

## Sanitary Components

# Technical document 076-04

Gullies and gutters with water seal

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## MODIFICATION HISTORY

<b>Revision no.</b>	<b>Date</b>	<b>Modifications</b>
11	18/03/2021	<p>Update of the 2015 version of Standard NF EN 1253-1.</p> <p>Integration of trapped floor gullies with a depth of water seal of less than 50 mm and editorial update of the whole document.</p> <p>Editorial update according to the structure in force following the creation of the Technical management appendix to the NF076 reference system, rev. 12.</p>

## Table des matières

<b>PART 1. PURPOSE</b> .....	<b>6</b>
<b>PART 2. COMPLEMENTARY SPECIFICATIONS OF STANDARD NF EN 1253-1</b> .....	<b>7</b>
<b>1 SCOPE</b> .....	<b>8</b>
<b>2 NORMATIVE REFERENCES</b> .....	<b>8</b>
<b>3 TERMS AND DEFINITIONS</b> .....	<b>9</b>
3.1 Trapped floor gully .....	9
<b>4 REQUIREMENTS</b> .....	<b>10</b>
4.1 Design and construction .....	10
4.1.1 General.....	10
a) Connection of the product to the pipe.....	10
b) Stability of the grating: gutters.....	10
4.1.2 Appearance (not modified) .....	10
4.1.3 Apertures in gratings (not modified) .....	10
4.1.4 Side inlets (not modified) .....	10
4.1.5 Depth of water seal .....	10
4.1.6 Resistance of water seal to pressure (not modified).....	11
4.2 Blockage prevention (not modified).....	11
4.3 Places of installation .....	11
4.3.1 General (not modified).....	12
4.3.2 Exceptions (not modified) .....	12
4.4 Materials .....	12
a) Choice of materials .....	12
b) Characteristics of the materials.....	12
c) Corrosion resistance tests .....	12
4.5 Thermal behaviour of floor gullies (not modified) .....	13
4.6 Tightness (not modified) .....	13
4.7 Mechanical strength.....	13
4.7.1 Loading strength .....	13
a) Gullies.....	13
b) Gutters.....	14
<b>5 TEST METHODS</b> .....	<b>15</b>
5.1 Dimensions of apertures in gratings.....	15
5.2 Position of side water inlets .....	15
5.3 Water seal.....	16
5.3.1 Depth of water seal .....	16
5.3.2 Resistance of water seal to pressure .....	17
5.4 Blockage prevention (not modified).....	17
5.5 Thermal behaviour (not modified) .....	17
5.6 Loading test (not modified) .....	17
5.7 Mechanical strength (not modified) .....	17
5.8 Tightness .....	17

5.8.1	Odour-tightness (not modified) .....	17
5.8.2	Watertightness of gully bodies and extensions.....	18
5.8.3	Floor gullies for use with sheet floor coverings, membranes or liquid applied membranes (not modified) .....	20
5.9	Flow rates .....	20
5.9.1	Water through the grating (not modified).....	21
5.9.2	Water through the grating and side inlets (not modified) .....	21
5.9.3	Test arrangement (not modified).....	21
5.10	Clogging test for gullies and gutters with water seal < 50 mm (added) .....	21
5.10.1	General.....	21
5.10.2	Test solution.....	21
5.10.3	Test apparatus .....	23
5.10.4	Procedure .....	24
5.10.5	Parameter of the test method above .....	24
5.10.6	Final check.....	24
6	<b>ALLOCATION AND SEQUENCE OF TESTS (NOT MODIFIED) -----</b>	<b>25</b>
7	<b>MARKING -----</b>	<b>25</b>
a)	Presentation at delivery -----	25
b)	Technical documents -----	25

## PART 1. PURPOSE

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The purpose of this document is to define the technical specifications and the test methods applicable to gullies with hydraulic blockage, regardless of the water seal depth.

It is based on Standard NF EN 1253, Part 1 and uses the same numbering system.

Note: As regards floor gullies with a depth of water seal  $\geq 50$  mm, it shall be specified that they comply with Standard EN 1253-1.

