☎: General: 0471- 2312910, 2318153, 2318154, 2318155 Chairman: 2318150 Member Secretary: 2318151
E-mail: ms.kspcb@gov.in FAX: 0471 – 2318134, 2318152 web: www.keralapcb.nic.in

KERALA STATE POLLUTION CONTROL BOARD
കേരള സംസ്ഥാന മലിനീകരണ നിയന്ത്രണ ബോർഡ്
Pattom P.O., Thiruvananthapuram – 695 004
പട്ടം പി.ഒ., തിരുവനന്തപുരം - 695 004

PCB/T4/115/97 Date:07.11.2016

Design Criteria & Guidelines for STP for Flats and Commercial Establishments

The following design criteria and guidelines are evolved to provide a reference for processing the application and assessing the STP proposal.

Design Criteria

<table>
<tr><th>Sl. No.</th><th>Item</th><th colspan="3">Design Criteria</th></tr>
<tr><td>1</td><td>Water consumption for residential building</td><td colspan="3">For a population of 20,000-1,00,000 — 100-150litre/capita/day

For a population above1,00,000 — 150-200 litre/capita/day</td></tr>
<tr><td rowspan="19">2</td><td rowspan="19">Water consumption for other buildings*#</td><td>Sl. No.</td><td>Type of Building</td><td>Consumption (litre/day)</td></tr>
<tr><td rowspan="3">1</td><td colspan="2">Factories</td></tr>
<tr><td>i. Factories with Bathrooms</td><td>45 per head</td></tr>
<tr><td>ii. Factories without Bathrooms</td><td>30 per head</td></tr>
<tr><td rowspan="4">2</td><td colspan="2">Hospital (Including Laundry)</td></tr>
<tr><td>i. No. of beds not exceeding 100</td><td>340 per head</td></tr>
<tr><td>ii. No. of beds exceeding 100</td><td>450 per head</td></tr>
<tr><td>iii. Nurses' homes & Medical quarters</td><td>135 per head</td></tr>
<tr><td rowspan="3">3</td><td colspan="2">Hotels</td></tr>
<tr><td>i. Hotel (up to 4 star)</td><td>180 per head</td></tr>
<tr><td>ii. Hotel (5 star and above)</td><td>320 per head</td></tr>
<tr><td rowspan="3">4</td><td colspan="2">Schools</td></tr>
<tr><td>i. Day Schools</td><td>45 per head</td></tr>
<tr><td>ii. Boarding schools</td><td>135 per head</td></tr>
<tr><td>5</td><td>Hostels</td><td>135 per head</td></tr>
<tr><td>6</td><td>Offices</td><td>45 per head</td></tr>
<tr><td>7</td><td>Cinemas, Concert halls and Theaters</td><td>15 per seat</td></tr>
<tr><td colspan="4">In addition, water demand of visitors to these building is considered as 15 LPCD</td></tr>
</table>

		8	Railway/Bus Stations & Airports		
			Nature of station	Where bathing facilities are provided (litres/capita)	Where bathing facilities are not provided (litres/capita)
			Railway /Bus Stations		
			i. Intermediate stations (excluding mail and express stops)	45	25
			ii) Junction stations and intermediate stations where mail or express stoppage is provided.	70	45
			iii)Terminal stations	45	45
			Airports		
			International and domestic airports	70	70

Notes

1. The number of persons shall be determined by average number of passengers handled by the station daily: due consideration may be given to the staff and vendors likely to use facilities.
2. Consideration should be given for seasonal average peak requirements.

3	Oil and grease/Grit trap**	1. Shallow trap (to allow quick rise of oils and fats to the surface) 2. The length of trap should be approximately 2 times its depth 3. Residence time in the trap is optimally 5-20 minutes at peak flow. 4. Surface area of the trap in m^2 should be approximately 1.5 to 2 times the depth of trap in metre. Alternately, Accelerated gravity separators(ref. Metcalf and Eddy, Fig.5.30) for grit removal can be provided.
4	Septic tank	Septic tank shall be designed as per IS2470-PartI
5	Equalization tank**	1. Capacity to hold 4-6 hours of average hourly flow for residential buildings. 2. Air flow –1.2-1.5 times the volume of equalization tank per hour. Or 2.5-3m^3/m^2/hour of tank floor area (whichever is greater). 3. Tank is to be covered and vented to odour control biofilter. Suction for blower capacity is 10 times volume of tank per hour

