



# **O & M for the High-performance Decentralized Wastewater Treatment Plants and Human Resource Development in India**

**A. A. Kazmi**

**Professor**

**Department of Civil Engineering**

**IIT Roorkee, Roorkee, India**



# **BACKGROUND**

# JOHKASOU INTRODUCTION IN INDIA

## MANUAL ON SEWERAGE & SEWAGE TREATMENT-2013

### CHAPTER-9 -ON-SITE SANITATION



MANUAL ON SEWERAGE  
AND SEWAGE TREATMENT SYSTEMS

PART A: ENGINEERING  
THIRD EDITION - REVISED AND UPDATED

MINISTRY OF URBAN DEVELOPMENT, NEW DELHI  
<http://moud.gov.in>

CENTRAL PUBLIC HEALTH AND  
ENVIRONMENTAL ENGINEERING ORGANIZATION

IN COLLABORATION WITH



JAPAN INTERNATIONAL COOPERATION AGENCY

NOVEMBER 2013

Capacity (A)		
10 Persons (2.0 m <sup>3</sup> /day)		
Weight (equipment only)		
470 kg		
Main body material		
FRP		
Tank volume, Equipment capacity		
Anaerobic filter tank	No. 1: 2.13 cum No. 2: 1.414 cum	
Contact aeration tank	2.037 cum	
Sedimentation tank	0.717 cum	
Blower	120 L/min × 130 W	

Package-type			On-site construction-type
Small-scale	Medium-scale	Large-scale	Medium/Large-scale
(About 5 to 50 people)	(About 51 to 500 people)	(Approx. 500 to 5,000 people)	(More than 500 people)

# **NATIONAL GREEN TRIBUNAL (NGT)**

## **Matter OA No. 673 of 2018**

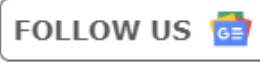
- *Many States/ UTs are constructing or have proposed to develop STPs in Polluted River Stretches with capacity less than 2 MLD. States, in such situations, may consider to adopt installation of **decentralized modular STPs; which offer advantages in form of lesser time involved in commissioning of systems, less land footprints, easy operations; instead of conventional centralized STPs based on techno-commercial considerations.** This will also enable them to comply to NGT stipulated timelines.*

**STRICT EFFLUENT STANDARDS: BOD-10 mg/L , TSS- 20 mg/L, TN – 10 mg/L**

**Johkasou system introduced in India by Daiki Axis- 2018**

# IIT-Roorkee validates adaptability of Japanese technology-based STPs for hilly regions

Tapan Susheel / TNN / Oct 12, 2022, 23:19 IST



Environmental researchers at IIT-Roorkee have carried out research on Japan's Johkasou technology (JT) for its adaptation and validation in Indian conditions. JT deals in sewage treatment plants (STPs).



ROORKEE: Environmental researchers at IIT-Roorkee have carried out research on Japan's Johkasou technology (JT) for its adaptation and validation in Indian conditions. JT deals in sewage treatment plants (STPs).

Japanese company Daiki signed an MoU in December 2020 with IIT-R. The researchers said that although JT can work effectively across the country, its implementation in Uttarakhand, particularly in

# INDO-JAPAN-MEMORANDUM OF COOPERATION- MARCH 2022

MEMORANDUM OF COOPERATION  
BETWEEN  
THE MINISTRY OF JAL SHAKTI  
OF THE REPUBLIC OF INDIA  
AND  
THE MINISTRY OF THE ENVIRONMENT  
OF JAPAN  
IN THE AREAS OF DECENTRALIZED DOMESTIC WASTE WATER  
MANAGEMENT

\*\*\*\*\*

Signed on the 19th day of March 2022 in the English language.

