



**International  
Standard**

**ISO 30500**

**Non-sewered sanitation systems —  
Prefabricated integrated treatment  
units — General safety and  
performance requirements for  
design and testing**

*Systèmes d'assainissement autonomes — Unités de traitement  
intégrées préfabriquées — Exigences générales de performance  
et de sécurité pour la conception et les essais*

**Second edition  
2025-07**

ISO 30500:2025

<https://standards.iteh.ai/catalog/standards/iso/3a8410a8-2d67-4f7c-81f7-826bd87f3126/iso-30500-2025>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO 30500:2025

<https://standards.iteh.ai/catalog/standards/iso/3a8410a8-2d67-4f7c-81f7-826bd87f3126/iso-30500-2025>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b>	<b>vi</b>
<b>Introduction</b>	<b>vii</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>2</b>
<b>3 Terms, definitions and abbreviated terms</b>	<b>2</b>
3.1 Terms and definitions	2
3.1.1 System components	2
3.1.2 System inputs and outputs	3
3.1.3 System safety and integrity	4
3.1.4 System use and impact	6
3.2 Abbreviated terms	6
<b>4 General requirements</b>	<b>8</b>
4.1 User requirements	8
4.2 Metric system	8
4.3 Design capacity and operability	8
4.3.1 Treatable input	8
4.3.2 Treatment capacity	8
4.3.3 Menstrual hygiene products	8
4.3.4 Overload protection	9
4.3.5 Operability following non-usage	9
4.3.6 Operability following short-term shutdown	9
4.3.7 Operability following long-term shutdown	9
4.3.8 Continuous use	9
4.3.9 Safe state	9
4.4 Performance requirements	9
4.4.1 General	9
4.4.2 Solid output, effluent and recirculated water requirements	9
4.4.3 Odour emissions requirements	10
4.4.4 Noise requirements	10
4.4.5 Air emissions requirements	10
4.5 Expected design lifetime	10
4.6 Ergonomic design	10
4.7 Secure design	10
4.8 Operating conditions	10
4.8.1 Ambient temperature range	10
4.8.2 Ambient air humidity	11
4.8.3 Atmospheric pressure	11
4.9 Requirements for NSSS components	11
4.9.1 General	11
4.9.2 Hygienic design	11
4.9.3 Tightness	11
4.9.4 Cleanability of surfaces	11
4.9.5 Chemical and biological additives	12
4.9.6 Requirements for ease of operation	12
4.10 Material requirements	12
4.10.1 Durability of materials	12
4.10.2 Fire resistance of materials	12
4.11 Connections and joining elements	12
4.12 General safety design requirements	13
4.12.1 Safety of edges, angles, and surfaces	13
4.12.2 Fire and explosion protection	13
4.12.3 Structural integrity	13
4.12.4 Prevention of hazardous contact with partially treated liquids and reuse	14
4.12.5 Underground systems	14

4.12.6	External impacts .....	14
4.13	Information and marking .....	14
4.13.1	Information and warnings .....	14
4.13.2	Marking and labelling .....	15
4.14	Maintenance .....	15
4.14.1	Reasonable configuration, adjustment, and maintenance activities .....	15
4.14.2	Location and access of configuration, adjustment, and maintenance points .....	15
4.14.3	Discharge and cleaning .....	15
4.14.4	Tools and devices .....	16
4.14.5	User manual .....	16
4.14.6	Handling and transport of the NSSS .....	16
<b>5</b>	<b>Technical requirements .....</b>	<b>16</b>
5.1	Safety assessment .....	16
5.2	Operational requirements .....	17
5.2.1	General .....	17
5.2.2	Intentional starting of NSSS operation .....	17
5.2.3	Intentional stopping of NSSS operation .....	17
5.2.4	Emergency stop .....	17
5.3	Reliability and safety requirements for energy supply .....	17
5.3.1	Security of energy supply .....	17
5.3.2	Safety requirements for electrical energy supply .....	17
5.3.3	Safety requirements for non-electrical primary energy supply .....	18
5.4	Mechanical requirements .....	18
5.4.1	Pressurized or vacuum equipment .....	18
5.4.2	Pipes, hoses and tanks .....	18
5.4.3	Moving and rotating parts .....	18
5.4.4	Backflow prevention .....	19
5.5	Requirements for radiation .....	19
5.5.1	High temperatures of parts and surfaces .....	19
5.5.2	Low temperatures of parts and surfaces .....	19
5.5.3	Other radiation emissions .....	19
5.6	Electrical and electronic equipment .....	19
5.6.1	Safety and reliability of electrical and electronic equipment .....	19
5.6.2	Control system .....	19
5.6.3	Safety-related function of the control system .....	20
5.6.4	Remote Monitoring .....	20
5.7	Reliability of conveyance devices .....	21
5.8	Transitions from the backend .....	21
<b>6</b>	<b>Additional requirements for the frontend .....</b>	<b>21</b>
6.1	General .....	21
6.2	Use and operation .....	21
6.2.1	General usability requirements .....	21
6.2.2	Accessibility .....	22
6.2.3	Requirements for ease of cleaning .....	22
6.2.4	Cultural requirements .....	22
6.3	Visibility of faeces .....	22
6.4	Evacuation performance .....	22
6.5	Integrity against external impacts .....	23
6.6	Slipping, tripping or falling .....	23
6.7	Water seal .....	23
<b>7</b>	<b>Performance testing .....</b>	<b>23</b>
7.1	General testing requirements .....	23
7.2	Controlled laboratory testing .....	24
7.2.1	General .....	24
7.2.2	Assembly, installation, operation, and maintenance .....	24
7.2.3	Documentation of input .....	24
7.2.4	Generated output .....	25

