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English Version

**Drain and sewer systems outside buildings - Management
and control of activities - Part 4: Control of inputs from
users**

Réseaux d'évacuation et d'assainissement à l'extérieur
des bâtiments - Gestion et contrôle des activités
opérationnelles - Partie 4: Contrôle des intrants des
usagers

Entwässerungssysteme außerhalb von Gebäuden -
Management und Überwachung von Maßnahmen - Teil
4: Kontrolle von Einleitungen der Nutzer

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (FprEN 14654-4:2020) has been prepared by Technical Committee CEN/TC 165 “Wastewater Engineering”, the secretariat of which is held by DIN.

This document is currently submitted to the formal vote.

EN 14654 consists of the following parts, under the general title *Drain and sewer systems outside buildings — Management and control of activities*:

- *Part 1: General*;
- *Part 2: Rehabilitation*
- *Part 3: Drain and sewer cleaning*
- *Part 4: Control of inputs from users* (the present document)

Other parts, dealing with other activities, may be added later.

In drafting this part of EN 14654, account has been taken of other available standards, in particular EN 752, *Drain and sewer systems outside buildings*” and EN 13508 *Investigation and assessment of drain and sewer systems outside buildings*”.

1 Scope

This document establishes requirements for the management and control of activities in drain and sewer systems outside buildings and specifies requirements for development and implementation of work programmes, and the selection of techniques.

This document together with FprEN 14654-1:2020 covers the control of inputs from users

It is applicable to drain and sewer systems from the point where wastewater leaves a building, roof drainage system, or paved area, to the point where it is discharged into a wastewater treatment plant or receiving water body.

Drains and sewers below buildings are included provided that they do not form part of the drainage system of the building.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 752:2017, *Drain and sewer systems outside buildings - Sewer system management*

FprEN 14654-1:2020, *Drain and sewer systems outside buildings — Management and control of operational activities — Part 1: General requirements*

EN 16323:2014, *Glossary of wastewater engineering terms*

EN 13508-2:2011, *Investigation and assessment of drain and sewer systems outside buildings – Part 2: Visual inspection coding*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16323:2014, EN 752 and the following apply.

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

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

NOTE: Certain key definitions from EN 16323:2014 have been repeated below for clarity. The following additional terms used in this document are defined in EN 16323:2014:

- drain;
- sewer system;
- receiving water body;
- wastewater treatment plant;
- sewer

3.1

domestic wastewater

water polluted by the human life, including water discharged from kitchens, laundry rooms, lavatories, bathrooms, toilets and similar facilities

[SOURCE: EN 16323:2014, 2.1.2.3]

3.2

foul wastewater

wastewater comprising domestic wastewater and/or industrial wastewater

[SOURCE: EN 16323:2014, 2.1.2.6]

3.3

industrial wastewater

wastewater discharge resulting from any industrial or commercial activity

[SOURCE: EN 16323:2014, 2.1.2.7]

3.4

input

any solid or liquid matter that is discharged into or otherwise enters a drain or sewer system including wastewater

3.5

non-domestic wastewater

water polluted by industrial, craft or commercial activity

[SOURCE: EN 16323:2014, 2.1.2.5]

3.6

surface water

water from precipitation, which has not seeped into the ground and is discharged to the drain or sewer system directly from the ground or from exterior building surfaces

[SOURCE: EN 16323:2014, 2.1.1.3]

3.7

user

any individual, domestic or non-domestic entity discharging into a drain or sewer system

3.8

wastewater

water composed of any combination of water discharged from domestic, industrial or commercial premises, surface run-off and accidentally any sewer infiltration water

[SOURCE: EN 16323:2014, definition 2.3.10.65]

4 General

Foul drain and sewer systems are designed to receive inputs of domestic wastewater and some types of non-domestic wastewater (see EN 752:2017, 8.2).

Surface water systems are designed only to receive inputs of surface water (see EN 752:2017, 8.2).

Combined drain and sewer systems are designed to receive inputs of domestic wastewater, some types of non-domestic wastewater and a certain amount of surface water (see EN 752:2017, 8.2).

Most types of sewer systems are constructed for foul inputs consisting primarily of human waste, toilet paper, laundry water and kitchen washing up water. Increasingly foul inputs tend to include products that can be harmful to sewer systems. Examples of such generally harmful inputs are listed in Appendix B.

Inputs of non-domestic wastewater to foul and combined drain and sewer systems are often controlled by formal agreements or regulations. Inputs of other sources of foul wastewater to foul and combined drain and sewer systems are not usually subject to these formal controls.

Controls are sometimes placed on the input of polluted surface water to surface water and combined drain and sewer systems.

The input of surface water to combined drain and sewer systems is sometimes subject to control to limit the amount of surface water discharged.