FOR THE MINISTRY OF JAL SHAKTI  
OF THE REPUBLIC OF INDIA

FOR THE MINISTRY OF THE ENVIRONMENT  
OF JAPAN



Gajendra Singh Shekhawat  
Minister of Jal Shakti, India



Tsuyoshi Yamaguchi  
Minister of the Environment, Japan

- ▶ Exchanging information and expertise on decentralized domestic wastewater management.
- ▶ Seminars, conferences and meetings.
- ▶ Capacity building through trainings, workshops and on job sites.
- ▶ Other forms to be mutually decided upon

### History

#### Document Details

<b>Name of Department/Committee :</b>	CED 24
<b>Document Number :</b>	CED 24 ( 24325)
<b>Document Title [English] :</b>	Packaged Sewage Treatment Plant - Specification
<b>Document Title [Hindi] :</b>	पूर्वनिर्मित मलजल उपचार संयंत्र – विशिष्टि
<b>Document Type :</b>	New
<b>Language :</b>	English
<b>Priority :</b>	3
<b>ICS Code :</b>	93.030, 13.060.30
<b>Date of Project Approval :</b>	31-08-2023

S.No.	P-Draft Completion Date	WC-Draft Completion Date	Final-Draft Completion Date	Project Completion Date(Gazette)	Entered By	Entered On
1	04-12-2023	04-05-2024	19-07-2024	04-12-2024	Mr. Dheeraj Damachya	04-12-2023

# Indian Standard IS 18797 : 2024 Packaged Sewage Treatment Plant — Specification September 2024

**Table 7 Parameters for Evaluation and Frequency of Testing***(Clause [B-6](#))*

SI No.	Parameter	Unit	Frequency
(1)	(2)	(3)	(4)
i)	Daily influent flow	litre/day	As desired
ii)	Inflow period	hour/day	As desired
iii)	Inflow pattern	Percentage versus hour	As desired
iv)	Peak influent flow	litre/minute	As desired
v)	Temperature of influent	°C	As desired
vi)	Daily effluent flow	litre/day	As desired
vii)	Sludge level	metre	Monthly (or more frequent)
viii)	Scum level	metre	Weekly (or more frequent)
ix)	Biological/biochemical oxygen demand (BOD) <sup>1</sup>	mg/l	Weekly (or more frequent)
x)	Chemical oxygen demand (COD <sub>cr</sub> ) <sup>1</sup>	mg/l	Weekly (or more frequent)
xi)	Total suspended solids (TSS) <sup>1</sup>	mg/l	Weekly (or more frequent)
xii)	Total nitrogen (TN) <sup>1</sup>	mg/l	Weekly (or more frequent)
xiii)	Total phosphorous (TP) <sup>1</sup>	mg/l	Weekly (or more frequent)
xiv)	Faecal coliform (FC)	Most probable number (MPN) per 100 ml	Weekly (or more frequent)
xv)	pH <sup>1</sup>		Weekly (or more frequent)

## ROUTINE OPERATION AND MAINTENANCE PROCEDURES

### F-1 ROUTINE OPERATION AND MAINTENANCE PROCEDURES

**F-1.1** The following routine inspection shall be carried out by the user once a week:

- a) Check pretreatment units (bar screens, O and G trap, grit chamber, etc);
- b) Check state of operation of blowers;
- c) Check state of operation of pumps and float switch/level switch/float; and
- d) Check state of operation of disinfection system.

**F-1.2** The following routine inspection shall be carried out by the service provider once a month:

- a) Check media or filter conditions;

- b) Clean air filters of blowers; and
- c) Check leakage, clogging, etc, in influent, effluent, internal, inter-connection, aeration pipes for leakage, clogging.

**F-1.3** The following routine inspection shall be carried out by the service provider once in six months:

- a) Replacement of air filters of blowers;
- b) Sludge level check;
- c) Check scum in all chambers;
- d) Sludge removal; and
- e) Cleaning of media and filter.



