

AS/NZS 5328:2022



Australian/New Zealand Standard™

Flushable products



AS/NZS 5328:2022

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- New Zealand Plumbers, Drainlayers & Gasfitters Association
- Water Industry Operators Association
- Water New Zealand

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Flushable products

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee WS-041, Service activities – water supply and wastewater systems.

The objective of this document is to provide test methods and criteria for determining if products are suitable for disposal by flushing them down a toilet. It also provides guidance on and requirements for the labelling and marking of products that are likely to be disposed via the toilet. This document is for manufacturers of such products, as well as managers and other stakeholders involved with wastewater transport and treatment systems.

The framework set out in this document is based on the International Nonwovens and Disposables Association (INDA) and the European Disposables and Nonwovens Association (EDANA) flushability guides (2018) and supplementary guidance. The document structure is based on ISO/TR 24524:2019, *Service activities relating to drinking water supply, wastewater and stormwater services — Hydraulic, mechanical and environmental conditions in wastewater transport systems*.

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The terms “normative” and “informative” are used in Standards to define the application of the appendix to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

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Introduction

The test criteria set out in this document for determining whether a product is suitable for toilet flushing derive from an evidence-based assessment of whether the product causes a negative impact on wastewater transport and treatment systems (collectively referred to as “wastewater systems”) or the environment. The criteria take into account the typical hydraulic, mechanical and environmental conditions generally found in wastewater systems, based on information that was available at the time of publication.

Wastewater systems have been and are designed to treat sanitary waste streams from toilets and urinals — comprising faeces, urine and toilet paper — along with other sanitary waste streams from bathing, laundry and kitchen activities. Most also treat industrial and commercial discharges containing chemicals. In recent years, a number of products have been introduced in the marketplace that are claimed to be compatible with sanitary objectives, which are then either identified as being toilet flushable or which by their location of use and usage, are likely to be flushed down the toilet as the means of disposal. Some of these products are not compatible with current infrastructure and resource recovery objectives.

As new and different types of sanitary wipes become available, it is increasingly becoming more important to ensure that consistent labelling is provided for consumers so that those wipes which are compatible with wastewater infrastructure and objectives be clearly labelled flushable, and those which are likely to cause operational issues to be clearly labelled “Do Not Flush”.

The principle objective of wastewater systems management is to protect public health, the environment, the work health and safety of workers, and sustainable development. Management also involves considering the impact on any outputs arising from wastewater treatment. There are many factors that contribute to the successful operation of wastewater systems. One of these is the prevention of blockages. When blockages occur, there is an unacceptable risk that wastewater may spill from the system and create public health and environmental risks along with otherwise unnecessary expenditure in rectifying the issues.

This document outlines a framework of test methods with requirements for assessing whether products are compatible with wastewater systems and the downstream environment (therefore suitable for toilet flushing). It provides labelling guidance for products which are likely to be flushed and either meet or do not meet the requirements.

This document is especially relevant for products designed and marketed for use in a bathroom setting and suitable for toilet flushing. Appropriate labelling of products will enable greater public education and awareness of the types of products that are suitable for toilet disposal and reduce the burden on the wastewater systems and the environment.

This document can also assist stakeholders in communicating with consumers and communities about the compatibility of products flushed via the toilet.

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Australian/New Zealand Standard

Flushable products

Section 1 Scope and general

1.1 Scope

This document sets out a framework, test methods and criteria for determining if products are suitable for disposal by flushing them down a toilet. This document applies to products that are intended for toilet flushing. It excludes toilet paper, liquids and soluble products.

This document also provides guidance on and requirements for the labelling and marking of products that are likely to be disposed via the toilet.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents for informative purposes are listed in the Bibliography.

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate*

ASTM E11, *Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves*

Method 2540B, *Standard Methods for the Examination of Water and Wastewater — Total Solids Dried from 103 to 105 °C*

Method 2540D, *Standard Methods for the Examination of Water and Wastewater — Total Suspended Solids Dried from 103 to 105 °C*

1.3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- (a) IEC Electropedia: available at <https://www.electropedia.org/>
- (b) ISO Online browsing platform: available at <https://www.iso.org/obp>

1.3.1

discharged material

material deposited into a toilet as a means of disposal

[SOURCE: ISO/TR 24524:2019, 3.1]

1.3.2

flushable product

product considered suitable for disposal through sewer networks and wastewater collection and treatment systems, including onsite treatment systems because it will not materially adversely impact those systems or be recognisable in effluent leaving onsite and municipal wastewater treatment systems or in the post-treatment products of treatment sludge

[SOURCE: ISO 24513:2019, 3.2.6]

1.3.3**may**

indicates the presence of an option

1.3.4**plastic**

solid material which contains, as an essential ingredient, one or more synthetic organic high polymers and which is formed (shaped) during either manufacture of the polymer or the fabrication into a finished product by heat and/or pressure

[SOURCE: ISO/TR 24524:2019, 3.4]

1.3.5**screen**

device of rigid bars, mesh, perforated plate or other configurations installed in wastewater systems

Note 1 to entry: Screens are used to collect and remove objects such as rags, paper, plastics and metals from wastewater systems to prevent damage and clogging of downstream equipment, piping and appurtenances.

[SOURCE: ISO/TR 24524:2019, 3.6, modified — Text added to Note 1 to entry]

1.3.6**shall**

indicates that a statement is mandatory

1.3.7**should**

indicates a recommendation

1.3.8**toilet****water closet pan****WC pan**

receptacle in the form of a bowl incorporating a water seal used in conjunction with a flushing device for the disposal of human wastes

[SOURCE: AS/NZS 3500.0:2021]

1.3.9**wastewater**

water arising from any combination of domestic, institutional, commercial or industrial activities, surface runoff and any accidental sewer inflow/infiltration water and which can include collected stormwater discharged to the environment or sewer

Note 1 to entry: Wastewater can flow in separate or combined sewer systems.