## PART 2. COMPLEMENTARY SPECIFICATIONS OF STANDARD NF EN 1253-1

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The following table contains the list of articles in Standard NF EN 1253-1 that have been modified and/or extended. Any article that is not listed must be included in full in accordance with Standard NF EN 1253 Part 1.

### List of the articles concerned:

Specifications article of Standard NF EN 1253-1	Requirements
1	Scope
2	Normative references
3	Terms and definitions
3.1	Trapped floor gully
4.1.1	General
4.1.5	Depth of water seal
4.3	Places of installation
4.4	Materials
4.7.1	Loading strength
5.1	Dimensions of apertures in the gratings
5.2	Position of side inlets
5.3.1	Water seal  Depth of water seal
5.3.2	Resistance of water seal to pressure
5.8.2	Watertightness for bodies and extensions
5.9	Flow rates
5.10	Addition of a clogging test
7	Marking

## 1 Scope

This document is applicable to gullies and gutters, regardless of the water seal depth, for use in drainage systems inside buildings, except for balconies.

This document does not apply to gullies and gutters with mechanical or mixed seal.

This document does not concern drainage devices associated with sanitary fixtures (drain outlet, gullies installed on shower pans, bathtubs, etc.). These products are covered by Standard NF EN 274 and also by Mark NF077 – Sanitary Tapware.

The product families covered until now are gullies and gutters Class K3 and Class L15.

Class K3 gullies are designed for zones without vehicle traffic, such as kitchens and wet rooms in dwelling units, retirement homes, hotels, schools, swimming pools, public baths.

Class L15 gullies are designed for zones carrying light vehicle traffic (weight less than 1500 kg), to the exclusion of lift trucks, in commercial premises.

Note: As regards areas with light vehicular traffic, and as the installation space needed is not problematic, the use of floor gullies with a depth of water seal  $\geq 50$  mm is highly recommended.

The characteristics verified include:

- Characteristics of materials
- Dimensional characteristics: dimensions of apertures in gratings, prevention of blockage, water seal
- Leak tightness characteristics: for odours and water
- Mechanical characteristics: resistance to loads and mechanical strength of the clamping ring / flange and membrane
- Hydraulic characteristics: flow through the grating and the side water inlets.

## 2 Normative references

NF EN 1253-1: Gullies for buildings - Part 1: Trapped floor gullies with a depth water seal of at least 50 mm.

NF EN ISO 9227: Corrosion tests in artificial atmospheres – Salt spray tests.

NF EN ISO 4628-3: Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting.

NF EN 10088-1: Stainless steel - Part 1: List of stainless steels.

NF EN 10088-2: Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strips of corrosion resisting steels for general purposes.

NF EN 10088-3: Stainless steels – Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes.

NF DTU 60.1 P1.1.2: Building works - Sanitary plumbing in residential buildings - drainage systems - Standard technical specifications.



### 3 Terms and definitions

This section gives the definition of a gully and a non-exhaustive list of the components of a gully.

A gully fitted with a rectangular grating is commonly called a “gutter”. This grating can be installed horizontally at floor level or vertically at the partition wall.

Metallic gullies and gutters to be built into the structure shall be earthed and this shall be clearly indicated in the installation instructions.

All the elements constituting the gully will be referred to as ‘gully components’. For the definition of these components, refer to Article 3 of Standard NF EN 1253-1.

The manufacturer will need to indicate the elements constituting its product (see Table 1).

**Table 1: List of gully components**

<b>Gully components</b>	<b>Basic elements constituting the gully (to be filled in by the manufacturer)</b>
Grating	<input checked="" type="checkbox"/> number of gratings: ... reference of gratings: ...
frame	<input type="checkbox"/>
sediment bucket	<input type="checkbox"/>
extension	<input checked="" type="checkbox"/>
clamp	<input type="checkbox"/>
counter-flange	<input type="checkbox"/>
sealing flange	<input type="checkbox"/>
connecting flange	<input type="checkbox"/>
immersion tube	<input checked="" type="checkbox"/>
gully body	<input checked="" type="checkbox"/>
membrane	<input type="checkbox"/>
other elements to be defined, if any	<input type="checkbox"/>

#### 3.1 Trapped floor gully

This article is supplemented with the following sentence:

Floor gullies whose depth of water seal is < 50 mm cannot be fitted with a side water inlet.

