

**IWSFG Template for reviewer comments and  
IWSFG secretariat observation**

Document reviewed: **PAS 1**

Due date:2017//

1 Te=Technical, Ge=General, Ed=Editorial

Initial	Starting Line Number (e.g. 17)	Ending Line Number (e.g. 23)	Clause/ Subclause (e.g. 3.1)	Type of comment <sup>1</sup>	Comments	Proposed change	Observation of the secretariat
PG				Ge	Submitting comments on the IWSFG PAS documents in this public comment period in no way represents participation in the development process of the IWSFG PAS documents. Nor does commenting imply agreement with any content; where portions of the IWSFG documents have not been commented upon, consent with the content therein is not implied.		
PG				Ge	As the PAS documents are designed to work in concert, it is noted here that revisions to PAS-3 to reduce intra-lab and inter-lab variability are necessary prior to publication. Extensive interlaboratory studies are necessary to establish the viability, reproducibility and validity of the proposed method parameters and criteria.	Conduct an inter-laboratory round robin experiment to establish the validity of the PAS-3 method prior to publication of the IWSFG documents.	

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					As the PAS documents are designed to work in concert, it is noted here that the method and criteria proposed in IWSFG PAS-3 are not appropriate for the evaluation of any products, including flushable wipes. Based on the results of an interlaboratory investigation of the PAS-3 disintegration test, three of eight toilet papers tested would not meet the proposed acceptance criteria. An additional three of the five toilet papers tested would not meet the proposed acceptable criteria if the rinse step were removed. As such, it can be concluded that the rinse step alone resulted in 50% of the materials artificially meeting the criteria (i.e., false positive results). It should be noted that the toilet papers tested have been used by consumers for many years, without any evidence of flushability concerns. As such, the results call into question the ability of PAS-3 to differentiate between materials that are compatible with wastewater infrastructure, from those that are incompatible.	Conduct a set of inter-laboratory round robin experiments to establish the validity of the PAS-3 method (and/or alternative methods) prior to publication of the IWSFG documents.	
PG				Ge	As the PAS documents are designed to work in concert, it is noted here that the PAS-3 disintegration test has been shown to be unreliable and unrepeatable between laboratories and thus will require significant modification and further method development before it should be considered for inclusion in an international specification.	Conduct a set of inter-laboratory round robin experiment to establish the validity of the PAS-3 method (and/or alternative methods) prior to publication of the IWSFG documents.	

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PG				Ge	The IWSFG PAS documents do not outline an approach for determining compatibility with wastewater infrastructure. The IWSFG documents lack any content or context regarding infrastructure issues currently experienced by wastewater utilities. Further, the IWSFG documents contain no data, examples or details regarding issues that can be attributed to flushable wipes. Therefore, the IWSFG documents provide no justification for stipulating qualities or characteristics for flushable products, and as such, represent arbitrary requirements that are unfounded and unrelated to issues faced by wastewater utilities.	Provide examples of infrastructure issues currently experienced by wastewater utilities specifically attributed to flushable wipes.	
PG				Ge	The IWSFG documents do not contain sufficient documentation or information to establish why the IWSFG documents have been developed, or what results the IWSFG documents seek to achieve regarding flushable wipes beyond vague and unsupported performance concepts. The IWSFG PAS documents contain no documentation of operational issues that have been experienced by IWSFG members, or the utilities they represent, that have been caused by flushable wipes. Further, no justification for how those issues would be resolved as a result of implementation of the IWSFG PASs for flushable wipes is provided. Based on the results of field testing and forensics conducted by a range of stakeholders since 2010, all available evidence continues to reinforce that flushable wipes are compatible with wastewater infrastructure.	Provide examples of infrastructure issues currently experienced by wastewater utilities specifically attributed to flushable wipes.	

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PG				Ge	The IWSFG has provided no details regarding the process utilized to establish baseline performance. Outside of photographs within an Annex, no data regarding the performance of materials in the PAS-3 test has been included in the documents available for public review. Further, no references to supporting documentation, test results, or other relevant substantiation demonstrating how and why the proposed disintegration performance is required for infrastructure compatibility were provided for review. Without such documentation, the current IWSFG documents are a collection of unproven assumptions and untested hypotheses. As such, a thorough and complete review of the IWSFG PAS documents cannot be conducted without access to relevant test results/data utilized to establish benchmark performance in the IWSFG PAS tests, and importantly, why and how that specific level of performance is necessary to protect wastewater infrastructure.	Provide details of all testing done to establish all test parameters and criteria.	
PG				Ge	The IWSFG PAS documents do not account for all pathways in wastewater infrastructure. Of greatest significance is the omission of test methods for either household or municipal pumps and aerobic biological degradation.	Provide the rationale for why the IWSFG documents do not provide testing to evaluate compatibility with pumps, or testing to evaluate the ability to degrade biologically under aerobic conditions.	

