ON-SITE SEWAGE TREATMENT FACILITIES IN MALAYSIA

ON-SITE DOMESTIC TREATMENT
Small Sewage Treatment System

On-site treatment systems designed to treat and dispose of effluent from single premise and/or single ownership development

Cess pit
(An old system - Obsolete)

Individual Septic Tank

Communal Septic Tank
(Obsolete system - serving multi premises)

SEWERAGE COVERAGE AREA IN MALAYSIA

<table>
<thead>
<tr>
<th>TYPES OF SERVICES AND APPLICATION</th>
<th>Units (PE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OFF-SITE TREATMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Decentralized (Multipoint)</td>
<td>8,847 (17,839,120)</td>
</tr>
<tr>
<td>Centralized (Regional)</td>
<td>82 (6,407,515)</td>
</tr>
<tr>
<td><strong>ON-SITE TREATMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Individual Septic Tank</td>
<td>1,306,662 (6,669,142)</td>
</tr>
<tr>
<td>Communal Septic Tank (CST)</td>
<td>4,378 (525, 240)</td>
</tr>
<tr>
<td>Small Sewage Treatment System</td>
<td>2400: (240,000)</td>
</tr>
<tr>
<td>Cess Pit (Pour Flush)</td>
<td>894,859 (4,474,293)</td>
</tr>
</tbody>
</table>

* Source: Malaysia Water Industry Guide 2014
  Note: 1. Estimate installation of SSTS since year 2008
DEFINITION of septic tank based on Water Services Industry 2006 (Act 655):

“A basic form of on-site treatment facility consisting of one or more compartments that provides treatment of sewage by means of sedimentation and anaerobic process.”

DESIGN CAPACITY
For 5 – 30 PE
(1.125 – 6.750 m³/day)

APPLICATION

- Serving a single premise, with capacity not more than 30PE
- Other treatment system shall be provided if the design PE more than 30PE.
**INDIVIDUAL SEPTIC TANK**

**LIMITATION**
- Limitation in providing primary treatment
- Treatment performance is inconsistent to meet the required standards

**PERFORMANCE MEASUREMENT**
- Performance is subjected to retention which is affected by quantity of settled solids which accumulated over time

**EFFLUENT QUALITY**
- Design for effluent discharge downstream of water intake points
  - Average effluent quality
    - BOD: 50 mg/l
    - Suspended Solid: 100 mg/l

**MAINTENANCE OF THE SYSTEM**
- Design shall allow regular desludging
- Desludging shall be at least once very 3 years

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**PLANNING ASPECT OF INDIVIDUAL SEPTIC TANK**

**Single Development Up To 30 Units Or 150PE In Total**
- Septic tanks regarded as temporary treatment system
- Owner of system shall provide the following
  - 150mm by-pass pipe from last inspection chamber before septic tank
  - By-pass pipe extended it to the drain outside the premises
  - The pipe shall be end capped for future connection

**Individual Development Outside The Local Authority Areas**
- Owners must be compelled to adhere to rules and requirement
  - Product must be approved by SPAN
    - Complying with determined effluent standard
    - Trenches to be provided for final effluent discharge
    - Raised soak away shall be provided if water table is high
    - Desludging activities must be provided by registered desludging contractor

- All soak away shall be located 5m downstream of wells for domestic consumption
**Small Sewerage Treatment System**

**Design Capacity**
For 31 – 149 PE
(6.975 – 33.525 m³/day)

Limited to development with lower population size

Additional aeration process at the second tank for removal of BOD

Provide only a partial treatment

Low energy consumption

The function of key components does not require intensive energy and technical ability for operation
STANDARDIZATION OF ON-SITE TREATMENT IN MALAYSIA

WHY DO WE NEED STANDARDIZATION

SERVICE LICENSEE
- Performance and durability

SPAN
Suruhanjaya Perkhidmatan Air Negara

FACILITY LICENSEE
- Quality and need for industry

ACCRREDITATION BODIES
- Compliance to specifications
SECTION 45

- Plans and specifications for the construction of sewerage systems and septic tanks require the approval of the Commission

SECTION 180(a)(i)

- The Commission may make such rules to provide for the minimum standards and specifications which shall be used in the design, construction, installation, protection, operation and maintenance of any water supply system or sewerage system

STANDARDS & GUIDELINES

MALAYSIAN SEWERAGE INDUSTRY GUIDELINES VOL. 5 – SEPTIC TANKS
- 3rd Edition January 2009
- Published by SPAN