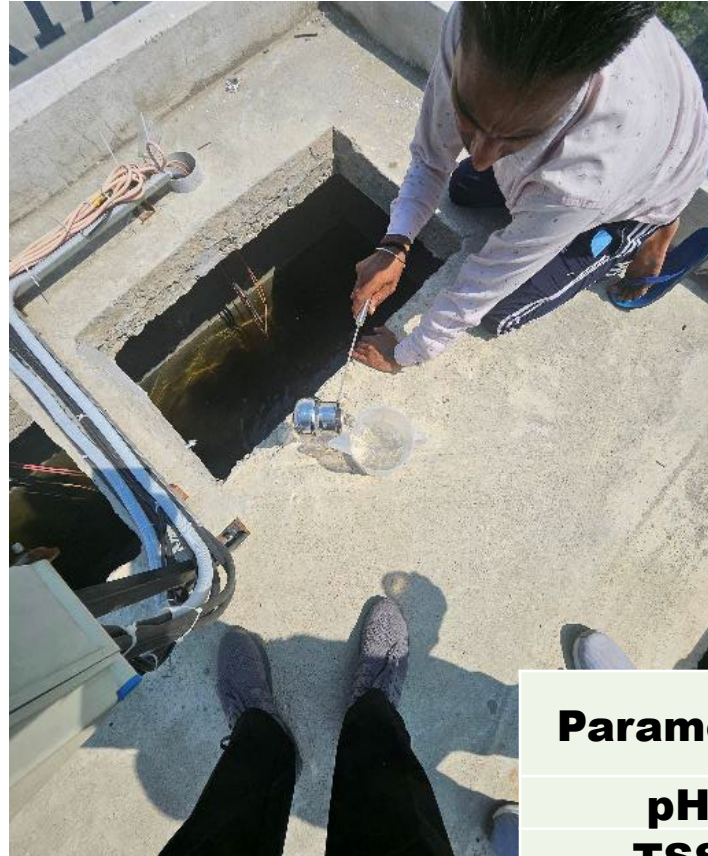
# **Experiences on performance of public (Government) Johkasous in India**

# 500 m<sup>3</sup>/day Small Wastewater Treatment Plant, Beljudi-Govt. of India Namami Gange Program



Parameter	Unit	Inlet	Outlet
pH	-	7.1	8.1
TSS	mg/L	76	14
COD	mg/L	118	30
BOD	mg/L	69	13
TN	mg/L	21.4	7.7

# 500 m<sup>3</sup>/day Small Wastewater Treatment Plant, Mukundpur-Govt. of India Namami Gange Program



Parameter	Unit	Water Quality Parameters	
		Inlet	Outlet
pH	-	7.3	7.9
TSS	mg/L	136	12
COD	mg/L	172	32
BOD	mg/L	78	12
TN	mg/L	22.9	7.7

# Governor House-Dehradun- 10KLD



Parameter	Unit	Jhokasou System		Tertiary Unit
		Inlet	Outlet	Outlet
pH	-	7.2	7.3	7.6
TSS	mg/L	189	24	20
COD	mg/L	594	127	107
BOD	mg/L	175	25	19

# 10 KLD- Delhi Development Authority Park Direct Lifting of wastewater from stormwater drain and use it for horticulture-SDG6 for clean water



**Case study: Launching the  
lecture to acquire the ability of  
O&M of Johkasou in Sri  
Vishwakarma Skill University**

# O&M Training Courses of Johkasou by Sri Vishwakarma Skill University



SHRI VISHWAKARMA  
SKILL UNIVERSITY

India's first Government Skill University, dedicated to providing high-quality skill education.

MoU with Daiki Axis on Skill Development Courses In Water Conservation & Wastewater Recycling

Pilot Training to develop Skill for Operators



**1 Week Training for 20 Student of Vishvakarma Skill University : Appointed 4 best students those qualified the exam and Trained them for 6 month. Now each is managing 20-30 Johkasou systems in India**

# **Skill Mapping**

- ▶ **Japan technical team visited India for 2 months to check the skill level of Daiki Axis India Maintenance staff and partners service staff.**
- ▶ **Skill Checks for Installation and Quality Control during installation at site**
- ▶ **70 point check list for general construction and safety purposes**
  - ▶ **Foundation**
  - ▶ **Levelling**
  - ▶ **Wiring**
- ▶ **To build a strong framework for proper installation and maintenance similar to the Johkasou act in Japan.**

# SITE EVALUATION



► Local tool kit

# TYPICAL SITE EVALUATION

M-Code	Site Name	Date	Location	State	Model	Installation Type	Operational Since	Partner	End use	Priority
M248920012	HPCL	17/10/2024	Mumbai	MH	AIE-50	Underground	Jul-24	Centaac		

· **There are no major problems regarding installation**

< Comment · Instruction >

1)Control panel wire penetrations are not properly finished. Caulking at the ends is not done.

