

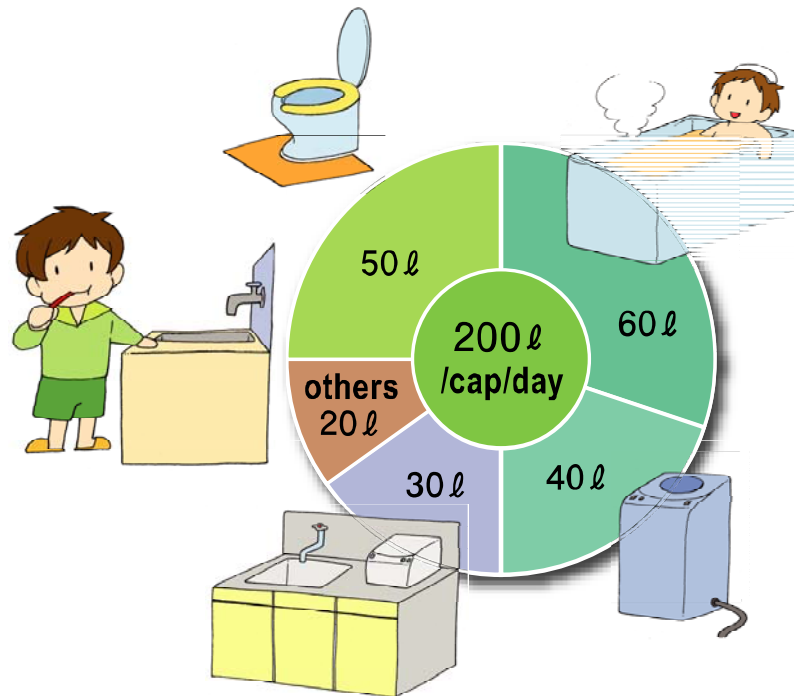
SESSION 3 :  
Standardization of  
On-site Treatment (1)

# Standardization of On-site Treatment in Japan

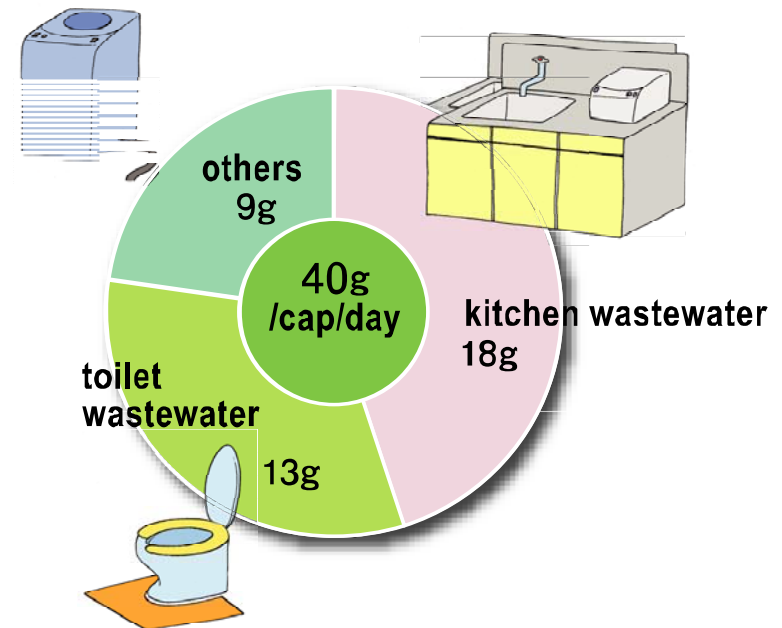
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# Characteristics of domestic wastewater in Japan



Water consumption  
200 L/person/day



BOD loads per capita per day  
40 gBOD/person/day

BOD: 200 mg/L, TN: 50 mg/L, TP: 5 mg/L

# Domestic wastewater treatment

## Centralized system



WWTP

87,800 thousand  
people  
(68.9%)

## Decentralized system



Johkasou

14,100 thousand  
people  
(11.1%)

## Decentralized system



Deemed Johkasou  
treating night soil only

14,700 thousand  
people  
(11.5%)

