

STP SIZING GUIDE

(A simple, field-tested guide to estimating sewage treatment plant capacity)

1. Introduction

In Kerala, sewage treatment plant (STP) sizing is guided by Pollution Control Board (PCB) norms, supported by NBC standards and local authority practices.

However, in real projects, sizing often varies due to:

- Local PCB interpretations
- Project type and usage
- Approval-stage assumptions

This guide provides a **practical, Kerala-specific approach** to STP sizing—balancing compliance and real-world performance.

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2. Basic Formula

STP Capacity (KLD) = Population × Water Consumption × Sewage Factor

Where:

- **Population** = Number of users (as per PCB norms)
- **Water Consumption** = Litres per capita per day (lpcd)
- **Sewage Factor:**
 - **90%** → Within Corporation limits
 - **80%** → Outside Corporation limits

3. Standard Norms

3.1	Residential Apartments	Population : Population = Number of Bedrooms × 2 • 3 BHK → 6 persons • 4 BHK → 8 persons (as commonly insisted by PCB) Water Consumption: • 150 lpcd → Standard (135 as per NBC)
3.2	Hotels	Water Consumption: • Up to 3-star category → 180 lpcd • Above 3-star / luxury → Up to 320 lpcd Occupancy: • Typically 2 persons per room Staff: • Residential staff → 135 lpcd • Non-residential staff → 45–70 lpcd
3.3	Educational Institutions	Without Hostel: • Students → 45–70 lpcd • Staff → Similar range With Hostel: • Students (residential) → 100–135 lpcd • Staff → Based on residential / non-residential split
3.4	Hospitals	Water Consumption: • 400–600 litres per bed per day Notes: Higher values may apply for: • Dialysis units • Operation theatres • Laundry-intensive facilities
3.5	Auditoriums / Banquets	• 15–20 litres per person per event
<i>Ranges reflect variations in usage patterns and facilities; conservative values are typically adopted for regulatory compliance</i>		



4. Sample Calculation

Example: Apartment Project

- 30 units (3 BHK)

Step 1: Population

$$30 \times (3 \text{ bedrooms} \times 2) = \mathbf{180 \text{ persons}}$$

Step 2: Water Consumption

$$180 \times 135 = \mathbf{24,300 \text{ litres/day}}$$

Step 3: Sewage Generation (Corporation Limit)

$$24,300 \times 90\% = \mathbf{21,870 \text{ litres/day}}$$

Final STP Size:

22–25 KLD (including buffer)

5. PCB Practical Expectations

In real approvals, PCB may:

- Use higher population assumptions
- Prefer conservative design values
- Expect future load consideration

Practical Approach:

- Add **10–20% buffer capacity (insisted in some cases)**
- Align with local PCB expectations
- Avoid under-sizing

6. Practical Design Considerations

- **Peak vs Average Load:**
Design for peak usage, not just daily averages
 - **Mixed Waste Streams:**
Kitchen, laundry, and domestic flows impact treatment
 - **Technology Selection:**
(SBR / MBBR / MBR / Johkasou) depends on space, quality, and O&M
 - **Future Expansion:**
Allow for increase in usage over time
 - **Oil & Grease Management (Critical):**
For facilities with full kitchens:
 - A properly designed and functioning **O&G trap is essential**
- Without this:
- STP performance deteriorates
 - Biological systems are affected
 - Maintenance increases

7. Polishing & Reuse Requirements

Treatment does not end at the biological stage. Final polishing depends on reuse or discharge requirements.

Discharge to Soak Pit

Pressure Sand Filter (PSF)
Activated Carbon Filter (ACF) - not essential

Discharge to Drain / Gardening / Flushing

PCB norms typically require:

👉 **BOD < 3 mg/L**

To consistently achieve this:

PSF + ACF + **Ultrafiltration (UF)** is recommended

Key Insight:

Our biological treatment does achieve PCB recommended norms even for reuse, however for consistency a UF system is recommended.

10. Conclusion

Proper STP sizing ensures:

- Regulatory compliance
- Reliable performance
- Lower long-term issues

8. Common Mistakes

- Incorrect population assumptions
- Ignoring PCB interpretation
- Not accounting for staff
- No buffer capacity
- Ignoring reuse requirements

9. Practical Recommendations

- Design for compliance + usability
- Slightly oversize rather than undersize
- Align early with PCB
- Plan reuse from the beginning



Assure Earth

11. Important Note

This guide is based on prevailing practices and interactions with Kerala PCB.

👉 **Prepared on:** 15/04/26

PCB norms and interpretations may change over time.

👉 It is recommended to:

Verify with the local PCB office, or get in touch with us, anytime.
Align final design with latest guidelines

12. Need Help?

Need help sizing your STP?

Talk to us—we'll help you design the right system.

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