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PG				Ge	Misuse of the word "standard," and variations thereof, occurs in the texts. The documents assembled by the IWSFG are neither a standard, nor are they Publicly Available Specifications developed, for example, in accordance with the process set forth by the British Standards Institute (BSI). Misuse of the word "require," and variations thereof, occurs frequently throughout the texts. The IWSFG documents can in no way require action.	Clarify that the documents are guidelines.	
PG				Ge	There is significant overlap of content (both verbiage and technical details) between the IWSFG documents and existing copyrighted material- in particular the work of Working Group 10, within Technical Committee 224 of the International Standards Organization- and there is no reference to consent from the copyright owners with regards to this use.	Provide acknowledgement from the ISO copyright office allowing the use of ISO content. From ISO TC224/WG10/TR 25424 WD3: "All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester."	

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PG				Ge	The first draft of the IWSFG documents consisted of a Standard and associated Publicly Available Specification (PAS) documents, and the entire body of work was described as the IWSFG Flushability Guidelines ( <a href="http://iwsfg.org/iwsfg-flushability-guidelines/">http://iwsfg.org/iwsfg-flushability-guidelines/</a> ). The second draft consists of three PAS documents and are referred to collectively as the Flushability Specification.	Clarify the type of document the IWSFG has developed. Provide the rationale and basis for renaming the IWSFG documents from "Guidelines" to a "Specification."	

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PG				Ge	<p>The documents do not appear to have been developed per an established Publicly Available Specification process- for example, by the process set forth by the British Standards Institute (BSI). Revise all instances to utilize an appropriate term such as “Guideline” or equivalent. Alternatively, provide details of the national or international standards organization that is accrediting the documents as “Publicly Available Specifications.”</p> <p>Note to Entry: The first sentence of the British Standards Institute (BSI) definition of a standard requires agreement- not among a single organization or group of common stakeholders- but among “manufacturers, sellers, buyers, customers, trade associations, users or regulators.” The full definition reads (<a href="https://www.bsigroup.com/en-GB/standards/Information-about-standards/what-is-a-standard/">https://www.bsigroup.com/en-GB/standards/Information-about-standards/what-is-a-standard/</a>): “In essence, a standard is an agreed way of doing something. It could be about making a product, managing a process, delivering a service or supplying materials – standards can cover a huge range of activities undertaken by organizations and used by their customers. Standards are the distilled wisdom of people with expertise in their subject matter and who know the needs of the organizations they represent – people such as manufacturers, sellers, buyers, customers, trade associations, users or regulators... They are designed for voluntary use so it’s up to you – you’re not forced to follow a set of rules that make life harder for you, you’re offered ways to do your work better. Standards are knowledge. They are powerful tools that can help drive innovation and increase productivity. They can make organizations more successful and people’s everyday lives easier, safer and healthier.”</p>	<p>Clarify if the IWSFG has developed the PAS documents in accordance with a standard process in accordance with a third-party certification body (ISO or BSI, as examples).</p> <p>In the interest of transparency, list the stakeholders groups and organizations that participated in the development (i.e., activities other than the public comment) of the IWSFG Standard and PAS documents.</p>	

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PG	20	24	Foreword	Te	<p>Document appears to share common authorship with documents generated, and therefore the intellectual property of, the International Standards Organization (ISO) Technical Committee (TC) 224. While superficial changes have been made, language and concepts in IWSFG PAS-1 appear to have been developed from current and/or draft versions of the documents generated as part of the work of ISO TC224 WG10.</p> <p>From <b>"ISO TC224/WG10/TR 24524: WD 3" (noted as: © ISO 2018 – All rights reserved)</b>: "This Technical Report addresses the hydraulic, mechanical and environmental conditions found in transport and treatment systems. The conditions listed in this report may be taken into account when designing and evaluating the performance of products which could potentially be flushed via the toilet... It is expected that this Technical Report and may provide the basis for wastewater services to delineate the qualities and characteristics of discharges to the wastewater system." In addition, note the Scope of <b>ISO TC224/WG10/TR 24524: WD 3</b>: "The scope of this Technical Report is to outline the broad hydraulic, mechanical and environmental conditions found globally in wastewater transport and treatment systems and their components that may be considered when defining or designing products or material intended or likely to be flushed down the toilet." (continued below)</p>	<p>As the work of ISO TC224 WG10 pre-dates the work of the IWSFG, where necessary and appropriate, provide proper attribution and/or reference to language and concepts drawn from the draft ISO TC224 WG10 documents. Further, in the interest of transparency, identify the affiliation of the author(s) of the IWSFG PAS documents, and state if they have been, or are currently, members of ISO TC224 WG10.</p>	

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PG	20	24	Foreword	Te	(continued from above) From the IWSFG PAS-1 (noted as: Copyright 2018 IWSFG): "The criteria for flushability and the appropriate test methods... reflect the hydraulic, mechanical and environmental conditions of drain lines, various onsite treatment and wastewater collection and treatment systems... 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 truly be considered as being "flushable"."	As the work of ISO TC224 WG10 pre-dates the work of the IWSFG, where necessary and appropriate, provide proper attribution and/or reference to language and concepts drawn from the draft ISO TC224 WG10 documents. Further, in the interest of transparency, identify the affiliation of the author(s) of the IWSFG PAS documents, and state if they have been, or are currently, members of ISO TC224 WG10.	