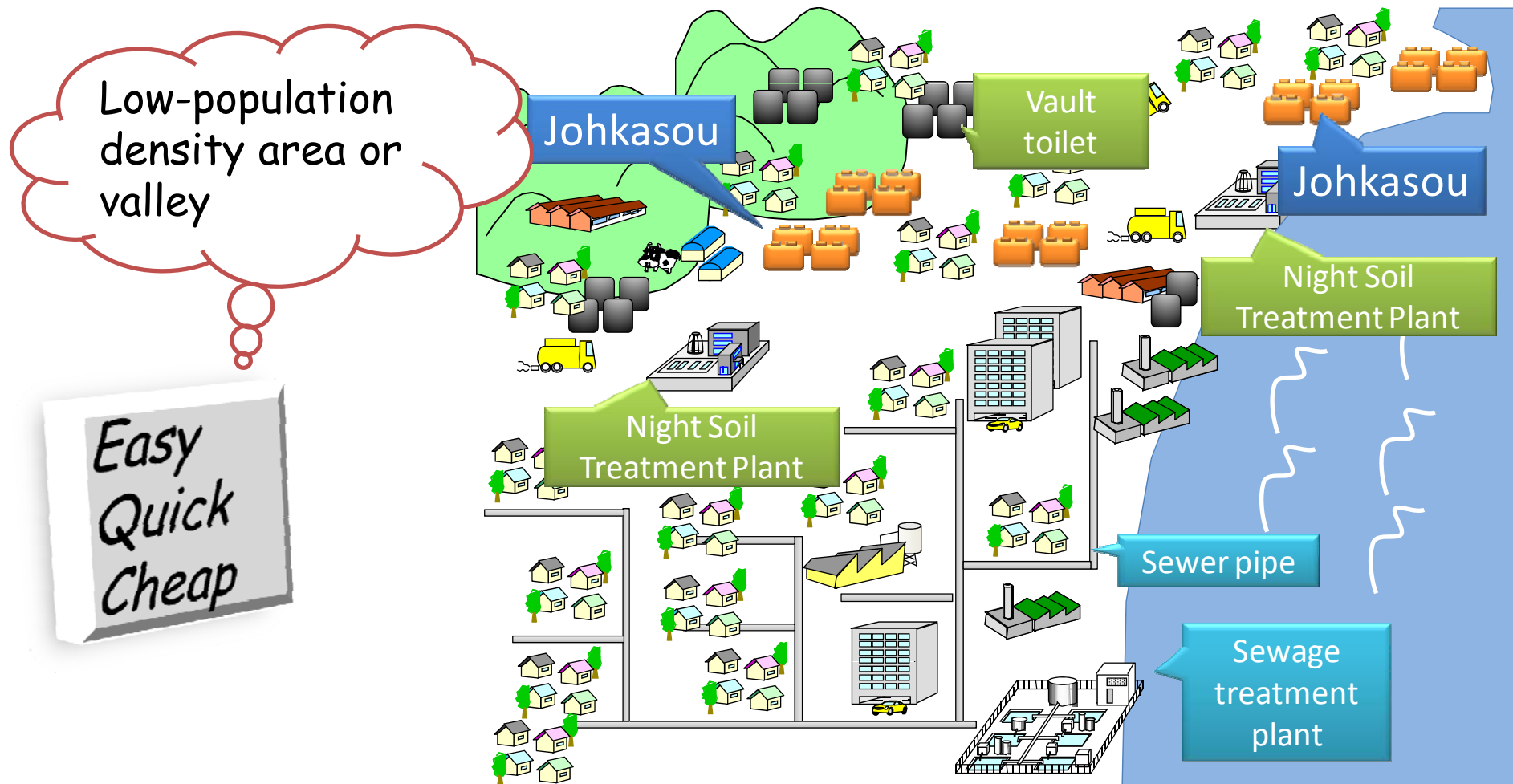
## Decentralized system



Vault toilet  
+ night soil  
treatment plant

10,800 thousand  
people  
(8.5%)