[SOURCE: ISO 24513:2019, 3.2.2.2]

1.3.10**wastewater network**

system of conduits used to remove and transport human waste and wastewater

Note 1 to entry: A system typically begins with connecting pipes from buildings to one or more levels of larger sewer pipes, which terminate at a wastewater treatment plant.

Note 2 to entry: Flow in sewer pipes can be gravity flow, pumped flow or a combination of the two.

Note 3 to entry: A wastewater conveyance system can also transport stormwater.

[SOURCE: ISO 24513:2019, 3.5.12.3.1]

Section 2 Framework

2.1 General

The key elements of a wastewater system that need to be considered in developing a specification for products suitable for toilet disposal are described in ISO/TR 24524 and reproduced with permission in this document in [Clauses 2.2 to 2.7](#).

The key elements are —

- (a) toilets;
- (b) drain lines;
- (c) wastewater transport systems;
- (d) screening;
- (d) treatment processes; and
- (e) environmental considerations.

2.2 Toilets

The purpose of a toilet is to dispose of human excreta (i.e. urine, menses, vomit and faeces) by using water to flush it through a drain line to another location for disposal, thus maintaining a separation between humans and their excreta.

Any material discharged via a toilet should not adversely affect the intended operation of the toilet. The typical flush volume for new toilets in Australia and New Zealand is 3.0 L and 4.5 L. The ability of material to be removed from the toilet bowl is determined by a toilet clearance test.

[SOURCE: ISO/TR 24524:2019 Clause 4.1, modified. Copyright ISO. All rights reserved.]

2.3 Drain lines

Drain line design, configuration, construction and maintenance may impact the ability of waste to pass through a drain line. Typically, material flushed from a toilet into a drain line moves along the drain line with water from toilet flushing. Failure of flushed material to exit the drain line may result in blocked plumbing, the generation of unacceptable odours or allow material to dry out and adhere to the pipe surface.

The length of a drain line and number of connections can vary significantly based on the building type and purpose. Requirements for drain line design configurations for Australia and New Zealand are specified in AS/NZS 3500.2. The ability of material to move down the drain line is determined by a drain line clearance test.

When material moves down the drain line, it may occasionally become snagged on a pipe imperfection. Snagged material should either self-release, tear off the snag or break up within a certain number of flushes. When such material does not release, tear off or break up, then it may result in issues for the drain line. Material intended to be discharged via a toilet should clear the drain line and reach the sewer without adversely affecting the operation of the drain line. The ability of a product to tear or self-release is determined by the disintegration test.

[SOURCE: ISO/TR 24524:2019 Clause 5.1, modified. Copyright ISO. All rights reserved.]

2.4 Wastewater transport systems

The design, layout and configuration of wastewater transport systems vary significantly depending on the municipality served, its geographic and topographic features and climatic conditions.

Pipes are required to convey the wastewater from a drain line to a wastewater treatment plant. The wastewater transport system includes pipes of various diameters, as well as maintenance holes and other hydraulic structures. Wastewater may flow through the pipes by gravity or under pressure from a pump.

Pumps are required where there is a need to overcome an elevation difference to pump to a level at which gravity can then be used to facilitate the transport of flows. This can occur anywhere from the end of the drain line to any point within the transport system.

Screens or grinders may be installed ahead of the pumps or other downstream infrastructure, including overflow outlets and immediately before the influent point of the treatment system to protect them from becoming blocked with inappropriately discharged material.

To ensure a product is compatible with the wastewater transport system, it needs to lose strength and disintegrate to avoid blockages of pumps and screens. The disintegration test and the two pump tests are used to evaluate a product for these properties.

Sewers are designed to maintain a velocity necessary to transport solids to prevent deposition and decomposition in the sewer. Modelling estimates the transit time from a property line to a screen or pump is typically considered to be between 30 min and 6 h. A minimum velocity in a sewer of 0.3 m/s will stop settling of suspended solids and velocity when flowing full of 0.6 m/s will facilitate self-cleaning of the sewer via resuspension of settled solids.

[SOURCE: ISO/TR 24524:2019 Clauses 6.1 and 6.3, modified. Copyright ISO. All rights reserved.]

2.5 Screening

Screens are designed to protect pumps and downstream infrastructure from issues such as clogging and blocking. Materials greater than a certain size can foul screens, resulting in an elevated load of solid waste to landfill, increased maintenance or potential blockages leading to sewer overflows and flooding.

[SOURCE: ISO/TR 24524:2019 Clause 7, modified. Copyright ISO. All rights reserved.]

2.6 Treatment processes

2.6.1 General

Material that enters a wastewater treatment plant should not unduly affect the ability of that plant to meet legislated or licence conditions.

[SOURCE: ISO/TR 24524:2019 Clause 8.1, modified. Copyright ISO. All rights reserved.]

2.6.2 Settling

The majority of solids that enter a wastewater treatment plant may be removed through settling. The rate of settling within a wastewater treatment plant is measured by the settling velocity. The settling rate of a material is affected by particle size and density, along with system design, operation and capacity. A settling rate should be at least 1 mm/s. A settling test is used to confirm the settling rate for materials.

[SOURCE: ISO/TR 24524:2019 Clause 8.2, modified. Copyright ISO. All rights reserved.]

