

## HORIZONTAL AIR SCOURED PRESSURE SAND FILTERS

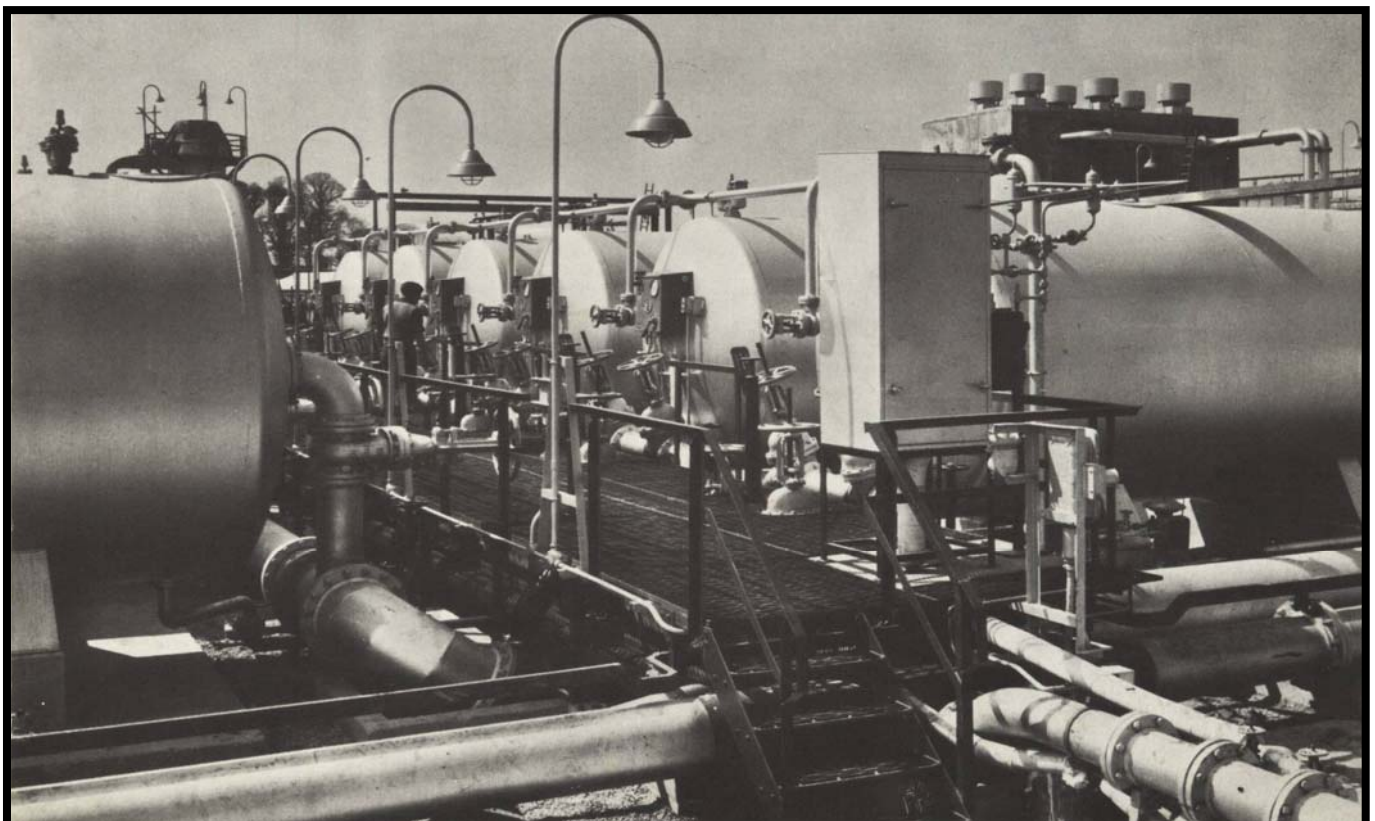
### GENERAL DESCRIPTION

In installations where a large number of vertical filters would otherwise be required considerable advantage is obtained by using horizontal filters. These are all 8' 0" (2.40 meters) in diameter, in lengths up to 30 feet; (9.15 meters) one unit of this size has the same filter area as four 8' 6" (2.58 meters) diameter vertical filters.