**Johkasou** has been developed in Japan as a decentralized wastewater treatment facility.

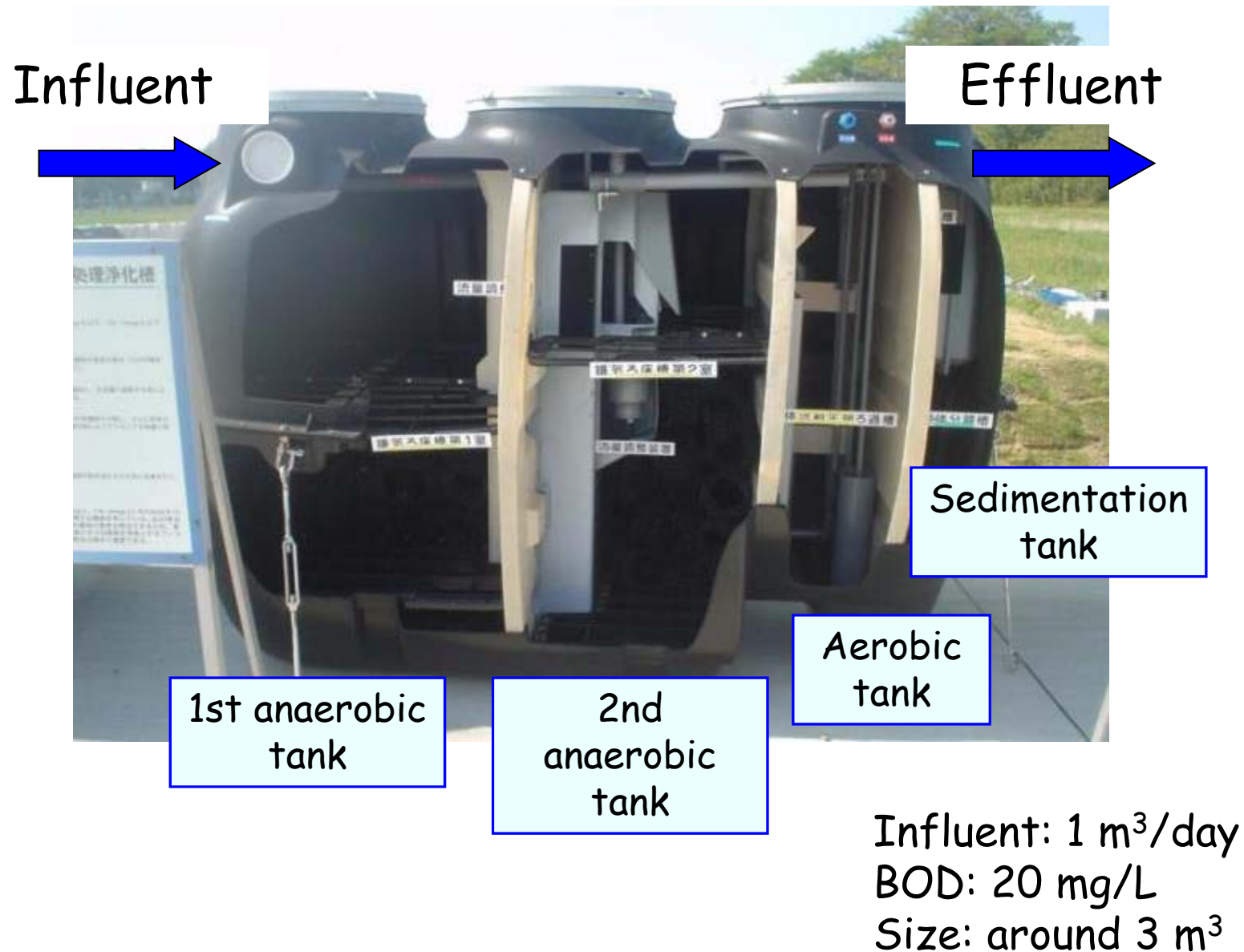


# National structure standards-compatible Johkasou

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

5 - 50 PE

# Model of Johkasou for 5 PE





Johkasou for 5 persons which has been operated for 15 years