## 4 Requirements

### 4.1 Design and construction

#### 4.1.1 General

This article is supplemented by the following paragraphs:

*a) Connection of the product to the pipe*

This article specifies methods of connecting the gully to the drainpipe.

- Glued and welded connections are acceptable without any special additional tests.
- Other connection methods (screw, spigot) are acceptable provided that a special study is carried out followed by appropriate tests that will be defined **in a first admission application**.

Moreover:

- The connection shall be complete and shall be adapted to the pipe.
- The manufacturer shall clearly show the method of connecting its product on the packaging and how to install it in its installation instructions.

The NF DTUs specify or impose connection methods (Parts P1-1 of NF DTU 60.2, NF DTU 60.32, NF DTU 60.33, NF DTU 60.5 and NF DTU 60.1 P1-1-2 § 5.5.2.2).

*b) Stability of the grating: gutters*

The gutter shall be designed so that the grating remains stable in its frame/grating support.

Gutter gratings may be held in position in the frame or grating support by:

- a locking device;
- a sufficient mass per unit area;
- a special design element (system of shims, etc.).

The stability of the grating is verified as follows:

Put a 50 kg, 25 mm long block with the same width as the grating 3 cm from the end of the grating and check that the grating does not lift by more than 1 cm.

#### 4.1.2 Appearance (not modified)

#### 4.1.3 Apertures in gratings (not modified)

#### 4.1.4 Side inlets (not modified)

#### 4.1.5 Depth of water seal

The depth of water seal H can be less than 50 mm if the gully satisfies the additional clogging test defined in paragraph 5.10 which has been added.

#### 4.1.6 Resistance of water seal to pressure (not modified)

### 4.2 Blockage prevention (not modified)

### 4.3 Places of installation

This section gives guidelines for the classification of gullies, depending on:

- their installation locations: kitchen, wet room, loggia, terrace or flat roof, etc.
- their type: gully or gutter for ready-to-tile pan, for tiled floor, for flexible plastic floor covering
- their characteristics: with/without side water inlets, with/without membrane fitted/not fitted at the factory.

Tests to be done on gullies or gutters depend on their type and their characteristics. Applicants will indicate the type and the characteristics of the product that they are presenting as well as its installation location (see Table 2).

**Table 2: Information used for a product designation**

Product	Gully type	Characteristics	Usage	Usage location
<input type="checkbox"/> gully  <input type="checkbox"/> gutter	<input type="checkbox"/> for tiled floor <input type="checkbox"/> for flexible plastic floor covering <input type="checkbox"/> for ready-to-tile pan	<input type="checkbox"/> Depth of water seal $\geq$ 50 mm <input type="checkbox"/> Depth of water seal $<$ 50 mm <input type="checkbox"/> without side water inlets <input type="checkbox"/> with side water inlets <input type="checkbox"/> without membrane <input type="checkbox"/> with membrane	<input type="checkbox"/> individual <input type="checkbox"/> shared	<input type="checkbox"/> wet room <input type="checkbox"/> kitchen <input type="checkbox"/> other
<input type="checkbox"/> with vertical grating <input type="checkbox"/> with horizontal grating		<input type="checkbox"/> not fitted at factory <input type="checkbox"/> fitted at factory		

Note: If the gully is used with a membrane (fitted at the factory or not), the manufacturer will need to specify how the flange is to be connected to the membrane and the body of the gully (see Article 5.8.3 of Standard NF EN 1253-1).

### 4.3.1 General (not modified)

### 4.3.2 Exceptions (not modified)

## 4.4 Materials

This article is supplemented by the following paragraphs:

#### a) Choice of materials

The choice of materials is left to the manufacturer's initiative provided that they comply with the requirements in § b) below.

