# Specification on the Institutional System and Technologies Related to Johkasou Operation and Maintenance (draft)

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**Foreword**

Japan's Johkasou and the legal system and social system[1] related to their operation and maintenance (collectively referred to as "the Johkasou system") are excellent decentralized wastewater treatment facilities that have undergone a unique development. In Japan, the Johkasou system plays a key role in the measures for domestic wastewater along with sewerage systems.

In recent years, interest in Johkasou has grown from overseas, and the number of countries installing Johkasou are increasing, mainly in Asia, and it is expected that Johkasou will improve sanitation in developing countries and preserve their water environment.

On the other hand, Johkasou need to be properly designed, manufactured, constructed, operated, as well as regularly maintained and inspected, and desludged in order to demonstrate their prescribed treatment performance as wastewater treatment facilities. In Japan, a mechanism to institutionally guarantee the treatment performance of Johkasou has been established through laws such as the Johkasou Act and the Building Standards Act, and other related laws and regulations. By stipulating matters related to the maintenance/inspection and desludging of Johkasou according to their scale and treatment method, these laws and ordinances ensure that the maintenance/inspection and desludging of Johkasou are appropriately performed and that these facilities achieve their prescribed treatment performance. It is necessary to understand that Johkasou in Japan functions as the Johkasou system under the Japanese legal system and social system.

This "Specification on the Institutional System and Technologies Related to Johkasou Operation and Maintenance" (hereinafter referred to as "this specification") is a systematic adjustment of technical matters related to the operation and maintenance of Johkasou under the Japanese Johkasou Act and other laws and regulations. It was created as a reference material for government officials, wastewater treatment engineers, consultants, etc. involved in decentralized wastewater treatment overseas for the creation of an operation and maintenance system in their own country when installing Japanese Johkasou.

Attention should be paid to the following when using this specification.

1) This specification introduces the legal system for Johkasou in Japan and the framework of administrative measures related to its application. It is necessary to systematically explain and adjust the legal system of Johkasou and related measures, but this will be reminded later in other documents.
2) The technical standards and requirements for Johkasou construction, maintenance, inspection, desludging, etc. described in this specification are stipulated by laws and ordinances in Japan, and those who operate those businesses in this country must comply with these. However, the conditions of Johkasou use, the local legal system and technical standards overseas differ from those in Japan. Therefore, in addition to understanding the purpose of this specification, there is a need for reviewing its content and adapt it to the actual conditions of each country or region.
3) In order to implement the technical matters described in this specification as administrative measures, it is necessary to separately consider the content of legislation and ordinances.
4) This specification is mainly intended for plastic-made Johkasou such as "FRP (Fiber Reinforced Plastic)" produced at factories, but Johkasou installed overseas are often made of "RC (Reinforced Concrete)". For this type of Johkasou or similar wastewater treatment facilities, it is also possible to apple this document for conducting maintenance and inspection as well as desludging.

# Specification on the Institutional System and Technologies Related to Johkasou Operation and Maintenance (draft)

## 1. Application Scope

This specification covers the technical requirements for the installation works and operation and maintenance of Johkasou – which are decentralized domestic wastewater treatment facilities –, the training of technicians involved in these operations, and the construction, operation and maintenance, and desludging of Johkasou. It provides the requirements for the registration and other obligations of the business operator.

This specification applies to Johkasou, which treat domestic wastewater (toilet wastewater and other miscellaneous wastewaters) from buildings, such as houses, and discharge the treated effluent directly to the environment. It is to be noted that Johkasou are not limited to the scale and material quality of the Johkasou referred to in this specification.

This specification provides necessary information for the government agencies in charge of wastewater treatment that are going to install Johkasou, as well as the business entities and consultants that are going to engage in businesses such as Johkasou installation, maintenance and inspection, desludging, legal inspection, and training of the technicians.

The scope of this specification includes:

1) Guidance on the estimation method of PE of johkasou
2) Guidance on Johkasou installation works
3) Guidance on maintenance and inspection of Johkasou
4) Guidance on desludging of Johkasou
5) Guidance on legal inspection of Johkasou
6) Guidance on registration and other obligations for Johkasou business
7) Guidance on the training of Johkasou-related technicians

The following is outside the scope of this specification:

1) Items related to the design and product certification of Johkasou
2) Items related to the installation, repair, dismantling, etc. of Johkasou
3) Items related to the treatment and reuse of Johkasou sludge
4) Items related to the analysis method of water quality and sludge
5) Items related to contracts and subcontracts

## 2. Citation and Documentation

JIS A 3302:2000; Criteria for calculating the number of people from whom wastewater is to be treated in human waste Johkasou according to the purpose of the building (see Annex A)

Johkasou Act; https://elaws.e-gov.go.jp/document?lawid=358AC1000000043

Johkasou Act Enforcement Regulations; https://elaws.e-gov.go.jp/document?lawid=359M50000100017

Ministerial Ordinance on Technical Standards for Johkasou Construction, Notification of Johkasou Installation, and Installation Plan; https://elaws.e-gov.go.jp/document?lawid=360M50004100001

## 3. Terms and Definitions

**3.1 Johkasou Designated Inspection Agency**

Organization designated by the prefectural governor that carries out legal inspections of Johkasou.

(Article 57, Johkasou Act)

**3.2 Domestic Wastewater**

Wastewater discharged from buildings for the use specified in JIS A 3302: 2000, which refers to wastewater discharged from kitchens, washbasins / laundry appliances, bathtubs / showers, toilets, etc.

**3.3 Johkasou**

Equipment or facility connected to toilets, which treats night soil together with gray water, used for effluent discharge outside other than a sewer system. (Article 2, Johkasou Act)

**3.4 Johkasou Construction**

Construction works for the installation of a Johkasou or a change in its structure or size. (Article 2, Johkasou Act)

**3.5 Johkasou Construction Vendor**

Corporate body that engages in Johkasou construction as a business. (Article 2, Johkasou Act)

**3.6 Johkasou Desludging**

Desludging refers to the extraction of the sludge and scum accumulated in a Johkasou and the adjustment of the sludge in the tank as well as its cleaning, including that of the unit equipment and the auxiliary equipment. (Article 2, Johkasou Act)

**3.7 Johkasou Desludging Technician**

Person who has expert knowledge, skills and more than 2 years of practical experience in Johkasou desludging.

(Article 11-4, Enforcement Regulations)

**3.8 Johkasou Desludging Vendor**

Corporate body that runs Johkasou desludging as a business. (Article 2, Johkasou Act)

**3.9 Johkasou Inspector**

Person who has expert knowledge and skills related to Johkasou inspection, more than 2 years of practical experience, and is registered in a designated inspection agency. (Article 55-5, Enforcement Regulations)

**3.10 Johkasou installation worker**

Person who has completed the training course for qualifying Johkasou Installation Worker , has been awarded a Johkasou Installation Worker license, and works as a supervisor of Johkasou construction. (Article 2, Johkasou Act)

**3.11 Johkasou Maintenance Vendor**

Corporate body that engages in Johkasou maintenance and inspection as a business. (Article 2, Johkasou Act)

**3.12 Johkasou Manager**

Owner, occupant, or any other person who has the authority to manage Johkasou. (Article 7, Johkasou Act)

**3.13 Johkasou Manufacturer**

Corporate body that runs a business that manufactures certified type of Johkasou. (Article 2, Johkasou Act)

**3.14 Johkasou Operator**

Person who has completed the training course for qualifying Johkasou Operator, has been awarded a Johkasou Operator license and who is engaged in the operation and maintenance of Johkasou under the name of Johkasou Operator.

(Article 2, Johkasou Act)

**3.15 Johkasou Technical Supervisor**

Person who has a certification of Johkasou Operator and has more than 2 years of practical experience in technical work related to maintenance, inspection and desludging of Johkasou with a scale of 501 or more people, or person who has equivalent or superior knowledge and ability better than the previous person. (Article 8, Enforcement Regulations)

**3.16 Johkasou System**

System that combines the Johkasou product and the legal system and social system related to Johkasou, its operation and maintenance and other activities.

**3.17 Legal Inspection of Johkasou**

Inspection on water quality and related items carried out by an organization designated by the prefectural governor. A first inspection is conducted after a Johkasou is installed and then regularly after that, once a year.

(Article 7 and 11, Johkasou Act)

**3.18 Maintenance and Inspection of Johkasou**

Refers to the work of inspecting, adjusting, or repairing Johkasou. In Japan, operation and maintenance are regularly conducted and include maintenance activities for the mechanical equipment, but not the desludging of a Johkasou.

(Article 2, Johkasou Act)

**3.19 Person Equivalent (PE) for Johkasou Treatment**

PE is an index showing the scale or size of a Johkasou, and is calculated according to JIS A 3302: 2000. 1 PE is equivalent to 200 L of wastewater, 40 g of BOD, 10 g of T-N and 1.0 g of T-P. ('Structural Standards for Johkasou, 2006 edition)

## 4. Treatment Steps and Structure of Johkasou

### 4.1 General

A Johkasou is a wastewater treatment facility based on the principle of wastewater treatment, and has a series of treatment process that includes pretreatment (primary treatment), secondary treatment, tertiary treatment, advanced treatment, just like a normal wastewater treatment facility, and the unit equipment required at each step of the process. Johkasou are designed and manufactured to maximize treatment performance by combining these components.

### 4.2 Johkasou Treatment Steps

#### 4.2.1 Treatment Steps

Figure 4-1 shows the Johkasou treatment process and the adopted unit equipment.

