International Wastewater Services Flushability Group

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

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 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 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.

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17 # 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, or as
d. solid residuals sent to landfill

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 these are identified as "flushable" products. Other products such as tampons, condoms, facial tissues are commonly but inappropriately flushed. The physically adverse effects of such products on wastewater systems (clogging and plugging) have been identified but other numerous environmental effects have not been studied systematically. For example, various flushed products may comprise materials and chemicals that can be harmful to the environment; hence, such products should not be identified as "flushable". Accordingly, the purpose of the flushability test, along with others presented in this IWSFG series, is to define the qualities and characteristics of those products that may be considered to be "flushable". By adhering to these test methods and providing the appropriate advice to the product users regarding the after use disposal of such products will ultimately lead to the long-term sustainability of the 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 identify those products that do not meet the established IWSFG standards 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 this test is to assess the performance, i.e. drain line clearance under snagging conditions, of a product when it is subjected to the hydraulic forces typically found under intermittent flow conditions in wastewater transport systems.

The test will demonstrate the potential of a product to pass through a simulated residential sanitary sewer pipe system (drain line) with a snagging obstruction under normal gravitational flow. The obstruction is simulated by either a misaligned pipe joint, a root intrusion, or burrs, which are commonly

[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 through 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 standards.

found in cut and re-assembled pipe. The test method determines the likelihood that an article, if flushed into a drain line with an uneven interior surface, will successfully clear the drain line.

3 Scope

The scope of this PAS includes all 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

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

IWSFG PAS 2A: 2017 *Toilet Clearance Test*

4.2 Informative References or Relevant Annexes

Annex 1 – Sources of Apparatus
Annex 2 – Photographs of Test Setup
Annex 3 – Example of a Drain Line Clearance Worksheet
Annex 4 – Procedure for Pre-rinsing Test Products to Determine Dry Mass
Annex 5 – Recovery of Product Residues
Annex 6 – Drying and Weighing of Products and Product Residues
Annex 7 – Dry Mass Calculation Worksheet

5 Terms and Definitions

Refer to IWSFG PAS 0:2017 except for unit size (See 5.1 & 5.2).

5.1 Unit Size – Dry Tissues

For dry tissues, which are not toilet paper, the unit size is 2 tissues as removed from the packaging.

5.2 Unit Size – Toilet Paper

For toilet paper, the unit size shall be a number of multiple joined sheets (typically 6) folded into a square as shown in Figure 1 below. The target mass for a unit size is 3 g.

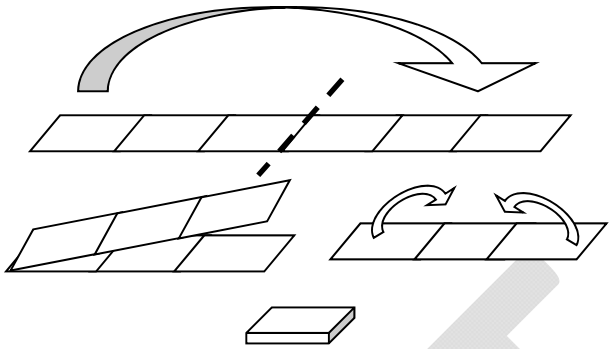

Figure 1 - Folding of Toilet Tissue into a "Unit Size" [2]

5.3 Unit Size – Moist Tissues

For moist tissues, the unit size is one tissue or the maximum number of the product that may be flushed according to the manufacturer's instructions or recommendations contained on the packaging.

5.4 Unit Size – Other Products

For other products, the unit size is one product or the maximum number of units of the product that may be flushed according to the manufacturer's instructions or the recommendations provided on the packaging.

6 Principles

The flushability test is used to demonstrate a product's potential to successfully exit a drain line with simulated snags when subjected to the hydraulic forces normally found in a gravity fed intermittent flow situation.

This test provides evidence to determine if a product will first tear and then exit a drain line with simulated snags when subjected to a set number of toilet flushes.

The testers acknowledge that many buildings do not have perfectly constructed drain lines. This testing is to replicate the typical property connections with snagging obstructions such as an offset pipe joint and/or an abrasive pipe material (e.g. cast iron, concrete, a globule of vitrified clay, etc.).

It is recommended that the toilet bowl clearance test and drain line snagging test be evaluated simultaneously, using identical product/product loading.

