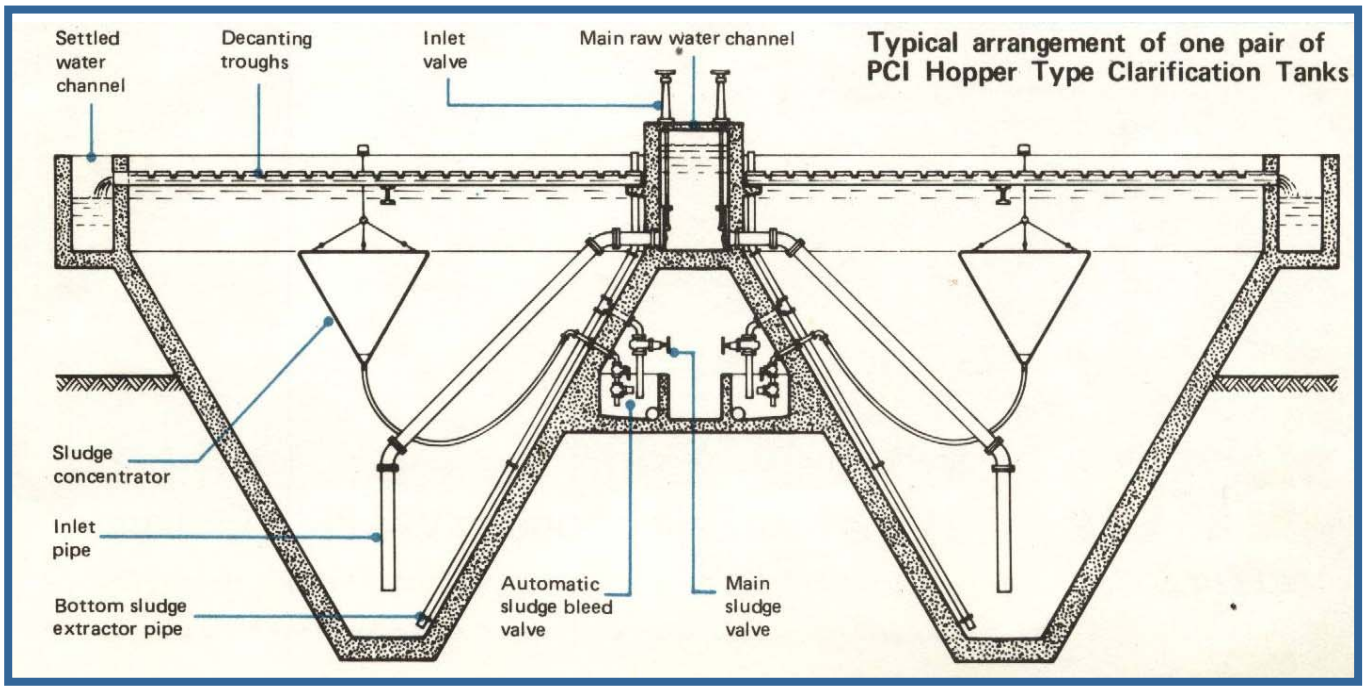
HOPPER TYPE CLARIFICATION TANKS

Vertical Flow Sludge Blanket Tanks

Flocculation is induced hydraulically and there is no mechanical gear, and so no maintenance costs. All the energy in the water is carefully employed-there are no losses due to mechanical inefficiencies.
The inverted cone or pyramid shape is ideal for the transition from the flocculating zone to the stable sludge suspended zone.
There is no break-up of floc as can occur when a separate flocculating compartment is used.
As the flocculating zone is in the base of the tank, no additional site area is occupied.
The flow from the sludge blanket zone to the surface decanting troughs is truly vertical and free from the disturbing influences associated with rotary flow or cross flow.
True vertical flow distribution damps out thermal effects, which can affect cross or mixed flow systems. With the favorable depth to area ratio there is no difficulty in re-starting after intermittent shutdowns. The sludge level is not critical and considerable variations are permissible.
De-sludging can be by automatic sludge bleed or by manual control or by a combination of both, as found most convenient and economical.
The operating head is low, normally only 300mm (12") between inlet and outlet,
The square plan shape means 20 per cent less site area than circular tanks
The multiple unit design provides on all but the smallest installations for one or more to be shut off without significant detriment to the effluent quality. The multiple unit design also minimizes construction costs by re-use of formwork.

Typical installation of PCI Hopper Type Clarification Tanks

PCI Vertical Flow Clarification Tanks have a worldwide reputation. There are several installations in operation.