1) First treatment step: Precipitate and separate the large solids contained in the inflowing wastewater. In the case of a small-scale Johkasou, it also serves as a treatment step for concentrating and storing the inflowing solid matter and excess sludge generated after the secondary treatment step.
2) Second treatment step: Utilize the action of aerobic microorganisms, organic substances and ammonia contained in wastewater are decomposed and converted into large solid matters, such as biofilm or activated sludge. In addition, advanced treatment from actions such as dipping iron pieces or adding a coagulant to agglomerate phosphorus, or nitrifying and denitrifying nitrogen in combination with the first treatment step may be performed.
3) Third treatment step: Precipitate and separate the solid matter flowing out from the second treatment step.
4) Fourth treatment step: As a measure to comply with wastewater regulations and prevent eutrophication, this step is provided as an option when more advanced treatment of organic substances, nitrogen, phosphorus, etc. is required.
5) Fifth treatment step: Disinfect the effluent from the third treatment step, that is, the treated water.
6) Sixth treatment step: Concentrate and store the excess sludge generated in each of the treatment steps described above.

#### 4.2.2 Components

The unit equipment that performs the functions of each treatment step in 4.2.1 are as follows.

1) First treatment step: Screen equipment (including crushing equipment), sand basin, sedimentation separation tank, anaerobic filter bed tank, etc.
2) Second treatment step: Aeration tank, contact aeration tank, rotating biological contactor tank, biological filtration tank, carrier fluidization tank, etc.
3) Third treatment step: Sedimentation tank, membrane separation module, treatment water tank, etc.
4) Fourth treatment step: Filtration device, activated carbon adsorption device, coagulation separation device, denitrification tank, nitrification tank, etc.
5) Fifth treatment step: Chlorine disinfection tank, UV (Ultraviolet) disinfection tank, ozone disinfection tank.
6) Sixth treatment step: sludge concentration storage tank, sludge concentration tank, sludge concentration device, sludge storage tank, etc.

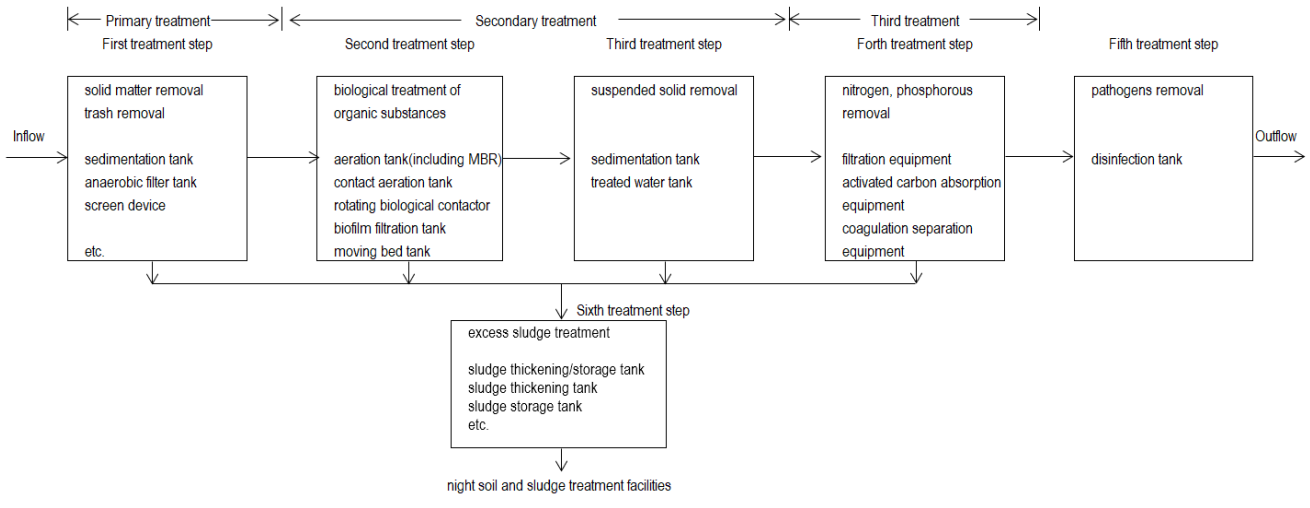



**Figure 4-1: Treatment steps that structure a Johkasou**

**4.3 Johkasou Structure**

**4.3.1 Johkasou Structure and Treatment Processes**

The Building Standards Act stipulates that the structure of Johkasou is limited to those using the structural method specified by the Minister of Land, Infrastructure, Transport and Tourism (standard structure type) or those having been certified by the Minister of Land, Infrastructure, Transport and Tourism (certified structure type). Johkasou having these structures are respectively referred to as standard structure type Johkasou and certified structure type Johkasou.

(Article 35, Enforcement Ordinance, Building Standards Act)

The treatment processes based on the biofilm process and activated sludge process are adopted among all kinds of treatment processes. When selecting the Johkasou treatment process, it is necessary to consider the conditions of the installation location, the discharge standards for the treated effluent, the characteristics of the influent, and the maintainability.

(Section 3.1, Chapter 3, Administrator Text)

In particular, the Johkasou treating the wastewater generated by 501 or more people (201 or more depending on the prefecture) are subject to the Water Pollution Control Act as well as the water quality regulations of the Water Pollution Control Act, or additional wastewater standards issued by prefectures.
(Appendix 1, Article 1, Enforcement Ordinance, Water Pollution Control Act)

**4.3.2 Standard Structure Type Johkasou**

The treatment steps shown in Table 4-1 are defined for the standard structure type Johkasou depending on its scale and required treated effluent quality.
In the structures shown in Table 4-1, the sixth and subsequent structures are defined as treatment processes that can be applied in accordance with the water quality regulations of the Water Pollution Control Act.

**4.3.3 Certified Structure Type Johkasou**

The certified structure type Johkasou has undergone a technical examination related to the Johkasou performance evaluation and has been certified by the Minister of Land, Infrastructure, Transport and Tourism.
Table 4-2 shows the main treatment processes, scales, and performances. For small-scale Johkasou, many types can remove nitrogen and have volumes smaller than those of the certified structure type Johkasou have been certified. The characteristics of these Johkasou are that, in addition to the conventional contact aeration process, the secondary treatment uses a biological filtration process, a moving bed biofilm process, a process that combines the former two, or a membrane separation activated sludge process.
In addition, even for medium- and large-scale Johkasou treating the wastewater of 51 or more people, those that use the oxidation ditch process or the batch type activated sludge process, in addition to those that use the same biological treatment process as small-scale Johkasou for secondary treatment, are certified.
Furthermore, as rural sewerage facilities, the anaerobic filter - contact aeration process, the batch type activated sludge process, and the intermittent aeration type activated sludge process have been certified for the scale of Johkasou treating the wastewater of 51 PE or more.
There are various treatment processes that can be applied in compliance with the water quality regulations of the Water Pollution Control Act.

**Table 4-1: Treatment process, scales and performances of structural example type Johkasou**

| Class | Type of treatment | Treatment process | Number of users for design (5 50 100 200 500 2000 5000) | BOD removal rate | Treatment performance: Effluent quality (mg/ℓ) BOD | COD | T-N | T-P |
|---|---|---|---|---|---|---|---|---|
| 1 | Combined domestic wastewater treatment | Separation-contact aeration process | | 90% or more | 20 or less | — | — | — |
| | | Anaerobic filter-contact aeration process | | | | | — | — |
| | | Denitrification type anaerobic filter-contact aeration process | | | | | 20 or less | — |
| 4 | Flush toilet wastewater treatment | Septic tank process | | 55% or more | 120 or less | — | — | — |
| 5 | | Land infiltration process | | SS: 55% or more | SS: 250 or less | — | — | — |
| 6 | Combined domestic wastewater treatment | Rotating biological contactor process | | 90% or more | 20 or less | 30 or less | — | — |
| | | Contact aeration process | | | | | | |
| | | Trickling filter process | | | | | | |
| | | Extended aeration process | | | | | | |
| | | Conventional activated sludge process | | | | | | |
| 7 | | Contact aeration and trickling filter process | | — | 10 or less | 15 or less | — | — |
| | | Coagulation separation process | | | | | | |
| 8 | | Contact aeration and activated carbon absorption process | | — | 10 or less | 10 or less | — | — |
| | | Coagulation separation and activated carbon absorption process | | | | | | |
| 9 | | Nitrified water recirculation type activated sludge process | | — | 10 or less | 15 or less | 20 or less | 1 or less |
| | | Tertiary treatment type denitrification dephosphorization process | | | | | | |
| 10 | | Nitrified water recirculation type activated sludge process | | | 10 or less | 15 or less | 15 or less | 1 or less |
| | | Tertiary treatment type denitrification dephosphorization process | | | | | | |
| 11 | | Nitrified water recirculation type activated sludge process | | | 10 or less | 15 or less | 10 or less | 1 or less |
| | | Tertiary treatment type denitrification dephosphorization process | | | | | | |
| 12 Emission standard under the Water Pollution Control Law | | Class: 6 - 11 / COD (mg/ℓ): 60 / SS (mg/ℓ): 70 / n-Hex (mg/ℓ): 20 / pH: 5.8–8.6 / Total coliforms (N/mℓ): 3,000 or less | | | | | | |
| | | 6 - 11 / 45 / 60 / 20 / 5.8–8.6 / 3,000 or less | | | | | | |
| | | 6 - 11 / 30 / 50 / 20 / 5.8–8.6 / 3,000 or less | | | | | | |
| | | 7 - 11 / 15 / 15 / 20 / 5.8–8.6 / 3,000 or less | | | | | | |
| | | 8 / 10 / 15 / 20 / 5.8–8.6 / 3,000 or less | | | | | | |

**Table 4-2: Main treatment processes, scales and performances of performance evaluation type Johkasou**

| Treatment process or the popularized name | Capacity (PE) | Performance, mg/L | | |
|---|---|---|---|---|
| | | BOD | T-N | T-P |
| Small-scale N/P removal type johkasou | 5～50 PE | 10, 20 | 10, 20 | (1) |
| Compact type small-scale johkasou | 5～50 PE | 20 | — | — |
| Anaerobic filter - contact aeration process* | 51～2,000 PE | 20 | 20 | — |
| Membrane separation activated sludge process | 5 人 PE or more | 5, 10 | 10 | (0.5、1) |
| Batch type activated sludge process* | 51 人 PE or more | 10, 20 | 10, 15 | (1) |
| Intermittent aeration type activated sludge process※ | 501 PE or more | 10, 20 | 10, 15 | (1) |
| Oxidation ditch process* | 501 PE or more | 20 | 15 | (1) |

* This treatment process is often used in rural sewerage facilities.