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

a. It avoids the health and safety issues associated with wastewater.

b. It avoids the inconsistencies that would inevitably be found between two or more samples of wastewater.

7 Apparatus

The drain line and toilet comprise a:

a. 4.5 L ± 0.4 L siphonic toilet as in IWSFG PAS 2A: 2017 Toilet Clearance Test
b. 3 m long ABS 76 mm (3 in) vented sewer pipe connection to the drain line with two 90° horizontal bends
c. 20 m long PVC drain line 10 cm (4 in) constructed of joined pipe sections of approximately 2.5 m, firmly mounted on a series of trestles such that there is a continuous slope of 2°
d. drain line containing one 90° horizontal corner 5 m from the head end
e. three common galvanized self-tapping screws

(See: Photo A.1 – Toilet and Drain Line Set Up)

Optional equipment:

a. Suitable containers (e.g. plastic bucket) to:
   1. transfer the test material from the toilet used for Toilet Clearance Test to the drain line, or
   2. capture the liquid exiting the drain line during the test

8 Preparation

8.1 Sample Acquisition

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

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

The test report shall clearly indicate the applicable method of sample acquisition procedure or purpose.

8.2 Number of Test Pieces

Ten specimens are required for each complete testing.[2] Specimens should be obtained from at least two distinctly separate packages of a product. To obtain 10 specimens, a

[2] Note: in order to prepare for the possibility that the alternate dry weight test verification is needed, 10 additional specimens should be acquired.

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 the glue effect.

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

Caution is necessary in order to not damage delicate specimens when removing them from the package. Specimens must be removed immediately before testing begins.

8.3.1 Dry Tissues

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

8.3.2 Moist Tissues

The specimen shall comprise one unit of moist tissues, which is taken directly from the packaging, unless the manufacturer's instructions recommend a maximum number, 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 they are removed from the package. No attempt to remove the lotion should be made and the removed moist tissue should be tested immediately, to reduce the amount of evaporation of the moisture.

8.3.3 Other Products

For other products, one specimen only should be taken directly from the package

8.4 Apparatus

The following configuration shall apply:

a. The maximum vertical distance from the toilet outlet to the horizontal drain line beneath it should not exceed 40 cm (16 in).
b. The line should be vented near the toilet to prevent the development of a vacuum in the line.
c. Each section of the drain line should be held in place by using adjustable supports or by laying the pipe on a bed of sharp sand.
d. The support system must be established and maintained to prevent sagging at the joints.

e. To ensure the accurate positioning of the drain line, it is recommended that the slope of each individual pipe be measured.
f. Along the drain line's length, distances are marked at regular intervals (0.5 meters) to allow for the quick measurement and recording of the location of the flushed articles relative to the toilet after each flush.
g. A screen or other device should be used at the terminal end of the drain line to recover the flushed articles during testing.

Photographs of a typical test system can be found in Annex 2.

Replicating the snagging obstruction requires that:

a. Three common galvanized self-tapping screws should be drilled into the flow path in the bottom surface of the drain line.
b. Screws should penetrate the pipe and extend 12 mm above the bottom surface.
c. The snags shall be positioned in the 10 cm PVC pipe:
    - 4 m from the toilet
    - 12 m from the toilet
    - 1 m from the discharge point.

Approximately 1 m of the upper 1/3rd of the drain line should be removed above the location of the snags in order to facilitate the clearance of any snagged material, which was not successfully removed by the flushing actions.

(See: Photo A.2: Galvanized Screws as Snagging Obstruction)

In the set-up and prior to conducting a test, the drain line and the snags should be checked to ensure that all are clear of residual materials from previous tests (See: Photo A.4).

Three flush actions should be performed without a specimen and the flushed material should be collected for measurement to establish a baseline flush for the drain line and to ensure the correct operation of the system. The average of the three flush actions should be 4.5 L ± 0.4 L.

Prior to initiating each test flush, ensure that the drain line has no flow.

From time to time, confirm that the average slope in the drain line is 2%.

9 Storage and Conditioning

9.1 Storage of Samples

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

If the samples have been removed from the manufacturer's original packaging, they 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 returned to their original packaging, e.g., hard-plastic containers or soft-plastic packages.
3. In case of hard-plastic boxes, the box should be re-closed, and then it 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 after squeezing the air out of the package, and then they should be double-bagged with resealable plastic bags to minimize the potential exposure to ambient air.
5. Samples then should be stored in secured laboratory cabinets.