HOPPER TYPE CLARIFICATION TANKS

The principal advantages of PCI vertical flow hopper type tank incorporating the "sludge blanket" system are as follows:

SHAPE

The tank is usually square in plan with the upper portion having vertical sides and the lower portion in the form of an inverted pyramid, with the sides at an angle of 60° to the horizontal. The size of the tank is governed by the upward velocity of the water, which in turn, is influenced by the character of the water. The retention period, as such, is immaterial.

FLOCCULATION

The incoming water id delivered near the bottom of the hopper portion by a vertical inlet pipe. The velocity of discharge, combined with the change in direction of flow, creates and maintains a condition of agitation ideal for initial flocculation, which then continues within the sludge blanket.

CONTROL OF FLOCCULATION

For waters whose characteristics are liable to exceptional changes, or when the flow is subject to unusually wide variations, the inlet pipe is fitted with the Candy Patent Variable Velocity Valve, which is adjustable from the top of the tank. Otherwise the inlet pipe has a fixed diameter outlet designed to give the required discharge velocity.

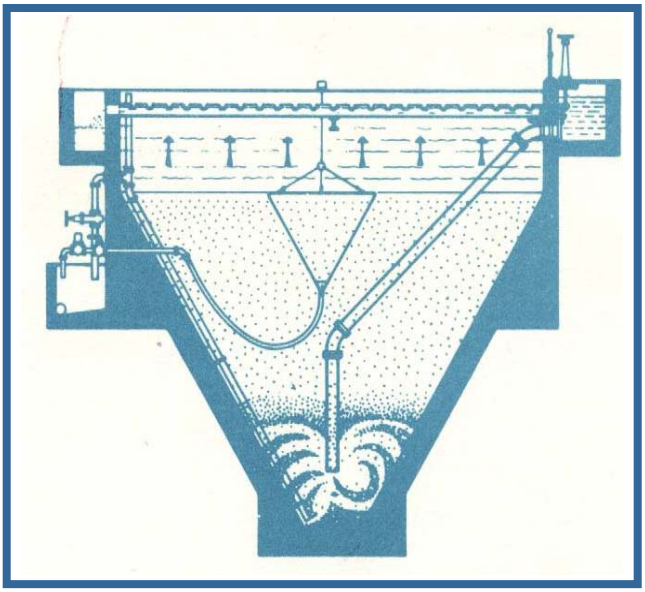
SLUDGE BLANKET

The water rises at a steadily decreasing velocity through suspended particles that are allowed to accumulate in the tank. This "sludge blanket" is composed of relatively large particles, which are capable of maintaining their position against the upward velocity of the water because they have been growing due to contact with smaller particles of coagulated matter moving upward with the water.
Sedimentation of these smaller particles may be said to take place on the surface of the larger stationery particles in the sludge blanket.
Particles that are too heavy to be carried in the sludge blanket fall to the bottom of the hopper from which they are discharged periodically.
The effect of increasing the flow through the tank is to expand the sludge blanket until equilibrium is restored. This causes the surface of the sludge blanket to rise but will not result in carry-over unless the increase in low is excessive.

SLUDGE DISCHARGE

To maintain mass balance within the tank, and therefore a stable sludge blanket, a controlled quantity of sludge must be removed. Before removal the sludge is concentrated either in fixed corner pockets or suspended cones.

Sludge is removed from the concentrators by continuous discharge or intermittently at an adjustable frequency or alternatively at a frequency controlled by the weight of sludge in the concentrators. This latter system automatically controls the desludging rate with changes in raw water quality and flow rate thus ensuring the minimum use of water for desludging in all circumstances. It can be used only for the suspended type cone concentrator.



Working principle of Vertical Flow Sludge Blanket System

COLLECTION OF SETTLED WATER

The water emerging from the sludge blanket passes up through the straight portion of the tank and is drawn off by a series of collecting troughs. These have notched sides and are provided with adjustable supports to enable them to be set accurately for perfectly uniform draw-off. This arrangement eliminates any possibility of short-circuiting.

CONSTRUCTION

The general design lends itself to straightforward reinforced concrete construction and the arrangement of footings and the height of the tank above ground will depend largely upon site conditions. When steel construction is adopted, the tank is made circular with a conical hopper and the arrangement of decanting troughs is modified to suit the shape.

PROGRESSIVE CHANGES IN DESIGN AND SPECIFICATION MAY BE MADE WITHOUT PRIOR ANNOUNCEMENT.

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