## 5. Technical Requirements for Johkasou Installation

### 5.1 General

The scale of the Johkasou to be installed should be such that the load of wastewater discharged from the target buildings and the water quality load shall not exceed the treatment capacity of the Johkasou (usually set in terms of the number of person equivalent (PE) from whom wastewater has to be treated).

When installing a Johkasou, the installation works must be carried out in accordance with the technical standards for Johkasou construction. (article 6, Johkasou Act)

When constructing a Johkasou, a Johkasou installation worker, or a Johkasou contractor with the certification, shall supervise the construction works on the spot. (article 29, Johkasou Act)

### 5.2 Estimation Method of Johkasou Scale According to the Building Scale and Use[7]

Buildings differ in the amount and quality of wastewater discharged depending on the scale and use, as well as the characteristics of wastewater (discharge time, patterns, etc.). It is necessary to determine the scale (PE) and treatment process of the Johkasou to be installed according to the load and characteristics of the wastewater from the building.

There are 11 main types of buildings that discharge domestic wastewater that can be treated by Johkasou.

1) Assembly hall facilities: conference halls, racetracks, gymnasiums, etc.
2) Housing facilities: housing, apartments, elderly homes, etc.
3) Accommodation facilities: hotels, motels, etc.
4) Medical facilities: hospitals, clinics, sanatoriums, etc.
5) Store facilities: supermarkets, department stores, restaurants, coffee shops, etc.
6) Entertainment facilities: amusement parks, golf courses, campgrounds, etc.
7) Parking facilities: service areas, gas stations, parking lots, etc.
8) School facilities: kindergartens, elementary / junior high schools, high schools / universities, libraries, etc.
9) Office facilities: Offices
10) Workplace facilities: factories, laboratories, laboratories, etc.
11) Others: Public toilets, stations, markets, etc.

The details of the calculation method of the number of persons from whom wastewater is to be treated in Johkasou according to the purpose of the building are shown in Annex A.

### 5.3 Technical Standards for Johkasou Construction

The technical standards for Johkasou construction are as follows. (Article 1, Ministry of Land, Infrastructure, Transport and Tourism / Environment Ministry Ordinance, 1985)

1) Prepare drawings and specifications for Johkasou construction.
2) Do not damage the Johkasou.
3) At the start of the construction, fully understand the situation of the site such as the installation location of the Johkasou, the discharge destination and make an appropriate construction.
4) Root cutting work, mountain keeping work, etc. should be done as specified below.
   (a) In the case where it is performed close to a building or another structure, take necessary measures in advance to prevent inclination, collapse, etc. of the structure.
   (b) Do not damage the gas pipes, cables, water pipes, etc. buried underground.
   (c) When conducting root cutting work, take necessary measures in advance to prevent the collapse of the ground, such as setting up a earth training structure, according to the depth of the root cutting work and the conditions of the stratum and groundwater.
   (d) When backfilling, check the levelness of the Johkasou to prevent foreign matter from entering it and perform sufficient compaction.
1) Foundation work should be carried out so that subsidence or deformation of the foundation does not occur depending on the ground conditions. In addition, create records on the foundation situation etc.
2) Concrete should be implanted so that the placement is homogeneous and dense, and it should be properly cured until it reaches the required strength.
3) Take necessary measures to prevent the plant from floating depending on the situation of groundwater, etc.
4) For electrical equipment, make sure that grounding and the like are carried out appropriately, and there is no hindrance on safety and function.
5) Confirm that equipment such as the pump, blower, etc. operates normally.
6) Store the materials and equipment used for the Johkasou construction at the construction site in order to not hinder quality and performance.
7) Take necessary measures to prevent damage caused by ground collapse, material collapse etc. at the construction site.

The standard specifications for Johkasou construction are shown in Annex B.

## 6. Technical Requirements for Johkasou Maintenance and Inspection

### 6.1 General

The maintenance and inspection of Johkasou refers to the inspection and adjustment of Johkasou or the repair work associated with these operations, which shall be carried out in accordance with the "Technical Standards for Maintenance and Inspection of Johkasou". The first maintenance and inspection is carried out immediately before the start of Johkasou use, and then is conducted regularly based on the maintenance and inspection frequency determined in accordance with the scale of the Johkasou and its treatment process. (Article 8, Johkasou Act)

Note: It is necessary to review the contents of maintenance and inspection of Johkasou and the number of inspections according to the regulatory situation and the technical level of each country.

**6.2 Rules for Johkasou Use**

When using a Johkasou, the following restrictions shall be followed. (Article 1, Enforcement Regulations)

1) The water amount for flushing the toilets shall be appropriate.
2) Do not allow pesticides, detergents, deodorants, oils and fats, disposable diapers, sanitary goods, etc. that interfere with the normal functioning of Johkasou to flow in.
3) Do not allow industrial wastewater, rainwater or other particular wastewater other than domestic wastewater to flow in the Johkasou.
4) Do not turn off the power of the electrical equipment, such as the blower and pump, attached to the Johkasou.
5) No structure that may interfere with the operation, maintenance and inspection or desludging of Johkasou shall be put above or around the facility.
6) Do not apply a load on the upper part of the Johkasou that may interfere with its normal functioning.
7) Do not block the opening part of the aerator device.
8) If a failure or malfunction is found in the Johkasou, it shall be immediately notified to the Johkasou manager.

**6.3 Technical Standards for Johkasou Maintenance and Inspection**

The technical standard for maintenance and inspection shall be as follow. (Article 2, Enforcement Regulations)

1) In order to keep the johkasou in normal function, the matters listed as follow should be checked.
   (a) The conditions of compliance with the rules of johkasou use
   (b) The conditions of the connection to inflow conduit and tank, and the connection to outflow conduit and tank
   (c) The conditions of level keeping for the tank
   (d) The status of flow direction of black water, gray water etc. in the inflow conduit
   (e) The condition of installation location of unit equipment and auxiliary equipment
   (f) The condition of generated scum, accumulated sludge, screen clogging, biofilm, and functions of other unit equipment and auxiliary equipment
2) The inflow conduit, pit with invert arch, transportation pipe, transportation hole, overflow weir, outlet and outflow conduit shall not be attached by foreign matters and the screen shall not be blocked.
3) For the inflow pump chamber and the flow equalization chamber, the pump actuation water level and metering device shall be adjusted to make wastewater can be transferred stably
4) For aeration device and agitator, the diffuser shall not be blocked, or no foreign matters attached on the machine agitator
5) The drive unit and pump equipment should work constantly or at a regular interval.
6) The anaerobic filter chamber and denitrification filter chamber shall not cause dead zone and its water level shall not rise abnormally.
7) For contact aeration chamber, nitrification contact chamber, denitrification contact chamber, the dissolved oxygen shall be kept properly and no dead zone caused.
8) For aeration chamber, nitrification chamber and denitrification chamber, the dissolved oxygen and concentration of mixed suspended solids shall be kept properly.
9) The sludge thickening equipment or the sludge dewatering device shall be activated properly.
10) When absorbent, flocculants, adjuster of hydrogen ion concentration, hydrogen donor and other drugs are used, the amount supplied shall be adjusted appropriately.
11) Necessary measures shall be taken to prevent the surrounding living environment from damage by odor, noise and vibration, and to prevent generation of mosquito, flies etc.
12) The effluent (excluding the effluent discharged from underground seepage type johkasou) shall be disinfected to prevent the troubles on environmental health.
13) Equipment for a measuring or recording water amount or water quality shall be operated properly.
14) Other necessary measures shall be taken for keeping the johkasou in normal function in addition to the preceding items.

An example of the standard work for the maintenance and inspection of small-scale Johkasou is shown in Annex C.

**6.4 Frequency of Johkasou Maintenance and Inspection**

Depending on the scale and treatment process of a Johkasou, and the type of mechanical and electrical equipment used in it, the frequency of inspections required to maintain normal operation differs. It is necessary to carry out maintenance and inspections at an appropriate frequency.

When deciding the frequency of maintenance and inspection of Johkasou, attention shall be paid to the following items.

1) Frequency of inspection of the mechanical equipment such as pumps and blowers
2) Frequency of inspection of the screening equipment, and the amount of residue generated from it, and frequency of removal
3) Frequency of disinfectant replenishment

The Johkasou manufacturer shall indicate the maintenance and inspection frequency required to maintain the treatment performance of this facility under normal use conditions.

An example of the inspection frequency of Johkasou is shown in Annex D.

## 7. Technical Requirements for Johkasou Desludging

**7.1 General**

Desludging involves extracting the generated sludge and scum from a johkasou and conditioning sludge in the tank, as well as cleaning tanks and auxiliary equipment. Johkasou desludging shall be done in accordance with the technical standards for johkasou desludging.

