International Wastewater Services Flushability Group

IWSFG PAS 2A: 2017 – Toilet and Drain Line Clearance Test Methods – Toilet Clearance

PUBLIC COMMENT VERSION

Forward

The International Wastewater Services Flushability Group (IWSFG) is a worldwide coalition of national and regional wastewater services' associations and organizations and individual wastewater services.

The work of preparing the standards is carried out by various drafting groups comprising volunteers designated by the principal and the supporting participants of the group. They participate on a voluntary basis, without remuneration of any kind.

> *The criteria for flushability and the appropriate test methods are the product of a global consensus of the coalition members and reflect the hydraulic, mechanical and environmental conditions of drain lines, various onsite treatment systems, and wastewater collection and treatment systems as well as the nature of the receiving waters for treatment plant effluents.*

The task of the group was to prepare standards reflecting the above purpose.

Wastewater services are organizations acting for the public good as a public service. The group expects the manufacturers and distributers of their products to act in a socially responsible and environmentally sustainable manner by adhering to the established standards.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The IWSFG shall not be held responsible for identifying any or all such patent rights.

13 # Contents

1 Introduction

Wastewater process systems are designed to receive, treat, and convey sanitary discharges[1] that, after treatment, are subsequently disposed of as:

a. liquid effluents to the aquatic environments of lakes, rivers, and oceans
b. solid residuals (biosolids) for application to land for their inherent nutrient values
c. solid residuals incinerated or digested for energy recovery
d. solid residuals to be sent to landfill sites

Typical waste streams include toilet paper, human waste, food waste, detergents and cleaning agents. In recent years, new products such as moist wipes and toilet bowl cleaning products have been introduced worldwide – many of which are identified as "flushable" products. Other products such as tampons, condoms, and facial tissues are commonly but inappropriately flushed. The physically adverse effects of such products on wastewater systems (clogging and plugging) have already been identified but numerous other environmental effects have not been studied systematically. For example, flushed products may comprise materials and chemicals that can be harmful to the environment; hence, such products should not be identified as "flushable". Accordingly, to purpose of the flushability test along with others presented in this IWSFG series is to to define the qualities and characteristics of those products that may be considered as "flushable". The application of these these test methods and the provision of the appropriate advice to the product users regarding their after use disposal will ultimately lead to the long-term sustainability of wastewater systems and the minimization of potential problems such as pipe blockages and equipment failures in sewer networks.

The goal of the IWSFG is not to ban the production and/or use of these products, but to encourage manufacturers to clearly and prominently identify those products that do not meet these tests as not being "flushable" and to encourage users to dispose of the products after use in a more appropriate manner.

2 Purpose

The purpose of the test is to assess the performance of a product, i.e., to clear a toilet bowl, when it is subject to the hydraulic forces and mechanical conditions typically found when placed in and flushed through a toilet, and in particular to assess the likelihood that the product and the water, when flushed:

a. will clear the toilet bowl and trap, without the need for excessive flushing

[1] In some instances, by agreement with a commercial or industrial client, a wastewater utility may agree to accept discharges containing chemicals or other contaminants not normally found in sanitary discharges. Acceptance is by specific agreement that such chemicals or contaminants can be safely treated within the treatment processes of the wastewater utility. Otherwise pretreatment by the commercial or industrial organization is required to bring the discharge into conformity with the established acceptable quality.

b. will not, as a result of the product being flushed on its own without toilet paper or fecal matter, reach or overtop the toilet rim during the process

Note: This test is proposed for general application globally.

3 Scope

The scope of this Publicly Available Specifications (PAS) includes all of the products that a manufacturer or distributer may wish to identify as being flushable and all products, which by the location of their use and likely contamination by human excreta, are likely to be flushed through a toilet into a drain line and wastewater conveyance and treatment system.

4 References

4.1 Normative References

IWSFG PAS 0:2017 *Terms and Definitions for Determination of Flushability*

4.2 Informative References or relevant Annexes

Annex 1 – Sources of Apparatus
Annex 2 – Photographs of Test Apparatus

5 Terms and Definitions

With the exception of the definitions of unit size see: IWSFG PAS 0:2017 *Terms and Definitions for Determination of Flushability*

5.1 Unit Size – for dry tissues that are not toilet paper, the unit size is 2 tissues as removed from the packaging.

5.2 This unit is comprised of a number of multiple joined sheets (typically 6) folded into a square as shown in Figure 1 below. The target mass for this unit is 3 g. Hence, the number of sheets in a unit should be that number which provides as close to 3 g of total material as is practical.