2.6.3 Liquid phase of treatment plants

Material remaining in the liquid phase of treatment plants that is not removed with settled solids typically has only a brief opportunity for biodegradation (generally less than 8 h).

NOTE For more information, refer to Metcalf and Eddy, 2013 (see Bibliography).

[SOURCE: ISO/TR 24524:2019 Clause 8.3, modified. Copyright ISO. All rights reserved.]

2.6.4 Management of settled solids

Settled solids recovered from a wastewater treatment process may be managed by processes including stabilization, landfilling, beneficial application to land, or combustion/transformation to gaseous form (and sometimes energy recovery). Recovered settled solids so managed typically need to meet legislated and customer requirements.

[SOURCE: ISO/TR 24524:2019 Clause 8.4, modified. Copyright ISO. All rights reserved.]

Aerobic and anaerobic biodegradation tests are used to confirm the biodegradability of materials and to confirm compatibility with solids management practices.

2.7 Environmental considerations

Stakeholders and the general public need to be mindful of materials that could enter wastewater treatment systems and how they may affect wastewater systems and the receiving environment. From time to time, sewers overflow to the environment for a multitude of reasons. Therefore, compatibility (or environmental fate) of materials that enter sewers by whatever means is important.

[SOURCE: ISO/TR 24524:2019 Clause 9, modified. Copyright ISO. All rights reserved.]

Section 3 General requirements

3.1 Determining if a product conforms to this document

The flowchart in [Figure 3.1](#) outlines the steps for determining if a product conforms to this document. The flushability tests referred to in the flowchart are specified in [Table 3.1](#) and the methods for testing are set out in the appendices. If a product is suitable for flushing, it may be labelled as flushable. If a product is not suitable for flushing, then it should not be labelled as flushable. Instead, it may be labelled with a “Tidy Man” or a “Do Not Flush” symbol (see [Section 4](#)).

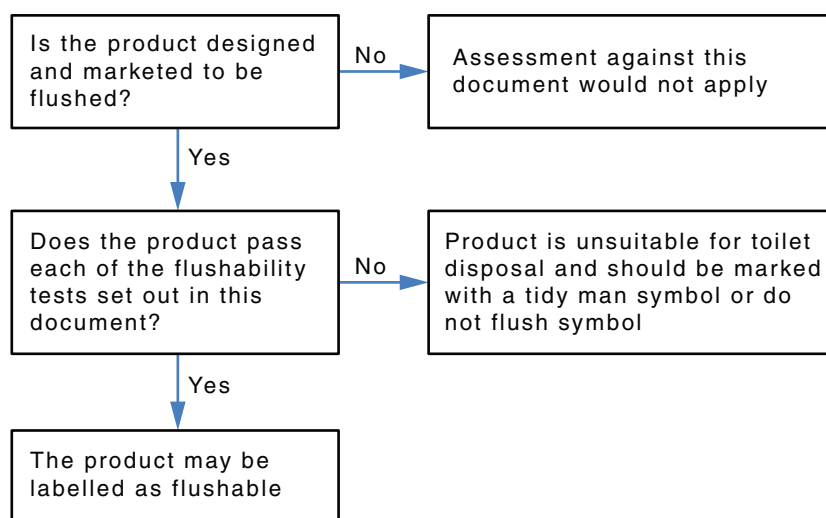


Figure 3.1 — Flowchart with steps for determining product conformity

3.2 Testing for compatibility with toilet flushing

To protect the wastewater system, a discharged material or product needs to be compatible with existing wastewater infrastructure. A discharged material or product that is flushed or disposed via the toilet shall be able to —

- (a) be flushed from the toilet bowl;
- (b) pass through the drain line (pipes inside and/or immediately outside property);
- (c) be transported through the wastewater collection system to the treatment facility;
- (d) not adversely affect the intended performance of wastewater treatment systems; and
- (e) not adversely affect the downstream environment.

NOTE See [Appendix I](#) for an example of an attestation indicating that a flushable product is free of plastic.

The components of the wastewater system and the tests applicable for testing a discharged product at each location are shown in [Figure 3.2](#).

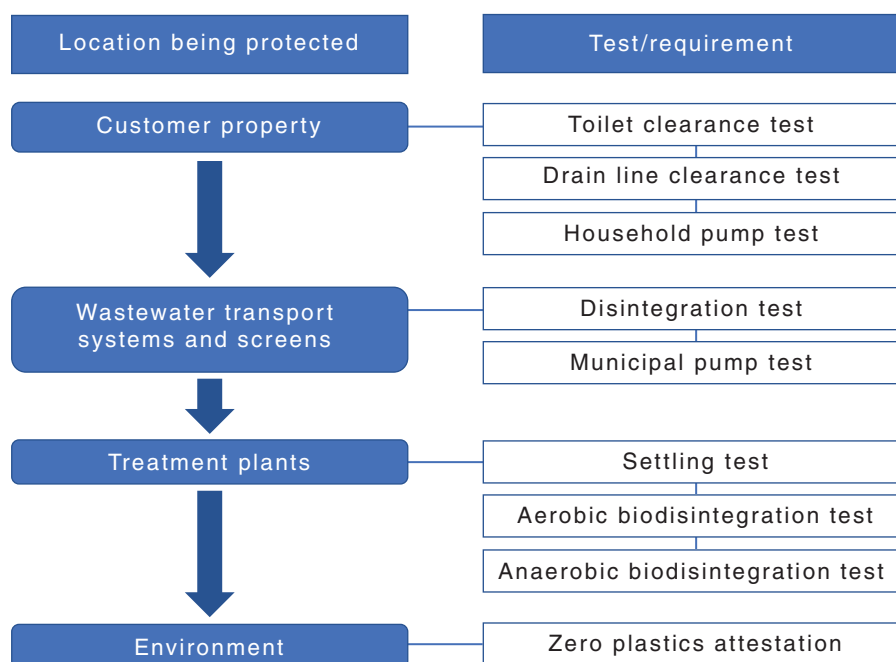


Figure 3.2 — Components of the wastewater system and locations for testing the compatibility of products flushed down the toilet

The tests and test criteria for determining if a discharged material or product is compatible with wastewater disposal are specified in [Table 3.1](#).