National and local regulations can specify controls on the inputs to drain and sewer systems.

The methods of control available to wastewater utilities depend on national and local regulations.

The control of inputs to drains and sewers can be carried out pro-actively, to prevent problems occurring, or reactively in response to problems that have occurred. When control is required before connecting to the network, appropriate access to the incoming discharge is necessary.

This European Standard applies the process described in FprEN 14654-1:2020 for implementing activities to control of inputs in the integrated drain and sewer system management plan. This document shall be used in conjunction with FprEN 14654-1:2020.

National or local regulations or the relevant authority can:

- a) prohibit certain inputs to certain types of drain or sewer system (e.g. discharge of surface water to foul drain or sewer systems or the discharge of foul wastewater to surface water drain or sewer systems);
- b) prohibit inputs that contain certain specific substances (e.g. priority substances and certain other pollutants according to Annex II of Directive 2008/105/EC);
- c) prohibit inputs that contain certain classes of substances (e.g. substances that could block drains or sewers, substances that could damage the components of the drain or sewer system, or the treatment process);
- d) require some types of input (e.g. industrial wastewater inputs) to be regulated by a permit.

5 Integrated sewer system management planning

5.1 Introduction

An operations and maintenance plan (see EN 752:2017, 6.4.4.3), dealing with control of inputs should be in place for the drain and sewer system prior to carrying out major programmes. Activities for the control of inputs can be one aspect of the operations and maintenance plan, which is part of an integrated sewer system management plan. However, this is not always possible if works are required urgently (e.g. in response to a sewer failure).

5.2 Control of inputs from users

The aim of input control is to limit any adverse impact of inputs from users on:

- a) structural integrity of the components of the sewer system or the wastewater treatment plant;
- b) function, operation and the service life of the drain or sewer system;
- c) function, operation and the service life of any mechanical or electrical equipment;
- d) function, operation and the service life of the wastewater treatment plant;
- e) the public, by causing nuisance;
- f) the environment;
- g) health and safety for users and for operating staff (toxic risks, explosives, etc.);
- h) costs incurred by the wastewater system operator.

Criteria for determining the impacts of inputs from users on the wastewater system are given in Annex A.

6 Preparation of the input control programme

6.1 Introduction

The input control programme defines the approach to be taken to the control of each input either specifically for an individual input or generally for a defined class of inputs.

6.2 Review of the inputs control activities planning

A review should be undertaken of the control of inputs aspects of the operations and maintenance plan within the integrated sewer system management plan (see EN 752:2017, Clause 6).

6.3 Investigation

6.3.1 Introduction

The investigation shall review whether any inputs from users are adversely impacting or could adversely impact the system. Possible impacts are listed in 5.2.

The locations of inputs having an adverse impact on the drain or sewer system should be identified based on:

- 1) investigation of non-domestic wastewater inputs into the drain and sewer system;

- 2) inspection of the drain and sewer system;
- 3) analysis of the causes of performance failures (e.g. sewer blockages);
- 4) review of the available information which may include the performance of similar systems elsewhere.

6.3.2 Review of previous investigations

The review should include:

- a) drain and sewer system performance information to identify locations where there have been operational incidents (e.g. sewer blockages) that could have been caused by inputs;
- b) existing visual inspection information to identify locations where there has been damage to the components of the drain or sewer system that could have been caused by inputs;
- c) existing visual inspection information to identify locations where settled or attached deposits could be caused by inputs;
- d) any sewer cleaning programme (see FprEN 14654-3:2020) to identify whether the components of inputs are likely to have been a significant contributory cause of the accumulated deposits;
- e) wastewater treatment plant performance information to identify failures that could have been caused by inputs;
- f) pollution incident reports to identify incidents that could have been caused by inputs;
- g) industrial wastewater discharge records to identify the potential sources of damaging inputs.

6.3.3 Further investigations

Investigations should be carried out where further information is needed in order to produce the programme. These investigations can be either proactively in anticipation of an event, or reactively in response to it.

These can include:

- a) visual inspection of drains, sewers (see EN 13508-1 2003 – A1 2011) and wastewater treatment plants to identify damage or deposits;
- b) investigation at the locations of sewer blockage incidents to identify whether the components of inputs continue to be a significant contributory cause of the future blockages;
- c) investigation of the contents of blockages in drains, sewers and wastewater treatment plants to identify the nature and likely sources of the materials;
- d) investigation of the causes of any unacceptable pollution resulting from inputs from surface water outfalls;
- e) Investigation of the causes of any unacceptable pollution resulting from inputs from wastewater treatment plants;
- f) Investigation of specific locations:

- 1) Premises which could give rise to unacceptable inputs (e.g. food service establishments, fuel stations, hospitals and care homes, campsites);
 - 2) Sources of pollutants or solids that could be discharged into the systems by the users (e.g. car washing on roads or parking areas, fuel stations, construction sites);
 - 3) Low points where surface water can collect or flood prone locations where users could lift foul sewer covers to relieve it;
- g) Review of pumping times or flows to detect
- 1) the presence of surface water in a foul wastewater drain;
 - 2) unexpected flows in a surface water or combined drain.

