

Regulation and Standards of Decentralized Domestic Wastewater Treatment in Indonesia

By: Elis Hastuti, Sri Darwati, Prayatni Soewondo, Yoshitaka Ebie



SUSTAINABLE DEVELOPMENT GOALS

Goal 6.3 Halving the proportion of untreated wastewater by 2030

Proportion of the population using improved sanitation



Progress on sanitation and drinking-water, 2013 (WHO/Unicef) 2

WASTEWATER FACILITY DEVELOPMENT

EXISTING CONDITION

The wastewater system access : 76.08% (67.20 %-improved sanitation, 8.88 % -basic improved sanitation)



Centralized sewerage systems access : < 3 %



Gap population without access: 60 millions



Sludge/septage treatment plant access : 10 %



River pollution from domestic wastewater : 40-70 %



PROGRAM OF ACCELARATION OF SANITATION, 2015-2019



REGULATION OF DOMESTIC WASTEWATER

	Act no. 32/2009: Conservation and environment management	
Sustainable Development	Ministry of public works regulaition no.4/2017: Domestic Wastewater Management	Indonesia National Standard (SNI)
" Indonesia's Technology Need Assessment for Climate Change Adaptation 2011".	Government regulation no.82/2001: water quality management and water pollution control	Manual of WWTP
	Government Regulation 16/2005 : water supply system development National Plan of Medium Term 2015-2019 National Plan of Long Term 2005-2025	Sanitation White Book
	President regulation 2015-2019: Accelaration of water supply and sanitation development	City strategic planning
	Draft of Ministry Regulation of Wastewater	etc
Rules	Ministry and forestry regulation n0.68/2016 : Effluent standard of WWTP	



Effluent Standard of Domestic WWTP

			Province		
Parameter	Jakarta No.122/ 2005	Middle Java No.5/20 12	Yogjaka rta No.7/20 16	East Java N0.72 /2013	South Sulawe si No.69/ 2013
pН	6-9	6-9	6-9	6-9	6-9
TSS (mg/L)	50	100	75	50	100
BOD_5 (mg/L)	50	100	75	30	75
COD (mg/L)	80		200	50	100
Oil Grease(mg/L)	10	10	10	10	5
Ammonia (mg/L)	10				5
Detergent (mg/L)	2		5		1
Coliform (MPN/100 ml)			10,000		

National standard : no.6/2016

рН	6-9		
BOD	30 mg/L		
COD	100 mg/L		
TSS	30 mg/L		
Oil & grease	5 mg/L		
Ammonia	10 mg/L		
Total Coliform	3000 /100 mL		

National standard : no.5/2014

рН	6-9
BOD	100 mg/L
TSS	100 mg/L
Oil&grease	10 mg/L

Decentralized wastewater treatment

<u>Centralized systems</u> require long construction period and huge initial budget

JICA Master Plan for centralized wastewater treatment in Jakarta (1991)



Centralized treatment



<u>Decentralized systems</u> have been expected to improve the low coverage situation





Reliable?

- Regulation
- Compliance
- Localization

DECENTRALIZED WWTP MANAGEMENT



Type of Decentralized WWTP

There are types :

- 1. Community Sanitation Center/Public: (10-50 households)
- 2. Shalow sewer/simplified sewer and communal WWTP (capacity of 50-1000 persons)
- 3. Regional WWTP (capacity of 1000-5000 persons)



Type of Treatment of Decentralized WWTP





Anaerobic submerged biofiter



Oxidation pond



Biodigester and Biofilter





Subsurface contructed wetland



Rotating biological contactor

Anaeerobic and aerobi biofilter



WWTP



STP-off site (> 100 m3/day)

Scheduled Desludging Service

- Program applied at 4 cities since 2013
- Service is not based on call
- Registered on site WWTP
- Inspection every year
- Regular desludging is 2-3 year
- Cost can be pay every month
- Management: local government, water works company, private

Problem: unproper WWTP, access to dense settlement, STP location, awarness community