9.2 Conditioning for the Test

The specimens shall be first conditioned by applying the IWSFG PAS 2A – *Toilet* Clearance Test Method.

10 Procedure

10.1 Summary

The test consists of conducting 10 toilet flush sequences with the test product, using loading levels provided by the manufacturer's instructions or anticipated usage. After each flush, observations are made regarding whether the specimen has cleared the toilet bowl and trap.

Following each flush, the location of the specimen in the drain line is recorded.

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 there is no flow in the drain line toilet.
   Note: This does not mean that the drain line should be dry.
2. If the drain line is not connected to a toilet, pour the specimen specified in Section 6 along with 4.5 L ± 0.4 L of water into a funnel at the upper end of the drain line, or
3. If the drain line is connected to the toilet used in the IWSFG PAS 2A Toilet Clearance Test, simply flush the toilet in conformity with the procedure followed in that test.
4. After the initial flush action, inspect the drain line to determine if the specimen has cleared the drain line, or to determine where the specimen is located in the drain line, i.e. is it caught on a snag. Then record the location of the test product and take a photograph.

5. Repeat the flush action after 5 minutes either by pouring 4.5 L ± 0.4 L of water into the funnel, or by flushing the toilet again. Inspect the drain line to determine where the test article is located. If visible, record the location of the product and take a photograph.
6. Repeat steps 2 to 4 a maximum of 5 times to verify the location of the test article in the drain line if it is visible. Record the location of the product and take a photograph.
7. Record the outcome (observations) according to Table 1.
8. Repeat the test sequence a total of 10 times to complete the test. Ten specimens of the acquired test product must be tested sequentially and completed with the results being logged.

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313 **Table 1: Procedures to Follow after Each Flush Based on Observations of Toilet and Drain-line**

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Observation	Procedures to Follow
Record the location of the specimen in the drain line following the 1st flush.	1. Determine if the specimen is visible and if it has exited the drain line or has become attached to a snag. If attached to a snag, take a photograph. 2. Allow 3 minutes for the water and the flushed articles to equilibrate within the drain line. 3. Unless the flushed specimen has exited the drain line, continue with the next flush in the sequence.
Record the location of the specimen in the drain line following the 2nd flush.	1. Determine if the specimen is visible and if it has exited the drain line or become attached to the snag. If snagged, identify the snag number and take a photograph. 2. If snagged, determine if the specimen is beginning to shear (tear) or has sheared and has continued beyond the snag. 3. Allow 3 minutes for the water and the flushed specimen to equilibrate within the drain line. 4. Unless the flushed specimen has exited the drain line, continue with the next flush in the sequence.
Record the location of the specimen in the drain line following the 3rd flush.	1. Determine if the specimen is visible and if it has exited the drain line or become attached to the snag. If snagged, identify the snag number and take a photograph. 2. If snagged, determine if the specimen is beginning to shear (tear) or has sheared and continued beyond the snag. 3. Allow 3 minutes for the water and the flushed specimen to equilibrate within the drain line. 4. Unless the flushed specimen has exited the drain line, continue with the next flush in the sequence.
Record the location of the specimen in the drain line following the 4th flush.	1. Determine if the specimen is visible and if it has exited the drain line or become attached to the snag. If snagged, identify the snag number and take a photograph. 2. If snagged, determine if the specimen is beginning to shear (tear) or has sheared and continued beyond the snag.

Observation	Procedures to Follow
	3. Allow 3 minutes for the water and the flushed specimen to equilibrate within the drain line. 4. Unless the flushed specimen has exited the drain line, continue with the next flush in the sequence.
Record the location of the specimen in the drain line following the 5th flush.	1. Determine if the specimen is visible and if it has exited the drain line or become attached to the snag. If snagged, identify the snag number and take a photograph. 2. If snagged, determine if the specimen is beginning to shear (tear) or has sheared and continued beyond the snag. 3. Terminate the test.

10.3 Test Termination

Upon completion of a round of testing, the drain line shall be drained and cleared of any residues from the specimens.

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

10.4 Test Results

The test must be repeated with 10 specimens.

a. If 8 or more of the 10 tested specimens show no residual fragments remaining on the 6.3 mm sieve after rinsing, the product will pass.

b. Record the test results for each one of the 10 specimens. Collect any residual fragments that remained on the 6.3 mm sieve during each test. Quantify the dry-mass of all the residual fragments from the 10 specimens by drying the fragments at 103 °C for 4 to 8 hours. For a product to pass the test, the total dry-mass of all residual fragments (>6.3 mm solids) must be less than 5 % of the initial dry mass of the 10 samples.