(Article 9, Johkasou Act)

**7.2 Technical Standards for Johkasou Desludging**

The technical standards for Johkasou desludging are as follows. (Article 3, Enforcement Regulations)

(Article 3, Enforcement Regulations)

1) Sludge, scum, and intermediate water, etc.in the sludge storage chamber shall be drawn out totally.
2) Sludge, scum, etc. in the sludge thickening-storage chamber shall be drawn out totally after the supernatant is transferred to the flow equalization chamber denitrification chamber, or aeration chamber.
3) Sludge, scum, etc. in the anaerobic filter chamber and denitrification filter chamber shall be drawn totally for the first chamber, and in a proper amount for the other chambers.
4) The sludge, scum, etc. in the sedimentation-separation chamber or flow equalization chamber, the contact aeration chamber, rotating biological contactor chamber, flocculation chamber and sedimentation chamber and disinfection chamber shall be drawn in a proper amount.
5) After drawing out the sludge etc., the unit equipment and auxiliary equipment shall be cleaned as required.
6) In the case of trickling filter type secondary treatment apparatus, the deposit shall be extracted and washed to prevent the inhibition of function for filter biofilm.
7) For inflow conduit, pit with invert arch, screen, waterway channel, transportation pipe, overflow weir, diffuser, machine agitator, outlet and outflow conduit, the extraneous matter and deposits shall be drawn and cleaned.
8) Water used for washing a tank interior shall be drawn. However, the water used for washing the tank other than an anaerobic filter tank, denitrification filter tank, disinfection chamber could be used as the filling water of sedimentation- separation chamber.
9) Chambers other than sedimentation separation chamber shall be fill with tap water.
10) For sludge, scum, etc. drawn from johkasou, necessary measures shall be taken for further appropriate treatment.
11) Other necessary measures shall be taken for keeping the johkasou in normal function in addition to the preceding items.

An example of Johkasou desludging work is shown in Annex E.

**7.3 Desludging Frequency of Johkasou**

Johkasou shall be desludged once a year. However, depending on the scale, the treatment process of the Johkasou and the capacity of the sludge storage tank based on the sludge removal plan, desludging may be more frequently required than once a year.

The Johkasou manufacturer shall indicate the sludge storage capacity for maintaining the treatment performance of the Johkasou it manufactured, and indicate the criteria for determining the desludging timeline.

## 8. Management of Data Related to Johkasou

**8.1 General**

Prefectures need to collect information on the status of Johkasou installation and accurately understand the implementation status of operation and maintenance. The Johkasou ledger containing this information is used to create a Johkasou maintenance plan, which provides guidance to Johkasou-related businesses and Johkasou managers. In addition, it enables the analysis of the effects of Johkasou installation, the sharing of information among related parties, and the improvement of the treatment function.

**8.2 Creation of the Johkasou Ledger**

Prefectures shall create a Johkasou ledger for each Johkasou installed in their jurisdiction.

(Article 49, Paragraph 1, Johkasou Act)

The matters to be recorded in the Johkasou ledger are as follows.

(Article 57-2, Paragraph 1, Enforcement Regulations)

(a) Location of the land where the Johkasou is located and the name or the designation of the Johkasou manager
(b) Installation notification date, Johkasou type and other installation-related matters
(c) Date of start of use, date of suspension of use, and other matters related to use
(d) Matters concerning the implementation status of maintenance and inspection
(e) Matters concerning the implementation status of desludging
(f) Implementation status of regular inspections on water quality
(g) Other matters that can be used as a reference regarding the Johkasou management

**8.3 Records of Maintenance and Desludging**

The Johkasou manager shall keep a record of the maintenance and desludging operations.

When the Johkasou manager entrusts a professional for maintenance inspections and desludging, this person (hereinafter referred to as "the consignee") shall create a record of maintenance inspections and desludging, and deliver it to the Johkasou manager.

When the consignee intends to issue a maintenance inspection and desludging record to the johkasou manager, he/she must explain the content.

Records of maintenance and inspection, and desludging of Johkasou shall be recorded using paper media or electronic media.

Johkasou managers and the consignee shall keep records of Johkasou maintenance and inspection, and desludging for three years.

(Article 5, Enforcement Regulations)

Examples of Johkasou maintenance and inspection record, as well as desludging record are shown in Annex F and Annex G.

## 9. Registration and Approval of Businesses Related to Johkasou

### 9.1 Registration Related to Johkasou Construction Business

**9.1.1 Registration** (Article 21, Johkasou Act)

A corporate body that intends to join the Johkasou construction business shall receive the registration from the governor of the prefecture where the Johkasou construction business is to be conducted.

The validity period of the construction business registration prescribed in the preceding paragraph shall be five years.

A corporate body that intends to continue the Johkasou construction business after the expiration of the validity period shall obtain a registration renewal.

The registered Johkasou construction vendor shall have a qualified Johkasou Installation Worker to engage in Johkasou construction works.

**9.1.2 Application for Registration** (Article 22, Johkasou Act)

A corporate body that intends to receive the registration for the Johkasou construction business (hereinafter referred to as "the applicant") shall apply documents containing the following matters to the prefectural governor.

(a) Name and address, in case of a corporation: the name of its representative(s).
(b) Name and address of business office
(c) Name of Johkasou Installation Worker, and the number of the certification as Johkasou Installation Worker issued to him.

### 9.2 Registration Related to Johkasou Maintenance and Inspection Business

**9.2.1 Registration** (Article 48, Johkasou Act)

Prefectural governments may establish a registration system for registering vendors that intend to join the operation and maintenance business of Johkasou by a prefectural ordinance. The following matters shall be stipulated in the ordinance.

(a) Matters concerning the validity period of the registration within 5 years.
(b) Matters concerning the equipment to be prepared
(c) Matters concerning the establishment of Johkasou managers and securing training opportunities for them

Johkasou maintenance and inspection vendors that are registered shall have persons who have the certification of Johkasou Operator to engage in the maintenance and inspection of Johkasou.

A corporate body that intends to continue the Johkasou maintenance and inspection business after the expiration of the registration validity period shall receive the renewal registration.

**9.2.2 Application for Registration**

A corporate body that intends to be registered as a Johkasou maintenance and inspection business (hereinafter referred to as "the applicant") shall apply documents containing the following matters to the prefectural governor.

(a) Name and address or name of the representative
(b) Name and location of business office
(c) Name of the Johkasou Operator and license number of the Johkasou Operator

(Created with reference to the Saitama Prefecture Johkasou Maintenance and Inspection Vendor Registration Ordinance)

**9.2.3 Possession of Johkasou Maintenance and Inspection Instruments**

Johkasou maintenance and inspection vendors must be equipped with the necessary equipment for Johkasou maintenance and inspection. The instruments required for maintenance and inspection of Johkasou is as follows.

(a) Water temperature measuring instrument
(b) Hydrogen ion concentration index measuring instrument
(c) Dissolved oxygen concentration measuring instrument
(d) Nitrite nitrogen measuring instrument
(e) Chloride ion concentration measuring instrument
(f) Residual chlorine measuring instrument
(g) Mixed suspended solids concentration measuring instrument
(h) Sludge volume measuring instrument
(i) Scum, sludge thickness measuring instrument
(j) Transparency measuring instrument
(k) Level measuring instrument
(l) Sludge return instrument

(Created with reference to the Saitama Prefecture Johkasou Maintenance and Inspection Vendor Registration Ordinance Enforcement Regulations)

### 9.3 Approval for Johkasou Desludging Business

**9.3.1 Approval** (Article 10, Enforcement Regulations)

A corporate body that intends to join the Johkasou desludging business shall get an approval from the mayor of the municipality where the johkasou desludging business is to be conducted.

The desludging approval is valid for up to 5 years.

A corporate body that intends to continue the Johkasou desludging business after the expiration of the approval shall obtain an approval renewal.

**9.3.2 Application for Approval** (Article 10 of the Enforcement Regulations)

A corporate body that intends to obtain an approval for the Johkasou desludging business (hereinafter referred to as "the applicant") must apply documents containing the following matters to the relevant local government minister.

(a) Name and address or, in case of a corporation, the name of its representative(s)

(b) Address of business office

(c) Name of the Johkasou desludging technician and license number of the Johkasou desludging technician

**9.3.3 Technical Standard for Johkasou Desludging Business Approval** (Article 11, Enforcement Regulations)

The technical standard for Johkasou desludging business approval mandates the following.

(a) Have instrument for measuring scum and sludge thickness, self-priming pump and other equipment suitable for withdrawing the generated scum and sludge from the Johkasou

(b) Have thermometer, transparency meter, hydrogen ion concentration index measuring instrument, sludge sedimentation test device and other equipment suitable for conditioning sludge in the tank after desludging the generated sludge, scum and other wastes from the Johkasou

(c) Have pipe and slot cleaning equipment, filter cleaning equipment and other equipment for washing or cleaning unit equipment and auxiliary equipment suitable for conditioning sludge in the tank after desludging the generated sludge, scum and other wastes from the Johkasou

(d) Have the presence of a Johkasou desludging technician

## 10. Legal Inspection of Johkasou and Appointment of the Johkasou Designated Inspection Agency

### 10.1 General

Legal inspections of Johkasou are divided into two main tasks. The first is to check the suitability of the installation works and the functioning status of the Johkasou at an early stage after installation, while the other consists of regular inspections to judge whether maintenance and inspection, and desludging are properly carried out. The legal inspections of Johkasou are to be carried out by a designated inspection agency appointed by the prefectural governor.

Note: For legal inspection of Johkasou installed overseas, it is necessary to consider the implementation system and method which depend on the actual situation locally, the regulatory situation and the technical standards of each country.

### 10.2 Appointment of the Johkasou Designated Inspection Agency

**10.2.1 Appointment Application** (Article 54, Enforcement Regulations)

The designated inspection agency shall be appointed after the application of a person who intends to execute the business related to water quality inspection (hereinafter referred to as "the inspection business").