Decentralized STP

Standard and Guideline of WWTP

- 1) SNI 03-2398-2002, The procedure of planning for septic tanks and absorption field
- 2) SNI 19-6447-2000, Performance testing methods of activated sludge system
- 3) Pd T-04-2005-C, Manual for the planning and installation of biofilter system for domestic wastewater treatment
- 4) Pd T-02-2004-C, Operation and maintenance of biofilter system for domestic wastewater treatment
- 5) SNI 7504:2011, Specification of Fiberglass reinforced plastic material for water treatment plant
- 6) SNI 8153:2015: Plumbing system for building
- 7) SNI ISO/IEC 17020:2012, general requirements of inspection bodies.
- 8) SNI ISO/IEC 17025:2012, accreditation laboratory
- 9) SNI of water quality test
- 10) Draft of Ministry Regulation (appendix of planning for wastewater treatment)
- 11) Draft- SNI : Manual of planning for biofilter system
- 12) Draft- SNI : Manual of planning for anaerobic baffled reactor
- 13) Draft-SNI: Testing method for performance of decentralized domestic wastewater facilities



WWTP Certification

FABRICATED WWTP

- Most of the WWTP are fabricated biofilter tank. The system has advantages of low land requirement, low cost operation and maintenance.
- Many application of the fabricated communal WWTP are not sustainable because of inadequate treatment process, short life time of tank, improper installation, no meet effluent standard.

INSPECTION BODY

- Instruction of Human Settlement Directore, No.Ku.03.03-DC/214, 21st Februari 1992 : Research Institute for Human Settlements (RIHS) is assigned for the WTP and WWTP certification.
- 2. Instruction of Ministry of Public Works No. 09/SPRINT/M/2003
- Accreditation from national committee accreditation (KAN)

GOALS

- To achieve protection of public health and environment
- To guarantee the WWTP application meet technical requirements and effluent standard
- The SOP of the WWTP system is applied properly
- As a priority the selection of company for the WWTP project
- Implementation of standard or manual in WWTP development.
- All the products in the market must have a certificate.
- The certificate is based on the result of the performance test

GUIDELINES S OF WWTP INSPECTION

Design Criteria of WWTP

- 1) SNI 03-2398-2002, The procedure for septic tanks with leach system
- 2) SNI 19-6447-2000, Performance testing methods of activated sludge system
- 3) Pd T-04-2005-C, Procedure for the planning and installation of biofilter system for wastewater treatment
- 4) Pd T-02-2004-C, Operation and maintenance of biofilter system for domestic wastewater treatment
- 5) SNI 7504:2011, Specification of Fiberglass reinforced plastic material for water treatment plant
- 6) Degree of Ministry of Environment and Forestry, No. 68/2016, Domestic wastewater quality standard
- 7) Regional regulations of wastewater quality standard
- 8) Regulations and other relevant reference s related to materials, pipes, and criteria design of WWTP

Methods of Inspection

- (1) Quality guideline for Inspection Body
- (2) Parameters test at on site:
 - 1) pH test : LIP2.IK-08-06 IPAL : SNI 06-6989.11-2004 : pH-meter
 - 2) Temperature test : LIP2.IK-08-07 IPAL : SNI 06-6989.23-2005 : termometer

(3) Parameters test at Laboratory:

- 1) Biochemical oxygen demand (BOD) : SNI 6989.72-2009
- 2) Chemical oxygen demand (COD) : SNI 6989.5-2009
- 3) Oil and grease: SNI 6989.10-2011
- 4) Total Suspended Solid : SNI 06-6989.3-2004
- 5) Nitrate, Nitrite, ammonium, phosphat, etc.

(4) Forms of inspection : process unit, operationunit, water quality, SOP, design criteria, support building, workshop, etc

Instruction Sheet

LIP2.IK 08-01 IPAL : Inspection of process unit of WWTP

LIP2.IK 08-02 IPAL : Inspection of fabrication of WWTP

LIP2.IK 08-03 IPAL : Inspection of capacity criteria, operation and maintenance of WWTP

LIP2.IK 08-04 IPAL : Inspection of planning criteria of WWTP

Existing-WWTP Certification Process





Inspection Site

- WWTP sample : min. 1 unit
- capacity as WWTPdesign
- well operated WWTP
- stable process
- less site disturbance

FLOWCHART OF EXISTING CERTIFICATION PROCESS



Progress of application of certificated WWTP

- Ministry of Public Works procurement (application of 5000 WWTP/year)
- Local government procurement
- Hospital, Private company

- 6 manufactures have certification
- 12 manufactures are on going the process
- > 100 manufactures product WWTP



Performance testing method of domestic wastewater facilities

Cooperation : NIES, ITB and RIHS

- Field study of communal WWTP in Indonesia and Japan
- Research of WWTP characteristic
- Stakeholder's meetings
- Intensive discussion of performance testing method at RIHS
- Observation of wastewater quality from sewer system
- Trial : Testing of fabricated WWTP at municipal water works





Summary of stakeholders discussion

- We need more manufacturers to distribute domestic wastewater facilities in all Indonesia.
- However, it's easy to make a profit if they produce poor performance and/or weak tanks.





