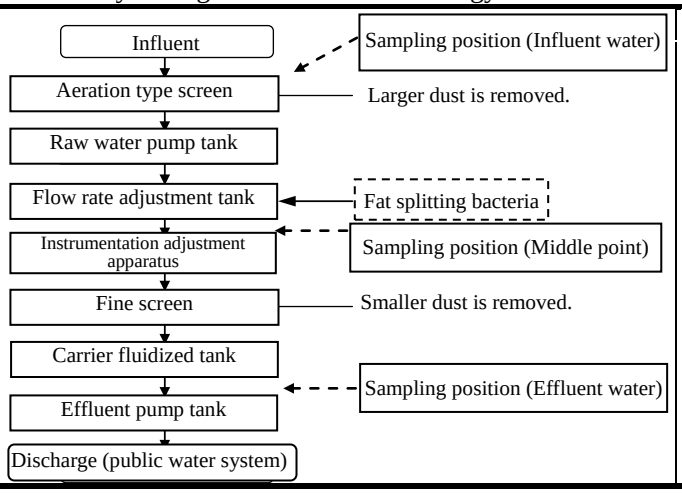
○ Overview

Target verification technology/Environmental technology developer	Carrier fluidized chamber type restaurant wastewater treatment apparatus/Fuji Clean Co., Ltd.
Verification organization (executing the test)	Center for Environmental Science in Saitama (Saitama-ken Environmental Analysis & Research Association)International
Verification test period	September 30, 2004 through March 2, 2005
Objective of this technology	(1) Treatment of organic wastewater containing much oil content by the carrier fluidized tank method (2) Synergy of fat splitting bacteria and microbial adhesion carrier

1. Summary of target verification technology

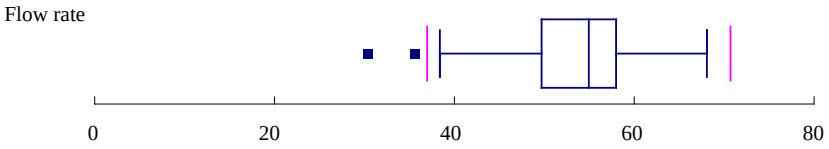


Principle

With the fat splitting bacteria fed into the flow rate adjustment tank and the high-concentration n-hexane-extracted substance and bacteria adhesion carrier suitable for removal of organic substances (BOD) deposited to fill the carrier fluidized tank, n-hexane-extracted substances and organic substances (BOD) are efficiently removed from kitchen wastewater.

2. Summary of the verification test

○ Summary of the verification-test site

Type of business establishment	Multiple restaurant complex (in a shopping mall)
Scale of business establishment	Total floor area: 4,678 m² Number of seats: 420
Location of site	UNICUS Minamifuruya, 3-1 Izumi-cho, Kawagoe City, Saitama Prefecture
Amount of wastewater during the verification-test period (m³/day)	

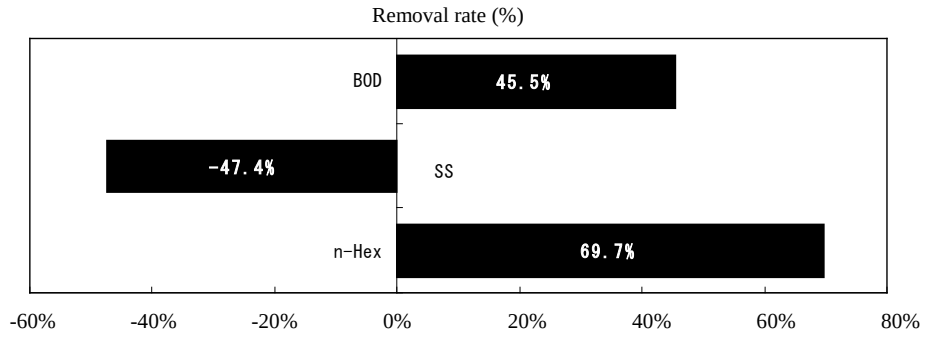
○ Specifications and processing capacity of the target verification apparatus

