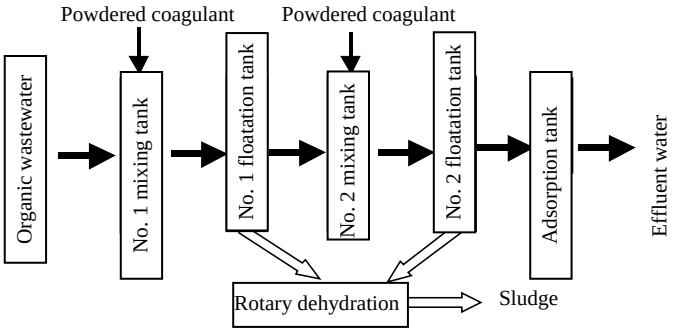
○ Overview

Target verification technology/Environmental technology developer	Small-sized wastewater treatment apparatus “Pressurized Floatation Type Comet” / Toenec Co., Ltd.
Verification organization (executing the test)	Hiroshima Prefectural Government (Hiroshima Prefectural Health Environmental Center, Hiroshima Environment & Health Association)
Verification test period	September 8, 2004 through December 1, 2004
Objective of this technology	General treatment of organic wastewater

1. Summary of target verification technology



Principle

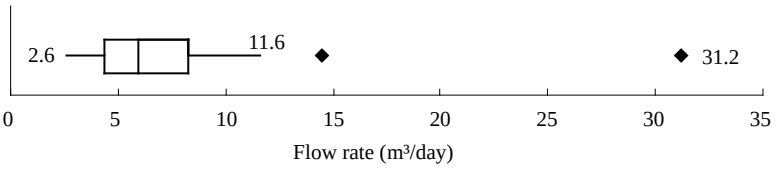
Pollutants are coagulated by powdered coagulant made of coal ash and removed by the pressurized floatation method. Dissolved-state organic substances are also adsorbed and removed by bamboo charcoal deposited and filled in the adsorption tank.

Features

- General treatment of organic wastewater
- Dehydration of sludge is performed properly.
- pH adjustment is not necessary.

2. Summary of the verification test

○ Summary of the verification-test site

Type of business establishment	Restaurant for company employees
Scale of business establishment	Total floor area (kitchen): 121 m² Number of seats: 210 Average portions served during verification test period: 263
Location of site	1-3-1 Hironada, Kure City, Hiroshima Prefecture (Chugoku Kogyou Co., Ltd. No. 1 Plant)
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	150B-2W
	Dimensions and weight	W2, 428mm×D1, 996mm×H1, 658mm, 750kg
Design conditions	Target substances	SS, n-Hex, T-P, BOD
	Daily wastewater flow rate	72 m^3/day (3 m³/hour) (Max. capacity 150 m^3/day, depending on the water quality)
	Influent-wastewater quality	(SS)590 mg/L, (n-Hex)240 mg/L, (T-P)12 mg/L, (BOD)800 mg/L
	Processed wastewater quality	(SS)200 mg/L, (n-Hex)30 mg/L, (T-P)16 mg/L, (BOD)160 mg/L

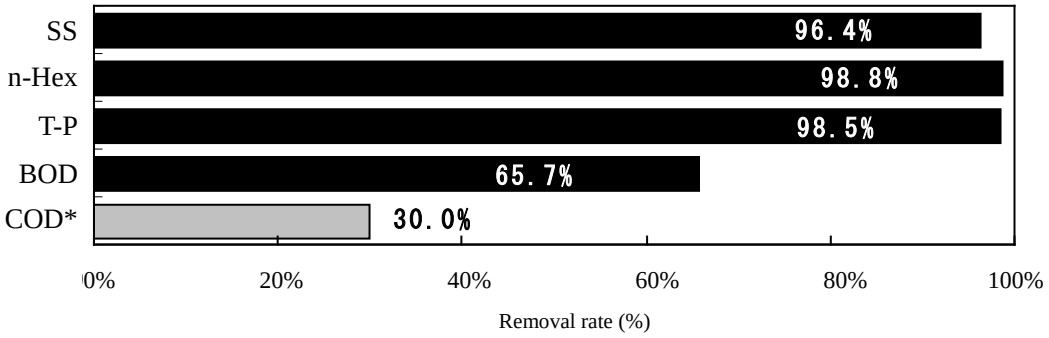
* 1 Actual measurements at the verification site.