To eliminate low quality treatment facilities from the market

Performance testing method and Reliable certification system are required!!

Performance testing method and certificate system

- Treatment efficiency
 Robustness of the tank
- Material, Design, Standard Operating Procedure, Power consumption, Workshop, etc.



Our goals

- All the products in the market must have a certificate.
- The certificate is based on the result of the performance test

Improved Certification Process



When the product is sold to customers



- Manufacturers have to submit drawings with the certification.
- Local governments can easily recognize whether the product is appropriate or not.

Draft-SNI: Performance Testing method of domestic wastewater facilities

Scope

This performance testing method is for prefabricated facilities or facilities that are constructed on-site/in-situ for domestic wastewater treatment

General Requirement

- Testing body is designated by National Accreditation Committee (KAN).
- b. Raw domestic wastewater for the test must be stably available in testing site.
- c. Testing by Inspector has knowledge and certificate of SNI ISO 17020
 :general requirements of inspection bodies



Draft-SNI: Performance Testing method of domestic wastewater facilities

Technical requirements :

1) Application

Application format, design drawing with related calculation, operation and maintenance instruction, and carrying in/out plan, material test, supporting equipment and workshop

2) Installation

Installation, initial adjustment, seeding and acclimation under testing body's observation.

3) Testing conditions

- a. Test periode
- b. Raw wastewater for the test
- c. Inflow pattern
- d. Loading rate
- e. Introducing sludge
- f. Water quality analysis
- g. Tank structure



Testing Condition of Domestic Wastewater Facilities

No	Parameter	Existing Testing	Improved Testing		
1	Pre testing	- Number of WWTP minimum 2 sites	Instalation at laboratory, seeding		
			stage by manufacture		
2	Capacity	1-400 households	1 households, depend on lab facility		
3	Testing	5-10 days at eac process unit	Maximum 12 weeks – seeding		
	periode		Minimum 10 weeks - testing		
4	Wastewater	real wastewater	Wastewater from sewer system		
	characteristic		and artificial wastewater		
5	Loading rate	Combination of High loanding,	normal loading: minimum 8 weeks		
		normal and low load ing	High loading : minimum 1 weeks		
			Low loading : minimum 1 weeks		
6	Sampling	for 3 days, composite every 3-4	Every week, composite ervery 2		
	method	hours	hours		
7	sludge	Measurement of sludge high at	Measurement performance with		
		every process unit	artificial sludge		
8	Tank structure	Dimesnion, sample tnak material,	Structural testing at full scale		
		ketebalan, composition			

Factors influence wastewater characteristic



Inflow pattern in Indonesia



Two peaks in the morning and evening
Starts 2-3 hours earlier than Japanese case
No high peak which is due to bath tub

Testing Condition of Domestic Wastewater Facilities





Loading rate

PE	5-10	11-30	31-50	51-	101-	> 500
				100	500	
Nilai k	1.5	1.45	1.35	1.3	1.25	1.2

Testing Condition of Domestic Wastewater Facilities

Range of wastewater fed to the test

	рН	BOD (mg/L)	COD (mg/L)	TSS (mg/L)	Oil and grease (mg/L)	NH ₃ (mg/L)	T-N (mg/L)	T-P (mg/L)
Minimum	5,8	150	180	145	20	27	40	3
average	7,2	200	420	160	25	39	45	5
Maximum	8,6	350	550	175	30	52	50	7

Pra –investigation of testing location and wastewater fed





Trial of the testing method will be conducted soon



WWTP CERTIFICATION (EXISTING and FUTURE)



Conclusions

- □ Improvement of decentralized wastewater treatment development to achieve technical requirements and effluent standard need upgrading treatment system and certification system.
- Reliable certification system is strategic WWTP development and also for dissemination of appropriate domestic wastewater treatment facilities in Indonesia.
- We have drafted Indonesian performance testing method to evaluate domestic wastewater treatment facilities.



THANK YOU FOR YOUR ATTENTION