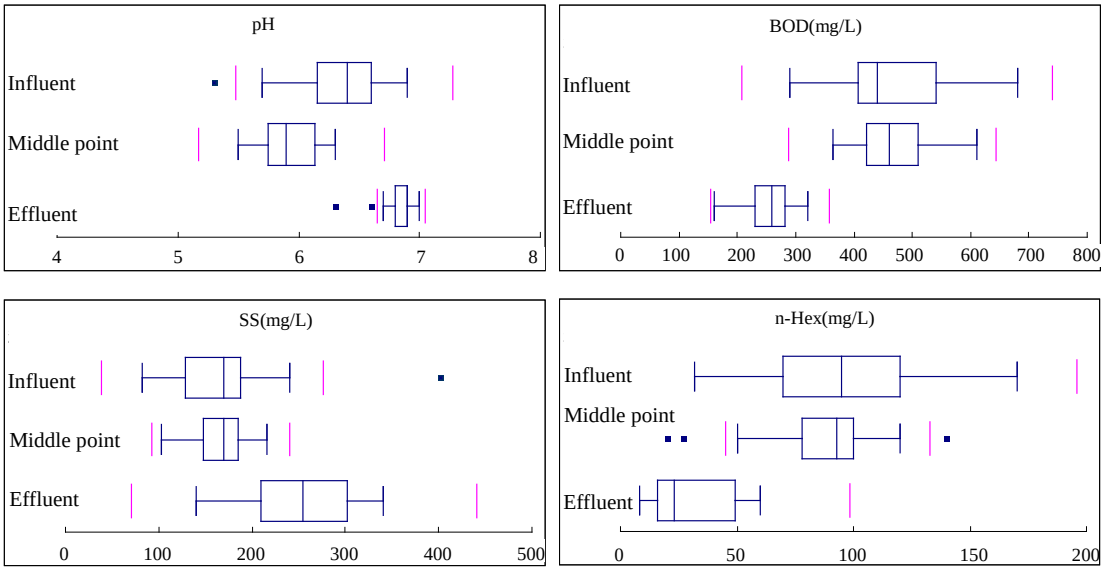
Division	Item	Specifications and processing capacity
Outline of apparatus	Model	Carrier fluidized tank method
	Dimensions and weight	W5,900mm × D11,100mm× H3,260mm, 4,400kg
Design conditions	Target substances	BOD, SS, n-Hex
	Daily wastewater flow rate	55 m^3/day
	Influent-wastewater quality	(BOD)1,000mg/L, (SS)800mg/L, (n-Hex)200mg/L
	Processed wastewater quality	(BOD)600mg/L or less, (SS)600mg/L or less, (n-Hex)30mg/L or less

3. Results of the verification test

○ Verification items concerning water quality

Item	Unit	Verification results (Lower adjacent value through upper adjacent value, and median)					
		Influent		Middle point		Effluent	
pH	-	5.7 - 6.9	6.4	5.5 - 6.3	5.9	6.7 - 7.0	6.9
BOD	mg/L	290 - 680	440	365 - 610	460	160 - 320	258
SS	mg/L	82 - 246	170	103 - 216	170	140 - 346	254
n-Hex	mg/L	32 - 170	95	50 - 120	93	8 - 60	23





Note 1: The removal rates are calculated from the results of periodical tests. Removal rate = (Total pollution load of influent water – Total pollution load of processed water)/ Total pollution load of influent water

Note 2: Number of influent water data = 27 for each item, Number of middle point water data=27 for each item, Number if effluent water data = 27 for each item

○ Items concerning environmental impact

Item	Verification results
Amount of generated sludge	No sludge to be treated was generated since the effluent was discharged into public waterways.
Amount of generated waste	Screen residues: 0.5 kg/day (water content: 60%)
Noise	At 1 m: 56 dB Near the site boundary (at 10 m): 51 dB (including environmental noise other than the facilities)
Odor	Odor intensity: 2 to 3 Odor concentration: 19 to 10 or less

○ Items concerning used resources

Item	Verification results
Electricity consumption	133 kWh/day when one aeration blower unit is operated. 225 kWh/day when two units are operated simultaneously.
Consumption of wastewater treatment chemicals, etc	Fat splitting bacteria (Product name: Dina Treat 2000): 0.37 kg/day
Consumption of other materials	Carrier: 0.6 m³ was replenished (on January 28).