6.4 Assessment

The assessment shall identify the locations where the performance of the system is being or could be unacceptably affected by inputs to the drain or sewer system.

When frequent problems occur, the nature of impacts may possibly be only one of the contributory factors. Other factors such as poor gradient, system defects, the fabric of the sewer etc. can cause problems. Where the consequences are severe, consideration should also be given to the feasibility of carrying out rehabilitation works to prevent or reduce the impact of inputs on the performance of the drain and sewer system.

Each input can be classified according to a grid that characterizes the nature of the problems encountered:

- Type 1: problems of industrial or commercial inputs requiring the installation of equipment and possibly permits and means of control;
- Type 2: user input problems that require information campaigns and possibly the mobilization of regulatory power;
- Type 3: Other problem not related to inputs from user.

The need for intervention can be described by an additional code:

- a) input is acceptable in its current state;
- b) input should be reduced/prevented;
- c) input should be urgently reduced/avoided in a defined time period.

6.5 Development of the programme

6.5.1 Introduction

A control of inputs programme shall:

- identify optimum frequencies for pro-active control of inputs activities;
- identify optimum frequencies for review of data;
- maintain or reduce the number of reactive control of inputs activities to an acceptable level.

6.5.2 Specification of objectives

The objectives of control of inputs activities should be established in accordance with the aims described in 5.2. These should be expressed as a performance requirement, for example:

- a) to reduce to a specified number, the numbers of blockages of drains and sewers or of mechanical equipment caused by a specific input; or
- b) to reduce the frequency of cleaning activities required to achieve specified performance; or
- c) to reduce the number of pollution incidents.

6.5.3 Developing options

6.5.3.1 Introduction

Methods of control can, depending on national or local regulations (see Clause 4) include:

- a) use of regulatory powers (where available);
- b) information campaigns to change user behaviour;
- c) other solutions.

6.5.3.2 Use of regulatory powers

Depending on national or local regulations, utilities can have regulatory powers. Other relevant organisations may also have regulatory powers. Examples are given below.

- a) To control inputs by requiring certain classes of users (usually industrial wastewater inputs but also commercial and craft activities wastewater inputs) to have a permit to discharge, which limits the type and quantities of substances that may be discharged. The approach taken can include:
 - 1) emission limit permits – specifying limits on the quantities or concentrations of specified substances that may be discharged;
 - 2) method based permits – for example specifying the method of pre-treatment that is to be undertaken prior to discharge;
 - 3) a combination of the above approaches.
- b) To prohibit the discharge of certain substances into the drain or sewer system.
- c) To regulate or supervise building work carried out or commissioned by users to ensure that where there are separate systems, new connections are made to the correct system.
- d) To require those users responsible for discharging the inputs to take certain remedial actions, for example to:
 - 1) divert foul wastewater, that has been incorrectly connected to a surface water system, to a foul drain or sewer system;
 - 2) divert surface water, that has been incorrectly connected to a foul system, to a surface water drain or sewer system;

- 3) install a separator or other treatment system to limit the impact of the input on the drain or sewer system;
- e) Use of regulatory powers to control the sale of products that can be discharged into the drain or sewer system or to require such products to be properly labelled with information about disposal. Impacts of inappropriate inputs from users given in Annex A. Information on possible criteria for assessment of generally inappropriate inputs is given in Annex B.

The method of verifying compliance with regulations should be determined and the cost of compliance monitoring should be estimated.

6.5.3.3 Influencing behaviour

As an alternative or in addition to the use of regulatory powers, or where regulatory powers are not available, consideration should be given to influencing the behaviour of users of the drain and sewer system by:

- a) providing information to inform them of good practice;
- b) providing information to inform them of the financial and functional consequences of inappropriate inputs;
- c) providing information to influence manufacturers or retailers of products about the consequences of inappropriate inputs;
- d) providing information to commercial and industrial dischargers;
- e) development of voluntary labelling schemes for generally problematic products to indicate the appropriate methods of disposal (functional requirements to assess whether such products are suitable for disposal via the sewer are given in Annex A. Information from product testing and research could increase the effectiveness of any communication. Information on the assessment of generally inappropriate inputs possible testing criteria are given Annex B.);
- f) providing information directed at all those users undertaking or commissioning construction work or installation of appliances or equipment to ensure that:
 - 1) connections are made to the correct system;
 - 2) arrangements are made to ensure that large quantities of sand and gravel are not conveyed into drains and sewers;
 - 3) access covers should not be located in low points where flooding is likely to occur and should not be opened to drain flooding surface water.