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PG	20	24	Foreword	Te	<p>Contradicts definition of "Flushable Product" in Section 5 of PAS-2. Definition of "Flushable Product" in Section 5 of PAS-2 (with proposed minor adjustments to language for clarification) accurately and succinctly describes a flushable product, and as such, is a suitable summary of the purpose of the PAS documents. The language utilized in the Foreword mischaracterizes the PAS documents, as none of the three documents "reflect the hydraulic, mechanical and environmental conditions of drain lines, various onsite treatment and wastewater collection and treatment systems as well as the nature of the receiving waters for treatment plant effluents."</p>	<p>Revise Foreword to be consistent with proposed "Flushable Product" definition in Section 5 of PAS-2: "The criteria for flushability and the appropriate test methods are the product of a global consensus of the coalition members and reflect <b><u>test methods and criteria to ensure a product labeled as flushable</u></b> <del>the hydraulic, mechanical and environmental conditions of it</del> <b><u>will not impact</u></b> drain lines, various onsite treatment and wastewater collection and treatment systems as well as the nature of the receiving waters for treatment plant effluents." NB: A response that this comment is not relevant to the PAS would imply that the three PAS documents do not work in concert, which would contradict Lines 139-140: "The document is designed to be used in conjunction with IWSFG PAS 2: 2018 Terms and Definitions for Determination of Flushability and IWSFG PAS 3:2018 Disintegration Test Methods – Slosh Box."</p>	

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PG	27	28	Foreword	Te	Improperly implies that the opinions presented by the IWSFG in the Foreword are social and/or environmental sustainability metrics. This is unfounded, unreferenced and untrue as no such metrics exist. The opinions of the IWSFG cannot be utilized to measure social and/or environmental sustainability. Additionally, the language implies that adherence to IWSFG PAS documents demonstrates social and/or environmental sustainability, or alternatively, that failure to adhere to the PAS indicates an entity either neither socially or environmental sustainable. Neither of these scenarios is true.	Delete. Inappropriately and improperly implies that the opinions presented by the IWSFG are social and/or environmental sustainability metrics.	
PG	27	28	Foreword	Te	In the United States, wastewater treatment plants are permitted to continuously discharge known pollutants including but not limited to Total Suspended Solids (TSS), oxygen depleting substances [typically measured as Biological Oxygen Demand (BOD)] and nutrients (defined as pollutants in the United States Environmental Protection Agency [EPA]'s Report to Congress on the Impacts and Control of CSOs and SSOs; 2004). These pollutants can and do have a negative impact on "the nature of the receiving waters for treatment plant effluents" (IWSFG PAS-1).	Describe how the risk from the discharge of pollutants (as defined by the US EPA) in the form of TSS, BOD and nutrients by wastewater treatment plants represented by IWSFG members is deemed appropriate. In particular, describe how risk and budget, as well as receiving water quality determine the extent of treatment for a WWTP.	

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PG	27	28	Foreword	Te	Sentence describing wastewater services is an oversimplification. The expectations of the IWSFG are irrelevant to the document.	<p><b>Delete the following sentence:</b>            “Wastewater services are organizations acting for the public good as a public service. The group expects the manufacturers and distributors of their products to act in a socially responsible and environmentally sustainable manner by adhering to the established standards.”</p> <p>If the sentence is retained, for context, provide the IWSFG’s position on “blending,” specifically how the practice of blending protects the public good and represents socially and environmentally sustainable operation by wastewater services.</p> <p>Note to entry:            “The [US Environmental Protection Agency] EPA issued guidance in the mid-2000s banning a technique used by some utilities in which some wastewater is routed around the treatment process before being blended with treated flows and then discharged into areas in the receiving waters known as mixing zones. The practice is used to keep the high volumes of wastewater, such as those during storms, from overwhelming the treatment plant. The agency said blending and the use of mixing zones violate the Clean Water Act.” (continued below)</p>	

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	27	28	Foreword	Te	Proposed Change continued from above	[continued from above] (from: <a href="https://www.bna.com/wastewater-practice-mostly-n57982084593/">https://www.bna.com/wastewater-practice-mostly-n57982084593/</a> ). "Opponents argue that the blending ban raises costs for wastewater utilities." (From <a href="https://www.wateronline.com/doc/epa-s-wet-weather-policies-debated-in-court-0001">https://www.wateronline.com/doc/epa-s-wet-weather-policies-debated-in-court-0001</a> ).	