○ Items concerning operation and maintenance performance

Maintenance item	Maintenance time and frequency	Number of operators and level of operator expertise required for maintenance
Periodical inspection	100 min (twice a month)	One operator who has expertise equivalent to that of a certified purification tank maintenance operator is required.
Replenishment of fat splitting bacteria	20 min (twice a month)	One operator who has expertise equivalent to that of a certified purification tank maintenance operator is required.

○ Qualitative findings

Item	Findings
Water quality findings	 Influent water: Sampled at 23:00 on January 26 Transparency: 3.0 Odor: Weak odor of kitchen refuse Hue: Deep yellowish-white with high turbidity  Effluent water: Sampled at 23:00 on January 26 Transparency: 3.5 Odor: Weak odor of kitchen refuse Hue: Deep yellowish-white SS: A large amount present, settled after placing the sample at rest
Period required for startup of the target verification apparatus	Not verified, because the facilities had been operated.
Period required for stoppage of the target verification apparatus	Can be stopped immediately by stopping the blower and pump.
Reliability of the target verification apparatus	A malfunction was caused due to the dropped float switch of the raw water pump. No other unstable circumstance occurred during the verification test period
Restoring from a trouble state	Failures may be restored in accordance with the manuals. However, troubleshooters must be familiar with the principles related to the maintenance.
Evaluation of O&M instruction manual	Nothing in particular needs to be improved.
Others	○ This target verification apparatus operates as a sewage treatment facility. The removal rate became negative because the flow was allowed for SS within the sewage treatment standard range. ○ Due to failure with the raw water pump, the fat content accumulated in the raw water pump tank flowed inside the system and the effluent water was instantly influenced. However, the condition was gradually restored by operating two blowers simultaneously and adjusting the flow rate of the water into the carrier fluidized tank. With the potential for this type of trouble taken into consideration, the oil content accumulated in the raw water pump tank must be cleaned as necessary. ○ Odor and noise had no impact on the environment. ○ The BOD and SS levels met the target quality levels. As for n-Hex, the influent concentration was within the range of 200 mg/L, however, the level in the processed water tended to exceed 30 mg/L level as the amount of influent water increased.

(Information for reference)

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○ Product Data

Item		Information provided by environment technology developer
Name of manufacturer (distributor)		Restaurant wastewater treatment apparatus/-
Name of manufacturer (distributor)		Fuji Clean Co., Ltd.
Contact address	TEL/FAX	TEL：0566-81-7600 / FAX：0566-81-7601
	URL E-mail	http://www.fujiclean.co.jp kaihatsu_2@fujiclean.co.jp
Dimensions/Weight		W5,900 mm× D11,100mm× H3,260mm, 440kg
Necessity for pre- and/or post-treatment		Not required
Additional equipment		Raw water pump tank
Lifespan of target verification apparatus		FRP-based unit: 30 years or longer
Startup period		3months

Approximate cost (yen)	Item	Unit price	Qty.	Total
	Initial cost			18,500,000 yen
	FRP unit and similar (including additional equipment)		One set	15,000,000 yen
	Equipment installation work		One set	3,000,000 yen
	Commissioning cost		One set	500,000 yen
	Installation civil engineering			Extra cost
	Running cost (monthly)			212,171 yen
	Sludge treatment cost	-----	-----	-----
	Waste treatment cost	40yen/kg	15kg	600 yen
	Electricity consumption	11.55yen/kWh	4,143kWh	47,851 yen
	Water consumption	-----	-----	-----
	Water treatment chemical cost	9,500yen/kg	10.56kg	100,320 yen
	Other consumables	135,000yen/m^3	0.6m^3	3,400 yen
	Maintenance commissioning cost	30,000yen /maintenance	Twice	60,000 yen
	Per 1 m^3 of processed wastewater (Processed wastewater is assumed to be 1,650 m^3/month.)			128.6 yen

○ Micellaneous information provided by the manufacturer

- Stable treatment is possible by the synergy of fat splitting bacteria and microbial adhesion carrier.
- Because the technology employs a method to feed powdered fat splitting bacteria by automatically preparing a suitable amount of bacteria in solution, the bacteria can be fed optimally on a continual basis without deactivation.
- Because the carriers filled in the carrier fluidized tank become microbial adhesion carriers, suitable for treating wastewater that contains oil and fat just like kitchen wastewater, a sufficiently stable treatment effect can be realized with reduced amounts of carriers.