A person who intends to apply shall submit the necessary application documents to the governor of the prefecture where the inspection business is to be carried out.

**10.2.1 Appointment Standard** (Article 55, Paragraph 1, Enforcement Regulations)

The prefectural governor shall not appoint a designated inspection agency unless the application meets the following requirements.

(a) The implementation plan of the inspection business, including the employees, facilities, methods of implementing the inspection business and other matters, is appropriate for the proper and reliable implementation of the inspection business.

(b) Accounting and technical foundations, which are necessary for a proper and reliable implementation of the plan for the inspection business, are provided.

(c) It is necessary and appropriate for the applicant to carry out the inspection business in light of the number of Johkasou installed in the area where the work is performed and the situation related to the inspection business in the area.

(d) The amount of the inspection fee shall be an amount regarded as reasonable.

(e) Johkasou inspectors shall be assigned.

(f) The following measures have been taken to ensure the reliability of the water quality inspections.

1) A full-time manager who is recognized as having the same or higher ability as a Johkasou inspector is assigned to the department that inspects water quality.

2) Documents on management of the inspection business and ensuring accuracy have been prepared.

3) In accordance with the description in the listed documents, there is a department that exclusively manages the inspection business and ensures accuracy.

(g) The applicant is a general incorporated association or general foundation.

### 10.3 Legal Inspection of Johkasou

**10.3.1 Inspection after Installation** (Article 7, Johkasou Act)

For a newly installed Johkasou, the Johkasou manager shall have his Johkasou undergo a water quality inspection by a designated inspection agency within a certain period of time.

The designated inspection agency shall submit a report to the prefectural governor promptly after operating the inspection on water quality.

**10.3.2 Periodic Inspection**

The Johkasou manager shall have his Johkasou undergo a water quality inspection conducted by a designated inspection agency once a year.

The designated inspection agency shall submit a report to the prefectural governor promptly after operating the inspection on water quality.

### 10.4 Items and Methods of Johkasou Legal Inspection

**10.4.1 Inspection after Installation** (Notification No. 64, Ministry of the Environment 2007)

1) Visual inspection

In the inspection immediately after the Johkasou is installed, the following items shall be observed by looking at the installation conditions of the Johkasou, visually observing the interior of the Johkasou, and using other necessary methods.

(a) Installation status
(b) Equipment operation status
(c) Situation of water flow
(d) Use status
(e) Occurrence of foul odors
(f) Implementation status of disinfection
(g) Occurrence of mosquitoes, flies, etc.

2) Water quality inspection

The water quality inspection shall be conducted on the following items. The measurement method for each item is to be determined separately.

(a) Hydrogen ion concentration
(b) Sludge volume of activated sludge (limited to activated sludge type Johkasou)
(c) Dissolved oxygen amount
(d) Transparency
(e) Residual chlorine concentration (limited to the Johkasou that use chlorine agents to disinfect discharged water)
(f) Biochemical oxygen demand

**10.4.2 Periodic Inspection** (Notification No. 64, Ministry of the Environment 2007)

1) Visual inspection

Comply with 1) of 10.4.1

2) Water quality inspection

Comply with 2) of 10.4.1

## 11. Training for Johkasou Technical Qualifications

### 11.1 General

Those who intend to engage in the construction, maintenance and inspection, and desludging of Johkasou, as well as the legal inspection, shall take a course to become technically qualified professionals who have the expert knowledge needed to carry out their respective duties.

The Johkasou designated training agency appointed by the competent minister shall conduct these trainings.

The technically qualified personnel for Johkasou are Johkasou installation workers, Johkasou operators, Johkasou technical supervisors, Johkasou desludging technicians, and Johkasou inspectors.

### 11.2 Appointment of the Johkasou Training Agency

**11.2.1 Appointment Application** (Article 48, Enforcement Regulations)

The Johkasou training agency shall be designated from the application of the institution that intends to carry out the training work, pursuant to the provisions of the ordinance of the competent ministry.

**11.2.2 Appointment Standard** (Article 43-18, Johkasou Act)

The competent minister shall not designate a training agency unless it is found that the application of the institution that intends to carry out the training work meets the following requirements.

(a) The applicant has an appropriate plan for the proper and reliable implementation of the training work regarding staff, equipment, the method of implementation and other matters.
(b) The applicant has the necessary financial and technical foundations for the proper and reliable implementation of the plan for the training work.
(c) The applicant is a general incorporated association or a general incorporated foundation.

### 11.3 Training Course for Qualifying Johkasou Operators

**11.3.1 Positioning of the Course**

This course focuses on the knowledge and skills necessary for Johkasou maintenance and inspection, based on the qualification system for "Johkasou Operators", which is the qualification of those engaged in the Johkasou maintenance and inspection work stipulated by the Johkasou Act.

**11.3.2 Qualification**

There are no qualification requirements such as educational background and work experience.

**11.3.3 Course Subjects** (Article 41, Enforcement Regulations)

1) The subjects, hours, and main content of each subject are as follows.

| Subject | Hours | Main content |
|---|---|---|
| (1) Introduction to Johkasou | 8 | • Conservation of the living environment<br>• Basic knowledge for wastewater treatment on physics, chemistry and biology<br>• Basic knowledge on water quality<br>• Principles of wastewater treatment |
| (2) Johkasou administration | 4 | • Current status of domestic wastewater treatment and the diffusion of Johkasou |

| | | |
|---|---|---|
| | | • Johkasou Act and other laws related to Johkasou |
| (3) Johkasou structure and function | 22 | • Methods to plan and design Johkasou<br>• Structure and function of the standard structure type and certified structure type Johkasou<br>• Structure and function of Johkasou equipment |
| (4) Introduction to Johkasou construction | 4 | • Way to read Johkasou drawings and construction procedures |
| (5) Inspection, adjustment and repair of Johkasou | 30 | • Significance and inspection method for Johkasou maintenance and inspection, evaluation method of treatment function<br>• Measures against the sanitary pests and odors generated in Johkasou |
| (6) Water quality management | 10 | • Measurement significance and method of water quality measurement items |
| (7) Introduction to Johkasou desludging | 2 | • Significance and methods of Johkasou desludging |

2) Those who are qualified as Johkasou installation workers are exempted from the subjects of introduction to Johkasou and introduction to Johkasou construction.

**11.4 Training Course for Qualifying Johkasou Installation Workers**

**11.4.1 Positioning of the Course**

This course focuses on the knowledge and skills necessary for the Johkasou construction based on the qualification system for "Johkasou Installation Workers", which is the qualification of the professional who actually supervises the Johkasou construction stipulated by the Johkasou Act.

**11.4.2 Qualification**

Person who has a qualification on plumbing construction management.

**11.4.3 Course Subjects** (Article 7, Ministerial Ordinance on Johkasou Installation Workers)

1) The subjects, hours, and main content of each subject are as follows.

| Subject | Hours | Main content |
|---|---|---|
| (1) Introduction to Johkasou | 8 | Same as 1) (1) of 11.3.3 |
| 2) Regulations | 3 | Same as 1) (2) of 11.3.3 |
| (3) Johkasou structure and function | 15 | • Ways to plan and design Johkasou<br>• Structure and function of the standard structure type and certified structure type Johkasou |
| (4) Johkasou construction management method | 8 | • Procedures for Johkasou construction<br>• Structure and function of Johkasou equipment |
| (5) Introduction to Johkasou maintenance and inspection, and desludging | 3 | • Overview of Johkasou maintenance and inspection and desludging |

2) Those who are qualified as Johkasou operators are exempted from the subjects of introduction to Johkasou, Johkasou maintenance and inspection, and introduction to desludging.

**11.5 Course for Johkasou Technical Supervisors**

**11.5.1 Positioning of the Course**

(Notification No. 376 for Johkasou technical Supervisors, Measures for Wastewater, 2001/9/25)

This course provides training that enables the participants to be recognized as having the same or higher knowledge and skills of a person and has more than two years of practical experience in technical work related to maintenance and inspection, and desludging of Johkasou with 501 PE or more.

**11.5.2 Qualification**

Person who has a qualification as Johkasou operator.

**11.5.3 Course Subjects**

1) The subjects, hours, and main content of each subject are as follows.

| Subject | Hours | Main content |
|---|---|---|
| (1) Role of Johkasou technical supervisor | 3 | • Conservation of the living environment<br>• Johkasou Act and other laws related to Johkasou |
| (2) General supervision | 4 | • Work content of the Johkasou technical supervisor |
| (3) Basic knowledge for | 4 | • Structure and function of Johkasou with 501 PE or more |

| | | |
|---|---|---|
| facility management | | • Structure and function of Johkasou equipment |
| (4) Management technology | 5 | • Significance and methods for maintenance and inspection, and desludging of Johkasou with 501 PE or more |
| (5) Repair/ improvement of Johkasou and equipment | 2 | • Repair of Johkasou's body and equipment, improvement of existing Johkasou |
| (6) Data processing technology | 2 | • Statistical analysis method of data obtained in maintenance and inspection, and desludging |

**11.6 Course for Johkasou Inspectors**

**11.6.1 Positioning of the Course** (Article 55-1, Enforcement Regulations)

This course provides training to acquire expert knowledge and skills on Johkasou inspection, which are shown in the designated standard of the designated inspection agency.

**11.6.2 Qualification**

Person who has a qualification as Johkasou operator or a person whose educational background and years of work experience meet certain criteria.