The steel filter shell conforms with the recognized specifications for plate thickness and method of construction. Each Shell is tested hydraulically and coated internally with anti-corrosive paint before despatch from Works.

Manhole access covers are provided, as well as faced pads for all inlet and outlet connections in the front domed end, and for the air release valves in the top of the filter cylinder.

The front dome end has connections, which serve for admitting unfiltered water air for air scour, and discharging used wash water from the compartment formed by a vertical weir plate. The outlet connection on the underside of the filter serves for the discharge of filtered water, the admission of upwash, and for draining out. An air release, automatic ball type or hand operated, is provided in the top of the filter. A pressure gauge is fitted on the front of the shell, connected through a four-way single lever valve to a point just above the filter media and to the outlet, to indicate the filtering head loss. A nozzle discharge is also provided for drawing samples of unfiltered and filtered water.



**TYPICAL INSTALLATION OF HORIZONTAL PRESSURE FILTERS**

## **FILTER FLOORS**

### **CONCRETE CONSTRUCTION**

The Filter floor consists of a set of parallel hard burned clay laterals running at right angles to the long axis of the filter and discharging into a central common channel. The laterals, which are embedded in concrete, have holes along their soffits. Nozzle plates are fitted to these holes and polypropylene dome headed nozzles with radial slots are screwed into the nozzle plates. These nozzles fit flush with the concrete floor with only the slotted domes projecting above the surface. The complete floor, (which is specially designed to provide for even distribution of filtering, upwash and air scour flow) is entirely non-corrodible. The air scour is distributed internally through an air header system supported above the concrete floor. Concrete filling for surrounding the laterals and for formation of the central channel is not supplied by PCI unless specifically requested.

### **STEEL CONSTRUCTION**

Alternatively, the filter media is supported on a steel plate welded in position, reinforced with heavy beams and fitted with polypropylene nozzles as before. In this case the filter floor is supplied welded into position. The air scour is distributed internally through a pipe suspended from the underside of the steel plate floor.

### **FILTER MEDIA**

The standard filter media usually has a total depth of 2' 6" (760 mm) and the grading of the sand and/or other material is selected according to the working conditions.

The filter media is cleaned by first admitting air below the media for about 5 minutes to scour the sand grains followed by an upward flow of filtered water for about 6-8 minutes to wash away the loosened impurities.

### **AIR SCOUR SUPPLY**

The compressed air for air scouring the filter is required at a pressure of 5 p.s.i. (0.35 bars) and at the rate of 1 ¼ cubic feet (0.47 litres/sec.) of free air per minute per square foot of filter bed.

It is usually provided by a motor driven rotary compressor designed to deliver the required flow at the correct pressure.

### **WASHWATER SUPPLY**

In a supply system where the water is pumped direct through the filters into a reservoir at a higher level, the washwater can often be drawn back from the reservoir provided there is a connection to the bottom. In this case the number of filters is immaterial as far as the washing is concerned, provided that the filtered water main is large enough for the reverse flow at the required rate.

This applies to gravitational as well as pumping systems provided that the hydraulic conditions are suitable and that the temporary reduction in the output of the plant can be tolerated.

