

This is a preview of "ISO 30500:2018". [Click here to purchase the full version from the ANSI store.](#)

First edition
2018-10

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*



Reference number
ISO 30500:2018(E)

© ISO 2018

This is a preview of "ISO 30500:2018". [Click here to purchase the full version from the ANSI store.](#)



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

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
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

This is a preview of "ISO 30500:2018". [Click here to purchase the full version from the ANSI store.](#)

Contents

	Page
Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	2
3.1 Terms and definitions.....	2
3.1.1 System structure.....	2
3.1.2 System inputs and outputs.....	3
3.1.3 System safety and integrity.....	4
3.1.4 System use and impact.....	5
3.2 Abbreviated terms.....	6
4 General requirements	7
4.1 User requirements.....	7
4.2 Metric system.....	7
4.3 Design capacity.....	7
4.3.1 Treatable input.....	7
4.3.2 Treatment capacity.....	7
4.3.3 Menstrual hygiene products.....	7
4.3.4 Overload protection.....	7
4.3.5 Operability following non-usage.....	8
4.3.6 Operability following short-term shut down.....	8
4.3.7 Operability following long-term shut down.....	8
4.3.8 Continuous use.....	8
4.3.9 Safe state.....	8
4.4 Performance requirements.....	8
4.4.1 General.....	8
4.4.2 Solid output and effluent requirements.....	8
4.4.3 Odour emissions requirements.....	9
4.4.4 Noise requirements.....	9
4.4.5 Air emissions requirements.....	9
4.5 Expected design lifetime.....	9
4.6 Aspirational and ergonomic design.....	9
4.7 Secure design.....	9
4.8 Operating conditions.....	9
4.8.1 Ambient temperature range.....	9
4.8.2 Ambient air humidity.....	10
4.8.3 Atmospheric pressure.....	10
4.9 Requirements for sanitation system components.....	10
4.9.1 General.....	10
4.9.2 Hygienic design.....	10
4.9.3 Tightness.....	10
4.9.4 Cleanability of surfaces.....	11
4.9.5 Chemical and biological additives.....	11
4.10 Material requirements.....	11
4.10.1 Durability of materials.....	11
4.10.2 Fire resistance of materials.....	11
4.11 Connections and joining elements.....	11
4.12 General safety design requirements.....	12
4.12.1 Safety of edges, angles, and surfaces.....	12
4.12.2 Fire and explosion protection.....	12
4.12.3 Structural integrity.....	12
4.12.4 Prevention of contact with unsafe effluent and reuse.....	13
4.12.5 Underground systems.....	13

This is a preview of "ISO 30500:2018". [Click here to purchase the full version from the ANSI store.](#)

4.12.6	External impacts	13
4.13	Information and marking.....	13
4.13.1	Information and warnings.....	13
4.13.2	Marking and labelling.....	14
4.14	Maintenance.....	14
4.14.1	Reasonable configuration, adjustment, and maintenance activities.....	14
4.14.2	Location and access of configuration, adjustment, and maintenance points.....	14
4.14.3	Discharge and cleaning.....	15
4.14.4	Tools and devices.....	15
4.14.5	User manual.....	15
4.14.6	Handling and transport of the sanitation system.....	15
5	Technical requirements.....	15
5.1	Safety assessment.....	15
5.2	Operational requirements.....	16
5.2.1	General.....	16
5.2.2	Intentional starting of sanitation system operation.....	16
5.2.3	Intentional stopping of sanitation system operation.....	16
5.2.4	Emergency stop.....	16
5.3	Reliability and safety requirements for energy supply.....	16
5.3.1	Security of energy supply.....	16
5.3.2	Safety requirements for electrical energy supply.....	17
5.3.3	Safety requirements for non-electrical primary energy supply.....	17
5.4	Mechanical requirements.....	17
5.4.1	Pressurized or vacuum equipment.....	17
5.4.2	Pipes, hoses and tanks.....	17
5.4.3	Moving and rotating parts.....	18
5.4.4	Backflow prevention.....	18
5.5	Requirements for radiation.....	18
5.5.1	High temperatures of parts and surfaces.....	18
5.5.2	Low temperatures of parts and surfaces.....	18
5.5.3	Other radiation emissions.....	18
5.6	Electrical and electronic equipment.....	18
5.6.1	Safety and reliability of electrical and electronic equipment.....	18
5.6.2	Control system.....	19
5.6.3	Safety-related function of the control system.....	19
5.7	Reliability of conveyance devices.....	19
5.8	Transitions from the backend.....	20
6	Additional requirements for the frontend.....	20
6.1	General.....	20
6.2	Use and operation.....	20
6.2.1	General usability requirements.....	20
6.2.2	Requirements for ease of cleaning.....	20
6.2.3	Requirements for ease of operation.....	21
6.2.4	Cultural requirements.....	21
6.3	Visibility of faeces.....	21
6.4	Evacuation performance.....	21
6.5	Integrity against external impacts.....	22
6.6	Slipping, tripping or falling.....	22
6.7	Water seal.....	22
7	Performance testing.....	22
7.1	General testing requirements.....	22
7.2	Controlled laboratory testing.....	23
7.2.1	General.....	23
7.2.2	Assembly, installation, operation, and maintenance.....	23
7.2.3	Documentation of input.....	23
7.2.4	Generated output.....	23
7.2.5	Test observations.....	24