**11.6.3 Course Subjects**

1) The subjects, hours, and main content of each subject are as follows.

| Subject | Hours | Main content |
|---|---|---|
| (1) Johkasou administration | 2 | • Johkasou Act |
| (2) Wastewater treatment principles | 3 | • Basic knowledge for wastewater treatment on physics, chemistry and biology<br>• Basic knowledge on water quality<br>• Principles of wastewater treatment |
| (3) Structural standards | 6 | • Methods of plan and design Johkasou<br>• Structure and function of the standard structure type and certified structure type Johkasou<br>• Structure and function of Johkasou equipment |
| (4) Johkasou maintenance / inspection and cleaning | 4 | • Significance and methods for maintenance and inspection and desludging of Johkasou<br>• Hygiene and safety measures for maintenance and inspection, and desludging |
| (5) Johkasou installation | 4 | • Johkasou installation plan<br>• Procedures for Johkasou construction |
| (6) Visual inspection | 5 | • Visual inspection method and criteria |
| (7) Water quality inspection | 4 | • Water quality inspection method and criteria |
| (8) Document inspection | 3 | • Document inspection method and criteria |
| (9) Comprehensive judgement | 5 | • Method to comprehensively judge the results of visual inspection, water quality inspection and document inspection |
| (10) Comprehensive practice | 6 | • Practice for comprehensive judgement |

2) Those who are qualified as Johkasou operator are exempted from the subjects of wastewater treatment principles, structural standards, maintenance and inspection, and desludging.

**11.7 Course for Johkasou Desludging Technicians**

**11.7.1 Positioning of the Course** (Article 11, Enforcement Regulations)

This course provides training to acquire expert knowledge and skills on Johkasou desludging.

**11.7.2 Qualification**

Those who have more than 2 years of practical experience in desludging Johkasou.

**11.7.3 Course Subjects**

1) The subjects, hours, and main content of each subject are as follows.

| Subject | Hours | Main content |
|---|---|---|
| (1) Public health, environmental conservation and introduction to Johkasou administration | 6 | ・Conversation of the living environment<br>・Current status of domestic wastewater treatment and Johkasou diffusion<br>・Johkasou Act and other laws related to the Johkasou Act |

| | | |
|---|---|---|
| (2) Basic knowledge, wastewater treatment principles | 7 | ・Basic knowledge on wastewater treatment physics, chemistry and biology<br>・Basic knowledge on water quality<br>・Principles of wastewater treatment |
| (3) Johkasou structure and function | 20 | ・Johkasou planning and design method<br>・Structure and function of the standard structure type and certified structure type Johkasou |
| (4) Desludging | 26 | ・Significance of Johkasou desludging and desludging methods<br>・Generation amount of the sludge collected from Johkasou and volume reduction technology for johkasou desludging<br>・Structure and function of the treatment facility of the sludge collected from Johkasou |
| (5) Hygiene and safety measures | 2 | ・Hygiene and safety measures for desludging work |



Annex A (Informative)

## Estimation of population for johkasou of buildings (JIS A 3302:2000)

1 Scope
This standard provides estimation of population for johkasou of buildings.

2 Estimation of population for johkasou of buildings
Estimation of population for johkasou of buildings is shown under table. But it can to be changed to increasing or decreasing of estimation of population for being unfit for actual situation.

3 Application for special buildings
3.1 For a building that its use is not listed in Table, the PE could be determined using formula for buildings used in similar use.
3.2 For a building with two or more kinds of different building uses, the PE will be the sum of PE obtained by the formula for each building use.
3.3 For a johkasou serving two or more buildings, its capacity shall be determined by summing the PE obtained for each building.
3.4 When used for two or more different building purposes by moving personnel in the building at school or elsewhere, it is possible to reduce the number of personnel to be processed according to the building purpose for each additional building or application of 3.2 and 3.3.

| Cat. | Building use | | | | Number of users for design (PE) | |
|---|---|---|---|---|---|---|
| | | | | | Formula | remarks |
| 1 | Gathering place facilities | a | Public assembly hall, theatre, cinema house, and entertain | | n=0.08A | n: PE<br>A: total floor area($m^2$) |
| | | b | Cycling stadium, racecourse and motorboat racecourse | | n=16C | n: PE<br>$C^{(1)}$ : total number of toilet stools (piece) |
| | | c | Stand, and gymnasium | | n=0.065A | n: PE<br>A: total floor area($m^2$) |
| 2 | Living accommodation | a | Individual house | A≦130 | n=5 | n: PE<br>A: total floor area($m^2$) |
| | | | | A>130 | n=7 | |
| | | | | two kitchen and two bathrooms | n=10 | |
| | | b | Residential complexes | | n=0.05A | n: PE *<br>A: total floor area($m^2$) |
| | | c | Loading house and dormitory | | n=0.07A | n: PE<br>A: total floor area($m^2$) |
| | | d | School dormitory, nursery homes, Self Defense Force camp | | n=P | n: PE<br>P: occupancy load limit (person) |
| 3 | Accommodation facility | a | Hotels | with wedding halls | n=0.15A | n: PE<br>A: total floor area ($m^2$) |
| | | | | without wedding halls | n=0.075A | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | b | Motel | | | n=5R | n: PE<br>R: number of guest room |
| | | c | Hostels | | | n=P | n: PE<br>P: occupancy load limit (person) |
| 4 | Medical facility | a | Hospital | with kitchens and/or laundry service | less than 300 beds | n=8B | n: PE<br>B: number of bed(bed) |
| | | | | | Equal or more than 300 beds | n=11.43(B-300)+2,400 | |
| | | | | without kitchens and/or laundry service | less than 300 beds | n=5B | |
| | | | | | Equal or more than 300 beds | n=7.14(B-300)+1,500 | |
| | | b | Dispensary, doctor’s office | | | n=0.19A | n: PE<br>A: total floor area($m^2$) |
| 5 | Shops & stores | a | Stores, supermarkets | | | n=0.075A | n: PE<br>A: total floor area($m^2$) |
| | | b | Department stores | | | n=0.15A | |
| | | c | Restaurants | | normal pollutant loads | n=0.72A | |
| | | | | | high pollutant loads | n=2.94A | |
| | | | | | low pollutant loads | n=0.55A | |
| | | d | Coffee shop/ tea house | | | n=0.80A | |
| 6 | Amusement facility | a | Billiard room, and table tennis room | | | n=0.075A | n: PE<br>A: total floor area($m^2$) |
| | | b | Pinball house | | | n=0.11A | |
| | | c | GO club, and mah-jongg saloon | | | n=0.15A | |
| | | d | Disco house | | | n=0.50A | |
| | | e | Golf practice range | | | n=0.25S | n: PE<br>S: number of driving seat(seat) |
| | | f | Bowling house | | | n=2.50L | L: number of lanes(lane) |
| | | g | batting practice range | | | n=0.20S | n: PE<br>S: number of batting seat(seat) |
| | | h | Tennis Court | | with night game facility | n=3S | n: PE<br>S: number of courts (court) |
| | | | | | without night game facility | n=2S | |
| | | i | Amusement parks | | | n=16C | n: PE<br>$C^{(1)}$: number of toilet stools(piece) |
| | | k | Swimming pools, skate parks | | | n= (20C+120U) ÷ 8×t | n: PE<br>C: number of toilet stools(piece)<br>$U^{(3)}$: number of urinals(piece)<br>t: one day average use time per unit toilet stool(piece) t=1.0 to 2.0 |
| | | l | Camp sites | | | n=0.56P | n: PE<br>P: occupancy load limit(person) |
| | | m | Golf courses | | | n=21H | n: PE<br>H: number of holes(hole) |
| 7 | Parking facility | a | Service Area | Lavatory | normal area | n=3.60P | n: PE<br>P: number of squares |
| | | | | | sightseeing area | n=3.83P | |
| | | | | | without store | n=2.55P | |
| | | | | Store | normal area | n=2.66P | |
| | | | | | sightseeing area | n=2.81P | |
| | | b | Parking area and garage | | | n= (20C+120U) ÷ 8×t | n: PE<br>C: number of toilet stools(piece)<br>$U^{(3)}$: number of urinals(piece)<br>t: one day average use time per unit toilet stool(piece)<br>t=0.4 to 2.0 |
| | | c | Gasoline stand | | | n=20 | n: PE per unit business place |
| 8 | School | a | Preschool, elementary school, junior high school | | | n=0.20P | n: PE<br>P: occupancy load limit (person) |
| | | b | High school, university and college | | | n-0.25P | |
| | | c | Libraries | | | n=0.08A | n: PE<br>A: total floor area($m^2$) |
| 9 | Offices | a | Office | with kitchen equipment | | n=0.075A | n: PE<br>A: total floor area($m^2$) |
| | | b | | without kitchen equipment | | n=0.06A | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | Workplace | a | Workplace | with kitchen equipment | n=0.75A | n: PE<br>A: total floor area($m^2$)<br>P: occupancy load limit (person) |
| | | b | | without kitchen equipment | n=0.30P | |
| 11 | Others | a | Market | | n=0.02A | n: PE<br>A: total floor area($m^2$) |
| | | b | Pubic bath house | | n=0.17A | |
| | | c | Public lavatory | | n=16C | n: PE<br>$C^{(1)}$: number of toilet stools(piece) |
| | | d | Station and bus terminal | P<100,000 | n=0.008P | n: PE<br>P: number of passengers (person/day) |
| | | | | 100,000≦P<200,000 | n=0.010P | |
| | | | | 200,000 ≦P | n=0.013P | |

* However, n per dwelling (refer to note (2)) will be 3.5 PE when the calculated n is smaller than 3.5 PE, or will be 2 PE when the dwelling is only one room, and will be 6 PE when the calculated n is larger than 6.0 PE.