For a product to be considered flushable, it shall pass the criteria set out in [Table 3.1](#).

Table 3.1 — Tests and test criteria

Part of sewerage system	Test	Pass/fail criteria	Reference in this document
Toilet and drain line	Toilet clearance	Throughout the 3 test replicates, no flush shall be associated with clogs that require use of a plunger to clear product and excess water from the bowl and trap.	Appendix A
	Drain line clearance	(a) The travel distance of the centre of movement of the flushed material in the drain line shall not consistently decrease over the course of 5 consecutive flushes. (b) All introduced products up to and including the 35th flush loading shall exit the drain line.	Appendix A
	Household pump test	(a) The product shall not cause the system to stop functioning at a point during the test. (b) The average number of products remaining in the basin at the end of days 2 to 6 shall not exceed the number of products added on a daily basis.	Appendix B

Table 3.1 (continued)

Part of sewerage system	Test	Pass/fail criteria	Reference in this document
Wastewater transport systems and screens	Disintegration	To be acceptable, the mean percentage of the initial dry mass of the sample passing through the 25 mm sieve for the 6 test products after 60 min of testing shall be greater than 75 %. This result shall be supported with visual examination and pictures of solids on the sieve.	Appendix C
	Municipal pump test	Based upon integration of the power curves, the average percent power increase over baseline for the 5 runs shall not exceed 5 %.	Appendix D
Treatment plants	Settling	(a) The average settling velocity for products that settle shall exceed 1 mm/s and at least 95 % of the total number of individual products tested shall settle. (b) At least 95 % of the products tested shall not become sufficiently buoyant to rise more than 30 cm from the bottom of the column within 24 h.	Appendix E
	Bio-disintegration — Aerobic	The average percent of the initial dry mass which passes the 1 mm sieve after 14 days shall exceed 95 %.	Appendix F
	Bio-disintegration — Anaerobic	The average percent of the initial dry mass which passes the 1 mm sieve after 28 days shall exceed 95 %.	Appendix G

Section 4 Labelling

4.1 Acknowledgement

[Section 4](#) has been reproduced with modification for Australian and New Zealand conditions from INDA and EDANA, *Code of Practice: Communicating Appropriate Disposal Pathways for Nonwoven Wipes to Protect Wastewater Systems*, 2nd edition, 2017. The Code of Practice, in its entirety, is owned by INDA and EDANA and used with permission (© 2017 INDA and EDANA. All rights reserved).

4.2 Packaging

The packaging of all finished products that have a high potential to be discarded via the toilet should clearly inform consumers whether or not the products are appropriate for disposal via the wastewater system.

The packaging of all finished products that are suitable for toilet flushing and that conform to this document may display a label indicating the product is suitable for toilet flushing.

Packaging for non-flushable products that have a potential to be flushed should clearly indicate that the product cannot be disposed of via the toilet by displaying a “Do Not Flush” (DNF) symbol. The “Dispose via the Solid Waste Stream” (“Tidy Man”) symbol to confirm disposal via the solid waste system may be used for non-flushable products. When the “Tidy Man” symbol is used, it should be the same size as the DNF symbol.

[SOURCE: Code of Practice, p. 5, modified. © 2017 INDA and EDANA. All rights reserved.]

4.3 Location

The following requirements apply to the location of a symbol:

- (a) A symbol shall be prominent and permanently affixed.
- (b) A symbol shall be prominently visible on the on-shelf package consumers are purchasing so that a consumer looking for proper disposal instructions can find them on the package being purchased without opening the pack.
- (c) A symbol shall not be obscured by packaging seals or folds or obscured by other package design elements.

NOTE For non-flushable products which may include baby wipes, feminine hygiene wipes, adult incontinence wipes and body cleansing wipes, the appropriate symbol should be placed on the front or top of the on-shelf package so a consumer can see the symbol without having to touch the package.

[SOURCE: Code of Practice, pp. 5–6, modified. © 2017 INDA and EDANA. All rights reserved.]

4.4 Colour

Symbol artwork should have sufficiently high contrast with the background to be highly visible (i.e. dark on a light background). Embossed symbols on injection-moulded plastics should be designed to provide a high visual impact.

[SOURCE: Code of Practice, p. 6. © 2017 INDA and EDANA. All rights reserved.]

4.5 Size

The size requirements for symbols on consumer packaging with display panels of particular sizes are set out in [Table 4.1](#).

Table 4.1 — Size requirements for symbols

Diameter of symbol	Size of display panel
≥ 6.35 mm	N/A
≥ 10 mm	> 32 cm ²
≥ 15 mm	> 161 cm ²
≥ 19 mm	> 290 cm ²
≥ 25 mm	> 484 cm ²
≥ 25mm (appropriately scaled)	≥ 591 cm ²

[SOURCE: Code of Practice, p. 6, modified. © 2017 INDA and EDANA. All rights reserved.]

4.6 Wording

The written instruction “Flushable” may be used with a flushable symbol. The written instruction “Do Not Flush” may be used with a DNF symbol. Any on-pack instruction for product disposal shall be clear, explicit and in English.

[SOURCE: Code of Practice, p. 6, modified. © 2017 INDA and EDANA. All rights reserved.]

