GPSD Funnel-Column Filter Model (FTV-SFC)

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1. Design Overview

The GPSD Funnel-Column Filter Model (FTV-SFC) is a hybrid passive filtration system designed for semi-industrial or urban water pre-treatment. It utilizes a wide conical reservoir to collect water and drive it through a compact, vertically packed ultrafine sand column for high-pressure filtration.

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2. Structural Layout

| Component | Spec Suggestion | |----------------------|-------------------------| | Funnel Diameter | 3–5 meters | | Column Diameter | 1 meter (inner core) | | Sand Column Height | 10 meters | | Drain Layer (Bottom) | 30–50 cm gravel | | Outlet | Central tube with pump or siphon

Total vertical height: 11–12 meters
Material suggestion: HDPE tank cone top + reinforced PVC or earth-packed column with concrete ring support

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3. Expected Filtration Performance

| Parameter | Estimate | |------------------------|-------------------------| | **Filtration Rate** | 0.8 – 1.5 liters/min/m²
| **Yield/day (1m² base)**| ~1,200 – 2,000 liters/day
| **Salinity Reduction** | Up to 30% (pre-treatment), depends on brine intensity
| **Suspended Solids** | >95% removal
| **Colloid / Particulate** | >90% reduction

Note: Efficiency improves with microbial biofilm maturity in lower column layers

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4. Maintenance Requirements

Task	Frequency		---	---
Top funnel sediment skim	Weekly
Check for channeling	Monthly
Remove top 10cm sand	Quarterly or as flow drops
Full sand replacement	Every 18–36 months

Maintenance can be done manually or with vacuum-extraction of sand tops. Column should be flushed during full replacement.

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5. Construction Estimates (Standard Unit)

Item	Cost Range (€)
HDPE or Steel Funnel	€250–€600
Sand (ultrafine, 10m³)	€300–€600
PVC Column (1m x 10m)	€200–€400
Gravel + Bedding	€50–€100
Basic Pump (manual/electric)	€100–€200
Labor & Excavation	€400–€800 (varies)
Total	**~€1,300 – €2,700**

Costs vary by region, labor, and sourcing of sand material.

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6. Construction Time Estimate

Phase	Time Estimate
Funnel Forming & Setup	1 day
Column Excavation/Assembly	2–3 days
Sand & Layering	1–2 days
Plumbing & Pump Setup	1 day
Test & Calibration	0.5 day
Total Duration	**~5–7 days**

Can be shortened with mechanical help or prefab materials.

Conclusion

The GPSD Funnel-Column system is a viable semi-industrial or rural urban-edge solution for pre-purifying seawater, brackish water, or runoff. It offers pressure-enhanced passive filtration with manageable construction, moderate cost, and scalable output. Suitable for integration with secondary UV, chlorination, or RO systems.