to its ready acceptance include:

- capable of dealing with peak and shock loadings
- equipment investment considerably below that for normal complete treatment
- highly technical operational supervision generally not required.

Plants utilizing this process fill the need for an efficient, low cost treatment plant particularly adapted to the needs of schools, subdivisions, motels, hospitals, trailer courts, industry and other small installations. They provide odor-free and trouble-free operation and produce an effluent acceptable to state and local health authorities.

Originally, extended Aeration Plants were intended to fill the gap between primary and complete treatment and were classified as "intermediate treatment", but operating results have shown consistent removals in the 80—90% range. The effluent is clear, odorless and has minimal pollution effect on the receiving stream.

Classic simplicity, essential for small plant effectiveness, sums up just about everything concerning this Extended Aeration Plant.... simplicity in equipment design, in installation, in operation, in maintenance.

Flow through the plant is as illustrated on the front cover of this brochure. Note that primary clarifier and sludge digestion tank are not required in this system. The plant elements consist of a raw sewage screen, aeration tank and aerator, final settling tank with sludge return pump, skimming and overflow weir.

## DESIGN BASIS

The design of an Extended Aeration sewage treatment plant follows the some principle utilized in other aerobic digestion plants. The hydraulic and organic phases are distinct and must be considered separately even though they form a combined consideration in the overall plant design. To select the proper size plant, determine the sewage flow and its strength or BOD. The table above serves as a guide in establishing the hydraulic and organic loading.

For normal domestic sewage (strength of 200 mg/l), the aeration tank provides a 24 hour detention period, based on the average daily flow; and the final tank a 4 hour detention period on the same basis. Sludge return to the aeration tank is continuous and varies according to actual operation requirements (a capacity up to 500% of the average daily flow is provided).

Oxygenation requirements are based upon the ultimate BDO (which is 1 1/2 time, the 5 day BDO). Approximately 2.0 mg/l dissolved oxygen is maintained in the aeration tank. The aerator has ample oxygenation capacity determined by oxygen transfer test in de-aerated tap water and the application of usual factors for relative transfer and oxygen deficiency in sewage.

### Suggested Average Daily Flow and B.O.D. Contributions

Various local health authorities may have standards of their own and it is suggested that the authority involved be consulted before using this table.

Classification	Remarks	Daily Sewage Flow per Person*	Daily B.O.D. per Person*
Municipality	Residential	100 gal.	0.17 lb.
Subdivision	Residential	100 gal.	0.17 lb.
Trailer Park	2.5 Persons per Trailer	50 gal.	0.17 lb.
School	Elementary	10 gal.	0.02 lb.
School	High	15 gal.	0.03 lb.
School	Residential	100 gal.	0.17 lb.
Factory or Office Building	No Showers	20 gal.	0.04 lb.
Factory	With Showers	25 gal.	0.05 lb.
Motel	With Toilet and Bath	50 gal.	0.12 lb.
Hospitals	Per Bed	200 gal.	0.30 lb.
Drive-In Theater	Per Car Space	5 gal.	0.01 lb.
Restaurant	Per Meal Served	5 gal.	0.01 lb.

\* Per person unless otherwise noted under "Remarks". For other applications or industrial waste, refer to the factory for suggestions.

## EASY TO SPECIFY.....

General: The contractor shall furnish and install one (1) activated sludge treatment plant of the extended aeration type, complete and ready for operation in accordance with the plans and specifications. The plant shall be capable of treating \_\_\_\_\_ gallons per day of domestic sewage of \_\_\_\_\_ mg/l, 5-day BOD from composite samples of average daily flow.

Screening: There shall be furnished, for installation in the influent channel, one (1) inclined bar screen for manual cleaning. The bar screen shall consist of 1/4" x 1" steel bar, spaced on 1" center, and shall be placed so as to screen all raw wastes entering the treatment plant.

Aeration: There shall be furnished one (1) Surface Aerator (per drawing) for installation in the (concrete) (steel) tank shown on the plans. The aerator shall be of the vertical updraft type and shall provide sufficient pumping capacity to maintain adequate mixing.

The aerator shall consist of an updraft tube, air distribution manifold, deflector and all necessary appurtenances.

The updraft tube shall be 1/4" steel, supported by legs resting on the tank floor. The tube shall be anchored to the tank walls with adjustable guy rods and turnbuckles.

The deflector shall be of 1/4" steel and shall be centered above the updraft tube at an elevation in accordance with the manufacturer's instructions. It shall be supported at the prescribed elevation to insure maximum surface aeration.

The distribution manifold shall be anchored to a channel support spanning the aeration tank and centered above the draft tube by means of a cast-iron base attached to the tank bottom. The manifold assembly shall be easily removable for servicing. Channel support shall be furnished by the equipment manufacturer.

Blower Assembly: There shall be furnished a (single) (duplex) blower assembly for the pumping action of the Surface Aerator, the air lift sludge pump and the air lift skimming device.

Each blower shall be of the positive displacement, rotary type, capable of providing \_\_\_\_\_ psi discharge pressure. Each blower shall be equipped with a base, V-belt drive, weighted type pressure relief valve, inlet filter, discharge silencer, and cover. Motor shall be \_\_\_\_\_ hp, 1750 rpm, open drip-proof motor, 40C, ambient, with class A insulation for \_\_\_\_\_ volt, \_\_\_\_\_ phase, \_\_\_\_\_ cycle current.

Duplex blower assembly shall be furnished with necessary pipe, valves and fittings to interconnect the blower assemblies to the point of common discharge. There shall also be furnished a pressure sensitive device to automatically cut—over the blower operation in the event of failure of one of the blowers.

Controls: There shall be furnished, with each blower assembly, necessary starting equipment suitable for operation on \_\_\_\_\_ volt, - \_\_\_\_\_ phase, \_\_\_\_\_ cycle current. Each starter shall be equipped with a full voltage overload relay and a (pushbutton) (2—position selector switch) (H-O-A selector switch) in a NEMA 1 enclosure.

Air Lift Sludge Return Pump: There shall be furnished one (1) 3" diameter air lift sludge return pump for continuous, return of settled solids. Pump shall be capable of returning sludge solid, at a rate at least twice the average raw flow. The air lift pump shall be complete with flare, air-bowl, 3/4" wrought steel air piping, 3" wrought steel sludge pipe and fittings as supplied by equipment manufacturer. Air lift sludge return pump shall be suspended from the center well support structure described above.

Air Lift Skimmer: There shall be furnished one (1) 3" diameter air lift skimming device consisting of an air-bowl, adjustable funnel with V-notch ports, 3" wrought steel scum pipe, 3/4" wrought steel air pipe and adjusting rods for wall mounting as supplied by equipment manufacturer.