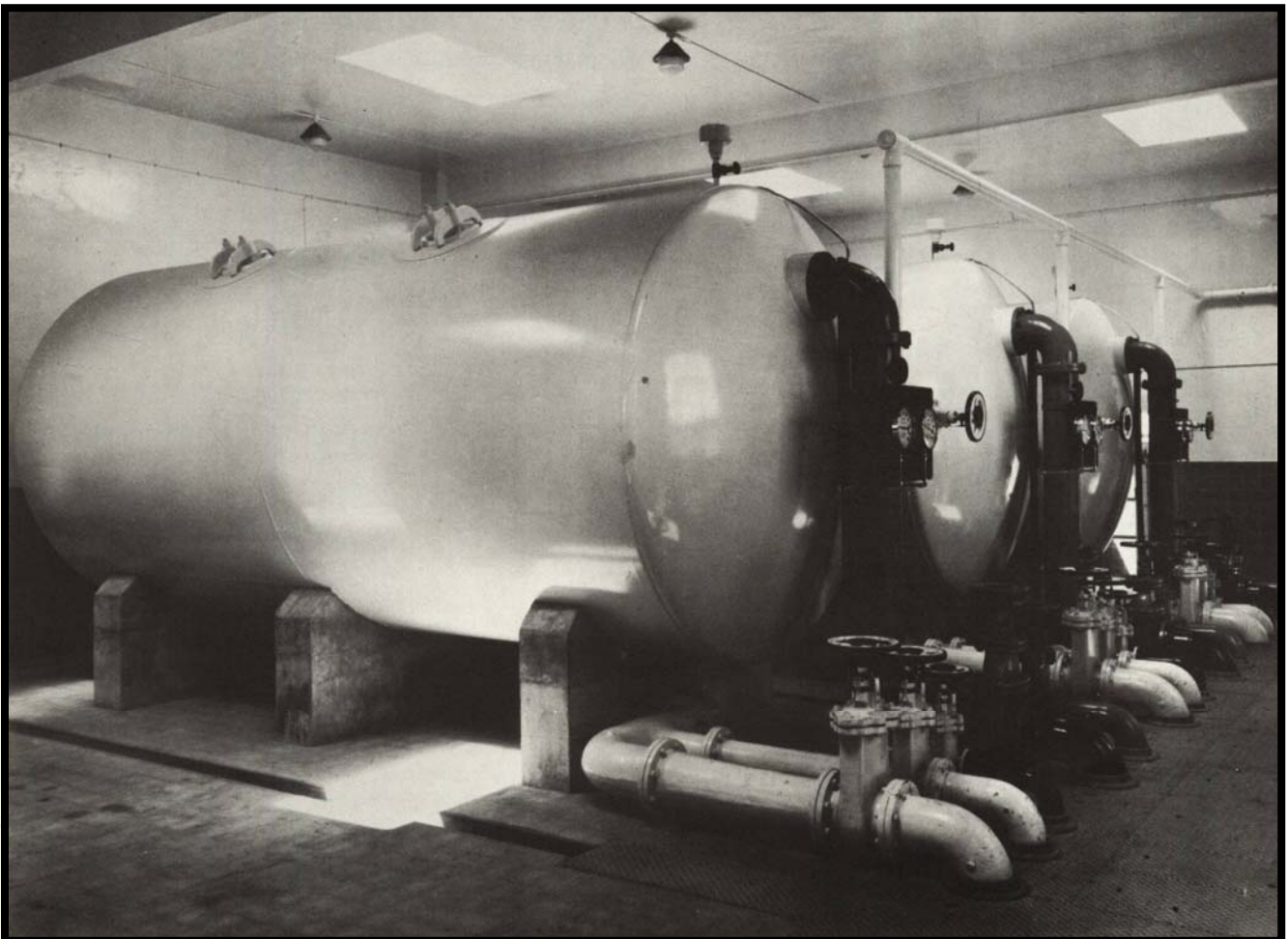
Where the washwater supply is to be independent of the system, a storage tank must be provided at a height to give a head of not less than 20 ft. (0.6 bars) at the filter outlet. This may be charged by a connection from the filtered water main or by pump. Alternatively, the tank may be a ground level and the water pumped from it. In either case a separate upwash main with branch to each filter is necessary.