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Anaerobic tank 1



Anaerobic tank 2



Aerobic tank and  
disinfection tank

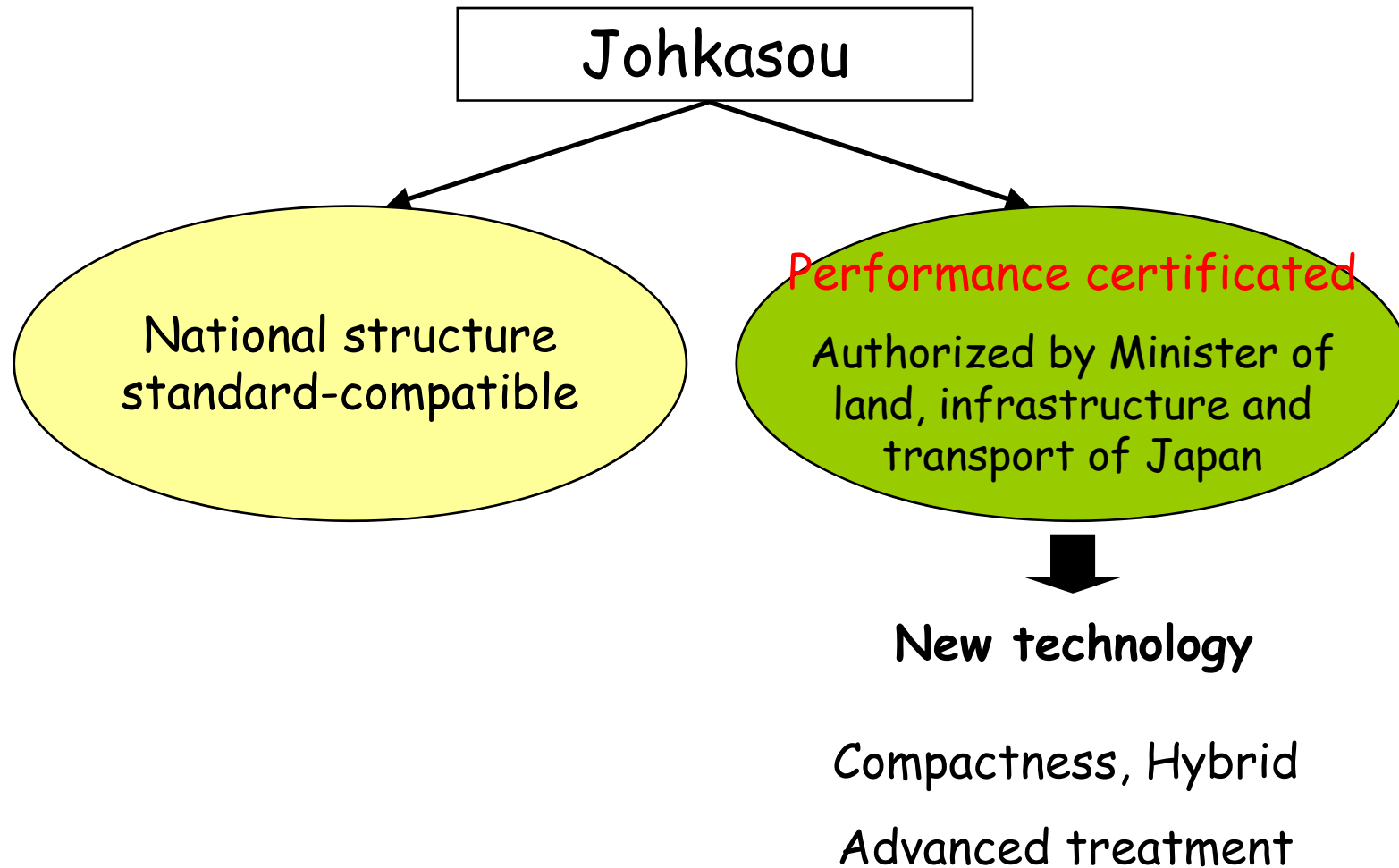


Effluent



Effluent

## Japan's Building Standards Act



Based on 2000 amending act, makers became able to develop original Johkasou and sell it based on performance certification.