MALAYSIAN STANDARD ON SITE TREATMENT UNITS PART 1 : PREFABRICATED SEPTIC TANKS SPECIFICATIONS
- Publish on June 2012

MALAYSIAN STANDARD ON SITE TREATMENT UNITS PART 2 : PACKAGED PREFABRICATED SMALL SEWAGE TREATMENT SYSTEM SPECIFICATIONS
- Draft approved by ISC D on November 2014
MALAYSIAN SEWERAGE INDUSTRY GUIDELINES
VOL. V
SEPTIC TANKS

PURPOSE
- To set up the requirements of SPAN for design and construction of Individual Septic Tank

APPLICATION
- Development with population equivalent size up to 150 PE
- For single development shall not more than 30 PE
**EFFLUENT DISCHARGE STANDARDS**

- Standards based on Environmental Quality (Sewage) Regulations 2009 under Environment Quality Act 1974
- Regulate by Department of Environment Malaysia (DOE)
- Standard A for upstream water intake point and Standard B for downstream

**LIMITATION**

- Septic tank performance may not be on a consistent basis to meet DOE standards
- For this reason, the effluent discharge downstream shall meet:
  - BOD5 : 50 mg/L
  - Suspended Solids : 100mg/L
## Design Effluent Values

<table>
<thead>
<tr>
<th>Parameter (mg/l unless otherwise state)</th>
<th>Effluent Discharge to Rivers / Stream</th>
<th>Effluent Discharge to * Stagnant Water Bodies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard A</td>
<td>Standard B</td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>Design</td>
</tr>
<tr>
<td>BOD₅</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>SS</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>COD</td>
<td>120</td>
<td>60</td>
</tr>
<tr>
<td>AMN</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Nitrate Nitrogen</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>O&amp;G</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

### MS 2441-1:2012

**On Site Sewage Treatment Units – Part 1: Prefabricated Septic Tanks Specification**

**SCOPE**

- Requirement for prefabricated septic tanks and their associated fittings
- Treatment of sewage for up to 30 PE
- Installed below ground level
- Serve one premise only
- Two materials covered, FRP & PE
- Intended for use by consultants, designers, manufacturer, certifying bodies, installers, regulators and other interested parties
MAJOR SPECIFICATION REQUIREMENTS

- Capacity
- Inlet & Outlet fittings
- Flow path
- Openings
- Anchorage
- Filter media
- Partitions
- Marking
- Thickness

GENERAL REQUIREMENTS

SEPTIC TANKS – GENERAL USAGE REQUIREMENTS

• Only for total development < 150PE
• Individual septic tank (IST) can only serve one premises
• Size capacity – smallest (5PE) & largest (30PE)
• Multiple IST within single lot not allowed

TYPES OF SEPTIC TANKS

• Prefabricated
• Cast In-Situ
STANDARDS REFERENCE

- **AS/NZS 1546 : 2008** - On-site domestic wastewater treatment units Part 1: Septic Tanks
- **EN 12566: 2007** - Small wastewater treatment systems for up 50 PT Part 1: Prefabricated Tank
- **CAN/ CSA B66 : 2005** - Design, material and manufacturing requirements for prefabricated septic tanks and sewage holding tanks

OTHER REFERENCES

- Malaysian Sewerage Industry Guidelines, Volume 5 - Septic Tanks
- Water Services Industry Act 2006
- Water Services Industry (Desludging and Septage Discharge) Regulations 2008 [Draft]

ON SITE SEWAGE TREATMENT UNITS – PART 2 :
PACKAGED PREFABRICATED SMALL SEWAGE TREATMENT PLANT SPECIFICATIONS

**SCOPE**

- Requirement for packaged prefabricated small sewage treatment system (SSTS) and their associated fittings
- Designed for sewage flow of 31 up to 149 PE
- Installed below ground level
- No vehicle load and not installed in high water table area
- Two materials covered, FRP & PE
- Off-site assembled
- Intended for use by consultants, designers, manufacturers, certifying bodies, installers, regulators and other interested parties
MAJOR SPECIFICATION REQUIREMENTS

- Capacity
- Inlet & Outlet fittings
- Openings
- Anchorage
- Filter media
- Partitions
- Marking
- Thickness
- Treatment efficiency