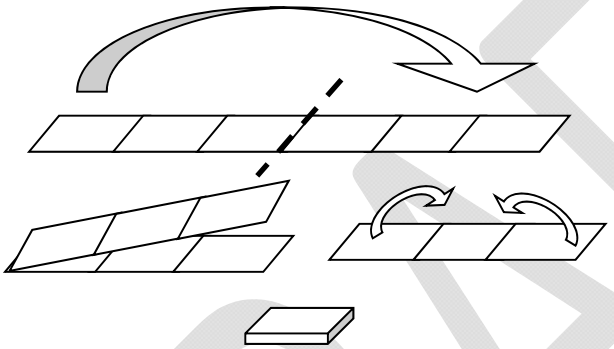

Figure 1: Folding of Toilet Tissue into a "Unit Size"

SOURCE: FG501 - Toilet Bowl & Drain-Line Clearance Test, INDA, 4.3 Simulated Fecal Material and Toilet Tissue.

5.3 Unit Size – moist tissues

one tissue or the maximum number of the product that may be flushed according to the manufacturer's instructions or recommendations provided on the packaging

5.4 Unit Size – other products

one product or the maximum number of the product that may be flushed according to the manufacturer's instructions or recommendations provided on the packaging

6 Principles

The flushability test is used to demonstrate a product's potential to successfully exit a toilet when subjected to the hydraulic forces and mechanical configuration of toilets normally used, without the use of a plunger.

The test will demonstrate the likelihood that when flushed:

a. the product will clear the toilet bowl and trap without the need for excessive flushing
b. the water in the bowl will not, as a result of the product being flushed on its own without excreta, reach or overlap the toilet bowl during the process.

The test provides evidence that the product will clear the toilet ready for transport through a private drain line within 5 of toilet flushes. A positive result in this test indicates that the test product flushed satisfactorily down the toilet.

Note: The test is undertaken using potable water, as opposed to wastewater because:

a. This avoids the health and safety issues associated with wastewater.
b. This avoids the inconsistencies that would inevitably be found between two or more samples of wastewater.

7 Apparatus

The apparatus comprises:

a. a siphonic toilet having a flushing capacity of 4.5 L ± 0.4 L
b. a mounting platform on which the toilet is secured

The mounting platform should be sufficiently high as to allow the collection of the flushed material and may be such that a drain line can be connected for use in the Drain Line Flow Test (IWSFG PAS 2B or IWSFG PAS 2B (UK)) and/or the Drain Line Snagging Test (IWSFG PAS 2C).

The toilet should be connected to a municipal water supply.

If the toilet is connected to a drain line, the line should be vented near the toilet to prevent the development of a vacuum in the line.

Note: Photographs of a representative test system can be found in Annex 2.

Optional equipment:

a. a suitable container (e.g. plastic bucket) to capture the flushed material, etc. for transfer to a drain line or to verify the volume of a flush

8 Preparation

8.1 Sample Acquisition

For products already in the marketplace, the testing laboratory shall select and acquire sample products from retail outlets (e.g., grocery stores or pharmacies).

For products under development as a new or an improved product, the testing laboratory may receive samples from their manufacturers or from the intended distributers.

The test report shall clearly indicate the applicable method of sample acquisition and its purpose.

8.2 Number of Test Pieces

Ten specimens are required for each complete testing. Specimens should be obtained from at least two distinct packages of a product. To obtain 5 specimens, a roll of toilet paper, or a bundle of wipes in its original package should be divided into 5 equal sections. Then, one specimen from each section will be used for testing.

For toilet papers, the starting point, as well as the end point of a toilet paper roll, should be avoided due to glue effect.

To obtain moist tissue specimens, it will be convenient to turn the packaging on its side to view the entire bundle of moist tissues. Then, the package will be divided into 5 equal sections, and a specimen will be removed from each section.

Caution is necessary not to damage delicate specimens when removing them from the package. Also specimens must be removed immediately before the testing starts.