These activities can be generally directed to all users of the drain or sewer system across the whole catchment area or they may be targeted at locations where specific problems have been identified or in parts of the catchment area where there are concentrations of problems.

Advice should be sought from communications specialists to ensure that the information campaigns use the most effective forms of communications to the target groups.

6.5.3.4 Other solutions

Other forms of solutions can include works undertaken under the control of the system operator to:

- a) divert foul wastewater, that has been incorrectly connected to a surface water system, to a foul drain or sewer system;

- b) divert surface water, that has been incorrectly connected to a foul system, to a surface water drain or sewer system;
- c) install a separator (see EN 16933) or pre-treatment system.

These works can be the responsibility of the user.

6.5.4 Assess feasibility of solutions

The solutions developed in 6.5.3 shall be assessed in accordance with FprEN 14654-1:2020. The following factors should also be considered:

- a) the practicality of using the regulatory power;
- b) the probable effectiveness of information campaigns (pilot studies can be used to estimate the effect) and the time over which they are likely to be effective before they need to be repeated;
- c) the practicality of ensuring effective quality control of all relevant construction and installation work carried out or commissioned by the user.

6.5.5 Select optimum solutions

In selecting the optimum solution or combination of solutions in accordance with FprEN 14654-1:2020 the costs considered should include:

- a) cost of the implementation;
- b) cost of on-going monitoring and enforcement activity;
- c) on-going costs to maintain the effectiveness;

The relative effectiveness of each option should also be taken into account.

6.5.6 Producing the programme

The programme should specify:

- a) information required by FprEN 14654-1:2020, 6.5.6;
- b) criteria, if any, to be used to determine whether the inputs will be subject to specific permitting requirements or to general regulations;
- c) nature of the inputs to be prohibited, including consumer products;
- d) investigations of possible wrong connections.

7 Preparation of the project specification

7.1 Introduction

An inputs control specification defines in detail the method of control for each input either specifically for an individual input or generally for a defined class of inputs. The method of control should be in accordance with the approach defined in the inputs control programme.

7.2 Review of the project description and project objectives

The review should include an assessment as to whether there have been any changes to the inputs identified during the preparation of the programme.

7.3 Investigation

Further investigations can be necessary to produce the project specification. These can include investigations:

- a) of the quality and quantity of an existing discharge;
- b) of the content of an existing discharge (e.g. wipes, fats oils and grease and cotton buds);
- c) of the system downstream of an existing or proposed discharge;
- d) to identify the locations of possible excessive flows, pollutants or solids introduced by the users;
- e) to identify the best ways to communicate with users when providing information.

Where the discharge is the discharge of a consumer product to the sewer system, the investigation should be based on testing criteria specified in the programme (see 6.5). This may include review of previous tests results or commissioning of new tests.

7.4 Assessment

Based on the results of the investigations carried out, and in accordance with the criteria specified in the programme (see 6.5) and with the assessment in the programme (see 6.4), the assessment shall establish the impact, or likely impact of the discharge on the system.

This assessment can include:

- a) an assessment of whether regulations require the discharge to have a specific permit or is subject to general regulations;
- b) for inputs requiring a specific permit, the following assessment of whether a permit should be granted and of the residual impacts that should be mitigated by emission limits or pre-treatment requirements;
- c) for inputs subject to general regulations an assessment of whether the discharge is permissible or whether the discharge could be permissible if pre-treatment were to be applied;
- d) an assessment to establish whether a prohibited input or a consumer product would have unacceptable impacts;
- e) an assessment of whether problems of excessive flows, pollutants and solids introduced by users would have unacceptable impacts;
- f) an assessment of whether problems of wrong connections would have unacceptable impacts;
- g) for areas where local proactive information campaigns are to be carried out, an assessment of:
 - 1) types of premises and the nature of inputs to be targeted;
 - 2) extent of information that could be necessary to advise users on appropriate methods of disposal of consumer products (in which case further investigation should be carried out to plan such a campaign (see 7.3 e);
 - 3) effectiveness of different ways to communicate the information.

7.5 Drafting the project specification

7.5.1 Introduction

In accordance with FprEN 14654-1:2020, 7.5, the drafting of the project specification involves the following stages: prepare potential solutions, assess feasibility of solutions, select optimal solution, detailed design of optimal solution.