4.7 Examples

Examples of symbols that may be used on consumer packaging are shown in [Figure 4.1](#). For the size of the symbols, see [Clause 4.5](#).



(a) “Flushable” symbol options



(b) “Do Not Flush” (DNF) symbol



(c) “Tidy Man” symbol

Figure 4.1 — Typical labelling examples

Appendix A (normative)

Toilet bowl and drain line clearance test

A.1 Acknowledgement

This appendix has been reproduced with modification for Australian and New Zealand conditions from FG501.R1(18) — *Toilet Bowl and Drain-Line Clearance Test*. FG501.R1(18), in its entirety, is owned by INDA and EDANA and used with permission (© 2018 INDA and EDANA. All rights reserved).

A.2 Scope

This appendix sets out the method to assess the potential of a product intended for toilet disposal to successfully clear a toilet bowl and drain line pipe.

A.3 Principle

The test system consists of a toilet connected to a drain line, simulating typical conditions.

The test simulates 2 days of normal toilet use by a family of four and is repeated at least 3 times. It consists of up to 35 toilet flushes using a specified loading sequence of product. This sequence includes flushes with water only (urinary event 1), flushes with product and toilet tissue (urinary event 2) and flushes with product, simulated faecal material (SFM) and toilet tissue (bowel movement). Each test run continues until all material in the 35th flush loading exits the drain line.

After each flush, observations are made regarding whether the material clears the toilet bowl and trap. In addition, the travel distance for all flushed materials is determined in the drain line following each flush. The latter information is used to calculate the location of the centre of movement of all materials within the drain line relative to the toilet, which is an indicator of blockage potential.

A positive result in this test indicates that the test product is compatible with properly maintained toilets and plumbing systems and should transport satisfactorily in larger sewage conveyance systems.

A.4 Apparatus

A.4.1 Toilet and drain line configuration

The toilet apparatus selected for testing shall be a commercially available toilet with a flush volume of no more than 4.5 L. Where a dual flush toilet is used, the same flush volume shall be used for each test. The drain line shall be constructed of clear PVC pipe to allow the observation of flushed materials as they are transported with each flush. One end of the drain line is connected to the outlet of a toilet and the other end is typically positioned over a floor drain. The drain line shall have the following parameters:

- (a) Pipe diameter (internal) — 100 mm.
- (b) Pipe slope — 1.65 %.
- (c) Minimum pipe length — 20 m.

The toilet and drain line shall be configured as follows:

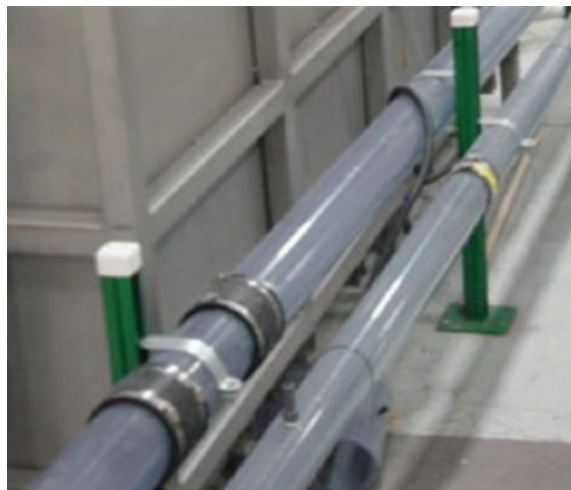
- (i) The maximum vertical distance from the toilet outlet to the horizontal drain line beneath it shall not exceed 40 cm.
- (ii) The line shall be vented near the toilet to prevent development of a vacuum in the line.
- (iii) In addition to turns associated with connecting the toilet with a horizontal section of the line, there shall be at a minimum two additional 90° horizontal turns along the drain line's length. Each turn can be achieved using single 90° elbows or two 45° elbows.
- (iv) Supports shall be positioned in such a way to prevent any sagging at the joints. The slope can be easily measured using a digital level which gives slope readout in percent. To ensure accurate positioning of the drain line, the slope shall be measured at both ends of each section of pipe.
- (v) Along the drain line's length, distances shall be marked at regular intervals of 0.5 m to allow for the quick measurement and recording of the location of flushed materials relative to the toilet after each flush.

NOTE 1 A screen or other device may be used at the terminal end of the drain line to recover flushed materials during testing.

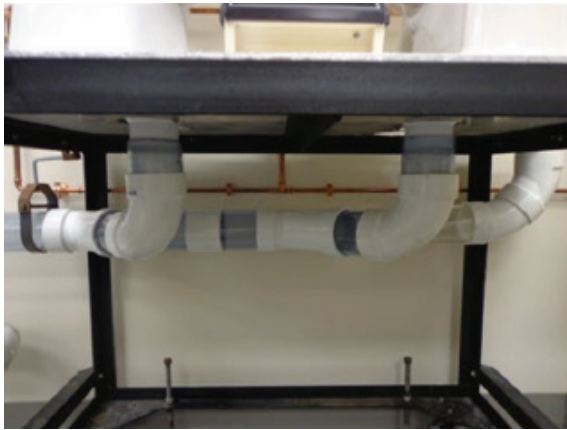
NOTE 2 See [Figure A.1](#) for photographs of representative toilet and drain line test set ups.



