OPERATION AND MAINTENANCE OF JOHKASOU SYSTEM IN JAPAN

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TOPICS

1. Legal framework for johkasou O&M

2. Practice of johkasou O&M, etc.

3. Training system for johkasou technicians



TECHNICAL STANDARDS FOR JOHKASOU O&M

Technical standard for operation and maintenance
 (Article 2, Ordinance for Enforcement of Johkasou Act)

This standard stipulates maintenance items and adjustment/repair items that must be carried out during operation and maintenance for every johkasou and the auxiliary device.

 Technical standard for desludging (Article 3, Ordinance for Enforcement of Johkasou Act)

Desludging standards stipulate items to be carried out for each unit and auxiliary device during desludging (e.g. methods for drawing out sludge)

o Guidelines for johkasou operation and maintenance (Official notice)

These guidelines are issued by the Ministry of the Environment as specific policies for operations and maintenance technicians. They are designed to ensure that operation and maintenance as well as desludging are carried out optimally and in line with the specific characteristics of each treatment process.

Guidelines for Johkasou O&M

□Technical standard for johkasou O&M, (1983, Johkasou Act)

- Guideline for O&M of Tandoku-shori johkasou (2000)
- Guideline for O&M of small-scale johkasou (1993)
- Guideline for O&M of medium/large-scale johkasou (2000)
- Guideline for O&M of N/P removal type johkasou (2000)
- Guideline for O&M of Membrane johkasou (2000)

□Technical standard for johkasou desludging (1983, Johkasou Act)



Johkasou (treat black + grey water)

Tandoku-shori johkasou (treat black water only)

ORDINANCE FOR ENFORCEMENT OF JOHKASOU ACT

(Rule of Using)

Article 1 Rules of using johkasou under the provisions prescribed in Article 3 paragraph 3 of Johkasou Act (hereinafter referred to as "Act") shall be as follows.

(i) Water amount for flushing toilet shall be appropriate.

(ii) Materials like insecticide, detergent, deodorant, fatty, disposable diaper, sanitary goods etc. which interfering with the normal functioning of johkasou, shall not be flowed.

(iii) abbr.

(iv) Industrial wastewater, rain water and other special wastewater shall not be flowed into johkasou.

(v) Johkasou with electric equipment shall not be turned the power supply off.

(vi) The top or around of johkasou shall has no structural object that may interfere with operation, maintenance and desludging of johkasou.

(vii) The top of johkasou shall not be loaded which may interfere with its normal functioning.

(viii) The opening part of aerator shall not be blocked.

(ix) When the failure or malfunction is found in the johkasou, it should be notified to the johkasou manager immediately.



O&M FREQUENCY OF JOHKASOU

(Article 6-2, Ordinance for Enforcement of Johkasou Act)

Treatment process	Type/size of johkasou	Frequency
 Separation-contact aeration process Anaerobic filter-contact aeration process Denitrification type anaerobic filter- contact aeration process 	1. Johkasou with a size less than 20 PE	4 month
	2 . Johkasou with a size more than 21 PE and less than 50 PE	3 month
Activated sludge process	(> 100PE, M/L)	1 week
 Rotating biological contactor process Contact aeration process Trickling filter process 	 Johkasou with sand filter device, activated carbon adsorption device or flocculation tank (> 50PE, M/L) 	1 week
	2. Johkasou with screen and flow equalization chamber or flow equalization tank (> 50PE, M/L)	2 week
	3. Other Johkasou (> 50PE, M/L) (without screen equipment, etc.)	3 month

LEGAL FRAMEWORK OF JOHKASOU MANAGEMENT - REGULATIONS BASED ON JOHKASOU ACT



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LEGAL FRAMEWORK OF O&M, DESLUDGING AND LEGAL INSPECTION OF JOHKASOU



JOHKASOU TECHNICIANS AND VENDORS

Qualifications /vendor	Registrant/ number of vendor	Business content	Legal basis	
Johkasou Operator	80,042	Operation and maintenance	lohkasou Act	
Johkasou Installation Worker	86,595	Installation/construction	JULIKASUU ACI	
Johkasou Technical Supervisor	29,794	Management of johkasou over 500 PE	Enforcement	
Johkasou Desludging Technician	16,021	Desludging	regulations of	
Registered Johkasou Inspector	1,280	Legal inspection	JUIKASUU ACI	
Specified Inspection Agency	65	Legal inspection		
Johkasou manufacturer	18	Research, development and manufacture		
Johkasou maintenance vendor	12,435	Operation and maintenance	Johkasou Act	
Johkasou desludging vendor	5,291	Desludging		
Johkasou Installation vendor	28,356	Installation/construction		

Source: Ministry of Environment, Japan, etc. (as of March 31, 2016)

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Definition of johkasou O&M

Operations concerning to inspecting, maintaining and repairing johkasou (Johkasou Act, Article 2-3)



- Prevent loss of unit function and device breakdown
- Maintain normal treatment performance
- Promote proper regular desludging



O&M OF SMALL-SCALE JOHKASOU

- Surrounding conditions
- Water flow condition
- Treatment performance
- Sludge accumulation
- Electrical and mechanical devices

Surrounding conditions

- abnormal noise/sound
- strong odor/smell



Check up the way of inflow water







Check the aeration device and the aeration condition, adjust the air flow when necessary

Check the distribution device, the amount of return water and the condition of disinfection device



f7



Check the water quality (DO, pH, ORP, NO2-)







Check the accumulated sludge



Check the accumulated sludge



Inspecting wastewater flow





Checking remaining disinfectant



汚泥堆積状態の確認

Measuring deposited sludge

An Example of johkasou O&M



Definition of johkasou desludging

Desludging involves extracting the generated sludge and scum from johkasou and conditioning sludge in the tank, as well as cleaning tanks and auxiliary equipment.