7.5.2 Prepare potential solutions

For the class of solution specified in the inputs control programme more detailed options should be prepared including:

- a) for discharges subject to specific permitting requirements: the emission limits, the pre-treatment and the monitoring regime that should be applied;
- b) for discharges subject to general regulations: the pre-treatment (if any) and the nature of proactive monitoring regime (if any) that should be applied;
- c) where the discharge relates to a consumer product:
 - 1) how to improve user awareness of the consequences of their actions;
 - 2) how the consumer product should be labelled to advise users on appropriate means of disposal;
 - 3) whether the sale of the product is permissible in accordance with national or local regulations;
 - 4) whether it is possible to influence the retailers or suppliers to require improvement of a product or provide better guidance on its use or disposal;
 - 5) whether it is possible to influence the manufacturer to improve a product or provide better guidance on its use or disposal;
- d) for unacceptable problems due to excessive flows, pollutants, solids and wrong connections:
 - 1) ensuring effective quality control of work by users on private drain as and sewers;
 - 2) obligation for the user to initiate corrective actions;
 - 3) if hydraulic infrastructure is involved, undertaking works to remedy or help users to undertake palliative actions;
- e) for those areas where local pro-active or reactive activities to influence users are to be carried out:
 - 1) the types of premises and nature of inputs to be targeted pro-actively;
 - 2) the criteria for starting activities to influence behaviour;
 - 3) how to sustain the message over a period;
- f) for those inputs where the users of the drain and sewer system are to be required to take remedial action:
 - 1) liaising with the relevant authority where the system operator does not have appropriate powers;

- 2) the legal basis for requiring the user to take action;
- 3) specification of the type action to be taken;
- 4) detailed guidance on future use of such powers if the need arises.

7.5.3 Assess feasibility of solutions

Depending on the class of solution the following criteria should be used, where relevant, to establish the technical feasibility of each option:

- a) authority of the wastewater system operator;
- b) financial means of the wastewater system operator and of the users;
- c) transparency and financial means of users subject to permits or general regulations;
- d) behaviour and collaboration of users;
- e) topography and hydrology of the site (often at the origin of excessive flows and wrong connections);
- f) technical capability and capacity of the operator;
- g) existence of and appropriateness of using regulatory power.

The feasibility of each option can change over time.

7.5.4 Select optimal solution

Where more than one option is feasible, the optimal solution or combination of solutions shall be selected in accordance with FprEN 14654-1:2020, 7.5.4.

7.5.5 Detailed design of optimal solution

After selecting the optimal solution, the final design is necessary. Depending on the case, this final design can be realized partly before and partly during the preparation of the project.

The final design of the solutions can include:

- a) finalising application criteria for specific permits and general regulations;
- b) for permitting solutions:
 - 1) detailed guidance including model permit clauses and action to be taken on non-compliance;
 - 2) drafting permits for each proposed permitted discharge;
 - 3) list of existing inputs which should be subject to a new or varied permit;
- c) for those inputs to be subject to general regulations:
 - 1) detailed guidance on the application of the regulations;
 - 2) copy of any existing regulations to be applied;
 - 3) draft of any new regulations (if any);

- d) review of list of prohibited inputs;
- e) for consumer products:
 - 1) knowledge of products that can be discharged;
 - 2) knowledge of products properly labelled with information about disposal;
 - 3) review of previous test results or commissioning of new tests;
 - 4) contacting manufacturers and/or retailers of consumer products to improve composition, production and labelling of these products
- f) for unacceptable problems due to excessive flows, pollutants, solids and wrong connections:
 - 1) organization of quality control of activities by users;
 - 2) drafting of legal notices requiring the users to take remedial action;
 - 3) if hydraulic infrastructure is involved, planning works to remedy or planning help to the user to engage palliative actions;
- g) for activities to influence users:
 - 1) whether the premises are to be targeted pro-actively or reactively and the criteria to be used;
 - 2) preparation of detailed communication materials (e.g. leaflets, videos, press and social media campaigns etc.);
 - 3) preparation of a schedule of communications activities to deliver the material through a variety of routes;
- h) for those inputs where the users to be required or requested to take remedial action:
 - 1) formalizing agreement with relevant authority (if applicable);
 - 2) the name of the relevant authority that will serve notice (if applicable);
 - 3) draft legal notice requiring the user to take action (if applicable);
 - 4) guidance on the application of such procedure in future where problems arise;
 - 5) criteria for implementation of reactive remedial activities;
- i) for other solutions:
 - 1) detailed design of each proposed solution;
- j) detailed communications plan:
 - 1) for implementation of the existing or new regulations;
 - 2) to advise users on appropriate methods of disposal of consumer products;
 - 3) for pro-active activities;

- 4) for reactive activities;
- k) drafting a monitoring plan:
 - 1) for each permitted discharge;
 - 2) to measure compliance to general regulations;
 - 3) to measure the compliance and the impact of consumer products;
 - 4) to measure the effectiveness of the campaign in raising awareness of the issues and change behaviour;
 - 5) to measure compliance of remedial actions.