(See Annexes 3, 4, 5 and 6 for the procedure to be followed for the dry mass measurement.)

10.4 Calculations

The following calculations are required:

The percentage of the 10 tests in which the specimens exited the drain line in 5 or less flush actions without snagging, and

- The percentage of the ten specimens' mass that did not snag (operationally defined as observed residual pieces or torn sections caught on the snags) is calculated using the following equation:

$$\% \text{ Disintegration} = \left[1 - \frac{\text{total dry mass of retained fraction in sieve (g)}}{\text{total initial dry mass of sample (g))}}\right] \times 100$$

(See Annexes 4, 5, and 6 for procedures to be followed.)

11 Acceptance Criteria

To be acceptable:

a. All ten specimens in a test sequence of the five flushes must clear the drain line.
b. Where residual pieces or torn sections of the specimens are observed on one or more snags, the specimen will be considered to pass the test provided that the collected pieces or torn sections constitute no more than 5% of the starting dry mass of the ten specimens when measured according to the procedures found in Annexes 4, 5, and 6.

12 Test Report

The test report should include the following information:

1. a reference to this test procedure
2. an overview of the test procedure including the drain line configuration
3. the date and location of testing
4. the complete identification of the tested product
5. a statement as to the acquisition process followed and the purpose of the testing
6. the dimensions and weights of all the specimens
7. the number of specimens used per flush
8. a description of any departure from the established procedure and any circumstances that may have affected the results along with an explanation
9. confirmation of the average number of flush actions performed in the test sequence
10. copies of the photographs taken during the procedure
11. the test results, including:
    a. the details of each test, in terms of distance travelled after each flush and number of flushes required to exit the drain line
    b. the average number of flushes needed for the specimens to exit the drain line

c. the percentage of the 5 tests in which the specimens did not exit the drain line
d. the percentage of the dry weight of the test specimens that remained caught on the snags
e. 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. When required, they should be adjusted to meet the manufacturer's specifications.

The drain lines used should be checked periodically for correct alignment; adjustments should be made to assure a continuous slope of 2% if necessary.

Periodically the snags in the drain line should be verified for having a 12 mm protuberance.

There may be some variation in the quality of the products being tested, which is why 5 separate specimens shall be acquired, according to Section 8.1.

Bibliography

1. *WRc, PLC. Test Protocol to Determine the Flushability of Disposable Products*. Swindon, Frankland Road, Blagrove, Swindon, Wiltshire, SN5 8YF. Collaborative Project CP: 311. Report No.: P7696. March 2008. Drinkwater, Andy and Stefania Galletti.
2. *Guidelines for Assessing the Flushability of Disposable Nonwoven Products. A Process for Assessing the Compatibility of Disposable Nonwoven Products with Plumbing and Wastewater Infrastructure*. INDA, FG 501, 3rd Edition, June 2013.
3. *The Drainline Transport of Solid Waste in Buildings, Phase 1*, The Plumbing Efficiency Research Coalition (PERC), November 2012.

Annex 1 – Sources of Apparatus

(Informative)

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

It is recommended that drain lines used be certified as conforming to applicable national standards.

The mounting platform for the drain lines can be constructed using readily available lumber.

Annex 2– Photographs of the Test Setup.