## CHOICE OF SITE

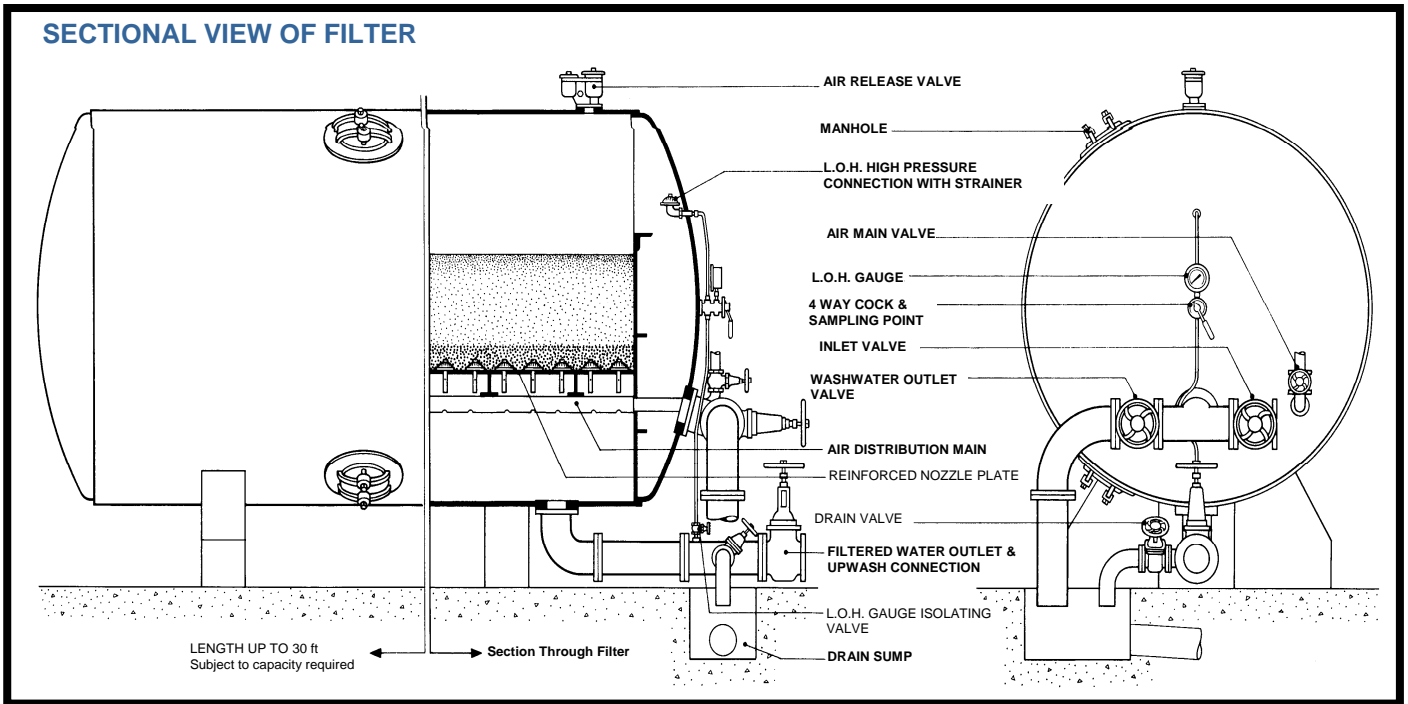
The main factors to be taken into consideration when selecting the site for a pressure filter installation are:

- 1** The pressure of the water at the site; the higher the pressure the greater the cost of the filters;
- 2** The conditions that will occur when filters are being washed and the arrangements for providing the washwater – as referred to previously;
- 3** The availability of sufficient head for filtration and friction in station pipework – usually 15 to 20 ft. (0.45 to 0.6 bars);
- 4** The control of flow through the plant;
- 5** The avoidance of the filters being subjected to a negative head.

## INSTALLATION OF HORIZONTAL PRESSURE FILTERS



### SECTIONAL VIEW OF FILTER



## FILTER SIZES AND CAPACITIES

Length on Straight		Size of Inlet/Washout		Size of Outlet/Upwash		Filter Capacity At 200 gph/sq.ft (2.72 mm/sec)		Air Scour flow		Washwater flow	
ft	m	ins	mm	ins	mm	gph	L/s	Ft3/min	L/s	Gall/min	L/s
10	3.05	6	150	6	150	16400	20.7	103	48.5	490-660	37-50
12	3.66	6 / 8	150/200	6	150	19400	24.6	122	57.5	580-780	44-59
14	4.27	6 / 8	150/200	6	150	22500	28.4	140	66.4	675-900	51-68
16	4.88	6 / 8	150/200	6	150	25500	32.2	160	75.4	765-1020	58-77
18	5.48	8	200	6	150	28600	36.1	179	84.4	860-1140	65-87
20	6.10	8	200	8	200	31600	39.9	198	93.4	950-1260	72-96
22	6.70	8 / 10	200/250	8	200	34600	43.8	217	102	1040-1390	79-105
24	7.34	8 / 10	200/250	8	200	37700	47.6	236	111	1130-1510	86-114
26	7.94	8 / 10	200/250	8	200	40700	51.4	255	120	1220-1630	93-123
28	8.55	8 / 10	200/250	8	200	43800	55.3	274	129	1319-1750	99-133
30	9.15	10	250	8	200	46800	59.1	293	138	1400-1870	106-142

\* 1 mm/sec. = 1 litre./square metre

Progressive changes in design and specifications may be made without prior announcement.