7.5.6 Prepare product specification

The product specification should give the information required in 7.5.5, where appropriate.

Depending on the case, this information could have been developed partially or completely in step 7.5.5.

7.5.7 Performance indicators

Examples of performance indicators to measure the effectiveness of the programme include:

- a) extent to which users have complied with new permit requirements or other regulatory activities;
- b) extent to which users have understood the communications.
- c) percentage reduction in the number of drain, pump or sewer blockages;
- d) improvement in the quality of receiving water bodies;
- e) reduction in screenings or silt sent to landfill;
- f) reduction in sewer flooding incidents;
- g) reduction in flows to treatment.

8 Implementation of projects

Implementation should be in accordance with FprEN 14654-1:2020, Clause 8.

9 Measurement of conformity

9.1 Measurement methods

Methods to measure the result of control of inputs from users activity can include:

- a) review of numbers of blockages of drains and sewers or of mechanical equipment caused by inputs;
- b) review of the frequencies of cleaning activities required to achieve specified performance;
- c) review of number of pollution incidents;
- d) review of pumping times;

- e) results of monitoring plans;
- f) user satisfaction survey;
- g) overall cost balance.

9.2 Non-conformities

When non-conformities are found, these should be dealt with in accordance with FprEN 14654-1:2020, 9.2.

9.3 Post project appraisal

Post project appraisal should be carried out in accordance with FprEN 14654-1:2020, 9.3, using the performance indicators identified in 7.5.7.

10 Review of plan and programme

The plan and the programme should be reviewed periodically and if the performance of the system as measured by the performance indicators identified in 7.5.7.2 show unacceptable performance then the plan and the programme should be reviewed.

Annex A (normative)

Impacts of inappropriate inputs from users

A.1 Introduction

Inappropriate inputs can have adverse impacts on the system. Possible impacts are listed in 5.2.

Inputs can have both positive and adverse impacts. Sometimes the impacts are the same on all parts of the wastewater system. However in some cases an input can affect different parts of the wastewater system in different ways. For example, an input could have a negative impact on the function of the drain and sewer system, but a positive impact on the sludge treatment process.

A.2 Structural integrity of the components of the sewer system or the wastewater treatment plant

A.2.1 Introduction

For an input to be compatible with the drain or sewer system it shall not contain any substances in an amount which, either on their own, or when combined with substances within the wastewater, could adversely affect the structural integrity of the components of the drain or sewer system or the wastewater treatment plant.

The damage can include:

- chemical attack or corrosion;
- mechanical damage.

A.2.2 Chemical attack or corrosion

Substances can cause chemical attack or corrosion either directly or indirectly in combination with wastewater. They can attack the pipe material, the materials, joints or fittings, the materials in ancillary structures, or mechanical and electrical equipment.

Examples of such substances include:

- a) acids;
- b) alkalis;
- c) salts;
- d) solvents.

A.2.3 Mechanical damage

Substances can cause mechanical damage due to abrasion or excessive temperature. They can attack the pipe material, the materials, joints or fittings, the materials in tanks or other ancillary structure, or mechanical and electrical equipment.

A.3 Function of the drain and sewer system

A.3.1 Introduction

The mechanisms by which a substance can adversely affect the function of the drain and sewer system include:

- a) accumulation of attached deposits in drains, sewers or ancillary equipment (e.g. pumps);
- b) accumulation of settled deposits in drains, sewers or ancillary equipment (e.g. pumps);
- c) other obstacles in drains, sewers or ancillary equipment (e.g. pumps).

A.3.2 Accumulation of attached deposits

For an input to be compatible with the drain and sewer system it shall not, either directly or indirectly, lead to:

- the accumulation of attached deposits (see EN 13508-2:2011, 8.3, Code BBB) on the surface of a pipe, channel or associated equipment (e.g. a pump) so that the capacity of the drain or sewer system is unacceptably reduced, or
- an unacceptable increase of blockages occurring, or an unacceptable increase in the risk of blockages.

Attached deposits can include:

- a) encrustation with minerals (see EN 13508-2:2011, 8.3, Code BBB A) e.g. concrete;
- b) accumulation of fat or grease (see EN 13508-2:2011, 8.3, Code BBB B) or paint residue;
- c) fouling with paper, textiles, plastics or other materials (see EN 13508-2:2011, 8.3, Code BBB C).

The extent of the accumulation can be increased when, after the substance has initially adhered to the components of the sewer system, other substances or more of the same substance adhere to that.

The possibility that the input could react with other components of the wastewater to form another substance that will form an attached deposit shall be considered.

In evaluating the likelihood that an attached deposit will block a pump or other equipment (e.g. a valve), the following shall be considered:

- 1) the mechanical properties of the attached deposit;
- 2) the likelihood that any textiles or plastics items will form strings or ropes in pumps or other rotating machinery and cause a blockage;
- 3) the likelihood of accumulation of attached solids on screens.