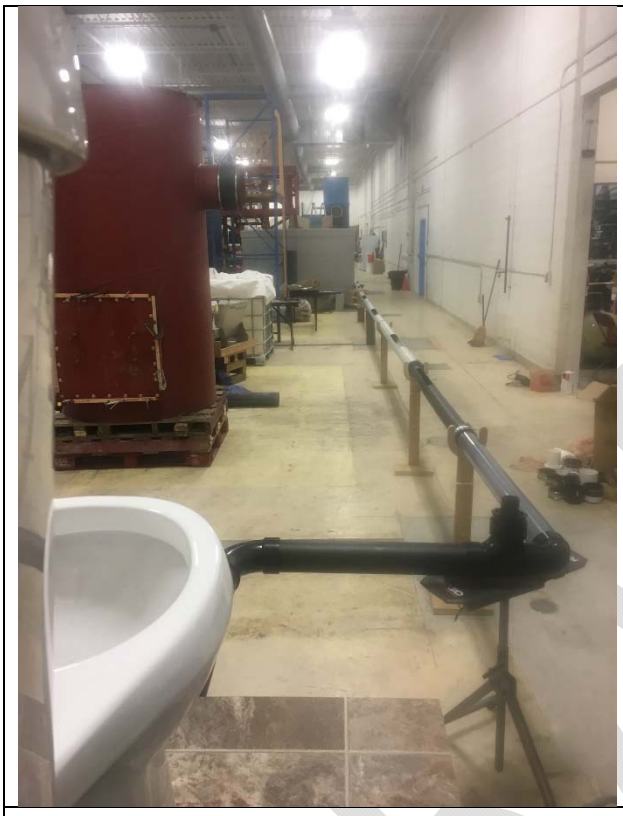

Photo A.1 – Toilet and Drain Line Set Up

Source: IWSFG Member

Photo A.2 - Galvanized Screws Used as Snagging Obstruction

Source: IWSFG Member

Photo A.3 – The Drain Line and Sieve Used to Capture the Flushed Product.

Photo A.4 –Snag Left by Previous Tests Prior to Commencing a New Test to be Removed.

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411 SOURCE: IWSFG Member

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413 # Annex 3 - Example of Drain Line Clearance Worksheet

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Study:	**Test Number:**	**Date:**
Product:	**Slope:**	**Initials:**

Flush Number	**Condition**	**Clears Drain line?** *(Yes or No)*	**Caught on Snagging Obstruction?** *(Yes or No)*	**Location in Drain Line** *(If yes, at which snag point is it located?)*
1	Initial Loading			
2	Empty Flush			
3	Empty Flush			
4	Empty Flush			
5	Empty Flush			

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Annex 4 - Procedure for Pre-rinsing Test Products for Determining Initial Dry Mass

(Informative)

A.4.1 Introduction

This Annex describes two approaches for pre-rinsing the test products to remove water soluble lotions or other additives from the test products before using them in the determination of the initial dry mass. The first method, which is recommended, involves flushing the products down a toilet and through a drain-line using tap water. This approach simulates the actual rinsing process that occurs when a product is flushed on its way to a wastewater conveyance system. When a toilet and drain-line is not available, an alternative method can be used that involves swirling the products in a container of tap water.

A.4.2 Test Product Selection

When conducting a test to support a flushable claim, the products used for testing must be the same as those offered in the intended market.

It is necessary to obtain a sufficient number of products (articles) to conduct the intended test.

If there is a need to determine the average dry weight for the product, at least 10 more articles will be required, and when the products exhibit a high variability in their weights, more articles may be needed.

Test articles should be randomly obtained from different sections of one or more packages to ensure that they are broadly representative. This is particularly important for products such as wipes, which are packaged in a roll or stack.

A.4.3 Toilet and Drain Line Method

A.4.3.1 Equipment

- Use a toilet and Drain-line as per PAS 2A, with catch basket positioned before the drain.
- It is recommended to use a toilet with at least a 4.5 L ± 0.4 L flush volume.

A.4.3.2 Procedure

- 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 a product (e.g. hygienic wipe) place it in the center of the toilet bowl and allow sufficient time, typically 15 seconds, for it to become fully saturated with water before adding another product or flushing the toilet.
- No more than 2 wipes should be flushed at one time.
- **Ret**rieve the products before they enter the basket or as soon as it is practically possible to prevent any disintegration of the product caused by water flowing out of the pipe.
- When necessary, use additional flushes without a product to move products out of the drain-line for collection.

A.4.4 Alternative Method

A.4.4.1 Equipment

- Containers with a capacity of approximately 20 L (5-gallons)

A.4.4.2 Procedure

- Fill the containers with tap water.
- Submerge the products in the water and swirl them for approximately 30 seconds, or longer if necessary, to remove any residual lotion or additives.
- To maintain the ratio of water to product existing in the toilet and drain-line described above, no more 6 units of a product should be placed at one time in a

single container containing 20 L of tap water.

Annex 5 - Recovery of Product Residues

(Informative)

A.5.1 Introduction

This Annex describes the recovery and rinsing procedures of the product residues following the snagging tests. Once the samples are transferred to a sieve, these procedures are used to rinse small materials and to recover the residues for gravimetric analysis.

