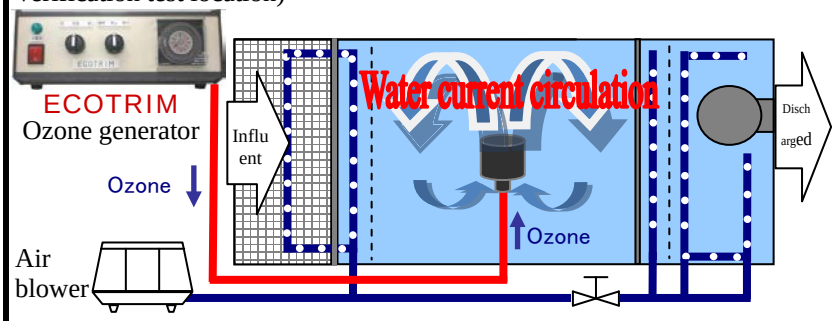
○ Overview

Technology intended for verification /environmental technology developer	Kitchen wastewater treatment equipment　ECOTRIM / OPPC Co., Ltd
Demonstration institution	Saitama-ken Environmental Analysis & Research Association
Period of the experiment for verification	October 6, 2009 to February 15, 2010
Purpose of this technology	This equipment decomposes the fats contained in the wastewater discharged from restaurant kitchens through the oxidizing power of ozone, removes the bad smell caused by rotten sludge accumulating in the grease trap, and improves the sanitary conditions of the kitchens.

1. Outline of the technology intended for verification

Concept diagram of the technology (different configuration from the verification test location)

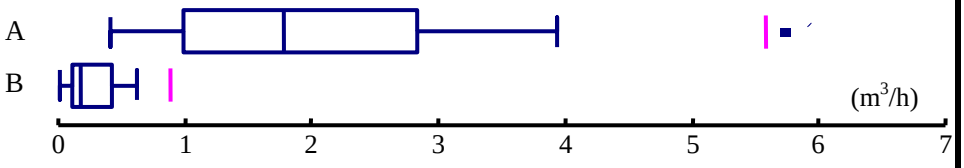


Principle

The piping (for ozone and air) is laid in the grease trap, where fats and other organic substances in the wastewater are decomposed into low-molecular substances through the oxidizing power of ozone generated by “ECOTRIM”. In addition, the wastewater in the tank is stirred by the air blower for more effective oxidation.

2. Outline of the verification experiment

2.1 Outline of the location for performing the verification experiment

Project type	School cafeteria (Nippon Institute of technology　No. 6 building　No. 1 cafeteria)
Project scale	Total floor area：　1404.7m^2　　Number of seats：1,000
Address	4-1 Gakuendai, Miyashiro-machi, Minamisaitama-gun, Saitama
Influent quantity into the equipment intended for verification *1 (Box plot *2) *1：This indicates the volume of influent entering the grease trap	 A：Normal influent volume verification test “Daily investigation (2nd to 4th investigation) B：1/10 influent volume verification test “Verification test with reduced influent volume entering the grease trap” *2：For the box plot, see “How to Read the Box Plot” (for Reference the detailed version　Page 47 of main part).

2.2 Specifications of subject equipment[*3] and daily influent volume at the time of verification test

Category	Item	Specification and Wastewater volume during the verification test period	
Outline of the facility	Model	"ECOTRIM" : ET1-P(1 set was installed.), ET1-N(4 sets were installed.) A total of 5 sets were installed.	
	Size and weight	Per 1 set W320mm×D285mm×H130mm・4.0kg	
Design conditions	Object	BOD(Biochemical oxygen demand) COD(Chemical oxygen demand) SS(Suspended solids) n-Hex(n-hexane extract content)	
	Treatment object[*4]	BOD (Biochemical oxygen demand)	less than 600 (mg/L)
		COD (Chemical oxygen demand)	less than 600 (mg/L)
		SS (Suspended solids)	less than 600 (mg/L)
		n-Hex (n-hexane extract content)	less than 30 (mg/L)
Daily influent volume	Section water volume	Normal influent volume verification test (2nd to 4th daily investigation)	10.5~16.3 (m^3/day)
	Measurement value	1/10 influent volume verification test (February 15th)	2.3 (m^3/day)

*3 : Model equipment was built to display the technology and was used in this verification experiment.
*4 : Standards of the Specified Plant for Public Sewerage in Miyashiro-machi, to which the wastewater is discharged from the verification test location, for the removal of substances

