

# **FINNISH REGULATIONS, EUROPEAN STANDARDS AND TESTING OF SMALL WASTEWATER TREATMENT PLANTS**

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# Finnish Environment Institute (SYKE)

- research and development centre
- subordinated under the Ministry of the Environment and the Ministry of Agriculture and Forestry
- 600 employees

More information

[www.environment.fi/syke](http://www.environment.fi/syke)

# THE HIERARCHY OF REGULATIONS

**THE  
CONSTITUTION OF  
FINLAND (731/1999)**



**ENVIRONMENTAL  
PROTECTION ACT  
(86/2000)**



**ONSITE  
WASTEWATER  
SYSTEM DECREE  
(542/2003)**



**MUNICIPAL  
ENVIRONMENTAL  
PROTECTION  
REGULATIONS**

**EVERYBODY IS RESPONSIBLE FOR  
THE ENVIRONMENT, AUTHORITIES  
SHALL STRIVE FOR SAFEGUARDING  
A HEALTHY ENVIRONMENT**

**GENERAL DEMAND TO TREAT  
WASTEWATER TO A HARMLESS  
LEVEL**

**GENERAL REQUIREMENTS  
FOR WASTEWATER  
DISCHARGES AND SYSTEMS**

**LOCAL ENVIRONMENTAL  
REQUIREMENTS FOR  
WASTEWATER SYSTEMS**

# **THE ONSITE WASTEWATER SYSTEM DECREE (OWSD) <sup>(1/3)</sup>**

## **FULL TITLE:**

**GOVERNMENT DECREE ON TREATING  
DOMESTIC WASTEWATER IN AREAS OUTSIDE  
SEWER NETWORKS (542/2003)**

## **MAIN CONTENT:**

- **MINIMUM TREATMENT REQUIREMENTS FOR  
ONSITE WASTEWATER SYSTEMS**
- **EXISTING SYSTEMS MUST HAVE A SPECIFIED  
WASTEWATER SYSTEM REPORT**

# **THE ONSITE WASTEWATER SYSTEM DECREE (OWSD) (2/3)**

- **THE APPLICATION FOR A BUILDING PERMIT MUST INCLUDE A WASTEWATER SYSTEM PLAN**
- **THERE ARE REQUIREMENTS FOR THE PLAN**
- **THE WASTEWATER SYSTEM MUST BE BUILT ACCORDING TO THE PLAN**
- **USE AND MAINTENANCE INSTRUCTIONS ARE NECESSARY**
- **THE WASTEWATER SYSTEM HAS TO BE USED ACCORDING TO THE INSTRUCTIONS**

# **THE ONSITE WASTEWATER SYSTEM DECREE (OWSD) (3/3)**

- **THE FINNISH ENVIRONMENT INSTITUTE COLLECTS INDEPENDENT, RELIABLE AND UP-TO-DATE INFORMATION ON COMMONLY USED WASTEWATER TREATMENT METHODS AND SMALL PLANTS AND THEIR EFFECTIVENESS**
- **THE INFORMATION ON WASTEWATER TREATMENT SYSTEMS AND THEIR PERFORMANCE MUST BE ACCESSIBLE TO EVERYBODY**

# General treatment requirements of the OWSD

The maximum permissible daily load of treated wastewater per capita outside sewer networks

	Standard load of untreated wastewater (g/person d <sup>-1</sup> )	Required reduction (%)	Permissible load of treated wastewater (g/person d <sup>-1</sup> )
<b>BOD<sub>7</sub></b>	<b>50</b>	<b>90</b>	<b>5,0</b>
<b>P<sub>tot</sub></b>	<b>2,2</b>	<b>85</b>	<b>0,33</b>
<b>N<sub>tot</sub></b>	<b>14</b>	<b>40</b>	<b>8,4</b>

# Composition of untreated wastewater according to OWSD

Composition of the daily load for untreated wastewater per capita. The values below can be used if other reliable information is not available.

load source	the daily load of untreated wastewater per capita (g/person d <sup>-1</sup> )		
	BOD <sub>7</sub>	P <sub>tot</sub>	N <sub>tot</sub>
faeces	15	0,6	1,5
urine	5	1,2	11,5
other	30	0,4	1,0
together	50	2,2	14