2)Piping support, especially outdoors, was not sufficient

(no particular support was provided around the tertiary treatment area, but there were no major problems).

3)Suction side piping of RWP uses hose piping. The explanation was that the original piping was PVC piping, but this was changed due to suction frequent problems such as improper

Vibration of the pump may have caused the union to loosen, resulting in poor suction. The lack of piping support may have affected the problem

5)I heard that there are plans to integrate the separated machine rooms, and I request that support and other problems be improved at that time.

Final Evaluation(total)	Detail Quality	Follow Planning	Control system	Accessibility
80	20	20	20	20

**TO INCENTIVISE DEALER AND CHANNEL PARTNER**



# TRAINING MATERIAL: Blower

## Maintenance training manual

安永エアポンプ株式会社

2024 / 5 / 13

**LINEAR AIR PUMP Model : AP-80H(-S)**

Dimensions: AP-80H

**Performance Curves (Representative value)**

**Specifications**

Model	Rated Voltage	Rated Power	Rated Flow	Rated Pressure	Rated Speed	Rated Current	Rated Noise	Weight
AP-80H(-S)	200	0.5	12	12-15	30	0.2	55	10.5

**LINEAR AIR PUMP Model : LW-240**

Dimensions:

**Performance Curves (Representative value)**

**Specifications**

Model	Rated Voltage	Rated Power	Rated Flow	Rated Pressure	Rated Speed	Rated Current	Rated Noise	Weight
LW-240	200	1.5	35	15-20	30	0.6	65	14.1

**Installation & Maintenance Instruction**

(DI less/indoor use)  
AP-80H, LW-200/240 Linear Air Pump

**Introduction**

If the pump is used with a power supply other than the specified one, it may cause an electric shock or a short-circuit accident and may cause the pump performance to deteriorate significantly.

**How to maintain**

- Check the power cord and plug.
- Check the power switch and the plug.
- Check the power switch and the plug.
- Check the power switch and the plug.
- Check the power switch and the plug.

**How to install**

- Install the pump in a location where it is not exposed to rain.
- Install the pump in a location where it is not exposed to dust.
- Install the pump in a location where it is not exposed to vibration.
- Install the pump in a location where it is not exposed to heat.
- Install the pump in a location where it is not exposed to noise.

**OPERATION MANUAL**  
Linear Diaphragm Pumps

Models: AP-40, AP-60F, AP-80H, AP-100F, AP-120F, LP-150HN, LP-200HN, LW-150, LW-200, LW-240, LW-300, LW-400

Thank you for purchasing a YASUNAGA AIR PUMP INC. linear pump.

**Blower Check Sheet for Trouble Shooting**

Item	Check Item	Check	Handling	Reference
Power	Check plug is properly	Plug is properly	Plug is properly	
	Check the cable is properly connected to the terminal	Connect the cable to terminal	Connect the cable to terminal	
	Check the breaker turn on	Turn on the breaker	Turn on the breaker	
Feeding	Measure the voltage (220~230V)	Measure with multimeter (220~230V)	Measure with multimeter (220~230V)	
	Check the air cleaner element get clogged	Replace the air cleaner element	Replace the air cleaner element	
Protection switch	Check the protection switch turn on	Replace the protection switch	Replace the protection switch	
	Check the diaphragm or rod is damaged	Replace the diaphragm or rod	Replace the diaphragm or rod	
Air blower	Check the air cleaner element get clogged	Replace the air cleaner element	Replace the air cleaner element	
	Check the condition of pipe connection	Replace the pipe	Replace the pipe	
Piping	Check the installation vertical of piping	Use less than 5 elbows and within 10 meters pipe	Use less than 5 elbows and within 10 meters pipe	
	Check the value is clogged or set in wrong direction to opposite	Check the check valve and make proper condition	Check the check valve and make proper condition	
Diffuser	Check the diffuser is clogged	Clean the diffuser	Clean the diffuser	
	Check the blower base is hot contact	Install higher position unit to sub range	Install higher position unit to sub range	
Insulation Condition	Check the height of blower insulation	Install the shield	Install the shield	
	Check the blower cover is hot contact	Replace the cover or roof	Replace the cover or roof	
Blower Body	Check the diaphragm assembly is not properly	Replace the diaphragm assembly	Replace the diaphragm assembly	
	Check the diaphragm assembly is not properly	Replace the diaphragm assembly	Replace the diaphragm assembly	