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PG	27	28	Foreword	Te	<p>Document contains language significantly similar to that found in draft versions of the ISO TC224 WG10.</p> <p><b>From the IWSFG PAS-1 (noted as: Copyright 2018 IWSFG):</b> "The group expects the manufacturers and distributors of their products to act in a socially responsible and environmentally sustainable manner by adhering to the established specifications."</p> <p><b>From "ISO TR 24524: WD 2 v1" (noted as: © ISO 2017 – All rights reserved):</b> "It is equally hoped that manufacturers and distributors of products that would be marked flushable or which by their location and use are likely to be flushed would take these conditions into account when designing and marketing such products. Thereby demonstrating their conformity with the principles of social responsibility as set out in ISO 26000 which provides guidance on how businesses and organizations can operate in a socially responsible way. This means acting in an ethical and transparent way that contributes to the health and welfare of society."</p>	<p>In the interest of transparency, declare if the author(s) of the IWSFG PAS documents are members of ISO TC224 WG10.</p> <p>Further, declare if the author(s) have participated in the development of both documents.</p>	

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PG	61	62	1	Te	Inaccurate. While various wastewater services may choose to provide advice to residential and commercial users, this sentence completely ignores industrial pretreatment programs, which through permitting "reduce conventional and toxic pollutant levels discharged by industries and other nondomestic wastewater sources into municipal sewer systems and into the environment." ( <a href="https://www.epa.gov/npdes/national-pretreatment-program">https://www.epa.gov/npdes/national-pretreatment-program</a> ).	Change line 61-62 to read to include information presented in Lines 126-131: Service providers routinely provide advice to residential and commercial customers, and often have permit limits on discharges of conventional and toxic pollutants from industrial customers.	

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PG	68	69	1	Te	The transport mechanism for solids in small diameter piping (i.e., drainline or plumbing) is well establishing in the literature and is referred to as a "sliding dam" where all materials in the plumbing and drainline (including toilet paper, feces and flushable wipes) form a dam at the invert of the pipe that is propelled forward by the leading edge of the wave of water behind the material. "As mentioned earlier, for many solids found in sewers, typically gross solids in combination with toilet paper, the usual mode of movement is not floating in the wave, but by contact with the invert of the pipe at all times: a sliding, leaking dam... The solid obstructs the flow down the pipe, and causes a build up of head behind it. The amount of water that flows past the solid depends on the size, shape and roughness of the flow path, and the driving head" (Butler et al; 2005; A model for the movement of large solids in small sewers; Water Science & Technology; Vol. 52; Issue 5; Pg. 69-76).	Revise to encompass and describe all sewer transport (both residential and municipal) in terms of transport of solids. Suggestion: "It is important that material that is intended to be disposed to the toilet should be compatible with <del>not only the residential plumbing and the</del> <u>wastewater delivery network</u> it should pass through, <del>but also the wastewater-delivery-network,</del> the downstream wastewater treatment system, and where it is not removed through treatment, the receiving environment."	

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PG	68	69	1	Te	Continued from above: Regarding transport distance, Butler and Davies (Butler and Davies; 2011; Urban Drainage; 3rd Edition; Spon Press; London, UK) concluded (emphasis added): "Solids which are large compared with the flush wave and pipe diameter move with a sliding dam mechanism (Littlewood and Butler, 2003). In this case, the flush wave builds up behind the solid, which acts as a dam in the base of the pipe. When the flow's hydrostatic head and momentum overcome the friction between solid and pipe wall, the solid begins to move along the pipe invert. The amount of movement that occurs depends on how 'efficient' the solid is as a dam; the higher the efficiency, the further the solid will move for the same flush wave... Photograph (a) shows toilet tissue alone in the flow and photograph (b) shows toilet tissue and an artificial faecal solid in combination. Note the pool of water forming behind the solid and propelling it along. <b><i>The role of toilet tissue in forming the 'dam' is noteworthy. Solids tend to move furthest in the sliding dam mode.</i></b> " In other words, <b><i>the more intact a material is in the drainline, the farther it will be transported</i></b> , due to the increased surface area against which the wave of water from the toilet flush can push, and is the mechanism by which they are transported in the plumbing and drainline. This simple fact, that intact material is more effectively transported in the drainline, contradicts fundamental principles of the IWSFG's PAS documents, their proposed testing and criteria.	Revise to encompass and describe all sewer transport (both residential and municipal) in terms of transport of solids. Suggestion: "It is important that material that is intended to be disposed to the toilet should be compatible with <del>not only the residential plumbing and the wastewater delivery network</del> it should pass through, <del>but also the wastewater-delivery-network</del> , the downstream wastewater treatment system, and where it is not removed through treatment, the receiving environment."	

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PG	68	69	1	Te	<p>The phrase "... material that is intended to be disposed to the toilet should be compatible with not only the residential plumbing it should pass through..." incorrectly implies that transport of solids (specifically, passing through plumbing) is only relevant for residential plumbing. This function is also critical for municipal sewers- both sanitary and combined sewers function by maintaining or periodically producing a minimum velocity to prevent solids from settling, or resuspend settled solids, such that they can be transported to the WWTP for removal and/or subsequent treatment.</p> <p>From Section 19.14 "Flow in Gravity Sewers" in Water-Resources Engineering (4th Edition, McGraw-Hill, pg. 693): "To prevent the settlement of wastewater solids, the velocity in a sewer flowing full should be not less than about 2 ft/sec (0.6 m/sec). Such a sewer flowing one-sixth full will have a velocity of 1 ft/sec (0.3 m/sec), which is reasonably adequate. This is especially important in sanitary sewers, for decomposition of settled wastes results in undesirable conditions."</p>	<p>Revise to encompass and describe all sewer transport (both residential and municipal) in terms of transport of solids. Suggestion: "It is important that material that is intended to be disposed to the toilet should be compatible with <del>not only the residential plumbing</del> and the <u>wastewater delivery network</u> it should pass through, <del>but also the wastewater-delivery-network,</del> the downstream wastewater treatment system, and where it is not removed through treatment, the receiving environment."</p>	