# An example of calculation the needed reduction in greywater treatment when dry toilets are used

	load of untreated wastewater (g/person d <sup>-1</sup> )	permissible load of treated wastewater (g/person d <sup>-1</sup> )	needed treatment reduction (%)
<b>BOD<sub>7</sub></b>	<b>30</b>	<b>5</b>	<b>83</b>
<b>P<sub>tot</sub></b>	<b>0,4</b>	<b>0,33</b>	<b>18</b>
<b>N<sub>tot</sub></b>	<b>1,0</b>	<b>8,4</b>	<b>0</b>

# **TREATMENT REQUIREMENTS AND LOCAL CIRCUMSTANCES (1/2)**

**- Municipalities may give treatment requirements in their environmental protection regulations.**


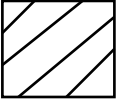
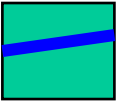

**- Depending on local circumstances the municipal requirements can be tighter or lower than the general treatment requirements of the Decree.**

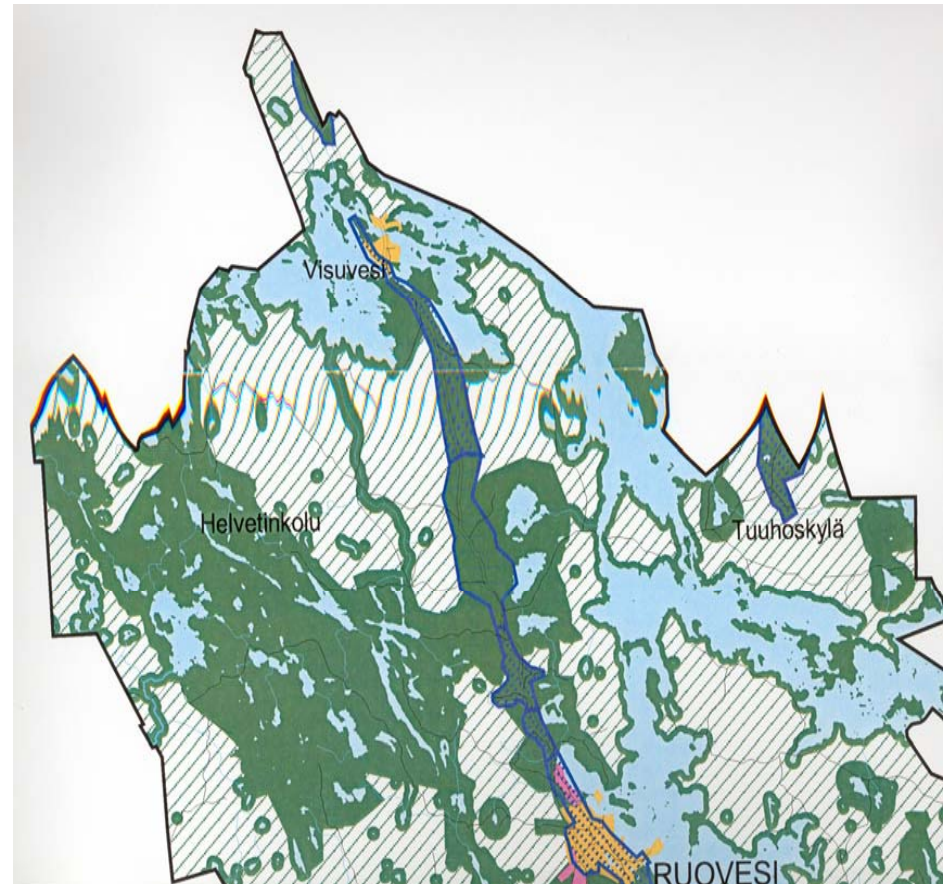
# TREATMENT REQUIREMENTS AND LOCAL CIRCUMSTANCES (2/2)

However, local requirements must always be equal or tighter than the values below:

	reduction	max load
	%	g/person d <sup>-1</sup>
<b>BOD7</b>	<b>80</b>	<b>10</b>
<b>P<sub>tot</sub></b>	<b>75</b>	<b>0,66</b>
<b>N<sub>tot</sub></b>	<b>30</b>	<b>9,8</b>

# Municipalities are encouraged to analyze their area and use different zones with equal requirements

-  Normal areas
-  Less sensitive areas
-  Special areas
-  Areas served by sewer networks