(a) Toilets on platform, showing bottom outlets



(b) Parallel 100 mm (left) and 75 mm (right) drain lines on support stands



(c) Detail of bottom of toilet stand showing connections to toilet outlets and vent tube (far right)



(d) Parallel 100 mm and 75 mm drain lines with 90° elbows



(e) Toilet with back outlet connected to a 100 mm drain line



(f) Drain line outlets with screen to collect flushed materials

Figure A.1 — Representative toilet and drain line test systems

A.4.2 Laboratory equipment

The following equipment shall be used:

- (a) Laboratory gram balance capable of accurately measuring the mass of SFM, individual test samples and toilet tissue to two decimal places.
- (b) Simple hand plunger.
NOTE Use of high-pressure plungers is not recommended.
- (c) Suitable container (e.g. plastic bucket) to capture water and verify the volume of a flush.
- (d) Thermometer or other temperature measuring device.
- (e) Equipment for preparing SFM (see [Clause H.1](#)).

A.5 Test pieces

A.5.1 Simulated faecal material

SFM shall be used to simulate faeces in a toilet after a bowel movement. See [Clause H.1](#) regarding its preparation.

A.5.2 Toilet tissue

Toilet tissue shall be added to toilets as components of female urinary events and bowel movements. Toilet tissue is added to a toilet as a “unit dose”. A unit dose of toilet tissue shall be prepared by folding a strip consisting of multiple joined sheets (typically 6 sheets) into a square as shown in [Figure A.2](#). The actual number of sheets in a unit dose depends upon the tissue typical of the region in which the test product will be marketed. The target mass for a unit dose of toilet tissue is 3 g. Hence, the number of sheets in a unit dose should be that number which provides as close to 3 g of total material as practical.

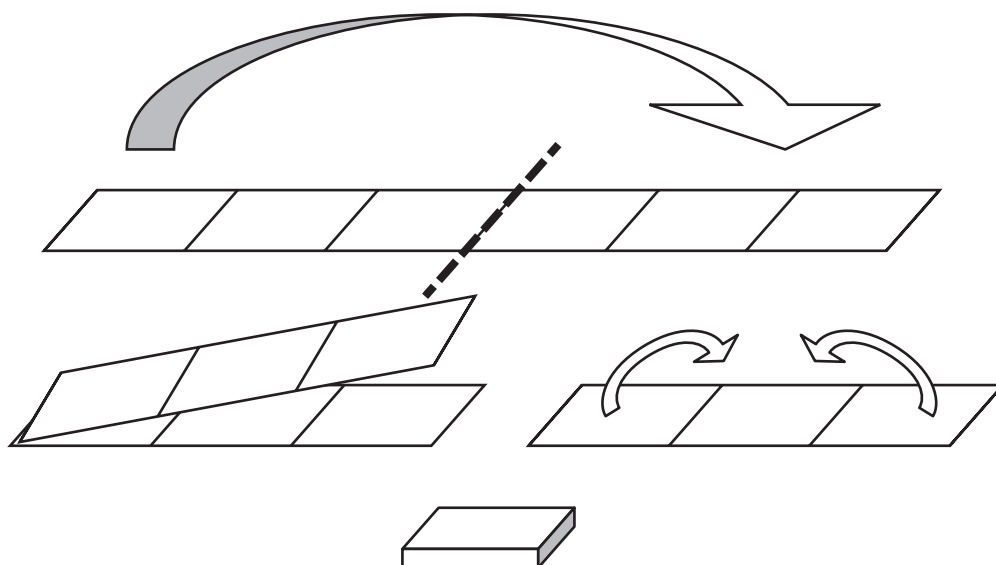


Figure A.2 — Folding of toilet tissue into a “unit dose”

A.6 Baseline procedure

A.6.1 Establishing a baseline for a test system

Upon set up and prior to conducting any study, a series of flushes without a test sample shall be used to establish a baseline for each specific toilet and drain line configuration to ensure correct operation.

The baseline shall be generated using the loading sequence set out in [Table A.1](#) and repeating this sequence a total of 7 times, resulting in at least 35 flushes, 21 of which contain toilet tissue.

Table A.1 — Loading sequence for establishing system baseline

Flush number	Type of load	First addition	Second addition
		SFM	Toilet tissue
1	Female urinary	—	1 unit dose
2	Male urinary	—	—
3	Female urinary	—	1 unit dose
4	Male urinary	—	—
5	Bowel movement	3 pieces @ 50 g to 55 g	2 unit doses

The progression at which these additions occur to the toilet simulates typical toileting habits. So, for example, the toilet tissue is added after the SFM when simulating a bowel movement.

A.6.2 General procedures used during baseline testing

The procedures for baseline testing shall be as follows:

- Prior to adding any materials to the toilet bowl or initiating a flush, ensure that the toilet has stopped running and the water in the bowl is at a normal level.
- When adding pieces of SFM or unit doses of toilet tissue, gently and carefully place them in the centre of the toilet bowl.
- After every addition of a unit dose of tissue, allow sufficient time for it to become fully saturated with water (10 s) before proceeding further.
- After each flush, allow 5 min for the water and the flushed materials to equilibrate within the drain line, before recording any presence of toilet tissue in the toilet and drain line.
- Record the location of the approximate centre point of all flushed materials within the drain line relative to their distance from the toilet to the nearest 0.5 m. Round down the location to the nearest 0.5 m.

A.6.3 Procedure for evaluating a baseline

The procedure for evaluating a baseline shall be as follows:

- Clear all materials from the toilet and drain line by repeatedly flushing water.
- Measure the temperature of the water in the toilet.
- To simulate a female urinary event, add one unit dose of toilet tissue to the toilet bowl, allowing it to fully saturate, then do the following:
 - Flush the toilet and allow the flushed materials to equilibrate within the drain line.
 - Inspect and record the location of flushed materials within the drain line relative to their distance from the toilet.