**L Chamber block / Shaft Assembly / Tank gasket replacement instruction:**

**Warning:** Make sure to do a trial run after replacing the chamber block and the shaft assembly.

**Warning:** Make sure to do a trial run after replacing the chamber block and the shaft assembly.

**Chamber Block / Rod / Cover gasket replacement instruction:**

**Warning:** If you remove the rod without removing the cover plate, the protective switch may be damaged.

# PRACTICAL TRAINING



Repair of Blower at Local Level

# PRACTICAL TRAINING SESSIONS



AXIS INDIA BANK AXIS INDIA PVT. LTD.		Registration Sheet		Yasunaga Air blowers Training May 2024	
Location: HYDERABAD			Date: 17-05-2024		
S No	Name of Participant	Mobile No	Email Address	Course Material Received (Y/N)	Sign
1	R RANFISH	62815 28879	ranesh.ranesh@axis.com	Yes	[Signature]
2	CH Durga Rajend	9848 87666	Arundachitatala@gmail.com	NO Yes	[Signature]
3	G. Sub Suresh	979869497	sub.suresh@axis.com	Yes	[Signature]
4	Ajit Kumar	922070528	ajitkumar@axis.com	Yes	[Signature]
5	M. Arjun Kumar	960996601	Electrical@axis.com	Yes	[Signature]
6	M. S. Kumar	9515 82588	Electrical@axis.com	Yes	[Signature]
7	S. Srinivas	946667868	SivaS@12246@gmail.com	Yes	[Signature]
8	M. Ravi Kumar	886661199	Harshad.936@gmail.com	Yes	[Signature]
9	K. Vikram	907433200	vkrishna@axis.com	Yes	[Signature]

# **Expected Efforts in India**



# The 5<sup>th</sup> International Forum on Asian Water Environment Technology (IFAWET-5) 6-8 August 2025, Dehradun, India



# EXTENSION OF MEMORANDUM OF COOPERATION

MEMORANDUM OF COOPERATION  
BETWEEN  
THE MINISTRY OF JAL SHAKTI  
OF THE REPUBLIC OF INDIA  
AND  
THE MINISTRY OF THE ENVIRONMENT  
OF JAPAN  
IN THE AREAS OF DECENTRALIZED DOMESTIC WASTEWATER  
MANAGEMENT

\*\*\*\*\*

The Ministry of Jal Shakti of the Republic of India and the Ministry of the Environment of Japan (hereinafter referred to as individually as a "Side" and collectively as "Both Sides");

**DESIRING** to strengthen the existing friendly relations between both countries;

**CONSIDERING** their common interest in promoting cooperation for Decentralized Domestic Wastewater Management in preserving water environment in public water area and improvement of public health, based on the principles of equality and mutual benefit;

**RECOGNIZING** that the effective protection of the environment requires global cooperation and coordinated efforts, and that activities to protect the environment should be carried out at the regional, national and local levels;

**REFERRING** to the United Nations Sustainable Development Goals (SDGs) Target 6.3 "halving the proportion of untreated wastewater";

**PURSUANT** to the laws and regulations of their respective countries;

**HAVE** reached the following recognitions:

1

PARAGRAPH VIII  
SETTLEMENT OF PROBLEMS

Any problem arising from the implementation or interpretation of this MOC will be settled amicably through consultation or negotiation between Both Sides.

PARAGRAPH IX  
MODIFICATION

This MOC may be modified at any time through mutual written consent by Both Sides.

PARAGRAPH X  
COMMENCEMENT, DURATION AND DISCONTINUATION

1. The cooperation under this MOC will commence on the date of its signature.
2. The cooperation under this MOC will continue for a period of two (2) years and may be extended by mutual consent of Both Sides or be discontinued at any time by either Side by giving written notification at least six (6) months prior to the date of the intended discontinuation.
3. The discontinuation of the cooperation under this MOC will not affect the duration of any on-going activity until the completion of such activities.