# **ENTRY INTO FORCE AND TRANSITIONAL PROVISIONS OF THE OWSD**

- **OWSD ENTERED INTO FORCE 1.1.2004, SINCE THEN IT COVERED ALL NEW WASTEWATER SYSTEMS**
- **EXISTING HOUSES WITH WC: A SYSTEM REPORT MUST BE AVAILABLE BY 1.1.2006**
- **EXISTING HOUSES WITHOUT WC: A SYSTEM REPORT MUST BE AVAILABLE BY 1.1.2008**
- **OLD WASTEWATER SYSTEMS HAVE TO FULFIL THE GENERAL TREATMENT REQUIREMENTS BEFORE 1.1.2014; EXCEPTIONS CAN BE MADE ON CASE-BY-CASE BASIS**

# Big regulatory reforms take time!

- **Preparatory phase: 10 years**
  - environmental need was expressed by experts, 1993
  - political decision-in-principle on water protection, 1998
  - basic regulations: new environmental protection act, 2000
  - proposal for a new decree, 2001
  - new decree enforced, 2003-04
- **Transitional period for implementation: 10 years**
  - wastewater systems built before 2004 must fulfill the treatment requirements of the decree before 2014

# Environmental impacts

The quality of environment will be improved in rural areas:

- reduced wastewater loads, especially phosphorus and thus reduced eutrophication in the lakes
- less health risks as the quality of ground waters and bathing waters improve
- less disagreements between neighbours





# EU INSTRUMENTS FOR THE STANDARDISATION OF THE SMALL-SCALE WASTEWATER TREATMENT PLANTS

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# Previous situation in Europe

- National product standards, technical approvals and other technical specifications and provisions have been a hindrance to the trade within EU
- The goal is to remove these differences and to create a common approval system for all European countries

# What is CE marking ?

- CE marking is a European “conformity marking” which works as a ”pass” when products travel around the EU
- Products with a CE mark can be sold in the whole European Economic Area (EEA)
- CE marking is neither a mark of origin, nor a quality mark or a safety mark

# Construction Products Directive (CPD; 89/106/EEC)

- The main goal is to establish an Internal Market for construction products
  - different national requirements
- National standards and other approval systems may not include technical barriers to trade
- The new European system is based on harmonised technical specifications
- All conflicting national specifications must be withdrawn once the harmonised European versions are available

# CE marking of Construction products

- is based on the Construction Products Directive
- essential requirements on mechanical resistance and stability, safety in case of fire, hygiene, health and the environment etc.

# Construction product ?

- is any product which is produced to be permanently used in construction works including both building and civil engineering works
  - includes for example "package treatment plants" and septic tanks

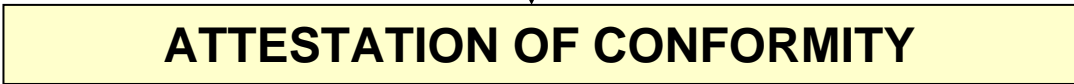
# Harmonized standards

- Enable CE marking of products
- For over 500 products
- Contains all the relevant details for a given product
- Methods for attestation of conformity
  - required properties
  - required testing
  - guideline for factory production control
- The informative "Annex ZA" of the standard details the conditions necessary for the manufacturer to affix CE marking on the products
- Product is presumed to be fit for use, if it conforms to a harmonized standard

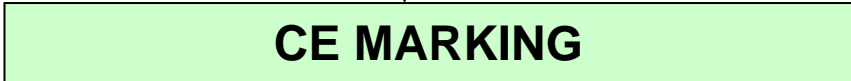
CEN /  
EOTA



Manufacturer  
(and Notified body)



Manufacturer





# Application of the harmonized standards

- When a harmonized standard is enforced, Member States can not have any national standards, approval systems, conformity systems, or other systems, which can constitute technical barriers to trade
- However, it is possible to have national regulations or provisions which complement the harmonized standards, for example discharge limits, treatment requirements
- In Finland the OWSD is such a regulation