NOTE If no materials are in the drain line after step (c)(ii), step (d) may be skipped.
- To simulate a male urinary event, flush the toilet containing only water and allow flushed materials to equilibrate within the drain line. Record the location of flushed materials within the drain line.
- Repeat step (c) female urinary event.
- Repeat step (d) male urinary event.

- (g) To simulate a bowel movement, add three pieces of SFM followed by 2 unit doses of toilet tissue to the toilet bowl, allowing each unit dose to fully saturate, then do the following:
 - (i) Flush the toilet and allow flushed materials to equilibrate within the drain line.
 - (ii) Record the centre of movement location of all flushed materials within the drain line relative to the toilet.
- (h) Repeat the sequence of actions specified in steps (c) to (g), a minimum of 6 additional times until all material loaded on the 35th flush sequence exits the drain line.
- (i) Calculate the centre of movement (*COM*) for all flushes.

A.6.4 Calculation of the centre of movement

The average distance travelled by the central region for each flushed material (i.e. SFM, unit dose of tissue, test sample) shall be used to determine the *COM* at different locations within the drain line. This information shall then be used to calculate the *COM* for all materials within the drain line using the following equation:

$$COM = (\sum CoM_n)/N$$

where

CoM_n = *COM* for each individual flush for which material remains in the drain line, measured in cm distance from the toilet

N = Number of flush events introduced into the drain line

A.7 Product test procedure

A.7.1 Preparation of test samples

Test samples shall be prepared as follows:

- (a) When conducting the test to support a flushable claim, the products used for testing shall be the same as those offered, or intended for, the Australian and New Zealand market.
- (b) For disposable nonwoven wipes, a minimum of 126 individual samples shall be needed to conduct the test

NOTE Refer to the use instructions for the maximum number of wipes recommended by the manufacturer (see [Table A.3](#)).
- (c) For products other than nonwoven wipes, the number of total pieces needed for a test shall be determined based upon the specific habits and practices for that product.
- (d) Before determining average dry weight using the procedures specified in [Clause H.3](#), products shall be pre-rinsed using the procedures specified in [Clause H.2](#).

A.7.2 Preparation of other materials used in the test

A.7.2.1 Simulated faecal material

For nonwoven wipes, a minimum of 63 pieces of SFM, each with a mass between 50 g and 55 g, shall be needed to conduct the test.

For products other than nonwoven wipes, the number of SFM pieces needed for a test shall be determined based upon the specific habits and practices for that product.

Before starting a test, the mass for at least triplicate pieces of SFM shall be determined and the mean and standard deviation calculated and recorded.

NOTE See [Clause H.1](#) for the preparation of SFM.

A.7.2.2 Toilet tissue

For nonwoven wipes, a minimum of 84 unit doses of toilet tissue shall be needed to conduct a test.

For products other than nonwoven wipes, the number of unit doses required for a test shall be determined based upon the specific habits and practices for the product.

Before starting a test, the mass for at least triplicate unit dose samples of toilet tissue shall be determined and the mean and standard deviation calculated and recorded.

A.7.3 Preparation of the test system

The test system shall be prepared as follows:

- (a) Confirm that the toilet and drain line are operating correctly.
- (b) Clear all materials from the toilet and drain line by repeatedly flushing water.
- (c) Measure the temperature of the water entering the toilet.
- (d) Wait until the water stops draining from the end of the drain line (approximately 1 min).
- (e) Place a suitable empty container below the end of the drain line.
- (f) Flush the toilet to collect the volume contained in a flush.
- (g) Measure the volume of water in the container and record it.
- (h) Repeat steps (e) to (g) 2 additional times.
- (i) Calculate the average and standard deviation for the flush volume.

A.7.4 General procedures used during testing

The procedures shall be as follows:

- (a) Prior to adding any material to the toilet bowl or initiating a flush, ensure that the toilet has stopped running and the water in the bowl is at a normal level.
- (b) When adding any item (i.e. pieces of SFM, a unit dose of toilet tissue or a test sample), gently and carefully place it in the centre of the toilet bowl.
- (c) After every addition of a unit dose of tissue, allow sufficient time for it to become fully saturated with water (typically 10 s) before proceeding.
- (d) After each flush, inspect the toilet bowl and drain line.
- (e) Based upon observations during and after each flush, follow the specific procedures set out in [Table A.2](#).

Table A.2 — Procedures to follow after each flush based on observations of toilet and drain line

Observation	Procedures to follow
All items clear the toilet bowl and trap (i.e. enter the drain line).	(a) Allow 5 min for the water and the flushed materials to equilibrate within the drain line. (b) Record the following: (i) The identity of each individual item in the drain line (SFM, tissue unit dose or test sample). (ii) The item's distance from the toilet. (c) Continue with the next designated flush in the series.
Item(s) remain in the bowl or trap with sufficient capacity in the bowl to accommodate water from a second flush.	(a) Allow the toilet to refill and flush it a second time. (b) If the item(s) clear the bowl and trap, record the following: (i) The need for a second flush. (ii) The identity of each individual item in the drain line (SFM, tissue unit dose or test sample). (iii) The item's distance from the toilet. (c) Continue with the next designated flush in the series.
Item(s) remain in the bowl or trap following a second flush.	(a) Use a plunger to clear the bowl and trap. (b) Flush the toilet to reset the water level and allow 5 min for the water and the flushed materials to equilibrate within the drain line. (c) Record the following: (i) The need to use a plunger to clear a clog. (ii) The identity of each individual item in the drain line (SFM, tissue unit dose or test sample). (iii) The item's distance from the toilet. (d) Continue with the next designated flush in the series.
Visual evidence of clogging (e.g. rise in water level) with insufficient capacity in the bowl to accommodate a second flush.	(a) Use a plunger to clear the bowl and trap. (b) Flush the toilet to reset the water level and allow 5 min for the water and the flushed materials to equilibrate within the drain line. (c) Record the following: (i) The need to use a plunger to clear a clog. (ii) The identity of each individual item in the drain line (SFM, tissue unit dose or test sample). (iii) The item's distance from the toilet. (d) Continue with the next designated flush in the series.