Note

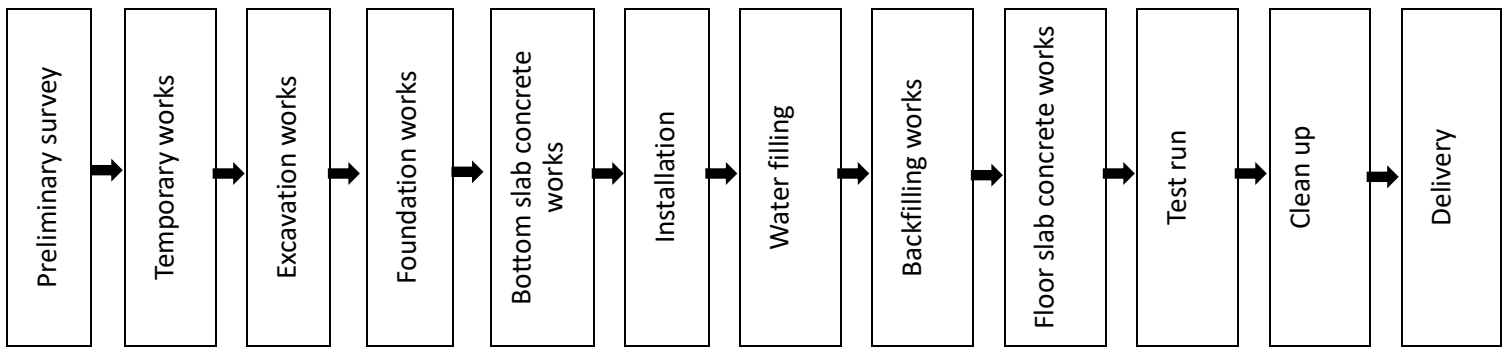
(1) Total number of toilet stools is total sum of the number of closet bowls, the number of urinals and the number of double use toilet stools

(2) The dwelling herein, which is the living room specified by the definitions of Building Standard Act, means a room continuously used for the purpose of dwelling, execution of one's business, operation, meeting, pleasure or the like.

(3) In the case of lavatory for ladies exclusively, about one half of the number of toilet stools is considered as urinals.

## Annex B (Informative) Standard specifications for Johkasou construction

The standard construction procedures for factory-produced Johkasou is as follows.




(a) Preliminary survey

After confirming the drawings of the Johkasou in advance, assess the situation at the site where the Johkasou is to be installed, and check the height of the ground and the situation at the point of discharge.

(b) Temporary works

Level the ground, tie a rope to determine the position of the Johkasou, and determine the level, position, and direction from the reference point. In addition, secure the necessary power supply and the water needed for construction.

(c) Excavation works

Dig a hole of the size required to install the Johkasou body. Earth retaining works may be required depending on the characteristics of the soil or subsoil at the installation site. Excavation on sites with high ground water levels requires dewatering.

(d) Foundation works

Lay down a layer of rubble (12 to 15 cm of crushed stones used for the foundation buildings) that is sufficiently compacted to keep the Johkasou body horizontal and prevent the ground from sinking or rising. After pouring leveling concrete, pour the base-plate reinforced concrete to facilitate the horizontal installation of the Johkasou and to transmit its weight and superstructure to the ground.

(e) Bottom slab concrete works

To ease the horizontal installation of the Johkasou body, cast the concrete bottom slab to transmit the load of the body to the ground.

(f) Installation

Install the Johkasou body in the assigned location, making sure that it is placed horizontally.

(g) Water filling

Fill the tank with tap water to protect it against damage or deformation during backfilling and prevent movement, and then check the level and potential water leakage.

(h) Backfilling works

First, tamp down the lower half and compact the earth by pouring water (sprinkle water to compact the compact the ground). Then, tamp down the upper half in the same way and fill in the space with earth to the level of the bottom of the inflow and outflow pipes.

(i) Pipe connection

After sufficiently compacting the piping pathway section, fill in with earth and connect the inflow and outflow pipes, and air pipe. Pay attention to the gradient of inflow and outflow pipes when installing them. Install the pipes and access pit and backfill the earth.

(j) Floor slab concrete works

Cast a concrete slab on top of the Johkasou body to facilitate maintenance and inspection, prevent the penetration of rainwater, and keep the Johkasou from rising. This work can also be done after backfilling or connecting the pipes.

(k) Installation of auxiliary equipment

Install auxiliary equipment, such as blowers and pumps, in their designated position. The blower and other equipment that may generate vibration or noise must be installed after preparing the appropriate foundations. In addition, provide a Johkasou with waterproof power supply especially designed for the Johkasou unit, and be sure to ground it to the earth.

(l) Test run

After the construction works is completed, check whether each unit equipment in the Johkasou and its auxiliary equipment operates properly. At the same time, also check again the level of the facility and ensure that there are no water leaks and that the flow of water is correct.

(m) Clean up (disposal of residual earth)

Except for the necessary earth and sand, dispose of the excess residual sand and earth by transporting it to designated areas.

(n) Delivery

Deliver the Johkasou to the Johkasou manager (Johkasou owner/user) together with the necessary documents after confirming that it operates properly. The details of how to use the Johkasou and the management of maintenance and inspection, and desludging shall be explained to the Johkasou manager.

## Annex C (Informative) Example of Johkasou maintenance and inspection

The content of the maintenance and inspection work of Johkasou for individual houses under normal use conditions is as follows.

(a) Inspection of how wastewater flows

Check the flow of wastewater in each unit equipment and check if there is any clogging in the transportation part.

(b) Measurement of transparency (check of treated effluent quality)

Measure the transparency, pH, etc. of the sedimentation tank effluent to determine whether the treatment is being performed properly.

(c) Disinfection tank

Check the residual amount of chlorine agent in the chlorine tablet holder and measure the residual chlorine in the discharged effluent. In addition, replenish chlorine tablets in the holder.

(d) Biological reaction tank (contact aeration tank)

Measure the water temperature, transparency, pH, dissolved oxygen concentration, etc. of the wastewater in the tank, and check the amount and color of the biofilm attached to the contact material. Based on this result, if it is determined that the biofilm is thickened, backwashing is performed to forcibly slough the biofilm. The sloughed sludge is then transferred using a pump to primary treatment equipment, such as the anaerobic filter tank etc.

(e) Measurement of scum and accumulated sludge thickness

If the scum and accumulated sludge thickness in the primary treatment equipment (anaerobic filter tank, sedimentation separation tank, etc.) are measured and it is determined that the sludge amount is approaching the limit of the storage capacity, the maintenance vendor shall notify the Johkasou manager or the Johkasou desludging vendor contracted by the Johkasou manager that desludging is required.

If scum or accumulated sludge is found in the sedimentation tank, they shall be transferred to the primary treatment equipment.

(f) Measurement of the circulating water amount

For Johkasou capable of removing nitrogen, measure the amount of circulating water and adjust it to an appropriate amount.

(g) Blower

Conduct inspection and adjustment of each part, such as the inspection and cleaning of the air filter, based on the specifications.

(h) Creation of records and explanation of inspection results

Create a maintenance inspection record based on the inspection results, explain the content, and hand it over to the Johkasou manager. At that time, inform the Johkasou manager if there are any precautions needed for the use of the Johkasou.

**Annex D (Informative)　Example of Johkasou maintenance and inspection frequency**

In the case of a newly installed Johkasou, the first maintenance and inspection is performed right before the use of the Johkasou. The purpose of this inspection is to check whether the number of people, from whom wastewater is to be treated, and the treatment process of the installed Johkasou are appropriate, whether the construction has been executed properly, and whether the treatment is being carried out immediately after the inflow of wastewater. After checking these points through this maintenance inspection, it is necessary to start using the Johkasou.

The second and subsequent maintenance inspections shall be carried out at least once for each period listed in Table 1 under normal operating conditions.

Table 1　Examples of Johkasou maintenance and inspection frequency

| Treatment process | Type of Johkasou | Period |
|---|---|---|
| Separation-contact aeration process, anaerobic filter-contact aeration process or denitrification type anaerobic filter-contact aeration process | 1 Johkasou with a size less than 20 PE | 4 months |
| | 2 Johkasou with a size more than 21 PE and less than 50 PE | 3 months |
| Activated sludge process | | 1 week |
| Rotating biological contactor process, contact aeration process or trickling filter process | 1 A johkasou with sand filter device, activated carbon adsorption device or flocculation tank | 1 week |
| | 2 A johkasou with screen and flow equalization chamber or flow equalization tank (excluding the johkasou listed in 1) | 2 weeks |
| | 3 A johkasou other than the johkasou listed in 1 and 2. | 3 months |
| Remark:　The number of PE in this table shall be estimated based on the Japanese Industrial Standards "Estimation of population for johkasou of buildings (JIS A 3302:2000)". In this case, the fraction less than 1 PE shall be rounded up. | | |

**Annex E (Informative)　Example of Johkasou desludging work**

The content of the desludging work of a Johkasou (anaerobic filter - contact aeration process) for an individual house is as follows.

(a)　Sludge withdrawal from the primary treatment equipment (anaerobic filter tank, settling separation tank, etc.)

Sludge etc. are drawn out according to the functioning and characteristics of each unit device. The collected amount is indicated to be "total amount" or "appropriate amount".

(b)　Check for damage in the tank

During maintenance inspection, it is difficult to have a clear picture of the underwater condition because the water level in the tank is not lowered. Therefore, check the inside of the tank for damage at the time of desludging.

(c)　Cleaning of attached matters, etc.

Pull out and clean the deposits (other than scum and sludge) on the accessories and unit equipment.

(d)　Water filling

After cleaning, fill the facility with tap water etc. to the designated water level. In principle, the water used to wash the unit equipment is drawn out. As an exception, the washing water that does not interfere with the function of the primary treatment equipment, may be used as filling water.