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PG	71	73	1	Te	Vague.	<p>Define the phrase “such products” providing specific category examples of the "physically adverse effects" observed. Provide references.</p> <p>While the physically adverse effects of non-flushable items improperly disposed into sewer systems have been well documented (most recently in collection studies conducted IN New York City in 2016; and Water UK in London, England in 2017), no such documentation exists for flushable wipes. Provide reference to documentation that systematically identifies and quantifies the physical adverse effects of flushable wipes on sewer systems globally.</p> <p>If intending to imply physically adverse effects as a result of flushable wipes, provide reference to studies that demonstrate the physically adverse effects experienced by wastewater treatment systems specifically attributable to flushable wipes.</p>	

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PG	74	74	1	Te	Vague. The term "harmful" is vague and unreferenced. The term "environment" is vague and should be clarified and referenced. Is the IWSFG referencing determination of harm based on an established assessment protocol? Is this based on existing standards?	Define "harmful to the environment." Provide reference to tests the IWSFG uses for determining if materials and chemicals are harmful to the environment. In particular, provide the results of tests that the IWSFG has conducted or is referencing that establishes that flushable wipes are "harmful to the environment." As noted above, total suspended solids, oxygen depleting substances and nutrients, all defined as pollutants by the US EPA and capable of degrading quality of receiving water bodies, are continuously discharged by wastewater treatment systems globally.	
PG	79	79	1	Te	Vague. Appears to imply a singular "flushability test," though PAS-1 Section 6.2 specifically details 4 tests.	Clarify. Replace "test" with "tests" or specifically identify the "flushability test."	
PG	87	87	1	Te	A septic tank or similar is a form of treatment, not disposal.	Replace "disposal" with "treatment"	
PG	101	102	1	Te	Incomplete. Does not account for a material that has a mechanism to lose strength, and thereby can remain intact and not cause blockages or failure of assets. See comment below regarding "binding and clumping."	"...sewer disintegrates <b>or has a mechanism to lose strength</b> and does not bind or clump."	

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PG	104	104	1	Te	<p>The statement that fats, oils and grease cause materials to "bind or clump" is opinion, speculative, and contradicted by research in this space. Any material in the sewer may become entrained in FOG formations, including feces, sand, etc. See:</p> <p>Wallace, et. al.; International evolution of fat, oil and grease (FOG) waste management - A review; Journal of Environmental Management; 187; 2017; 424-435: "The mechanism of FOG deposit mainly involves three processes: 1) the aggregation of excess calcium compressing the double layer of FFA; 2) saponification between FFA and positive metal ions like calcium ion; 3) the previously formed deposit acts as a core attracting un-reacted FFAs and calcium ion, also debris in wastewater (based on the effects of Van der Waals attraction and electrostatic repulsion (DLVO theory) (Fig. 2)."</p> <p>He, et. al.; Evidence for Fat, Oil, and Grease (FOG) Deposit Formation Mechanisms in Sewer Lines; Environ. Sci. Technol.; 45; 2011; 4385-4391: "The preferential accumulation of fats and calcium further suggests that FOG deposits may be metallic salts of fatty acids, and chemical saponification may be responsible for their formation."</p> <p>He, et. al.; Mechanisms of Fat, Oil and Grease (FOG) deposit formation in sewer lines; Water Research; 47; 2013; 4451-4459.</p>	Delete. " <del>Binding or clumping of material is typically caused by fats, oils and grease.</del> "	

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PG	104	106	1	Te	Redundant. Source control described in 61-63. Further, as shown in the comment above, FOG is a separate issue, and lines 104-106 are unrelated to the document.	Delete. <del>"These are most predominantly associated with industrial and commercial inputs to the sewer, which are managed with 105 source control programs by water service providers."</del>	