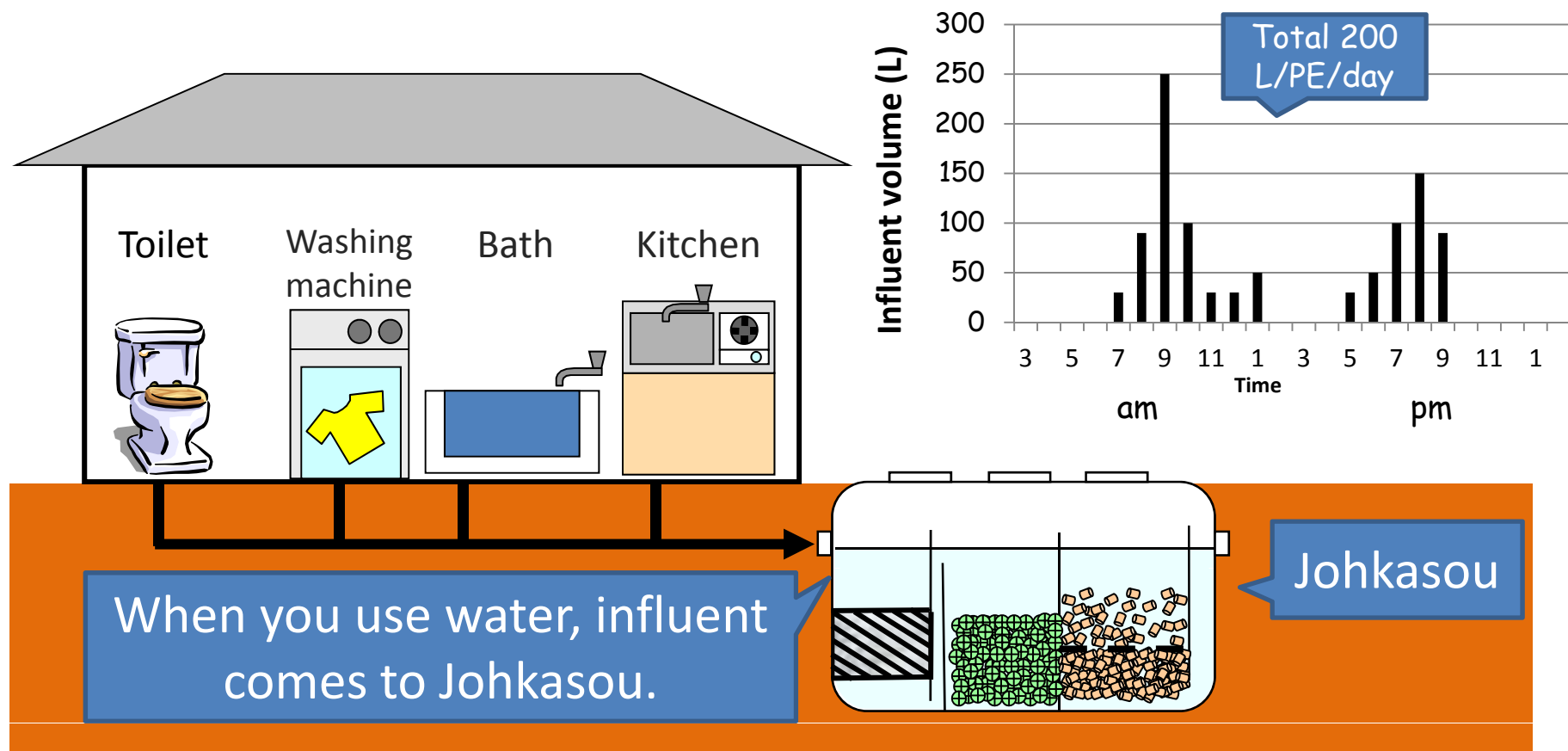
Temperature controlled  
test room

1. Short-term test with temperature control
  - 16 weeks (or 8 weeks in parallel)
  - 13 and 20°C
  - with influent control
2. Outside long-term test
  - 48 weeks
  - with influent control
3. On-site household test
  - 48 weeks
  - without influent control
  - at least 3 sites

The performance test is done by the third party

# Influent pattern for 5 PE

Daily influent pattern of domestic wastewater for 5 PE.



## 1. Compact type

- $<1.5\text{m}^3$  for 5 PE

## 2. Nitrogen removal type

- BOD  $<10\text{ mg/L}$
- T-N  $<10\text{ mg/L}$

## 3. Nitrogen and phosphorus removal type

- BOD  $<10\text{ mg/L}$
- T-N  $<10\text{ mg/L}$
- T-P  $<1\text{ mg/L}$

## 4. Membrane separation type

- BOD  $<5\text{ mg/L}$
- T-N  $<10\text{ mg/L}$

# Operation and maintenance

## Initial inspection



Johkasou Inspector

### Legal inspection by Article 7

#### Purpose

Confirm if the construction/  
installation and treatment  
performance are good.