Signed on the 20<sup>th</sup> day of Aug 2025 in the English language.

FOR THE MINISTRY OF JAL SHAKTI  
OF THE REPUBLIC OF INDIA

FOR THE MINISTRY OF THE ENVIRONMENT  
OF JAPAN

  
Chandrakant Raghunath Patil  
Minister of Jal Shakti, India

  
ASAO Keiichiro  
Minister of the Environment, Japan

4

**City** Dehradun Mumbai Delhi Bengaluru Hyderabad Kolkata Chennai Agra Agartala Ahmedabad

Weather Uttarakhad Elections Uttarakhand@25

News / City News / Dehradun News / Japanese Tech Proposed To Treat Sewage At Kedar...

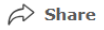


**Trending** Bengaluru Roads Disha Patani Lucknow Suicide Delhi BMW Crash Andra

## Japanese tech proposed to treat sewage at Kedarnath

Tanmayee Tyagi / Sep 11, 2025, 22:58 IST

## Japanese tech proposed to treat sewage at Kedarnath

Tanmayee Tyagi / Sep 11, 2025, 22:58 IST

 Share  AA  Select **TOI** as



Dehradun: The National Mission for Clean Ganga (NMCG), a flagship programme of the Govt of India, in an affidavit before the National Green Tribunal (NGT), has proposed introducing the Japanese Johkasou sewage treatment system at Kedarnath.

The move follows a state govt report recommending decentralised wastewater solutions for locations not covered by the ongoing centralised 600 KLD sewage treatment plant (STP) project.

The Johkasou system, which treats wastewater close to its source, was recommended by professor AA Kazmi of IIT Roorkee. The proposal targets 155 fixed toilets at Kedarnath that currently rely on soak pits and fall outside STP's design.

# New Tenders/Projects

## “Research Experiential Learning Centre on Sustainable Energy and Circularity” IIT Roorkee

Annexure A-2

### 2. Wastewater Recycling and Resources Recovery Technology Labs

S. No.	Category	Equipment /Units		Technical Specifications			QTY	SET	Year		
				Item	Material / Type	Capacity / Details			1	2	3
5	Waste Water and Resources Recovery Technology Park (50KLD JOHKASOU Based STP)	a.	-	<ul style="list-style-type: none"> <li>Sedimentation &amp; Separation Chamber,</li> <li>Anaerobic Contact Media Chamber,</li> <li>Moving Bed Biofilm Reactor (MBBR) Chamber,</li> <li>Secondary Sedimentation Chamber,</li> <li>Disinfection Chamber,</li> <li>Internal Water Circulation System</li> </ul>	-	50 KLD	-	01	-	-	Y



**Office of  
The Chief Executive Officer,  
Shillong Municipal Board,  
Bishop Cotton Road, Shillong.**

Tender Document for Sewage Treatment Plant (STP) Based on  
JOHKASOU TECHNOLOGY at Reserved Police, Thana Road,  
Shillong. Capacity of Treatment Plant: 300 KLD

# WAY FORWARD

- ▶ **AGGRESSIVE MARKETING, AWARENESS CREATION FOR MASS REPLICATION FOR JOHKASOU- DEMAND GENERATION-MORE JOHKASOU MANUFACTURER PARTICIPATION.**
- ▶ **PRODUCT CERTIFICATION AS PER INDIAN CODE & INTEGRATION OF GOVERNMENT PROCUREMENT- GOVERNMENT E-MARKETPLACE**
- ▶ **STRENGTHEN SKILL DEVELOPMENT PROGRAM- BRANDING AND INCENTIVIZATION OF JOHKASOU OPERATORS.**
- ▶ **GOVERNMENT CERTIFICATION FOR JOHKASOU OPERATORS**
- ▶ **TESTING FACILITY UNDER MEMORANDUM OF COOPERATION.**
- ▶ **MORE WORKSHOP/TRAININGS AND AWARENESS PROGRAMS**