7.2.5	Test observations.....	25
7.2.6	Laboratory conditions.....	25
7.2.7	Testing sequence and duration.....	25
7.2.8	Loading pattern.....	27
7.2.9	Performance requirements during laboratory testing.....	27
7.3	Field verification of performance.....	32
7.3.1	General.....	32
7.3.2	Class 1 and Class 4 NSSS.....	33
7.3.3	Class 2 and Class 3 NSSS.....	33
<b>8</b>	<b>Sustainability.....</b>	<b>34</b>
8.1	General.....	34
8.2	Recovery of nutrients.....	34
8.3	Water consumption and recirculated water.....	34
8.3.1	Calculations.....	34
8.3.2	Water consumption.....	34
8.3.3	Recirculated water.....	34
8.4	Energy consumption and energy recovery.....	34
8.4.1	Calculations.....	34
8.4.2	Energy consumption.....	34
8.4.3	Direct and indirect energy recovery.....	35
8.5	Recurring operational requirements.....	35
8.6	Life cycle assessment.....	36
<b>Annex A (normative) Test methods and additional testing requirements.....</b>		<b>37</b>
<b>Annex B (normative) Risk assessment and list of significant hazards.....</b>		<b>70</b>
<b>Annex C (normative) User manuals.....</b>		<b>76</b>
<b>Annex D (informative) Sustainability measures.....</b>		<b>79</b>
<b>Annex E (informative) Design considerations.....</b>		<b>81</b>
<b>Annex F (informative) Health and environmental parameters — Notes and references.....</b>		<b>84</b>
<b>Annex G (informative) Remote monitoring.....</b>		<b>86</b>
<b>Annex H (informative) Guidelines for electrically operated spray toilet seat used for frontends of NSSS — comfortability aspects.....</b>		<b>92</b>
<b>Annex I (normative) Alternative feedstocks and characterisation.....</b>		<b>94</b>
<b>Annex J (informative) Summary of parameters declared by manufacturer and parameters tested by third-party laboratory.....</b>		<b>98</b>
<b>Bibliography.....</b>		<b>99</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Project Committee ISO/PC 305, *Sustainable non-sewered sanitation systems*.

This second edition cancels and replaces the first edition (ISO 30500:2018), which has been technically revised.

The main changes are as follows:

- Clause 2 normative references have been updated;
- Clause 3 terms and definitions have been updated;
- technical information throughout the document has been aligned with the state of art;
- the bibliography has been updated.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

It is estimated that 1,5 billion people do not have access to basic sanitation systems. The devastating consequences of the lack of sanitation facilities include an estimated 2,0 billion people globally using a source of drinking water that is faecally contaminated, and in March of 2024, the World Health Organization (WHO) reported that around 444,000 children under 5 years of age dying per year, primarily from dysentery-like diarrhoeal diseases.

In March 2013, the United Nations (UN) issued a global call to action to eliminate the practice of open defecation by 2025. However, by 2018, the plan to end open defecation had been extended to 2030 and beyond. Although open defecation is often associated with low-income regions, it is also an increasing problem in urban areas of higher-income regions, where the provision of public toilets has been reduced for economic reasons.<sup>[158]</sup> The UN and regional sanitation leaders have concluded that areas where open defecation is common have the highest levels of child death and disease, as a result of ingesting human faecal matter that has entered the food or water supply. A lack of safe, private sanitation is also associated with the highest overall levels of malnutrition, poverty and disparity between rich and poor, and makes women and girls more vulnerable to violence.

On 1 January 2016, the 17 UN Sustainable Development Goals (SDG) were launched, including SDG 6: Ensure access to water and sanitation for all. The SDGs are a set of goals to end poverty, protect the planet and ensure prosperity for all as part of the new UN sustainable development agenda.

Targets 6.2 and 6.3 of SDG 6 state:

- by 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations;
- by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

In May 2024, the UN released the report *United Nations System-Wide Strategy for Water and Sanitation*, which highlighted that progress on SDG 6 was "off-track." To accelerate progress, the report identifies five Global Accelerators, including innovation.<sup>[156]</sup> In this context, the purpose of this document is to support the development of stand-alone sanitation systems designed to address sanitation needs while promoting economic, social and environmental sustainability through strategies that include minimizing resource consumption (e.g. water, energy) and converting human excreta to safe output.

This document is intended to promote the development and implementation of prefabricated integrated treatment units as non-sewered sanitation systems (NSSS), notably where other sanitation systems are not cost effective, unavailable or impractical. This aims to ensure human health and safety as well as protecting the environment.

However, this document does not attempt to exhaustively address sustainability concerns with respect to NSSS.

The concept of the NSSS is indicated in [Figure 1](#), showing the integration of the frontend(s) and backend(s) along with the input and output. Inputs entering the NSSS primarily comprise of human faeces and urine, menstrual blood, bile, flushing water, anal cleansing water, toilet paper and other bodily fluids/solids. Outputs exiting the NSSS include the products of the backend treatment process such as solid output and effluent, as well as noise, air and odour emissions.

By design, NSSS operate without being connected to a networked sewer or networked drainage systems. The NSSS can be either manufactured as one package or manufactured as a set of prefabricated components designed to be assembled without further fabrication or modification that influences the system function. The prefabricated components of NSSS are intended to require minimal work to be integrated and quickly provide fully functioning sanitation systems.