#### Contents

- visual inspection
- water quality inspection
- document inspection

#### Timing of implementation

Three to eight months after  
starting operation

#### Responsible organization

Specified inspection agency,  
which is a public service

## Operation



Johkasou Operator

### Operation/Maintenance

#### Purpose

Maintain a normal  
treatment performance

#### Contents

- sludge accumulation
- water quality
- mechanical apparatus
- replenish disinfectant

#### Frequency

Over three times a year,  
depending on the size and  
the treatment process

#### Responsible organization

Johkasou maintenance  
vendor, who is licensed by

## Desludging



Johkasou Desludging Technician

### Desludging

#### Purpose

Recover normal treatment  
performance normally

#### Contents

- removing sludge
- cleansing the johkasou
- confirming if there are  
faults or defects inside  
the johkasou

#### Frequency

Once a year

#### Responsible organization

Johkasou desludging  
vendor, who is registered

## Annual inspection



Johkasou Inspector

### Legal inspection by Article 11

#### Purpose

Confirm if the maintenance  
and desludging is done  
appropriately, and if the treatment  
performance is good.

#### Contents

- visual inspection
- water quality inspection
- document inspection

#### Frequency

Once a year

#### Responsible organization

Specified inspection agency,  
which is a public service

At least every 4 months

Every year



# Annual inspection

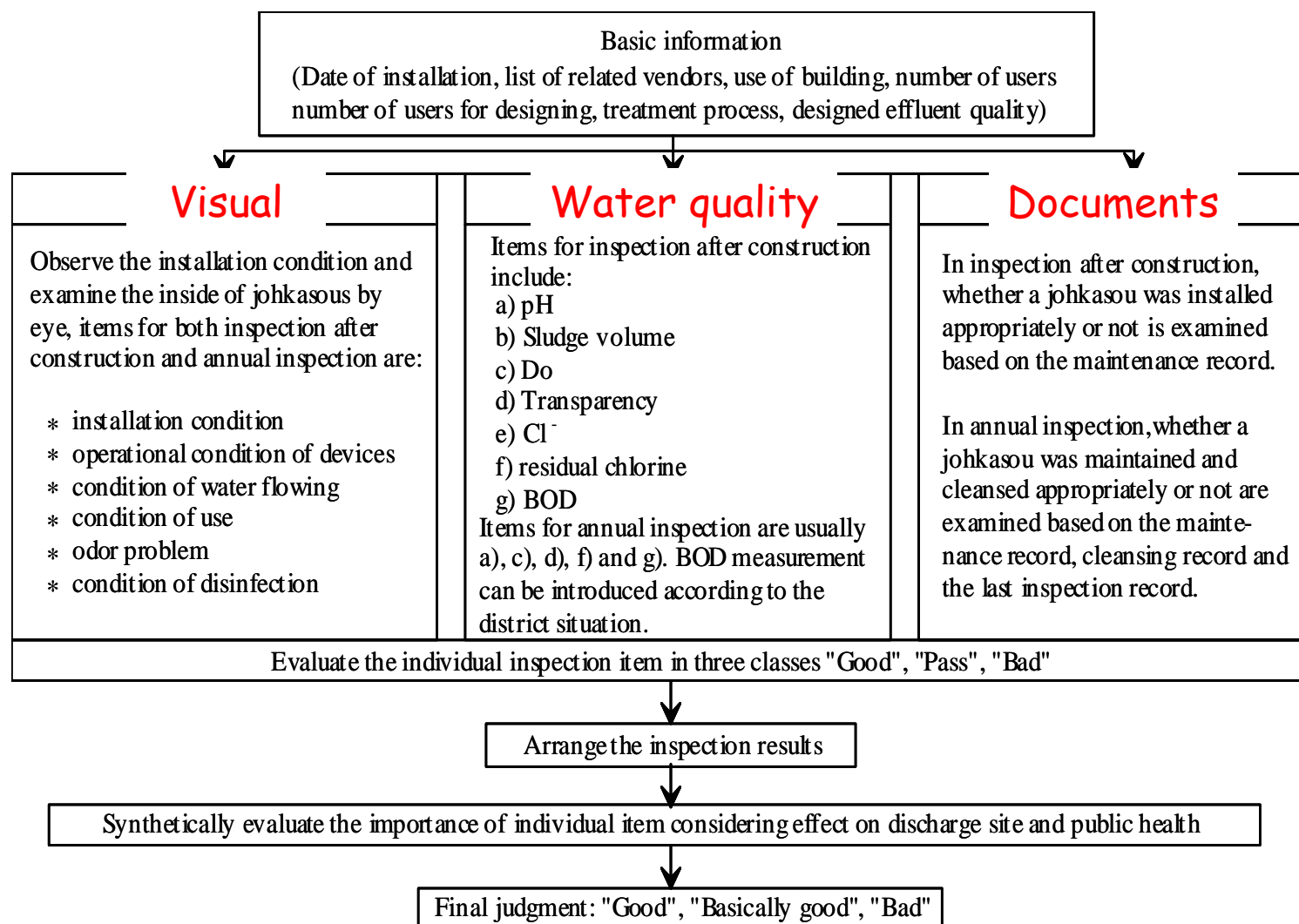


Figure 2 Inspection content and procedure of legal inspection

Qualifications	Registrant	Business content
Operator	68,668	O&M
Installation worker	81,464	Installation/construction
Technical supervisor	25,105	501 PE or more
Desludging technician	14,782	Desludging
Inspector	1,119	Inspection