#### b) Characteristics of the materials

All the materials shall resist flows of domestic wastewater up to a temperature of 95°C during a number of cycles pre-defined depending on the location of use (see Table 3).

**Table 3: Resistance class to thermal shocks as a function of the usage location**

Thermal resistance class	Purpose / Usage location	Resistance of materials at 93°C
Th 1500 (class A according to NF EN1253-1)	<ul style="list-style-type: none"> <li>Gullies for collective bathrooms</li> <li>Gullies for kitchens</li> </ul>	1500 cycles (100 h) at 93 ± 2°C
Th 360 (class B according to NF EN1253-1)	<ul style="list-style-type: none"> <li>Gullies for single-person bathrooms (private house)</li> <li>Gullies for single-person bathrooms (block of flats)</li> </ul>	360 cycles (24 h) at 93 ± 2°C

Note: All-metal gullies and gutters are deemed to comply with this requirement.

All metallic elements in contact with water must resist corrosion (see § c) below).

Only steels mentioned in Standards NF EN 10088-1, NF EN 10088-2 and NF EN 10088-3 shall be used, to obtain resistance to corrosion:

- austenitic steels: all types
- ferritic and martensitic steels: X 8CrTi 17 or X 8CrNb 17 exclusively.

#### c) Corrosion resistance tests

Perform the neutral salt spray test under the conditions specified in Standard ISO 9227.

#### **Procedure**

- Spray the partially disassembled gully with its accessories for 200 ±2 h, including a pause lasting (48 ±1) h halfway through the treatment, in other words after the first 100 hours ±1 h of spraying.
- Continue heating the tank during the pause in spraying.

Throughout the tests, do not open the tank except to check and maintain the conditions, with a maximum spray time pause of 30 minutes per day. Never stop heating and do not handle, wash or verify the samples being tested.

- Rinse the test specimens with water to remove all salt residue after treatment and before visual inspection. When the test is completed, make a visual examination of the surfaces with the naked eye from a distance of 300 mm without a magnifying glass, with indirect non-dazzling light at an intensity of between 700 Lux and 1,000 Lux

#### **Required characteristics**

Parts shall be examined and evaluated according to Standard NF EN ISO 4628-3 for characterisation of rusting. The degree of surface rusting shall be  $\leq$  Ri 2.

### 4.5 Thermal behaviour of floor gullies (not modified)

### 4.6 Tightness (not modified)

### 4.7 Mechanical strength

#### 4.7.1 Loading strength

This article is supplemented by the following paragraphs:

##### *a) Gullies*

This paragraph specifies the parts of the gully to be tested and defines the test conditions for floor gullies.

#### **Procedure**

The test may be done on the complete floor gully (body+upstand and/or grating support+grating), or on the upstand and/or grating support+grating, placed in an adapted test support, placed flat on the test machine plate.