(e)　Creation of records and explanation of results

Create a desludging record, explain its contents, and hand it over to the Johkasou manager. At that time, inform the Johkasou manager about any precautions needed for the use of the Johkasou.

Annex F (Informative)　An Example of Johkasou Maintenance and Inspection Record

**Maintenance and Inspection Record Sheet for Small-scale Johkasou**

| | | | |
|---|---|---|---|
| Facility name | | Manufacturer and model of Johkasou | |
| Building use | | Treatment process | |
| Johkasou manager (Johkasou owner) name | | Maintenance and inspection company | |
| N/A | | Company address | |
| Johkasou manager (Johkasou owner) address | | Person in charge | |
| Johkasou manager (Johkasou owner) telephone number | - - | Company telephone number | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Last maintenance&inspection date and time | Y | 01 | M | 01 | D | 13 | H | | | | |
| maintenance&inspection date and time | Y | 05 | M | 01 | D | 01 | H | | | | |
| Last desludging date | Y | 11 | M | 11 | D | 11 | H | | | | |
| Number of PE | PE | | | | | | | | | | |

**1 Use conditions**

| | | | | |
|---|---|---|---|---|
| Number of johkasou user/PE rate (BOD load) | 0 | PE rate | 0 | |
| Average daily wastewater amount | | Reading value | | $m^3$ |
| (from water meter : $m^3$/d) | | Calculation result | | $m^3$/日 |
| Inflow situation | 0 | | | |

**2 Frame, slab, manhole**

| | | |
|---|---|---|
| Damage to manhole, etc. | 0 | |
| Deformation, slab damage, etc. | 0 | |
| Deformation, structure damage, etc. | 0 | |
| Load status | 0 | |
| Frame rise and subsidence status | 0 | |
| Leakage status | 0 | |
| Horizontal deviation of the frame | 0 | |
| Mixing of stormwater and sand from manholes | 0 | |

**3 Plumbing**

| | | |
|---|---|---|
| Misconnection of pipes | 0 | →異常部位 |
| Pipe damage | 0 | →異常部位 |
| Inflow of stormwater, groundwater and sand from the pipe | 0 | |
| Bad gradient of inflow pipe | 0 | |
| Bad gradient of outflow pipe | 0 | |
| Backflow from the outflow pipe | 0 | |
| Adhesion of slime, etc. in the pipe | 0 | → Abnormal parts |

**4 Blower/control equipment**

| | | |
|---|---|---|
| Blower operating status | 0 | Sedimentation tank sludge extraction Pump settings →Operation time per operation - 分 Operating time / time interval - Hourly |
| Operation status of control & safety equipment | 0 | |

**5 Air pipe (buried pipe)**

| | | |
|---|---|---|
| Air pipe blockage | 0 | |
| Air pipe damage | 0 | |

**6 Circulation device**

| | | Before adjustment | After adjustment |
|---|---|---|---|
| Operation/adjustment status of circulation device | 0 | - L/m | - L/m |

**7 Flow control device**

| | | Before adjustment | After adjustment |
|---|---|---|---|
| Operation / adjustment status of flow rate regulator | 0 | - L/m | - L/m |

**8 Common to each unit device**

| | | | |
|---|---|---|---|
| Outbreak of sanitary pests | 0 | | |
| Occurrence of odor | 0 | | |
| Water overflow in the tank | 0 | | |
| Traces of rising water level | 0 | | |
| Formation of short-circuit water flow | 0 | | |
| Deformation / damage of internal equipment | 0 | | |
| Partition leakage | 0 | | |

**9-1 Common to primary treatment equipment , First chamber**

| | | | |
|---|---|---|---|
| Scum accumulation status | 0 | - | cm |
| Sludge accumulation status | 0 | - | cm |
| Status of inflow/outflow ports, etc. | 0 | | |

**9-2 Equipment common to primary treatment after 2nd chamber**

| | | | |
|---|---|---|---|
| Scum accumulation status | 0 | - | cm |
| Sludge accumulation status | 0 | - | cm |
| Inflow/Outflow ports status | 0 | Adjustment | |

**10 Common to aerobic biological reaction tanks**

Maintaining operation →Aeration amount

| | | |
|---|---|---|
| Aerator status | 0 | |
| Air pipe, etc. (blockage / damage) | 0 | |
| Proliferation status of micrometazoans | 0 | →Remarks |

**11-1 Contact aeration tank**

| | | |
|---|---|---|
| Status of contact materials and inflow/outflow parts | 0 | |
| Sloughed sludge status | 0 | |
| Biofilm status | 0 | |
| Operation status of backwash device | 0 | No backwash |

**11-2 Carrier fluidized tank**

| | | |
|---|---|---|
| Carrier status (wear, etc.) | 0 | |
| Flow status of carriers | 0 | |
| Carrier filling status | 0 | |

**11-3 Biofilm filtration tank**

| | | | |
|---|---|---|---|
| Carrier status (wear, etc.) | 0 | | |
| Water level in the inflow part of the filtration device | 0 | - | cm |
| Backwash device settings | 0 | - | times/day |
| | | - | min/times |
| Operation status of backwash device | 0 | | |
| Carrier filling status | 0 | | |

**12-1 Settlement tank**

| | | | | |
|---|---|---|---|---|
| Level of overflow weir and the fixing condition | 0 | | | |
| Scum accumulation status | 0 | - | cm | |
| Sludge accumulation status | 0 | - | cm | |

**12-2 treated water tank**

| | | | |
|---|---|---|---|
| Scum accumulation status | 0 | - | cm |
| Sludge accumulation status | 0 | - | cm |

**13 Disinfection tank**

| | | | |
|---|---|---|---|
| Accumulation status of scum and sludge | 0 | | |
| Status of disinfectant (swelling, blockage, etc.) | 0 | | |
| Contact / adjustment status of disinfectant | 0 | | |
| Disinfectant consumption status and replenishment amount | 0 | - | g |

**14-1 Water quality**

| | | |
|---|---|---|
| | | - mg/L |
| DO (mg/L) in an aerobic biological tank | | - mg/L |
| NOx-N in biological reaction tank (+・−mg/L) | 0 | mg/L |
| pH of effluent | - | |
| Water temperature in the tank (℃) | | ℃ |
| Primary treatment effluent transparency | | cm |
| Appearance of secondary treated runoff | 0 | |
| Transparency | | cm |
| Residual chlorine concentration of discharged effluent (mg/L) | - | mg/L |

**14-2 Water quality of nitrogen removal type**

| | | |
|---|---|---|
| NOx-N concentration of treated effluent (mg/L) | 0 | mg/L |
| NH4-N concentration of treated (mg/L) | | mg/L |

**15 Inflow (relay) pump tank / discharge pump tank**

| | |
|---|---|
| Operation status of automatic control equipment | 0 |
| NO. 1 Pump operation status | 0 |
| NO. 2 Pump operation status | 0 |
| Status of pipes and wiring (leakage, etc.) | 0 |
| Accumulation status of scum or sludge | 0 |

**Desludging need** Schedule ( - M - $m^3$)

Urgent need ( $m^3$)

**Information to the desludging company**

**Replacement of consumables and parts**

**History of consumables and replacement parts**

**Findings**

【Number to enter for the presence or absence of abnormality】
0 It is normal.
1 It has been adjusted.
2 Improvements such as replacement of parts have been made.
3 Observation is required, and the situation will be observed until the next maintenance and inspection.
4 Improvements such as parts replacement and repair are required.

〔Appearance of secondary treated runoff〕
0 Almost no turbidity (fine particles) ・ No odor in water
1 Almost no turbidity (fine particles) ・ Water has an odor
2 Some turbidity (fine particles) is observed ・ There is no odor in the water.
3 Some turbidity (fine particles) is observed ・ Water has an odor
4 Turbidity (fine particles) is observed ・ Water has no odor
5 Turbidity (fine particles) is observed ・ Water has an odor

Annex G (Informative)　An Example of Johkasou Desludging Record

## Small-scale Johkasou Desludging Record Sheet

| | | | |
|---|---|---|---|
| Desludging vendor | | | |
| Person in charge | | | |
| Company address | | | |
| Company telephone number | | | |
| Facility name (user name, etc.) | | Last desludging date | |
| Building use | | Scheduled desludging date | |
| Johkasou manager (johkasou owner) name | | Desludging date | |
| N/A | | Planned sludge extraction unit equipment | |
| Johkasou manager (johkasou owner) address | | | |
| Telephone number | | | |
| Installation location | | Total volume of unit to be desludged （$m^3$） | |
| | | Vehicle used　Vacuum truck | |
| | | Amount of removed sludge (amount of sludge carried out) （$m^3$） | |
| Number of map pages | | | |
| Johkasou manufacturer | | | For tank capacity: Collected sludge amount / Filling water amount |
| Model | | Relay pump tank / inflow pump tank | % / % |
| Treatment process | | Primary treatment equipment (1st chamber) | % / % |
| Number of people for desigen (PE) | PE | Primarytreatment equipment (2nd compartment and after) | % / % |
| Planned daily wastewater amount | ($m^3$／日) | Secondary treatment equipment | % / % |
| Installation date | Y　M　D | Discharge pump tank | % / % |
| Date of start of use | Y　M　D | Cleaning of pipes (method) | |
| Presence / absence of relay pump tank / inflow pump tank | None | Deformation / damage / leakage of internal equipment | |
| Presence or absence of oil / fat separation tank | None | Inflow of foreign matter, etc. | |
| Presence or absence of discharge pump tank | None | Collected sludge disposal destination | (Example) Tama Clean Center |
| Special note (・Situation of deformation and damage of internal equipment, reason for pulling out the entire amount, etc.) | | | |
| Information to the maintenance vendor | | | |