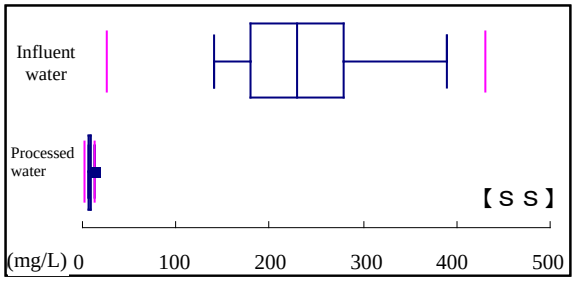
* 2 This target verification apparatus was designed for the purpose of satisfying all the items of the standards specified by the Water Pollution Control Law. Since the phosphorus value of the wastewater at the site was low, the T-P values for Influent-wastewater quality/effluent quality were apparently reversed. This apparatus is not designed to deteriorate T-P values if used when phosphorus is not present.

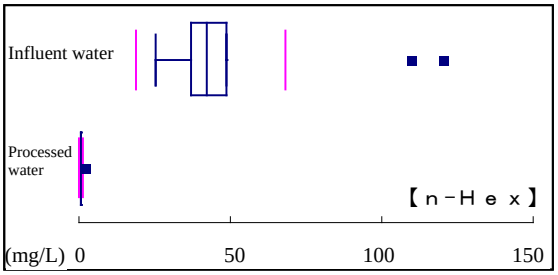
3. Results of the verification test

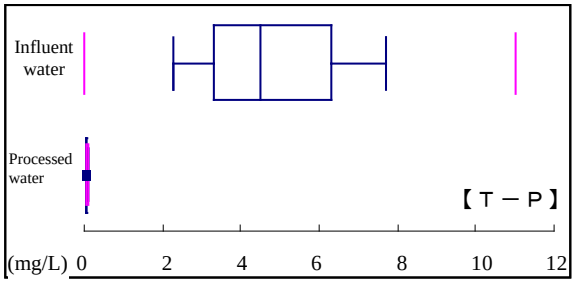
○ Verification items concerning water quality

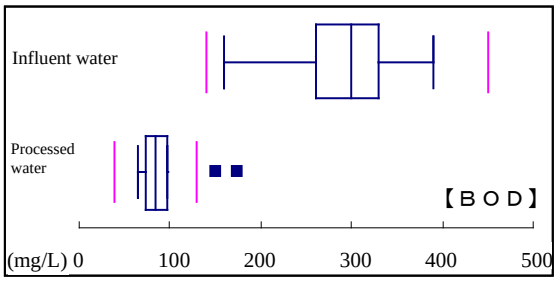
Item	Unit	Verification results(daily average values) Verification results (Lower adjacent value through upper adjacent value, and median)	
		Influent water	Processed water
SS	mg/L	140 – 390, 230	6 – 13, 8
n-Hex	mg/L	25 – 49, 42	0.5 – 0.9, 0.7
T-P	mg/L	2.3 – 7.7, 4.5	0.05 – 0.08, 0.06
BOD	mg/L	160 – 390, 300	65 – 98, 84
COD*	mg/L	63 – 200, 150	47 – 160, 82
PH*	-	5.4 – 6.9, 6.4	6.6 – 6.8, 6.7

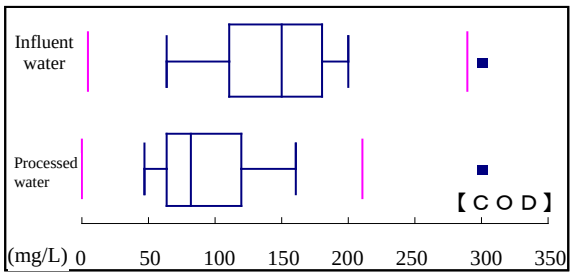


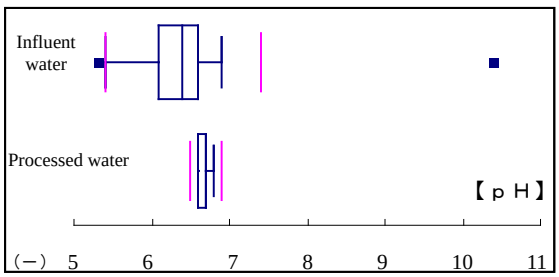












Note 1: The removal rate is determined by the equation shown below.
(Total of the measurements of pollution loading amount of influent water per day – Total of the measurements of pollution loading amount of processed water per day) /(Total of the measurements of pollution loading amount of influent water per day

Note 2: Items marked with * are not considered target removal items of the apparatus.

Note 3: Number of influent water data= 10 Number of processed water data= 10

Note 4: The SS, n-Hex, BOD, and outlier (max.) of COD values of processed water were recorded on days when the pH of the influent water exceeded 9.