8.3 Sample Preparation

The following requirements apply to products to be tested

8.3.1 Dry Tissues:

The sample shall comprise one unit of toilet paper or one unit of dry tissues.

8.3.2 Moist Tissues

The sample shall comprise one unit of moist tissue taken directly from the packaging, unless the manufacturer's instructions recommend a maximum, in which case the maximum loading per flush suggested by the manufacturer should be used and recorded in the test report.

Moist tissues shall be tested as removed from the package. No attempt at removing the lotion should be undertaken and the removed moist tissue should not be left for any length of time, to reduce the opportunity for the moisture to start evaporating.

8.3.3 Other Products

For other products, a unit is comprised of one specimen taken directly from the package.

8.4 Apparatus

Upon set-up and prior to conducting a test, perform three flush actions without a test product and collect the flush for measurement to establish a baseline flush for the toilet and to ensure its correct operation.

Prior to initiating a flush, ensure that the toilet has stopped running and that the water in the bowl is at a normal level.

The average of the three flushes should be 4.5 L ± 0.4 L.

When a toilet testing configuration is used over an extended period of time, the verification of the flushing volume should be periodically repeated to verify the toilet's performance.

9 Storage and Conditioning

9.1 Storage of samples

Samples shall be stored under ambient laboratory conditions in the manufacturer's original packaging.

However, if the samples have been removed from the manufacturer's original packaging, the samples shall be identified and stored as follows:

1. Dry products should be returned to their original packaging, and should be double-bagged with resealable plastic bags.

2. Moist products should be kept in their original packaging, e.g., hard-plastic containers or soft-plastic packages.
3. In case of hard-plastic boxes, the box should be closed, and then should be double-bagged with plastic resealable plastic bags to minimize any exposure to the ambient air.
4. Soft-plastic packages should be closed tightly while squeezing the air out of the package, and then should be double-bagged with resealable plastic bags to minimize the potential of exposure to the ambient air.
5. Samples shall be stored in secured laboratory cabinets.

9.2 Conditioning for the test

There are no conditioning requirements. The test specimens should be removed from their packagings (if any) and used directly in the test procedure.

10 Procedure

10.1 Summary

The test consists of ten toilet flush sequences using the test specimens, and the loading levels provided by the manufacturer's instructions or the normal anticipated usage. After each flush, observations are made regarding whether the specimen has cleared the toilet bowl and trap.

If the toilet is connected to a drain line for a combined toilet bowl clearance and drain line flow test, the location of the specimen in the drain line is recorded following each flush.

10.2 Test procedure

The following steps should be undertaken:

1. Prior to adding any articles to the toilet or initiating a flush, ensure that the toilet has stopped running and that the water in the bowl is at a normal level.
2. Place the specimens (as specified in Section 6.3) flat on the surface of the water in the center of the toilet bowl.
3. Wait 10 seconds, for the specimen to become saturated.
4. Activate the flush mechanism.
5. After each flush, inspect the toilet bowl and the receiving container (or drain line if attached to the toilet) to determine if the specimen has exited the toilet.
6. If any test specimen has not cleared the toilet, wait 3 minutes and repeat

248 further empty flushes 3 minutes apart to a maximum of 5 until specimen has
249 cleared the toilet, while recording the location of specimen after each subsequent
250 flush.

251 **Notes:**

252 1. If the test is being carried out in association with a drain line flow test (IWSFG
253 PAS 2B: 2017 or a IWSFG 2B (UK): 2017), the time between the flushes should be
254 extended to 5 minutes.
255 2. At no time, should a plunger be required to empty the toilet during the test
256 sequence. If a plunger must be used, the specimen will be deemed to have
257 failed the toilet clearance test.
258
259 3. If any flush sequence requires more than 5 flushes for a specimen to clear the
260 toilet, abort that test sequence, record the event on the test data sheet, empty
261 the toilet, perform a flush without a specimen to confirm a proper flushing
262 action, and commence the next flush sequence by repeating steps 2 to 5. If any
263 specimen requires more than 2 flushes to clear the toilet bowl, the failure of
264 that particular test should be noted in the test report.
265 4. Record the outcome (observations) according to Table 1.
266 5. When all of the specimens have exited the toilet, wait 3 minutes for the toilet to
267 empty and commence the next flush sequence by repeating steps 2 to 5.
268 6. Repeat the test sequence a total of 10 times to complete the test.