A.3.3 Accumulation of settled deposits

Drain and sewer systems are designed to convey those solids that are expected in wastewater. Inputs are not compatible where they would lead to the accumulation of settled deposits (see EN 13508-2:2011, 8.3, Code BBC) in the drain or sewer system. In properly designed systems the accumulation of settled deposits can occur where the particle size is larger, the density of the substance is higher or the concentration of the solids in the wastewater is greater than is typically found in

wastewater. Settled deposits can also cause problems where they accrete to form a solid mass (e.g. concrete residues).

The possibility that the input could react with other components of the wastewater to form another substance that will form a settled deposit shall be considered.

A.3.4 Other obstacles

For an input to be compatible with the drain and sewer system it shall not contain anything that is either so large or will swell when in contact with wastewater so that it will become so large that they are likely to form an obstacle (see EN 13508-2:2011, 8.3, Code BBE) to the flow in a drain, sewer, channel or other equipment.

These can include:

- a) large objects in the input;
- b) objects that enlarge when they come into contact with wastewater;
- c) inputs that could react with other components of the wastewater to form another substance.

A.4 Function of mechanical equipment

For an input to be compatible with the drain or sewer system or the wastewater treatment plant it shall not impede the function of mechanical and electrical equipment including by:

- a) blocking screens (e.g. by forming a matt of material on the screen, from material hanging on bars or wrapping round bars);
- b) blocking pumps (e.g. by forming a ball that blocks the pump or by forming a cord due to the rotation of the impeller);
- c) pass through macerators without being cut up;
- d) reduce the efficiency of pumps (e.g. by fouling impellers or by abrasion of impellers);
- e) damage to or impediment to the function of level sensors;
- f) significantly increase the risk of foaming around mechanical and electrical equipment.

A.5 Nuisance

A.5.1 Attract vermin

For an input to be compatible with the drain or sewer system it shall not create conditions that would result in nuisance from vermin in the wastewater system for example by:

- a) increasing the food available to them;
- b) increasing the availability of habitats that encourage their presence.

A.5.2 Odour nuisance

For an input to be compatible with the drain or sewer system it shall not cause an odour nuisance due to the input of odorous substances or substances that would react with the wastewater to create excessive quantities of odorous substances.

A.6 Function of the wastewater treatment plant

A.6.1 Introduction

The criteria listed in 5.2 apply equally to elements of the wastewater treatment plant. In addition the following can apply:

- a) substances that cannot be treated;
- b) substances that disrupt or interfere with wastewater treatment processes;
- c) substances that impede the flow in the wastewater treatment plant;
- d) hydraulically overload the wastewater treatment plant.

A.6.2 Substances that cannot be treated

Wastewater treatment plants are designed to treat the materials expected in wastewater. Inputs are not compatible where they cannot be treated by a wastewater treatment plant designed in accordance with EN 12255. These include:

- a) for a substance to be compatible with the wastewater treatment plant it shall be a substance that is either
 - 1) a mineral solid that can be removed in the grit separator and disposed of as inert inorganic waste; or
 - 2) bio-degradable organic waste that can be treated by conventional wastewater treatment processes.
- b) for a substance to be compatible with the wastewater treatment plant it shall be a solid that can be settled out at some stage in the wastewater treatment plant and will therefore not pass directly into the treated effluent;
- c) shall not accumulate in a septic tank at a rate that will reduce its effectiveness in preventing sediment being discharged from the septic tank.

The possibility that the input could significantly increase the mass of solids removed at the inlet screens that need to be separately disposed of shall be considered.

A.6.3 Substances that disrupt or interfere with wastewater treatment processes

For an input to be compatible with a wastewater treatment plant it shall not interfere with the function of a wastewater treatment process. Substances that are incompatible include:

- a) substances that impair the growth of treatment microorganisms;
- b) substances that promote the growth of competing or compromising microorganisms.

A.6.4 Substances that impede the flow in the wastewater treatment plant

For an input to be compatible with a wastewater treatment plant it shall not impede the flow in a wastewater treatment plant. By, for example:

- a) blocking of pipes or nozzles;
- b) obstructing filter media;

- c) blockage or malfunction of mechanical equipment.

A.6.5 Hydraulically overload the wastewater treatment plant

For an input to be compatible with a wastewater treatment plant it shall not hydraulically overload the wastewater treatment plant.

A.7 Environment

A.7.1 General

The Water Framework Directive (2000/60/EC) and the Industrial Emissions Directive (2010/75/EU) and national or local regulations can place restrictions on the input of certain substances into drain or sewer systems.