3. Results of the verification experiment

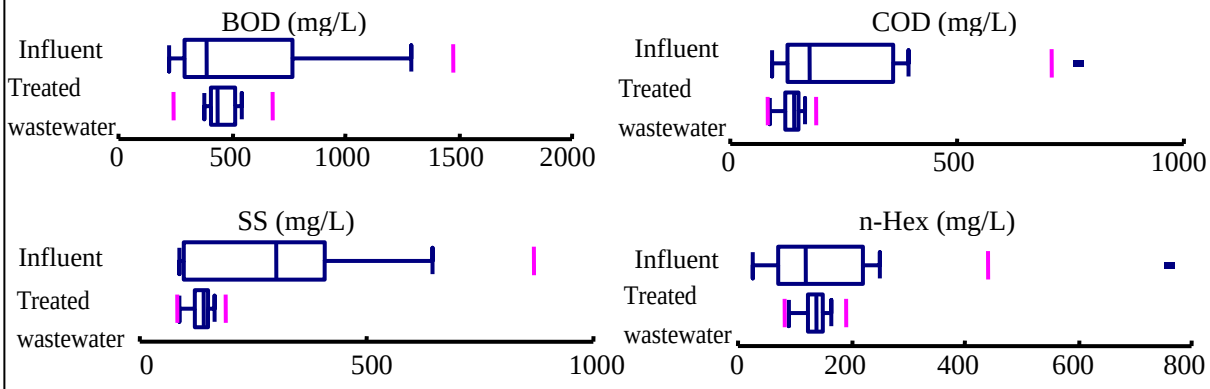
3.1 Water quality verification experiment : Normal influent volume verification test result and 1/10 influent volume verification test result

Comparison by water quality concentration

Item	Normal influent volume verification test result (November 18, 25, 27, 2009)				1/10 influent volume verification test result (February 15, 2010)			
	Influent (mg/L)		Treated wastewater (mg/L)		Influent (mg/L)		Treated wastewater (mg/L)	
	lower adjacent value – upper adjacent value (central value)		lower adjacent value – upper adjacent value (central value)		lower adjacent value – upper adjacent value (central value)		lower adjacent value – upper adjacent value (central value)	
BOD	54.2~916	(406)	314~728	(546)	223~1290	(393)	374~542	(437)
COD	14.4~321	(162)	89.1~259	(184)	94~ 394	(176)	122~178	(145)
SS	24.0~540	(148)	52.0~450	(293)	86~ 644	(302)	135~198	(164)
n-Hex	29.0~200	(66.5)	60.0~170	(120)	26~ 250	(120)	86~120	(100)

In the normal influent volume verification tests, which were the 2nd to 4th daily inspections, the central values showing the concentration for all items were higher in the treated wastewater than in the influent. The influent load of the wastewater volume flowing into the grease trap (section water volume: 10.5 to 16.3 (m^3/day)) was large, and the wastewater could not be sufficiently treated due to its short duration in the grease trap. This is the reason for the high central values.

Therefore, we conducted a verification test in which the influent volume was reduced to 1/10 by using a distributor (measurement value: 2.3 (m^3/day)), and the test results showed improved values for COD, SS and n-Hex. For the influent volume entering the grease trap (daily influent volume: section water volume and measurement value), see the table in “General Outline 2.2” (Page 1 – Outline).



Box plots of water quality investigation results in the 1/10 influent volume verification test[*1]

(Water quality verification experiment)

*1: For the box plot, see “How to Read the Box Plot” (for Reference the detailed version Page 47 of main part).

In a comparison of the pollutant load, the removal rates of the substances were improved by about 30% by adjusting the flow rate, just like the removal rates shown in the verification test with the reduced influent volume. In addition, the BOD removal rate was 8%.

Comparison by pollution load

Item	Results of the verification experiment (27 November, 2009)			Result of the verification test with the reduced influent volume. (February 15, 2010)		
	Influent	Treated wastewater	Removal ratio (%)	Influent	Treated wastewater	Removal ratio (%)
BOD (g/day)	8140	8480	- 4.2	1,060	973	8.0
COD (g/day)	3440	3100	9.7	513	316	38.5
SS (g/day)	2780	3300	-18.8	524	367	29.9
n-Hex (g/day)	1660	1850	-11.5	294	221	25.0
Quantity of Influent (m^3/day)	16.0			2.3		

3.2 Operation and maintenance item

○ Environmental impact item

Item	Verification result
Amount of sludge	No sludge is generated by this equipment.
Amount of wastes	Residue in the grease trap inlet: Clean this about once every two days (depending on the type of food).
Noise	The surroundings of verification equipment　Shut down period58 (dB), Operation period 57 (dB)
Odor	Odor concentration 10 or less (Ordinance of the Saitama Prefectural Government) and odor index less than 10

○ Used resources index

Item	Verification result
Amount of electric energy used	569 (W/day) (Body 500 W × 16 hours, air blower 236 W × 24 hours)
Amount of chemical used for waste water treatment	No chemicals were used.

