

ISO 30500:2025-07 (E)

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

Contents		Page
Foreword.....		vi
Introduction.....		vii
1 Scope.....		1
2 Normative references.....		2
3 Terms, definitions and abbreviated terms.....		2
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
4 General requirements.....		8
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
5	Technical requirements.....	16
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
6	Additional requirements for the frontend.....	21
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
7	Performance testing.....	23
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
8	Sustainability.....	34
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
	Annex A (normative) Test methods and additional testing requirements.....	37
	Annex B (normative) Risk assessment and list of significant hazards.....	70
	Annex C (normative) User manuals.....	76
	Annex D (informative) Sustainability measures.....	79
	Annex E (informative) Design considerations.....	81
	Annex F (informative) Health and environmental parameters — Notes and references.....	84
	Annex G (informative) Remote monitoring.....	86
	Annex H (informative) Guidelines for electrically operated spray toilet seat used for frontends of NSSS — comfortability aspects.....	92
	Annex I (normative) Alternative feedstocks and characterisation.....	94
	Annex J (informative) Summary of parameters declared by manufacturer and parameters tested by third-party laboratory.....	98
	Bibliography.....	99