This is a preview of "ISO 30500:2018". [Click here to purchase the full version from the ANSI store.](#)

7.2.6	Laboratory conditions.....	24
7.2.7	Testing sequence and duration	24
7.2.8	Loading pattern	25
7.2.9	Performance requirements during laboratory testing	26
7.3	Field verification of performance	30
7.3.1	General.....	30
7.3.2	Class 1 sanitation systems.....	31
7.3.3	Class 2 and Class 3 sanitation systems.....	31
8	Sustainability	32
8.1	General.....	32
8.2	Recovery of nutrients.....	32
8.3	Water consumption and reuse of effluent.....	32
8.3.1	Calculations.....	32
8.3.2	Water consumption.....	32
8.3.3	Reuse of effluent.....	32
8.4	Energy consumption and energy recovery.....	32
8.4.1	Calculations.....	32
8.4.2	Energy consumption	33
8.4.3	Direct and indirect energy recovery	33
8.5	Life cycle assessment.....	33
8.6	Recurring operational requirements.....	33
	Annex A (normative) Test methods and additional testing requirements.....	35
	Annex B (normative) Risk assessment and list of significant hazards	68
	Annex C (normative) User manuals.....	74
	Annex D (informative) Sustainability measures	77
	Annex E (informative) Design considerations	79
	Annex F (informative) Health and environment parameters — Notes and references.....	83
	Bibliography.....	85

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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.

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

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.

This is a preview of "ISO 30500:2018". [Click here to purchase the full version from the ANSI store.](#)

Introduction

It is estimated that 2,3 billion people do not have access to basic sanitation systems. The devastating consequences of the lack of sanitation facilities include an estimated 1,8 billion people globally using a source of drinking water that is faecally contaminated and 361 000 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. 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 1st 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 this context, the purpose of this document is to support the development of stand-alone sanitation systems designed to address basic sanitation needs and promote 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 implementation of sanitation systems where increased sustainability is desired, or where traditional sanitary sewer systems are unavailable or impractical and thus, to ensure human health and safety as well as protecting of the environment.

However, this document does not attempt to exhaustively address sustainability concerns with respect to non-sewered sanitation systems (NSSS). There are many aspects to sustainability that are not covered in this document.

The concept of a 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, other bodily fluids/solids. Outputs substances 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, such sanitation systems operate without connection to any sewer or drainage network. The NSSS can be either manufactured as one package or manufactured as a set of prefabricated elements 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.

This is a preview of "ISO 30500:2018". Click here to purchase the full version from the ANSI store.