(Johkasou Act, Article 2-4)



Recover/reset treatment performance of johkasou

by removing sludge regularly



Vacuum Truck for Desludging







An examples of johkasou desludging



Filling the tanks with water







LEGAL INSPECTION

• Article 7 inspection (inspection after installation)

This inspection focuses on installation status and looks to see whether the johkasou has the intended treatment functions. It is carried out when most of the functions are up and running, between three and five months from the time usage begins.

• Article 11 inspection (periodic inspection)

This inspection focuses on maintenance inspection and desludging status and looks to see whether the intended treatment functions are being maintained through proper operations and maintenance. It is carried out once a year.

Agencies authorized to carry out legal inspection

There are 66 Specified Inspection Agency designated by prefectural governors to carry out legal inspection. To be designated, an agency must assign experts who have knowledge of johkasou inspection as Johkasou Inspector with the requisite skills and have inspection experience at least two years.

LEGAL INSPECTION PROCESS





Checking inside the johkasou



Water quality measurements





An example of johkasou legal inspection

BOD measurement



Reporting the inspection results to the owner





Measuring residual chlorine concentration





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TRAINING AND CERTIFICATION SYSTEM FOR JOHKASOU TECHNICIANS

1. Position of the qualifications in the Act

Johkasou Installation Worker Article 42(1)(ii), Johkasou Act Johkasou Operator Article 45(1)(ii), Johkasou Act Johkasou Technical Supervisor Article 10(2), Johkasou Act Johkasou Desludging Technician Article 11(iv), Ordinance of Johkasou Act Johkasou Inspector Article 5(1)(iv), Ordinance of Johkasou Act

Examination/training Agency Article 43, 46, Johkasou Act

2. Business content of the qualifications As shown in the right figure.



- These regulations make the qualifications to be indispensable for persons who want to join johkasou businesses, and give incentives to them.
- The qualifications could be obtained by receiving training courses or passing national examinations.
- This training and qualification system has played an essential role to enhance the technical level of johkasou technicians, and contributed to the appropriate spread of johkasou.

FEATURES OF THE TRAINING SYSTEM (1)

\circ Public Cleansing Act era (~ 1970)

• Training for operators already regularly involved in johkasou desludging to make them specialist technicians in operations and maintenance

• Waste Disposal and Public Cleansing Act era (1970–1985)

- Operations and maintenance separated into maintenance inspection and cleaning, training for different johkasou managing engineers for each
- Training for technicians who carry out johkasou construction
- Training for technicians who carry out johkasou legal inspections

○ Johkasou Act era (1985~)

- National qualifications established for Certified Johkasou Installation Worker and Certified Johkasou Operator with testing and training sessions implemented for each
- Training sessions implemented for Certified Johkasou Engineering Managers, Certified Johkasou Cleaning Technicians, and Certified Johkasou Inspectors

FEATURES OF THE TRAINING SYSTEM (2)

Working-level contents of curricula for johkasou businesses

- Johkasou technicians should be equipped with extensive knowledge on not only wastewater treatment/johkasou, but also water environment conservation and public health.
- Curriculums for johkasou operator and johkasou installation worker are as shown below

Training course for Johkasou Operator		Training course for Johkasou Installation Worker			
 Fundamental of johkasou Laws and regulations related johkasou Structure and function of johkasou Introduction to installation of johkasou Operation and maintenance of johkasou Water quality management of johkasou Introduction to desludging of johkasou 	8 H 4 H 22 H 4 H 30 H 10 H 2 H	 Fundamental of johkasou Laws and regulations related johkasou Structure and function of johkasou Management of johkasou installation Introduction to O&M and desludging of joint 	8 H 3 H 15 H 8 H ohkasou 3 H		
Total 8	0 Hours	Total	37 Hours		

FEATURES OF THE TRAINING SYSTEM (3)

Follow-up for johkasou technicians and continuing professional development (CPD)

- Support the johkasou technicians by providing updated technical information on johkasou, and give them appropriate information/advice on johkasou O&M, desludging and legal inspection.
 Publication of monthly journal JOHKASO and books related johkasou technology/administration
 Holding a national conference on johkasou technology, johkasou technicians and other stake-holders coming together for exchanging information and discussing issues on johkasou businesses.
- Seminar courses for CPD of johkasou technicians
 Special seminar for johkasou desludging workers
 Special seminar on installation management of johkasou
 Special seminar on O&M of compact type johkasou
 Special seminar on desludging practice of compact type johkasou



SUMMARY

- As johkasou are required to treat and discharge wastewater free from hygienic risk and complying with the water quality stipulated by the technical standard, the O&M, desludging and legal inspection are very important to ensure the johkasou function as designed.
- Technical standards for O&M and desludging as well as the guidelines are prepared for johkasou of different sizes and treatment processes. These documents make it possible for technicians to conduct O&M and desludging of johkasou appropriately.
- A training system for certification of johkasou technicians has been established. More than two hundred thousand of various johkasou technicians have been raised so far. With the support of the technicians, johkasou industry has developed significantly in Japan.
- The experiences of Japan shows that appropriate O&M, desludging and monitoring as well as a training system are essential to implementation of decentralized domestic wastewater treatment, and a legal institution should be necessary to integrative