- EN 12566: Small wastewater treatment systems for up to 50 PT

<b>Parts</b>	<b>Type</b>	<b>Situation</b>
1: Prefabricated septic tanks	Harmonized standard → CE	Published + amendment 1
2: Soil infiltration systems	Technical report	Published
3: Packaged and/or site assembled domestic wastewater treatment plants	Harmonized standard → CE	Published
4: Septic tanks assembled in situ from prefabricated kits	Harmonized standard → CE	In preparation
5: Pre-treated effluent filtration systems (including sand filters)	Technical report	In preparation
6: Prefabricated treatment unit used for septic tank effluent	Harmonized standard → CE	In preparation
7: Prefabricated tertiary treatment unit	Harmonized standard → CE	In preparation

# Part 3: Packaged and/or site assembled domestic wastewater treatment plants

- Scope
  - domestic wastewater treatment plants for up to 50 PT
  - including guest houses and businesses
  - covers plants with tanks made of concrete, steel, PVC-U, Polyethylene (PE) and Glass Reinforced Polyester (GRP-UP)
  - for use buried in the ground
  - all components by one manufacturer
- Not included
  - Grey water treatment plants











# Relevant characteristics relating to essential requirements

- Treatment efficiency
- Nominal designation (treatment capacity)
- Watertightness
- Crushing resistance and maximum load deformation
- Durability

# Assignment of evaluation of conformity tasks

- Factory production control (Manufacturer)
- Initial type testing by the manufacturer
  - Treatment capacity
- Initial type testing by a notified body (test laboratory)
  - Treatment efficiency test
  - Watertightness test
  - Testing or calculation of Structural behaviour
  - Durability

# Testing by SYKE and VTT

- **Finnish Environment Institute (SYKE) and Technical Research Centre of Finland (VTT)** have started in cooperation the CE- testing of small scale wastewater treatment plants in 2006
- Both have a status of **notified body**
- SYKE is responsible for the treatment efficiency and watertightness tests
- VTT takes care of verifying structural behaviour and durability

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# Treatment efficiency test

- Influent characteristics defined in the standard
  - BOD/COD, Tot-P, Tot-N, TSS
- Daily flow pattern for testing
- Testing of the treatment plants in different conditions (nominal, under and over loadings, no loading and power breakdown)
  - 10 test periods
  - 26 samplings
  - altogether 38 weeks + start-up phase

Test programme is as follows:

Sequence	Characteristic	Load	Time (weeks)	Sampling
1	Start-up	nominal	X	-
2	Normal	nominal	6	4
3	Underloading	50 % nominal	2	2
4	Normal+power breakdown	nominal	6	5
5	Low occupation stress	no load	2	-
6	Normal	nominal	6	3
7	Overloading	125/150 % nominal	2	2
8	Normal+power breakdown	nominal	6	5
9	Underloading	50 % nominal	2	2
10	Normal	nominal	6	3
			<b>38+X</b>	<b>26</b>



## Test results include ...

- mean values of efficiency ratios for nominal loading
- individual values of efficiency ratios for non-nominal loading
- information of all maintenance and repairs carried out during the test period
- information concerning deviations from the test procedure



**Producers name and address**

**05**

**EN 12566-3**

**” Product name ”**

<b>Hydraulic daily load:</b>	1 m <sup>3</sup> /day
<b>Material:</b>	materiaalin nimi
<b>Watertightness ( water test):</b>	pass
<b>Crushing resistance:</b>	pass
<b>Treatment efficiency:</b>	COD: 90 % BOD: 90 % SS: 80 %
<b>Electrical consumption:</b>	2.4 kWh/d
<b>pH:</b>	NPD
<b>Total nitrogen:</b>	40 %
<b>Total phosphorus:</b>	89 %
<b>Dissolved oxygen concentration:</b>	NPD
<b>Sludge production:</b>	NPD

# CE marking is mandatory or voluntary

- CE marking of small wastewater treatment plants will be mandatory in most EU countries
- It is not yet mandatory in Finland, Sweden, Ireland and United Kingdom
- Mandatory in most new EU countries ?
- In export mandatory to all (in practise)

# Consumer perspective

- Products with a CE mark do not necessarily comply all the national rules in each EU country
- Harmonized standard for WWTP:s do not give any treatment requirements but a Member State can do so
- In Finland treatment requirements are given in the Decree and it is the responsibility of the consumer to check, if the chosen plant is suitable for the location

Thank you for your attention!