# Major standards in the world

European Standard (EN)

EN12566-3: Small wastewater treatment systems for up to 50 PE



The United States

NSF/ANSI Standard 40: Residential Wastewater Treatment Systems

Australia

AS/NZS 1546 Part 3: Aerated wastewater treatment systems

## Characteristics of Asia-Pacific region

- Climate
  - Monsoon, heavy rain, dry season, etc
- Water environment
- Characteristics of wastewater (volume and conc.)
- Food culture
- Economic area
- Way of thinking
- etc



Asian Standard

or

mutual recognition in Asia

- Japanese decentralized wastewater treatment system, Johkasou is effective in low population density area.
- Key points to keep Johkasou in good condition are
  - Periodical O&M
  - Appropriate desludging
  - Inspection and improvement
- Asian standard for performance test and related legislation

# Technical Specification for Johkasou

## ■ Background

- Organizing technical information on johkasou standards and disseminating it to overseas are less advanced than doing in the Western countries, because of a wide variety of regulations by domestic laws related to johkasou system.
- International standardization of on-site wastewater treatment technologies has been discussing for several years, , creating a technical document/specification on johkasou system has become an urgent task to respond to the international standardization.
- This document is described by arranging technical information on johkasou main body (product) mainly based on johkasou related laws and regulations; Johkasou Standard and the Components from Johkasou System Association.



# Technical Specification for Johkasou

## ■ contents (1)

Preface

1. Scope

2. Normative references

3. Terms and Definition

4. Symbols and Abbreviations

5. Requirements

5.1 Design

5.1.1 General

5.1.2 Inlet pipe, Outlet pipe,  
Drainpipe and connection

5.1.3 Access

5.1.4 Size determination

5.2 Load bearing capacity

5.2.1 General

5.2.2 Date for calculating

5.2.3 Criterion

5.3 Treatment performance

5.4 Watertightness

5.4.1 General

5.4.2 Water-filling test

5.4.3 Air pressure test

5.5 Durability

5.5.1 General

5.5.2 Chemical resistance

# Technical Specification for Johkasou

## ■ contents

### 5.6 Components

#### 5.6.1 General

#### 5.6.2 Partition

#### 5.6.3 Access cover

#### 5.6.4 Blower

#### 5.6.5 Filter media

### 6. Calculation and Test Method

#### 6.1 Water-tightness

#### 6.2 Treatment performance

#### 6.3 Structural strength

#### 6.4 Chemical resistance test

### 7. Technical Information

#### 7.1 Legal label

#### 7.2 JSA label

#### 7.3 Other indications

### 8. Evaluation of conformity

#### 8.1 General

#### 8.2 Initial type tests

##### 8.2.1 Product test

##### 8.2.2 Type approval

# Technical Specification for Johkasou

## ■ contents

### 8.3 Factory production control

#### 8.3.1 General

#### 8.3.2 Raw materials and components

#### 8.3.3 Production process

#### 8.3.4 Finished product testing

#### 8.3.5 Warranty

#### 8.3.6 Stock control

### 9. Construction instructions

### 10. Maintenance instructions

### Annex

#### Annex A Testing Method for Johkasou

#### Treatment Performance

#### Annex B Standard for access cover

#### Annex C Standard for blower

#### Annex D Standard for filter media

#### Annex E Strength Test Method

#### Annex F Production and production

#### equipment overview

#### Annex G Instructions to construction

#### and maintenance

#### Annex H Procedures of installation

#### Annex I Examples of contents and procedures of maintenance

#### Annex J Examples of contents and procedures of desludging

# Contents of Technical Specification for Johkasou (1)

## ■ Scope

- Used for population

1 m<sup>3</sup>/d ~ 10 m<sup>3</sup>/d (5 ~ 50 inhabitants)

Reference: EN12566-3 ~ 50 PE

1 PE 150L/cap.d, 60g/cap.d

## ● Usage

- In principle, johkasou should be buried underground except particular circumstances. A johkasou could be loaded on its top by the vehicle or not. Except the case that the total gross load is less than 2 tons and a johkasou that the safety on loads has been confirmed by the top load test is used, specific construction method should be requested for installing a johkasou with vehicle loads.