		to be used in larger equalization tank. The size of biofilter is one sixth volume of equalization tank.
6	Secondary settling for extended aeration**	1. Surface overflow rate– 12-18$m^3/hr/m^2$ 2. Depth-2.5 to 3m 3. Detention period-2.5to3hours
7	Moving Bed Bio Reactor## (Kaldnes Process)	1. Retention time for aerobic: 2.5 to 4.5 hours 2. Retention time for anoixic: 1 to 1.2 hours 3. Area of biofilm: 200-250 m^2/m^3 4. BOD loading rate – 1-1.4$kg/m^2/day$
8	Raw sewage pump**	1. Capacity of the raw sewage lift pump is selected based on daily average rated capacity of the STP, on the premise that the pumps shall be operated for 20 Hours in a day. 2. Bypass line to equalization tank to limit pump rate to average sewage flow to be provided.
9	Aeration tank(Extended aeration)**	1. F/M – 0.1-0.12 2. MLSS – 3500-4500 3. Aeration time: 16 Hrs minimum (desirable: 18 hrs) 4. 50-60 m3/hr of air for every kg of BOD removed Diffusers : Flux rate 8 – 12 m^3/ Running meter /hr (for 90 OD diffuser)
10	Secondary clarifier**	1. Overflow rate : 12-18 m^3/m^2/Day throughout flow of sewage. 2. Depth- 2.5-3 m 3. Detention time : 2.5-3hours
11	Pressure sand filter**	Loading rate : Less than 12 $m^3/m^2/hr$
12	Chlorination **	Retention time-20-30 minutes Dose rate 3-5ppm chlorine
13	Activated carbon filter**	Loading rate : Less than 10 $m^3/m^2/hr$

*BIS 1172:1993; #National Building Code 2005 ** Kodavasal(2011);
##CPHEEO,2013: *** APA(2003)
*# BIS 1172: 1993 & National Building Code:2005

B. STP Proposal

STP design shall include the following:

1. ***Plan*** showing the location of project, STP, nearby residences and water bodies, and effluent discharge location. STP and outlet location shall be fixed with respect to two fixed points.

5. The STP shall be kept in a tidy state by ***good housekeeping***. This includes regular hosing down and scraping the walkways, white washing the walls, cleaning and painting metal works, maintaining adequate lighting and ventilation etc.
6. There shall be ***easy access*** to each and every effluent treatment unit and the recycling facility for inspection.
7. ***Access walkways*** of minimum 0.75m clear width shall be maintained within the STP for access to all areas requiring maintenance and operation. Walkways shall have safety rails. Staircases shall be provided where levels vary. No ladders and step irons shall be provided.
8. A ***general head room of 3m*** shall be maintained for enclosed or cellar STP with artificial ventilation.
9. Proper ***lighting arrangements*** shall be provided in the STP. Lights shall be located where they are accessible for maintenance and replacement.
10. For enclosed STP, ***minimum air volume of 14 cubic metre per cubic metre of room per hour*** shall be provided. Ventilation exhaust pipes shall be carried up to a height not less than 1m above the roof of the building at which the STP is located.
11. To ***minimize noise problem from STP***, the designer shall consider the use of silencers, sound barriers, anti-vibration mounting and blowers with motors of low rpm. Provision of an air blower is discouraged. Alternatively, the use of submersible ejectors shall be considered which would result in quieter operation. The intake and exhaust grills of the ventilation system shall also be designed t properly to reduce the whistling noise and shall not point towards nearby buildings.
12. Mechanical equipment which is critical to the functioning of the STP, shall be provided with ***standby units like pumps***.
13. ***Spare parts*** sufficient for two years operation as per manufacturer's recommendation shall be provided with the equipment supply.
14. Hours run meters shall be provided for all major equipments to record the total hours of operation. They shall be of resettlable type.
15. ***Time of day type meter*** shall be installed exclusively for the effluent treatment and reuse system and shall be maintained properly.
16. An ***automatic flow measuring device*** with non-resettable type totalizer shall be provided at suitable location for measuring the flow for STP serving a population more than 50
17. An ***easily accessible sampling point*** shall be provided for taking samples of the treated effluent.
18. ***Inbuilt facility*** shall be provided for reuse of treated effluent for flushing, gardening, vehicle and floor wash, cooling water make up etc. Water meter shall be provided for measuring the quantity of treated water recycled.