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Table 1: Procedures to Follow after Each Flush Based on Observations of Toilet and Drain Line (if connected).

Observation	Procedures to Follow
Specimen clears the bowl or trap following the 1st flush.	1. Allow 3 minutes for the water and the flushed articles to equilibrate within the receiving container. 2. Continue with the next empty flush in the sequence.
Specimen remains in the bowl or trap with sufficient capacity in the bowl to accommodate water from a 2nd flush.	1. Allow the toilet to refill and perform a second flush. 2. If the specimen does not clear the bowl and trap, record the following: a) the need for a 3rd flush b) the identity of the specimen in the container 3. Continue with the next empty flush in the sequence.
Specimen still remains in the bowl or trap following a 3rd flush. Visual evidence of clogging (e.g. rise in water level) with insufficient capacity in the bowl to accommodate a further flush.	1. The specific flush test has failed. 2. Continue with the next designated flush in the series.

10.3 Test Termination

Upon completion of a round of testing, the toilet shall be drained and cleared of any residues from the test specimen.

In cases where specimens contain fiber-binding chemicals that are likely to remain on the toilet bowl surfaces, the surfaces shall be washed using solvents such as ethanol and methanol, or soap and water.

10.4 Calculations

The following calculations are required:

a. the percentage of the 10 tests in which specimens exited the toilet with no more than 3 flushes

11 Acceptance Criteria

To be acceptable:

a. No test sequence can require more than 3 flushes for the test specimen to clear the bowl.
b. No test sequence required the use of a plunger for the specimen to clear the bowl.
c. The toilet bowl water is not surcharged up to its rim.

Note: None of the 10 flush sequences containing a test specimen should fail to meet the above criteria.

12 Test Report

The test report should include the following information:

a. a reference to this test procedure
b. an overview of the test procedure including the toilet type
c. the date and location of the testing procedure
d. the complete identification of the tested product
e. a statement as to the acquisition process followed and purpose of testing
f. the dimensions and weights of the specimens
g. the number of specimens used per flush
h. any departure from the procedure and any circumstances that may have affected the results along with an explanation of such departure
i. the confirmation of the average flush volume at the start and end of the test
j. copies of photographs taken during the procedure
k. the test results, including:

1. the percentage of the 10 tests in which the specimens exited the toilet with no more than three flushes
2. for each individual test:
    a. the number of flushes required for the specimen to clear the toilet bowl
    b. any rise of the level of water in the toilet bowl
3. any specimen failure, due to either clogging or product remaining in the toilet bowl or trap:
    a. after three consecutive flushes
    b. resulting in the water rising in the toilet bowl to overflow the rim
    c. a statement indicating whether the product passed or failed the test

13 Precision

Periodically the toilets used should be checked for their correct operation (flapper/check valve, fill line) and their delivery of the correct flush volume. They should be adjusted to meet the manufacturer's specifications as required. Also there may be some variation in the quality of the products being tested, which is why 10 separate specimens shall be acquired and tested, according to Section 8.1.

Bibliography

1. UKWIR Test Protocol to Determine the Flushability of Disposable Products. WRc Portfolio Report No. P7696. (Specific reference to Stages 3 and 4 of the protocol).
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4. EN 997 (2003) European Standard: WC pans and WC suites with integral trap.
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8. Guidelines for Assessing the Flushability of Disposable Nonwoven Products. A Process for Assessing the Compatibility of Disposable Nonwoven Products with Plumbing and Wastewater Infrastructure. FG 501, 3rd Edition, June 2013.
9. Maximum Performance (MaP) Testing, Toilet Fixture Performance Testing Protocol, Version 5, March, 2013.
   Note: For further information on or clarification of this test protocol, contact the following individuals: Bill Gauley, P. Eng., Gauley Associates, Ltd. bill@gauley.ca or John Koeller, P.E., Koeller and Company, jkoeller@map-testing.com.

Annex 1 – Sources of Apparatus

(Informative)

All of the apparatus required for this test is readily available in hardware stores and plumbing outlets.

It is recommended that toilets used should be certified as to conforming to the applicable national standards. The mounting platform for the toilet (and for drain lines if attached) can be constructed using readily available lumber.

Annex 2 – Photograph of Test Apparatus

(Informative)

Source: Courtesy, UK WRc.