



BSI Standards Publication

**Service activities relating to drinking water
supply, wastewater and stormwater systems
— Hydraulic, mechanical and environmental
conditions in wastewater transport systems**

National foreword

This Published Document is the UK implementation of ISO/TR 24524:2019.

The UK participation in its preparation was entrusted to Technical Committee CB/503/-/1, Flushable Products.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2019
Published by BSI Standards Limited 2019

ISBN 978 0 580 51153 0

ICS 97.020; 03.080.30; 13.060.30

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 28 February 2019.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

TECHNICAL REPORT

ISO/TR
24524

First edition
2019-02-28

Service activities relating to drinking water supply, wastewater and stormwater systems — Hydraulic, mechanical and environmental conditions in wastewater transport systems



Reference number
ISO/TR 24524:2019(E)



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019, Published in Switzerland

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.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Toilets	2
4.1 General	2
4.2 Typical toilet types	2
4.3 Usage patterns	3
5 Drain lines	3
5.1 General	3
5.2 Drain line hydraulic conditions — intermittent flow	3
5.2.1 General	3
5.2.2 Drain line clearance — stranding	3
5.2.3 Drain line clearance — settling	4
5.2.4 Drain line clearance — snagging	4
5.3 Typical drain line configurations	4
6 Wastewater transport systems	5
6.1 General	5
6.2 Typical transit times in transport systems	6
6.3 Typical hydraulic conditions in flowing pipes (Reynolds number)	6
7 Screening	6
8 Treatment processes	6
8.1 General	6
8.2 Settlement	7
8.3 Liquid phase of treatment plants	7
8.4 Biodegradation of settled solids	7
9 Environmental considerations	7
Bibliography	8

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 224, *Service activities relating to drinking water supply, wastewater and stormwater systems*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document addresses the hydraulic, mechanical and environmental conditions generally found in wastewater transport and treatment systems (which will be referred to collectively as the “wastewater systems”) based on information that was available at the time of publication.

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

The principal objectives for managers of wastewater systems are to protect public health and the environment and the occupational health and safety of their workers, along with promoting sustainable development^[1]. Management of the wastewater system should also consider impacts on any outputs arising from wastewater treatment. There are many factors that contribute to the successful operation of wastewater systems, including adequate capacity and proper design, along with the necessary capital expenditure and maintenance to maintain and expand the infrastructure as necessary. Another factor for the successful operation of wastewater systems is the prevention of blockages. When blockages occur, there is an unacceptable risk that wastewater may spill from the system and, in doing so, flood property and the surrounding land, and pollute watercourses and the surrounding environment.

A major problem for wastewater operators is the disposal/flushing to sewers of inappropriate and unsuitable items^{[2]–[4]}. Wastewater system blockages and clogged pumps can also come from a variety of sources, including debris and other materials creating barriers to the entry or free flow of water into or through the system including outside drains, industrial and commercial discharges.

Further, there may be fouling and damage to wastewater treatment systems from blocked grilles, gratings, and screens that are intended to:

- a) collect and restrict the passage of materials;
- b) protect other equipment from being damaged;
- c) protect the operation of the treatment systems themselves;
- d) minimize the potential for the untreated or partially treated material to enter the environment.

These problems may result in:

- health risk and inconvenience to customers, including that their properties may be flooded with wastewater;
- damage to the environment, including watercourses;
- otherwise unnecessary expenditure in rectifying the issues in order to maintain efficient operations and to prevent sewer backups or sewer overflows;
- exposure of workers to health and safety risks.

The presence of inappropriate materials can compound problems of aging infrastructure and hydraulic capacity of the wastewater infrastructure. It should be noted that sewer overflows may occur for a number of reasons unrelated to blockages, for example: system design constraints; infrastructure failure; and weather.

To protect the wastewater system, a discharged material or product that is disposed via the wastewater system should be able to:

- be flushed from the toilet bowl;
- pass through the drain line (pipes inside/immediately outside property);
- be transported through the wastewater system (sewers and pumping stations);
- not adversely affect the intended performance of wastewater treatment systems;
- not adversely affect the receiving environment when in a disintegrated state.

The physical characteristics that a product should achieve in order to avoid these issues include:

- being able to disintegrate to a sufficient degree and in a timely manner so as to not cause problems in the drain line, sewer system or when passed through pumps;
- to be transported in the flow through the piped system, yet settle in the primary settlement process of wastewater treatment;
- for the material to be compatible with both the wastewater treatment process and the receiving environment.

The conditions listed in this document may be taken into account when designing and evaluating the performance of products which could potentially be flushed via the toilet. It can also assist stakeholders in communicating with consumers and communities about the compatibility of materials flushed via the toilet.

Service activities relating to drinking water supply, wastewater and stormwater systems — Hydraulic, mechanical and environmental conditions in wastewater transport systems

1 Scope

This document details the hydraulic, mechanical and environmental conditions generally found in wastewater transport systems from toilets through to wastewater treatment plants, the general powers of wastewater services to manage discharges to sewers, and the responsibilities imposed on wastewater services by applicable local, regional or national legislation.

2 Normative references

ISO 24513, *Service activities relating to drinking water supply, wastewater and stormwater systems — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24513 and the following apply.

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

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

3.1

discharged material

material deposited into a toilet as a means of disposal

Note 1 to entry: Some solid materials that are discharged will be contaminated with human excreta such as faeces, urine, vomit, menses, blood, saliva and nasal or throat discharges.

Note 2 to entry: Discharges to wastewater transport systems come also from other sanitary equipment such as showers, laundries, kitchen sinks, and industrial and commercial entities.

3.2

grille

assembly of bars at an environmental exit point from a wastewater transport system to minimise release of solid materials to the environment and exclude entry

Note 1 to entry: In some parts of the world grilles are called grates.

3.3

microplastics

small pieces of plastic less than five millimetres in diameter

Note 1 to entry: Microplastics can be in the form of a sphere (microbeads), or as fibres or fragments.

[SOURCE: Adapted from Gesamp Reports and Studies No. 90 – Microplastics in the Ocean (2015), p.14.]