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PG	109	113	1	Te	<p>Contradictory. Lines 112-113 clearly acknowledge the critical importance of settling of solids for wastewater treatment. Further, Lines 114-117 acknowledge the process whereby materials that have not been removed during primary treatment further degrade in subsequent treatment unit processes or the environment. It should be noted that all WWTPs continuously discharge suspended solids that may meet this exact description. Importantly, however, this concept is not accounted for in the description in Line 111, which is therefore incomplete as written, and as a result invalid and incorrect. All materials in wastewater are not treated in the liquid stream in the WWTP. Further the 24-hour timeframe, which appears to indicate the hydraulic retention time, is vague and lacks a reference to the actual treatment processes described, and can vary significantly based on the design of the plant. Timeframe notwithstanding, the scenarios listed do not include treatment whereby a material or chemical settles with or adsorbs to the sludge solids (as described in Lines 114-117), and as a result, can be degraded in subsequent unit processes (ex. activated sludge) where retention times can be significantly longer than 24 hours.</p>	<p>Revise to provide an accurate description of all mechanisms by which wastewater is treated with appropriate references.</p> <p>Suggested changes to align text with known WWTP unit processes: "The primary mechanisms for removal of materials are: collection <b>and biodegradation</b> in settled solids, and biodegradation in the liquid stream passing through the plant. Biodegradation in the liquid stream of the plant is important for non-sorptive chemicals. <del>must occur within 24 hours, due to the short processing time of the predominant mechanical wastewater treatment plants.</del> For many materials, a critical aspect is that they become part of the settled solids, hence settling is an important characteristic.</p>	

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PG	117	117	1	Te	Vague. The descriptor "have a high degree of biodegradability" is vague.	Suggest: "meet the Organization for Economic Cooperation and Development (OECD) criteria for biodegradability as set forth in the OECD 301 Series Guidelines for Testing of Chemicals." For details see: <a href="https://www.oecd.org/chemicalsafety/risk-assessment/1948209.pdf">https://www.oecd.org/chemicalsafety/risk-assessment/1948209.pdf</a>	
PG	134	135	2	Te	Vague. The statement "This Specification is designed to be protective of the public infrastructure used for the removal and transport of sewage and treatment systems" is vague.	Define the term "protective" as used in the context of the Purpose of the document. Provide a reference to the standard (or similar) from which this term is derived with respect to public infrastructure.	
PG	134	135	2	Te	Incomplete. IWSFG PAS documents and proposed tests do not account for significant portions of residential and municipal systems including household pumps, municipal pumps, and activated sludge unit processes. As such, the proposed PAS documents and associated tests do not provide a complete framework for evaluation.	Provide the IWSFG's rationale for not including a test to evaluate the aerobic biodegradation and/or biodegradation of products.	

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PG	136	137	2	Te	Vague. The statement "and where a product cannot or is unlikely to be removed during transport or treatment, it should be unlikely to cause any significant negative environmental impacts." is vague. Multiple terms require additional context, information and reference.	Define the phrase "significant negative environmental impacts." In particular, differentiate between significant and insignificant negative environmental impacts. Provide an example of an insignificant negative environmental impact. Provide a reference to existing standards or guidance that define "significant negative environmental impacts." Does the continuous discharge of BOD, TSS and nutrients by WWTPs cause significant negative environmental impacts? If not, how is this determined?	
PG	147	149	3	Te	Vague. Is the IWSFG involved in the ISO TC6 SC2 WG27 development process?	Provide specific details regarding how "[t]oilet paper [will be] covered by a separate paper manufacturing standard being developed by the International Standards Organization working group ISO TC6 SC2 WG27."	

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PG	149	150	3	Te	Vague. The statement "the IWSFG suggests that toilet paper could be assessed against the IWSFG PAS documents" is vague.	Provide additional information regarding the IWSFG's position on a toilet paper that is assessed against the PAS documents and does not meet the criterion of one or more of the tests. Further, given that the stated purpose of the IWSFG PASs are to "be protective of the public infrastructure used for the removal and transport of sewage and treatment systems," provide references, test results, data, or similar that establish that a toilet paper that does not meet one or more of the PAS criteria is unsafe for "the public infrastructure used for the removal and transport of sewage and treatment systems."	
PG	169	169	6.1	Te	Misuse of the word "standard."	PAS is not a standard. Revise to "guideline."	

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PG	167	250	Sections 6 and 7	Te	Sections 6 and 7 of PAS-1, both of which contain information regarding the criteria proposed by the IWSFG for determining if a product should be labeled flushable, are strikingly similar to the analogous sections of the INDA/EDANA Guidance Document 3. With the exception of the use of a plunger in the INDA/EDANA FG501 test, the TAPPI method for evaluating environmental and human safety (which is an incorrect application of that method, as noted below), and operational and criteria modifications to the INDA/EDANA FG502 test, the requirements are identical.	Explicitly note at the outset of Section 6 that the framework for determining if a product is flushable as outlined in IWSFG PAS-1 is derived from the INDA/EDANA Guidance Document 3. For example, replace the first sentence of Section 6.1 with: "Using the INDA/EDANA Third Edition of the Guidelines for Assessing the Flushability of Disposable Nonwoven Products as a framework, this PAS sets out 5 critical criteria that need to be addressed for a product to be deemed suitable for flushing down the toilet."	
PG	184	184	6.2	Te	TAPPI/ANSI Test Method T 401 om-15, Fiber Analysis of Paper and Paperboard is not a test for environmental and health protection. Language in Section 7.1.1 adequate addresses environmental and human health protection.	Delete "TAPPI/ANSI Test Method T 401 om-15, Fiber Analysis of Paper and Paperboard." Replace with a reference to existing tests/frameworks for evaluating "Environmental and health protection" per Section 7.1.1.	