- Reference: EN12566-3 The use of "buried in the ground without vehicles loads" is the only condition of use available according to this European Standard.

# Contents of Technical Specification for Johkasou (2)

## ■ Influent・Effluent

- Amount of wastewater and BOD 200 L/cap.d, 200 mg/L  
(domestic wastewater)

Reference: EN12566-3 150 L/cap.d, 150-500 mg/L

- Quality of effluent water BOD:  $\leq 20$  mg/L and BOD removal:  $\geq 90\%$

Reference: EN12566-3 There are only BOD removal.

They conform to a water quality decided each countries.

# Contents of Technical Specification for Johkasou (3)

## ■ Size determination

JIS A 3302 :2000:Estimation of population for waste water purifier of buildings

Reference: France, Kingdom of Belgium and Deutschland have similar purifier of buildings

Category	Building use	Number of users for design (PE)	
		Formula	Remarks
V	Stores, supermarkets	$n=0.075A$	n: PE A: total floor area (m <sup>2</sup> )
	Department stores	$n=0.15A$	
	Restaurants		
	normal pollutant loads	$n=0.72A$	
	high pollutant loads	$n=2.94A$	
	low pollutant loads	$n=0.55A$	
	Coffee/tea houses	$n=0.80A$	

Table 6 Building uses defined in JIS A 3302:2000 (partly) and unit loading for buildings

Category	per PE	
	Q, L	BOD, g
<b>I Public facility</b>		
Public meeting places, theaters, cinemas	200	30
Horse/Bicycle/Motorboat Racetrack	150	40
Gymnasiums, sports stadiums	155	40
<b>II Living accommodation</b>		
Individual house	200	40
Residential complexes		
Lodging houses and dormitory		
School dormitory houses, nursery homes,		
<b>III Accommodation facility</b>		
Hotels with wedding halls	200	40
without wedding halls	400	40
Motels	200	30
Hostels	200	40
<b>IV Medical facility</b>		
Hospital		
with kitchens and/or laundry services		
less than 300 beds	125	40
more than 300 beds	113	36
without kitchens and/or laundry services		
less than 300 beds	200	30
more than 300 beds	182	27
Small hospitals	130	40
<b>V Shops&amp;stores</b>		
Stores, supermarkets	200	30
Departmental stores	200	30
Restaurants normal pollutant loads	180	40
high pollutant loads	90	40
low pollutant loads	200	40
Coffee/tea houses	200	30



# Contents of Technical Specification for Johkasou (4)

## ■ Treatment Performance

1) Structural methods type: There is no testing for treatment performance.

( Quality of Effluent water BOD 20mg/L, BOD&T-N 20mg/L)

2) New technology Johkasou: They must take a test. (AnnexA)  
(Membrane separation, high performance Johkasou )

Reference : EN12566-3 There is no structural method.

# Contents of Technical Specification for Johkasou (5)

- Components (Standard components)
  - Partition
  - Access cover (Annex B)
  - Blower (Annex C)
  - Filter media (Annex D)

Reference: EN12566-3 There is only requirements of  
access cover.

# Contents of Technical Specification for Johkasou (6)

## ■ Maintenance instructions

- Maintenance (Annex G)
- Desludging (Annex H)

Reference: EN12566-3 There is only as for the simple requirements.

# Contents of Technical Specification for Johkasou (7)

- Domestic legal
  - Involved : Structural methods type
  - Non involved: legal inspection, johkasou operator,  
Maintenance, Desludging

A dynamic background image showing a water splash with bubbles and ripples, creating a sense of movement and freshness. The water is a clear, vibrant blue, and the splash is centered, with droplets and bubbles visible throughout the frame.

**Thank you**  
**Arigato (Japan)**  
**Khopkhun krap (Thailand)**  
**Terima kasih (Indonesia, Malaysia)**  
**Dhanyavad (India)**  
**Xie xie (China)**  
**kahm uhn (Viet Nam)**  
**Danke (Germany)**