When indicated, record the location of each flushed item in the drain line relative to its distance from the toilet. If an item breaks apart, record the location of the part of the item closest to the toilet. Record distances in 0.5 m intervals, round down to the nearest 0.5 m.

A.7.5 Product testing

A test round shall involve the loading sequence set out in [Table A.3](#), which is repeated 7 times, resulting in at least 35 flushes, 21 of which include toilet tissue and test sample. A test consists of 3 test rounds.

Table A.3 — Loading sequence for products

Flush number	Type of load	First addition	Second addition	Third addition
		SFM	Toilet tissue	Test sample
1	Female urinary	—	1 unit dose	1 unit of product or for wipes — 2 wipes ^a
2	Male urinary	—	—	—
3	Female urinary	—	1 unit dose	1 unit of product or for wipes — 2 wipes ^a
4	Male urinary	—	—	—
5	Bowel movement	3 pieces @ 50 g to 55 g	2 unit doses	1 unit of product or for wipes — 2 wipes ^a
^a Refer to the use instructions for the maximum number of wipes recommended by the manufacturer.				

The progression at which items are added to the toilet mimics typical toileting habits. For example, toilet tissue is added after the SFM and the product (e.g. wipes) is added after the toilet tissue in a bowel movement simulation.

The test shall include the following steps:

- (a) Repeatedly flush the toilet until all materials are cleared from the toilet and drain line.
- (b) To simulate a female urinary event, individually add the unit dose specified in [Table A.3](#), allowing toilet paper and any product to fully saturate, then do the following:
 - (i) Flush the toilet once.
 - (ii) Inspect the toilet and drain line and based upon observations follow the specific procedures set out in [Table A.2](#).
 - (iii) Record the location of flushed materials within the drain line.

NOTE If no materials are in the drain line, skip step (c) and move to step (d).
- (c) To simulate a male urinary event, flush the toilet containing only water and allow flushed materials to equilibrate within the drain line:
 - (i) Inspect the toilet and drain line and based upon observations follow the specific procedures listed in [Table A.2](#).
 - (ii) Record the location of flushed materials within the drain line.
- (d) Repeat step (b) female urinary event.
- (e) Repeat step (c) male urinary event.
- (f) To simulate a bowel movement, individually add three pieces of SFM, two unit doses of toilet tissue and product as specified in [Table A.3](#) to the toilet bowl, allowing each material to fully saturate, then do the following:
 - (i) Flush the toilet.
 - (ii) Inspect the toilet and drain line and based upon observations follow the specific procedures listed in [Table A.2](#).
 - (iii) Record the location of all flushed materials within the drain line.
- (g) Repeat the sequence of actions specified in steps (b) to (f) a minimum of 6 additional times until all material loaded on the 35th flush sequence exits the drain line.
- (h) Calculate the *COM* for all flushes.

- (i) Repeat the sequence of actions specified in steps (a) to (h), two additional times.
- (j) At the conclusion of the test, once again measure and record the average flush volume for 3 flushes.

A.8 Pass/fail criteria

To be acceptable, the samples shall meet the following the criteria:

- (a) *Toilet bowl and trap clearance* — Throughout the 3 test replicates, no flush shall be associated with clogs that require use of a plunger to clear product and excess water from the bowl and trap.
- (b) *Drain line clearance* — The following results:
 - (i) The travel distance of the *COM* of the flushed material in the drain line shall not consistently decrease over the course of 5 consecutive flushes.
 - (ii) All introduced products up to and including the 35th flush loading shall exit the drain line.

A.9 Ongoing maintenance of the toilet and drain line

Prior to each test, toilets used shall be checked for correct operation (flapper/check valve, fill line) and delivery of correct flush volume. Adjust the toilets, as needed, to meet the manufacturer's specifications.

A.10 Test report

The test report shall include the following information:

- (a) Executive summary that includes whether the product met the pass criteria.
- (b) Reference to this test procedure (i.e. AS/NZS 5328 Appendix A).
- (c) Overview of the test procedure.
- (d) Date and location of testing.
- (e) Detailed description of the test system including toilet type with specifications, drain line slope, length and diameter as well as number and location of 90° bends.
- (f) Water temperature.
- (g) Summary of baseline data for the test system.
- (h) Confirmation of average flush volume at the start and end of the test.
- (i) Explicit identification of the test sample with sufficient details to identify the material including dimensions.
- (j) Identification of the type of SFM including the average mass (with standard deviation) for a piece.
- (k) Identification of the type of toilet tissue, its sheet size and the total number of sheets in a unit dose along with the average mass (with standard deviation) for a unit dose.
- (l) Number of test samples dosed per flush along with their average mass with standard deviation.
- (m) Mass of each item and the total mass flushed in a simulated urinary and bowel movement event.
- (n) Loading sequence for each flush including SFM, toilet paper and test sample.

- (o) Any sample failure due to clogging or sample remaining in the toilet bowl or trap after two consecutive flushes as well as when these happened in the test sequence.
- (p) COM calculated after each flush, ideally presented in a graphic format to show any downward trend during the test sequence (105 flushes).
- (q) Any departure from the standard procedure along with an explanation.
- (r) Any other circumstances that may have affected the results.