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PG	184	184	6.2	Te	No "relevant acceptance criteria" is provided in TAPPI/ANSI Test Method T 401 om-15, Fiber Analysis of Paper and Paperboard. The method does not have acceptance criteria.	Delete TAPPI/ANSI Test Method T 401 om-15, Fiber Analysis of Paper and Paperboard." Replace with a reference to existing tests/frameworks for evaluating "Environmental and health protection" per 7.1.1.	
PG	204	210	7.1	Te	The determination of whether or not a product, material, and/or chemical is safe for the environment and human health is beyond the reach and authority of IWSFG in general and the scope of this PAS in particular. Lines 202-203 appropriately describe the requirements for manufacturers- specifically, to comply with existing legislation.	Delete lines 204-210.	
PG	205	205	7.1.2	Te	Incorrect reference. Reference #7 contains no language related to plastic fibers.	Delete Reference #7 from Line 205	
PG	205	205	7.1.2	Te	What is the position of the IWSFG regarding clothing containing plastic fibers? Can clothing containing plastic fibers be laundered in residences with washing machines that discharge to the sewer?	Delete 7.1.2. If retained, provide the IWSFG's position and/or beliefs regarding the use of plastic fibers for clothing. Further, provide the IWSFG's position and/or beliefs regarding the laundering of clothing containing plastic fibers.	

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PG	205	206	7.1.2	Te	Vague and contradictory. The IWSFG makes no effort to differentiate between fibers from flushable wipes and other sources, such as clothing (see <a href="http://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/">http://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/</a> , as an example). Further, this statement fails to provide any insight into the IWSFG's beliefs or position regarding the environmental or human safety of the discharge of plastic fibers in WWTP effluents, or the application of plastic fibers to soil along with biosolids.	Delete Section 7.1.2. If retained, provide the IWSFG's position and/or beliefs regarding plastic fibers in clothing, as well as the number of plastic fibers derived from clothing that are safe for discharge via WWTP effluents, or as soil amendment in conjunction with land-applied biosolids.	
PG	208	209	7.1.3	Te	References contradict text. None of the references cited (References #11, #12, #13, or #14) contain language explicitly stating, or even otherwise indicating, concerns of any kind regarding environmental impact of regenerated cellulose fibers.	Delete Section 7.1.3. If retained, provide the exact language from each of the References (#11, #12, #13, and #14) that supports the statement that there exists in the literature "strong concerns about the impact of regenerated cellulose in the environment."	
PG	208	209	7.1.3	Te	References #11 and #12 appear to be identical.	Make single Reference. If different, cite the specification information referenced, as well as the page number from on which the relevant information is located.	

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PG	208	209	7.1.3	Te	<p>Incorrect references. From Page 15 of References #11 and #12; Biodegradable Plastics and Marine Litter. Misconceptions, Concerns and Impacts on Marine Environments from the United Nations Environment Programme (UNEP) in 2015, rayon is defined as Biodegradation "in terrestrial environment (including medical applications)" and "aquatic/marine environment."</p> <p>Further, on Page 22, "Plastics made from the same initial polymer can show differences in material properties and rates of biodegradation. For example, a study of cellulose based fabrics demonstrated that biodegradation was greatest in rayon and decreased in the order rayon &gt; cotton &gt;&gt; acetate (Park et al 2004). The tests used were soil burial, activated sewage sludge and enzyme hydrolysis. Biodegradability was related to the crystallinity of the fibres (rayon had lowest crystallinity) and the fabric weave."</p>	<p>Delete Reference #11 and #12 from Line 208. References #11 and #12 contain information specifically identifying rayon as biodegradable in terrestrial and aquatic/marine environments, thereby contradicting the content of PAS-1. If References #11 and #12 are retained, provide the exact language from each of the References that supports the statement that there exists in the literature "strong concerns about the impact of regenerated cellulose in the environment."</p>	

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PG	208	208	7.1.3	Te	<p>Reference incorrectly included- conclusions in Reference #13 conflict with content of 7.1.3. Specifically, the journal article by Remy et. al., When Microplastic is Not Plastic: The Ingestion of Artificial Cellulose Fibres by Macrofauna Living in Seagrass Macrophytodetritus, does not support the conclusions that there exist "strong concerns about the impact of regenerated cellulose in the environment."</p> <p>The authors concluded the following (conclusions shown in quotes, with summary text appended below in bold):</p> <p>1. "Even though 27% of sampled organisms contained 1 or more artificial fibers, the average amount of artificial fibers in each individual digestive tract was small (1.38 fiber) which is relatively low and could therefore indicate the small retention time of these fibers in the guts of the sampled invertebrates." <b>a. Therefore, it can be concluded that the fibers are quickly evacuated through the normal digestion processes of the invertebrates.</b></p> <p>2. "The observed viscose fibers thus do not seem to be transmitted from lower to higher trophic levels via predation." <b>a. Therefore, it can be concluded that the viscose fibers are not transmitted from lower to higher trophic levels, and are therefore not bioaccumulative.</b> (continued below)</p>	<p>Delete Reference #13 from Line 208. Reference #13 contains information that demonstrates a lack of both impacts and concerns regarding regenerated cellulose in the environment. If Reference #13 is retained, provide the exact language from the Reference that supports the statement that there exists in the literature "strong concerns about the impact of regenerated cellulose in the environment."</p>	