○ Operation and maintenance performance item

Maintenance item	Maintenance time per operation and maintenance frequency	Number of people and skill required for maintenance
Periodic check (Body)	Once every six months, control time 30 min	One person with general knowledge of operation and maintenance
Removal of food residue	Not performed during operation at this time	One person without any special skills is required.

○ Qualitative remark

Item	Remark
Remark on water quality	 Influent　　Treated wastewater The original treatment targets*[1] could not be achieved when the section water volume (normal influent volume entering the grease trap) was 10.5 to 16.3 m^3/day. However, the removal of substances was confirmed in the 1/10 influent verification test (measurement value of the influent entering the grease trap: 2.3 m^3/day). This device reduces the n-Hex concentration by decomposing the fats into low molecular substances and discharges the treated wastewater at a certain quality even if the influent quality fluctuates. Thus, the device can stabilize the wastewater quality treated by the grease trap. Although the effluent is slightly cloudy, no floating fats are found and no odor is emitted. *1: See Table 5-3 (Page 20 of the Main Part in the Detailed Version).
Terms required for initiation	Installation work can be completed in a day. Operation can be started simply by turning on the power switch.
Terms required for shutdown	Operation can be completed simply by turning off the power switch.
Reliability of the equipment intended for verification	No errors occurred during the verification period of the equipment.
How to solve the problems	Problems can be solved by following the instructions indicated in the operation manual.
Evaluation of the instruction manual of operation and maintenance	Since this equipment is easy to operate, no special training is required. There are no specific points in the manual that must be corrected.
Others	It is necessary to adjust the influent volume for large facilities where wastewater of 10.5 to 16.3 m^3/day flows through the grease trap and the influent load is high. Therefore, this equipment must be installed in suitable facilities where the influent volume does not fluctuate significantly. After installation of the equipment, no abnormal odors due to putrefaction were detected. In addition, this compact equipment can be installed even in small kitchens, and many users say that they found it easy to operate and maintain the grease traps after installation of this equipment. It will be used widely in the future.

4. Reference information

The information shown on this page is provided by the applicant for verification at its responsibility for publication of the technical data and not the subject of the verification experiment. The Ministry of the Environment and the organization conducting the verification experiment are not responsible for the information on this page.

4.1 Product date (reference information)

Items		Column to be filled in by the environmental technology developer
Name / type		Kitchen wastewater treatment equipment / ECOTRIM
Manufacturer (distributor)		OPPC Co., Ltd
Contact address	TEL / FAX	TEL (03)5447-6733 / FAX (03)5447-6747
	Web address	http://www.oppc.jp/
	E-mail	postmaster@oppc.co.jp
Size and weight		W320mm×D285mm×H130mm・4.0kg
Necessity for pre-treatment and post-treatment		None
Supplementary facility		None
Life of the equipment		Some customers have been using this equipment for over 5 years. (The product guarantee period is 1 year.)
Time for initiation		One day after installation work

Approximate cost (yen)

Expense item	Unit price	Quantity	Total
Initial cost			600,000 yen
"ECOTRIM" 1 set	550,000yen	1 set	550,000 yen
Installation cost (including test operation)	50,000 yen	1 set	50,000 yen
(6-year lease rate 1.71%)			(10,773 yen /month)
Running cost (monthly)			4,310 yen
Power usage (ECOTRIM) 100 (W/operation for 16 hours/day)	20 yen /kWh	48kWh	960 yen
Power usage (air blower) 59 (W/operation for 24 hours/day)	20 yen /kWh	42.5kWh	850 yen
Maintenance cost	30,000 yen	Once a year	2,500 yen
Running cost for 1 m^3 of treated wastewater (When treated water is 66 m^3/month)			65 yen /m^3
Note: The cost of disposing of food waste is not included.			

4.2 Other information from the manufacturer (reference information)

Through the efficient decomposition of fats in the wastewater discharged from restaurant kitchens and other facilities by microorganisms and the oxidation action of ozone, plus the removal of unpleasant odors from decay, this equipment improves the performance of grease traps and the sanitary conditions of the kitchens.

- ●It is not necessary to add any chemicals or microorganisms.
- ●Operation can be performed by connecting the equipment to an ordinary power source.
- ●Compact design and easy operation
- ●Using only the oxygen in the air, the operation cost is very low.
- ●Unpleasant odors, unsightly contamination and pests are eliminated.
- ●Operation can be started on the day the equipment is installed.
- ●By setting the timer for switching on/off the ozone injection, the equipment can remove nitrogen and phosphorous.
- ●The equipment can also be installed before domestic wastewater treatment tanks for small-scale business facilities.