A.5.2 Equipment

- Peerless shower head Model 76114WH with hose assembly (pictured at right), or similar device, attached to a faucet (tap) with a graduated flow regulator adjusted to deliver 4L per minute
- 4 L beaker (recommended)
- stopwatch or other timing device
- fine mesh hand sieve
- forceps
- drying pans

Source: IWSFG Member.

A.5.3 Procedure

1. Turn the faucet on and adjust the regulator to a flow rate of 4 L per minute.
2. The flow rate can be determined by measuring the volume delivered to a suitable container with graduations after a specified time period. For example, it should take exactly 60 seconds to deliver 4 L of water to the 4 L mark on a beaker. Once the flow is adjusted, this measurement should be repeated at least three times and should vary less than 5%.
3. When transferring the contents from a disintegration test to the sieve, pour the contents of the test vessels slowly while distributing them over the complete surface of the sieve.

4. With the handheld showerhead spray nozzle held approximately 10-15cm (4-6”) above the top surface, gently rinse smaller materials through the sieve. Constantly move the spray over the entire surface without concentrating the spray on any specific areas. Do not force the passage of any material through the sieve.
5. After 1 minutes of rinsing, quantitatively recover all the retained materials from both sides of the sieve using forceps or by backwashing the material into a smaller sieve and then using forceps.
6. Transfer these materials into labeled drying pans or tared weigh boats to determine their dry weight (see Annex 6).

Example of a Flow Regulator and Shower Head Rinse Apparatus

Source: IWSFG Member

Annex 6 – Drying and Weighing of Products and Product Residues

(Informative)

A.6.1 Equipment:

a. oven capable of maintaining a constant temperature between 40° and 103°C
b. weighing dishes
c. forceps
d. desiccator
e. analytical balance (reads to 4 decimal places)
f. 10 specimens

A.6.2 Procedure

A.6.2.1 Loss of Mass Calculation Procedure

1. If there are residual fragments at the end of any of the 10 tests, collect them using the procedures described in Annex 5 prior to determining their dry weight.
2. Set the oven to a temperature appropriate for the chemical and physical properties of the specimen – this is typically 103 °.
3. Place the specimens to be analyzed in an oven-safe weighing dish or on a piece of foil.
4. In the case of difficult to handle specimen residues, it may be appropriate to place the residues in pre-weighed (tared) aluminum weigh boats.
5. Dry the specimens in the oven for several hours or overnight.
6. Transfer the specimens from the oven to a desiccator and allow them to cool.
7. Weigh the specimens and record the weight.
8. Return the specimens to the oven for approximately 30 minutes and again allow them to cool in the desiccator and determine their weight.
9. Repeat this process as necessary until the specimens reach constant weights.
10. Record the total weight of residuals from 10 tests.
11. Calculate the loss of mass using the Loss of Mass worksheet set out in section A.6.4.

A.6.3.1 Initial Dry Mass Calculation Procedure

1. Select 10 specimens in accordance with Annex 4, section A.4.3.
2. Specimens with water soluble lotions or additives should be pre-rinsed using the procedures described in Annex 3 prior to determining their dry weight.
3. Set the oven to a temperature appropriate for the chemical and physical properties of the specimen – this is typically 103 °C.
4. Place the specimens to be analyzed in an oven-safe weighing dish or on a piece of foil.
5. In the case of difficult to handle specimen residues, it may be appropriate to place the residues in a pre-weighed (tared) aluminum weigh boats.
6. Dry the specimens in the oven for several hours or overnight.
7. Transfer the specimens from the oven to a desiccator and allow them to cool.
8. Weigh the specimens and record the total weight.

9. Return the specimens to the oven for approximately 30 minutes and again allow them to cool in the desiccator and determine their weight.
10. Repeat this process as necessary until the specimens reach constant weights.
11. Record the total weight of the ten (10) specimens.
12. Calculate the loss of mass using the Loss of Mass worksheet set out in A.6.4.

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591 ### A.6.4 Example of a Loss of Mass Calculation Worksheet

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Loss of Mass Calculation Worksheet				
Sample Number	**Initial Total Dry Mass of 10 Specimens Prepared in Accordance with Annex 4**	**Dry Mass of Retained Specimens from the 6.3 mm sieve**	**Percent Disintegration**	**95% Mass Loss PASS/FAIL**
1				

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