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PG	208	208	7.1.3	Te	<p>(continued from above)</p> <p>3. "One of the main possible explanations could be related to the lower retention time of the nonplastic observed fibers here in the gut. Indeed, cellulose, even of artificial origin like viscose, is more digestible and degradable than plastic. Some marine invertebrates are known to be able to digest cellulose, and this could explain both the faster digestive transit of the fibers and the absence of accumulation. The small average amount of AFs found in the invertebrates' gut contents also seems to favor this nonaccumulation or transmission."</p> <p>a. Therefore, it can be concluded that the viscose fibers are digestible and degradable. This further supports the conclusions regarding nonaccumulation or transmission of the fibers.</p> <p>4. "In addition, viscose fibers are known to degrade more rapidly (100% in 8 weeks) than cotton fibers, both by sunlight or in soil when buried."</p> <p>a. Therefore, it can be concluded that the viscose fibers have been shown to biodegrade under a range of tests and conditions.</p> <p>Further, Park et. al., (reference #53 within the Remy article) concluded the following: "Rayon fibers, which have a low crystallinity and a low degree of orientation, showed the highest biodegradability in most cases."</p> <p>The abstract full reads as follows, confirming the degradability of viscose with respect to natural materials such as cotton: "Biodegradability of cellulose fabrics was evaluated by use of a soil burial test, an activated sewage sludge test, and an enzyme hydrolysis. Surface changes after biodegradation were observed by optical microscopy. From X-ray diffraction analysis (XRD), changes in the</p>	<p>Delete Reference #13 from Line 208. Reference #13 contains information that demonstrates a lack of both impacts and concerns regarding regenerated cellulose in the environment. If Reference #13 is retained, provide the exact language from the Reference that supports the statement that there exists in the literature "strong concerns about the impact of regenerated cellulose in the environment."</p>	

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PG	209	209	7.1.3	Te	Reference #14 contains no information regarding either the presence or impact of regenerate cellulose on the environment. Further, the authors write (emphasis added): "Of the anthropogenic debris identified (> 500 µm) in samples from California, the majority were fibers from textiles. <b>Because we did not have the ability to use FTIR or Raman Spectroscopy to confirm the material type, we cannot be sure if the fibers are made from synthetic material (i.e. plastic) or natural fibers such as cotton.</b> "	Delete Reference #14 from Line 209. Reference #14 contains no information regarding regenerated cellulose. If Reference #14 is retained, provide the exact language the Reference that supports the statement that there exists in the literature "strong concerns about the impact of regenerated cellulose in the environment."	
PG	216	220	7.2	Te	Justification provided is unfounded and unrealistic. The sentence "...the IWSFG does not believe it acceptable that any product flushed down the toilet should require a plunger to remove it if appropriately used and the product is suitable for toilet disposal." incorrectly implies that all toilet blockages requiring the use of a plunger are caused by items not suitable for toilet disposal. This is illogical, as it is widely known that feces alone, or feces in combination with toilet paper, can result in a toilet blockage requiring the use of a plunger. As such, this would imply that in such a scenario, the feces and/or toilet paper were not "appropriately used," which implies there is an "appropriate use" for either.	Delete 218-220. If retained, revise to: "No more than 5% of toilet flushes containing product should be associated with clogs that require use of a plunger to clear 216 product and excess water from the bowl and trap. <del>Note: this test criteria differs from the requirements in INDA/EDANA FG501- because the IWSFG does not 218- believe it acceptable that any product flushed down the toilet should require a plunger to remove it if 219- appropriately used and the product is suitable for toilet disposal.-"</del>	

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PG	230	231	7.3	Te	Photographic requirements are unnecessary and redundant. Photograph(s) of sieve are not a replacement for the gravimetric result, so they are of no inherent value. For example, if a product were to meet the criteria, with 95.1% passing the sieve (i.e., 4.9% remaining on the sieve), the photograph would neither confirm nor refute that result. As such, it is useless. Further, this implies that someone could visually determine the accuracy of the gravimetric result through visual observation, which is categorically incorrect, unfounded, and not scientifically proven or valid.	Delete last sentence of Section 7.3.	
PG	249	259	7.5.2	Te	Text incorrectly implied that INDA/EDANA method FG506 requires a photograph. No photograph is required in FG506. Further, photographic requirements are unnecessary and redundant. Photograph(s) of sieve are not a replacement for the gravimetric result, so they are of no inherent value. For example, if a product were to meet the criteria, with 95.1% passing the sieve (i.e., 4.9% remaining on the sieve), the photograph would neither confirm nor refute that result. As such, it is useless. Further, this implies that someone could visually determine the accuracy of the gravimetric result through visual observation, which is categorically incorrect, unfounded, and not scientifically proven or valid.	Delete last sentence of Section 7.5.2	

end