GENERAL REQUIREMENTS

SSTS – GENERAL USAGE REQUIREMENTS

- Only for development 31PE - 149PE
- Prefabricated only
STANDARDS REFERENCE

- MS 1225-2:2006, Polyethylene (PE) tanks for cold water storage - Part 1: Capacity more up to 600 gal (first revision)
- BS EN 12566-3+A1: 2009, Small wastewater treatment systems for up 50 PT - Part 3: Packaged and/or site assembled domestic wastewater treatment plants
- CAN/CSA B66: 2005, Design, material and manufacturing requirements for prefabricated septic tanks and sewage holding tanks

OTHER REFERENCES

- Malaysian Sewerage Industry Guidelines, Volume 5 - Septic Tanks
- Water Services Industry Act 2006
- Water Services Industry (Desludging and Septage Discharge) Regulations 2008 [Draft]

JUSTIFICATIONS

To elevate and maintain the quality of on-site treatment system produced by the manufacturers at desirable level to perform as required

To ensure necessary certification is obtained thus manufacturers are more responsible and accountable.
BENEFITS

By specifying the requirements and test specification, it will;

Enable Septic Tanks and SSTS to be manufactured/constructed in compliance to manufacturing requirements and performance criteria established in the standard

End users will have the opportunity in having good quality and certified products

TECHNICAL SPECIFICATION SEWAGE TREATMENT SYSTEM

Part 1: Prefabricated Tanks - Packaged Plants &
Part 2: Construction and Installation - Packaged Plants

SCOPE

- Requirements for packaged sewage treatment plant consisting prefabricated tanks made of FRP or PE
- Serve between 150 and 5000 population equivalents
SPECIFICATION

• Performance requirements and associated test methods for the prefabricated tanks and their accessories that are installed buried in the ground with no vehicles loads are applied above it

• Marking requirements and evaluation of conformity for the prefabricated tanks

SPECIFICATION

• Operational requirements and performance criteria that deal with features such as functional design and material as means of compliance with overall requirements of the packaged plant

• Focus is on operational systems of the plant comprising piping, aeration, pumping, control and other ancillaries

• Specification also includes treatment efficiency testing to ascertain if the plant achieve the effective and reliable operational performance under normal operating conditions throughout its serviceable life span
BENEFITS OF TECHNICAL SPECIFICATIONS

Well Planned Sewerage Services

Good Quality Assets

ISSUES, CHALLENGES & WAY FORWARD
ADVANTAGES & DISADVANTAGES OF ON-SITE TREATMENT SYSTEM

ADVANTAGES
- Low installation cost
- Easy installation
- Serving a single premise

DISADVANTAGES
- Inconsistent treatment performance
- Require regular desludging frequency of once every 3 years
- Capacity allowed only up to 30PE
- Lacking of Enforcement

SEWAGE CHARACTERISTICS AND EFFLUENT QUALITY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>PE RANGE</th>
<th>CAPACITY RANGE (m³/day)</th>
<th>BOD</th>
<th>COD</th>
<th>SS</th>
<th>TN</th>
<th>NH3-N</th>
<th>Oil &amp; Grease</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(IDEAL) INFLUENT</td>
<td>All</td>
<td>All</td>
<td>250</td>
<td>500</td>
<td>300</td>
<td>50</td>
<td>30</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>EFFLUENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDIVIDUAL SEPTIC TANK</td>
<td>5 - 30</td>
<td>1.12 – 6.75</td>
<td>50</td>
<td>200</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>SMALL SEWAGE TREATMENT SYSTEM</td>
<td>31 - 149</td>
<td>6.97 – 33.52</td>
<td>35</td>
<td>160</td>
<td>75</td>
<td>N/A</td>
<td>N/A</td>
<td>7.5</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
1. Only applicable for effluent discharge to stagnant water bodies such as lakes and ponds
2. The proposed effluent parameters for SSTS

CHALLENGES IN DETERMINING THE DESIGN INFLUENT PARAMETERS
The influent parameter in Malaysia mostly diluted due to infiltration and illegal discharges from rain gutter
WAY FORWARD

To standardize on-site treatment system

To elevate and control the quality of prefabricated components of the system produced by manufacturers

To ensure necessary certification is obtained thus manufacturers are more responsible and accountable

To ensure the system would be able to provide treatment efficiency as intended

To specify level of operation and maintenance required as defined for the system

To ensure construction and installation is at desirable level to perform as required

End users will have the opportunity in having good quality and certified products

THANK YOU

SEWERAGE REGULATORY DEPARTMENT
NATIONAL WATER SERVICES COMMISSION
MALAYSIA