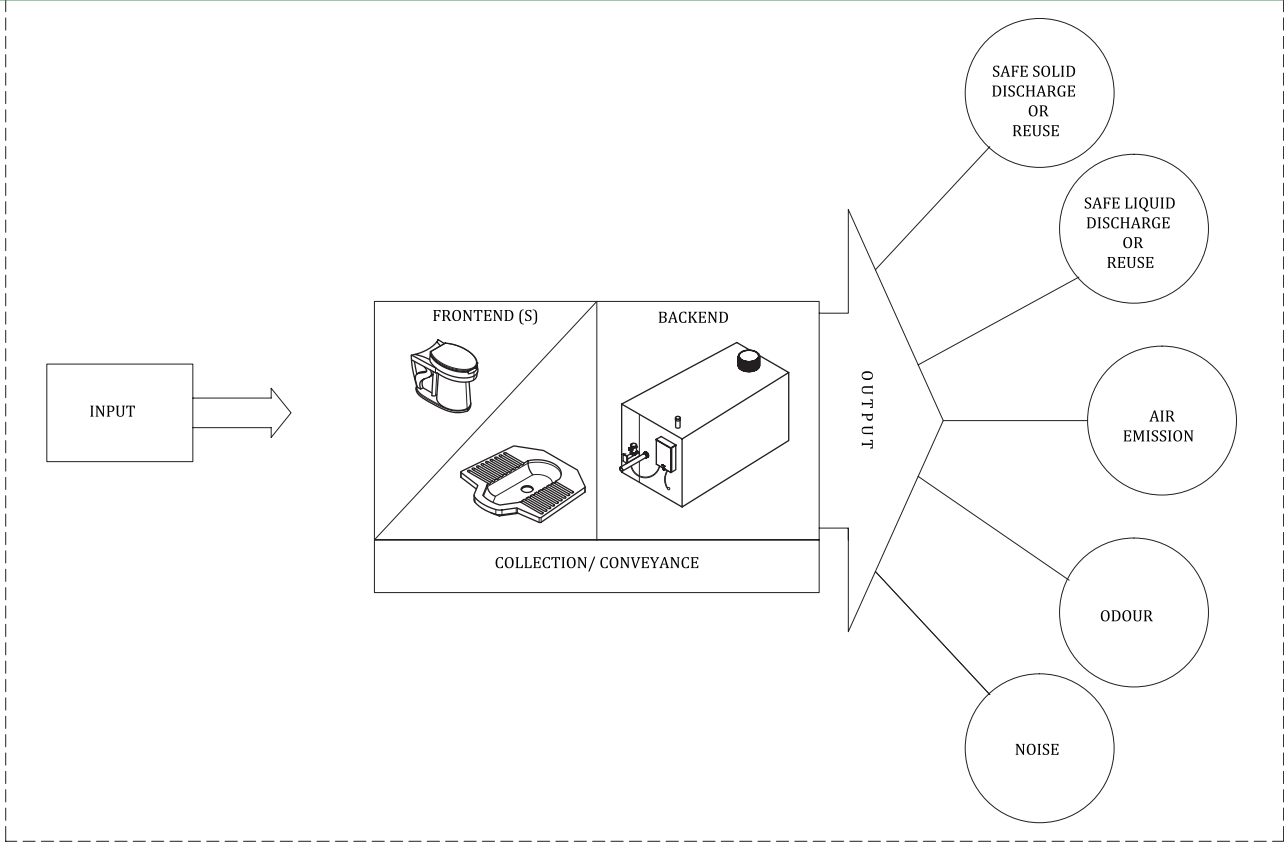


Figure 1 — Concept of a non-sewered sanitation system

In NSSS, the frontend includes user interfaces such as a urinal, squatting pan, or sitting pan, which may apply evacuation mechanisms ranging from conventional flush, pour flush, and dry toilets to novel evacuation mechanisms such as those employing mechanical forces requiring little to no water. Conventional and novel evacuation mechanisms may be combined with urine diversion applications (e.g. urine diversion flush toilet, urine diversion dry toilet). Backend treatment technologies and processes of NSSS range from biological or chemical to physical unit processes (e.g. anaerobic and aerobic digestion, combustion, electrochemical disinfection, membranes). Some systems use only one of these technologies or processes while others apply various unit processes in combination through several treatment units.