○ Items concerning environmental impact

Item	Verification results
Amount of generated sludge	3.4 kg/day (dry) and 17.4 kg/day (water content: 80.3%)
Amount of generated waste	Bamboo charcoal: 0.11 kg/day or less (not replaced during the verification test period)
Noise	Findings during the verification test period: Noise level is equivalent to “a quiet car or ordinary conversation”. Measurement (on September 16, 2004): 65 dB (noise mainly from the kitchen ventilation fan)
Odor	Findings during the verification test period: No odor Measurement (on September 16, 2004): Odor index at 20 (odor mainly at the outlet of the kitchen ventilation fan)

○ Items concerning used resources

Item	Verification results(with 2 tanks operated)
Electricity consumption	17.9 kWh/day
Water consumption	380.5 L/day
Consumption of wastewater treatment chemicals, etc	Mineral coagulant (product name: Elecsite Ash): 8.4 kg/day Bamboo charcoal: 0.11 kg/day or less (not replaced during the verification test period)

○ Items concerning operation and maintenance performance

Maintenance item	Maintenance time and frequency	Number of operators and level of operator expertise required for maintenance
Daily inspection	11 min (once a day)	No particular knowledge or expertise is required. One operator can handle the daily inspection and removal of sludge. However, to secure working safety, cleaning or other work should be conducted by two operators.
Monthly inspection and cleaning, etc	156 min (once a month)	

○ Qualitative findings

Item	Findings
Water quality findings	  Influent water (left photo) - Transparency: 1 to 13 degrees - Light white to deep milky white - Light to medium level of odor of kitchen refuse Processed water (right photo) - Transparency: 30 degrees or higher - Colorless to light yellow - Zero to light level of odor of kitchen refuse
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	
Reliability of the target verification apparatus	The facility operated almost normally during the verification test period.
Restoring from a trouble state	Failures may be restored in accordance with the Operating Manual or Maintenance Manual. However, fixing mechanical failure in the apparatus or adjusting the operating conditions requires expertise.
Evaluation of O&M instruction manual	Procedures required for daily inspection and operation are plainly described, with detailed descriptions provided for further reference and verification. Operating procedures and inspection items are clearly tabulated and the explanations are provided with a sufficient number of photos to ensure clear comprehension of the contents.
Others	○ It was confirmed that the No. 1 floatation tank could only improve the water quality up to the respective design quality items of processed water. ○ Sludge is effectively dehydrated by the drum screen for easy handling. ○ No abnormal noise or odor was generated.

(Information for reference)

The information provided on this page has been submitted by the environmental technology developer, who is solely responsible for its contents. Neither the Ministry of the Environment nor the Verification Organization may be held responsible for the information.

○ Product Data

Item		Information provided by environment technology developer
Name/Model No.		Microbubble Generating Type Suisei
Name of manufacturer (distributor)		Toenec Corporation (Manufactured by YLEX・REWATER Co.,Ltd.)
Contact address	TEL/FAX	TEL(052)659-1120 / FAX(052)659-1141
	E-mail	ecos-jigyoug@toenec.co.jp
Dimensions/Weight		W 2,428mm×D 1,996mm×H 1,658mm 750kg
Necessity for pre- and/or post-treatment		When the pH of the influent water is less than 5 or higher than 9 or if considerable surfactant is contained, the need for pre-treatment must be considered.
Additional equipment		Raw water tank (for water volume adjustment)
Lifespan of target verification apparatus		10 years
Startup period		2 days for apparatus installation and adjustment

Approximate cost (yen)	Item	Unit price	Qty.	Total
	Initial cost			20,000,000
	Equipment cost (including installation, adjustment, and additional equipment)		One set	20,000,000
	Foundation cost	-----	-----	-----
	Building construction cost	-----	-----	-----
	Running cost (monthly)			242,229
	Sludge treatment cost (including waste bamboo charcoal treatment cost)	68,700	0.3 t	20,610
	Electricity consumption	9	450 kWh	4,050
	Water consumption	300	8.8 m^3	2,640
	Water treatment chemical cost	1,000	200 kg	200,000
	Other consumables		One set	1,300
	Maintenance commissioning cost	1,770	7.7 h	13,629
	Per 1 m^3 of processed wastewater (Processed wastewater is assumed to be 230 m^3/month.)			1,053

* The running cost was estimated as described below.

- The sludge treatment cost is the price excluding the transportation cost (a unit price of 32,060 yen for Hiroshima to Fukuoka)
- The other consumables refer to bamboo charcoal and container bags.
- The electricity consumption quotes business-use electricity rates.
- The “Qty.” of the maintenance commissioning cost refers to the length required for daily inspection and monthly inspection. The unit price is that of an ordinary worker in the List of Construction Prices (Hiroshima Prefecture).

○ Micellaneous information provided by the manufacturer

- The apparatus can be installed additionally to the existing facilities. A much more space-efficient type 150B-1W is also available.
- The apparatus is fully integrated with the majority of the treatment functions automated.
- The mineral coagulant “Elecsite Ash” employs coal ash whose safety, as artificial zeolite, was confirmed and the utilization serves a recycling society.