A.7.2 Impact on the quality of receiving waters

For an input to be acceptable it shall not lead to unacceptable environmental impact either where it is:

- a) discharged to a foul or combined drain or sewer system, but is:
 - 1) either untreated or modified by the treatment process; or
 - 2) discharged through a combined sewer overflow;
- b) discharged to a surface water drain or system (e.g. due to a misconnection or spillages on paved surfaces).

A.7.3 Impact on the quality of sludge

For an input to be acceptable it shall not lead to unacceptable residues in sludge including:

- a) chemical residues;
- b) non-biodegradable contamination.

A.8 Health and safety

For an input to be acceptable it shall not lead to unacceptable risks to the health or safety of the public or operator personnel. These include risks from:

- a) explosion;
 - 1) direct input of explosive materials or materials which can produce explosive vapours;
 - 2) input of materials which could react with wastewater to produce explosive vapours (e.g. calcium carbide).
- b) toxic materials;
- c) biological hazards (e.g. wastes containing particularly high risk infectious materials);
- d) sharp materials that could injure operator personnel.

Annex B (informative) Criteria for assessment of generally inappropriate inputs

B.1 Assessment criteria

The key criteria required for assessment of any input that could affect the ability of wastewater systems to perform their intended purpose are given in Table B1

Table B.1 — Examples of possible assessment criteria

Harmful impact	Ref.	Description
Abrasion	Ab	Cause mechanical damage through abrasion
Adhesion	Ad	Mechanical or cohesion
Attract vermin	Ve	Provide food or harbourage for vermin
Biodegradability	Bi	Biodegradability in treatment or the environment
Bulk	Bu	Size (too large)
Buoyancy	By	In typical sewer flow (float or settle)
Snagging	Sn	Resilience when caught on imperfection
Cording	Cd	Fibres that can twist to form a cord
Corrosivity	Co	Corrosion or other adverse effect on the material properties
Disintegration	Di	Rate and extent of disintegration in flow
Foaming	Fo	Causes foam to form on the wastewater
Gel or solid	Ge	Gel or solid formation when mixed with wastewater
Settleability	Se	A material shall not settle prematurely in a drain or sewer, but shall settle out in the appropriate stage of a wastewater treatment plant.
Swelling resistance	Sw	Items that swell may become too large
Temperature	Te	Of discharge and result of reaction with wastewater
Toxicity	To	Environmental toxicity or effect on treatment

B.2 Typical products of concern

National or local regulations or the relevant authority can restrict the disposal of materials to the drain and sewer system. Such materials and any other products not explicitly permitted to be discharged (See note 1 below) should be disposed of into appropriate waste streams such as landfill etc.

However it is observed in practice that people sometimes discharge a variety of items because of mis-information, convenience, in error or for other reasons, often in ignorance of the problems they will create. Table B2 lists examples of the types of product that have been observed in wastewater systems and lists the relevant criteria that normally make such products unacceptable to wastewater operators.

Table B.2 — Examples of generally inappropriate inputs and the harmful impacts they can cause

Generally inappropriate inputs	Relevant harmful impacts (see Table B.1)
Bedpan liner, bottle etc.	Bi, Bu, Di, Sn
Cat litter	Ad, By, Di, Se, Sw
Concrete/plaster washings	Ab, Ad, Bu, Se
Condoms	Bi, By, Di
Cotton buds	Bi, By, Di
Disposable nappies	Ad, Bi, By, Cd, Di, Ge, Se, Sn, Sw
Disposable razors	Ab, Bi, By, Co, Di
Food waste (fat)	Ad, Se, Ve
Food waste (other)	Bi, Di, Ve
Gloves	Bi, By, Di
Ostomy bags	Ad, Bi, By, Di, Ge, Sn, Se, Sw
Personal hygiene wipes	Ad, Bi, By, Cd, Di, Sn, Se
Sanitary towels	Ad, Sn, Di, Bi, Se, By, Sw, Cd
Tampons	Sn, Di, Bi, Se, By, Sw, Cd
Tampon insertion tubes	Bi, Di, Se
Toilet brushes	Bi, Bu, By, Di
Toilet cleaning wipes	Ad, Bi, By, Cd, Di, Se, Sn,
Toilet fresheners	Bi, Di, Sn
Toilet roll cores	Bi, Di, Sn
Toilet tissue (moist)	Bi, Di, Sn
Disposable underwear	Ad, Bi, By, Cd, Di, Se, Sn
Disposable WC seat covers	Ad, Bi, Bu, By, Cd, Di, Se, Sn

Some products such as ostomy bags, moist toilet tissue and personal hygiene wipes may be designed to be suitable for discharging into sewer systems. Where these items have been subject to national testing requirements, embracing the relevant criteria with appropriate agreed threshold values, they may have been granted explicit consents in certain jurisdictions.

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