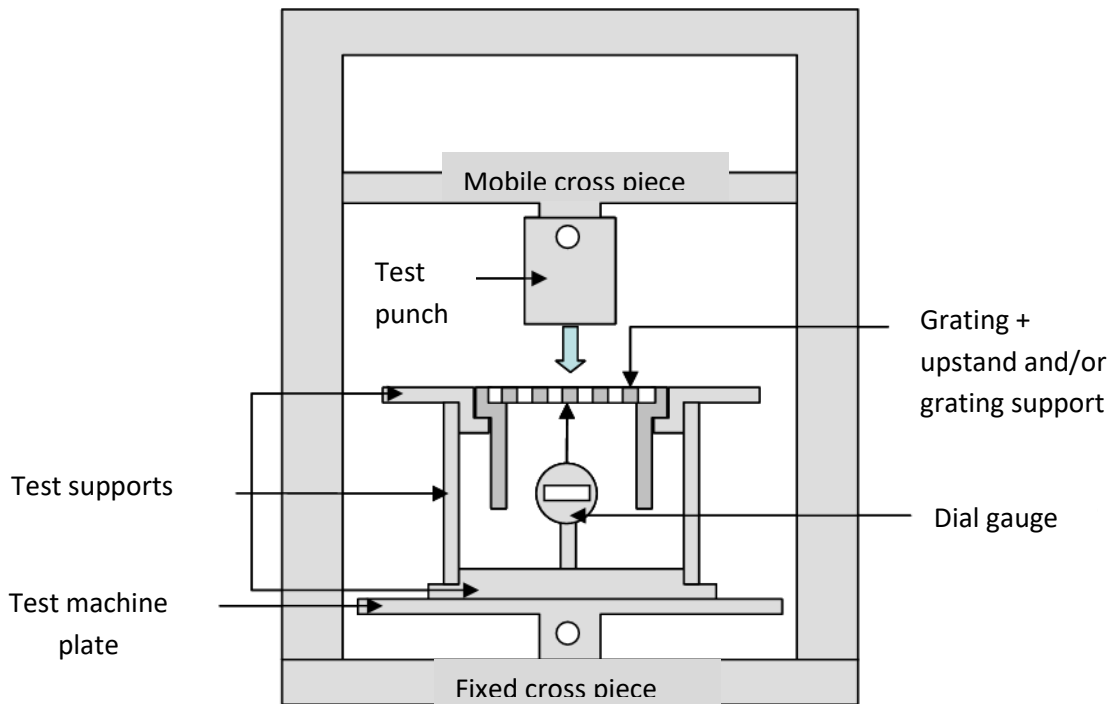
The tests shall be carried out under the following conditions:

Place the specified test block on the assembly, making sure that:

- the force is applied perpendicular to the surface of the assembly;
- the load is applied at the geometric centre of the test assembly.

The deformation may be measured using a dial gauge placed under the grating or other appropriate measurement systems.

For the procedure, refer to article 4.4 in Standard NF EN 1253-2.



**Figure 1: Apparatus for load test and deflection measurement principle**

### **Measurement of the residual deflection**

The deformation of the grating shall be measured:

- After application of 2/3 of the force
- And after 1 hour

The residual deflection is obtained by taking the difference between the two measurements and shall be between 0.4% of the passage size (CP) and 2.0 mm.

### **Required characteristics**

The upstand system and/or grating support+grating or the complete gully fitted with its grating shall resist a load of 3 kN or 15 kN depending on the class.

No cracks or fractures shall occur before the test load has been reached.

#### *b) Gutters*

In addition to the load test, a stability test shall be carried out on the grating as described in § 4.1.1.b) above.

Test conditions for the load test are defined below:

The load resistance test is not applicable if the width of the gutter is less than 25 mm.

For other widths, the procedure used for gullies shall be applied using a 35 mm diameter block located at the geometric centre of the grating.

## 5 Test methods

### 5.1 Dimensions of apertures in gratings

This paragraph defines the dimensions of the grating apertures according to their installation location (see Table 4).

**Table 4: Apertures in the gratings**

Class	Usage location	Type of gully	Minimum (mm)	Maximum (mm)
K3	Room with water outlet, domestic use	Gullies with gratings	4	8
		Gullies with slots	Width: 3 Length: 300	Width: 5 Length: unlimited
	Kitchen, collective bathrooms		6	10 (8 mm max. in zones where people are walking barefoot)
	Balcony, loggias, terrace, planted roof		6	10 (8 mm max. in zones where people are walking barefoot)
L15	Zones subjected to light vehicle traffic, excluding lift trucks in commercial premises		6	15

#### **Required characteristics:**

The holes or slots shall let through a metal ball, diameter 3 mm (gullies with slots only), 4 mm or 6 mm according to the usage location and shall stop a ball diameter 8 mm in zones where people walk barefoot.

#### **Note for gullies with gratings:**

For aesthetic reasons, gratings comprising apertures with dimensions partially smaller than 4 mm are accepted if the flow test performed by closing openings with dimensions less than 4 mm is compliant with the specifications given in Table 5.

Gratings without apertures (e.g. gully with ready-to-tile finishing frame, or gutter with stainless steel frame and cover) shall comply with the specifications given in Table 4.

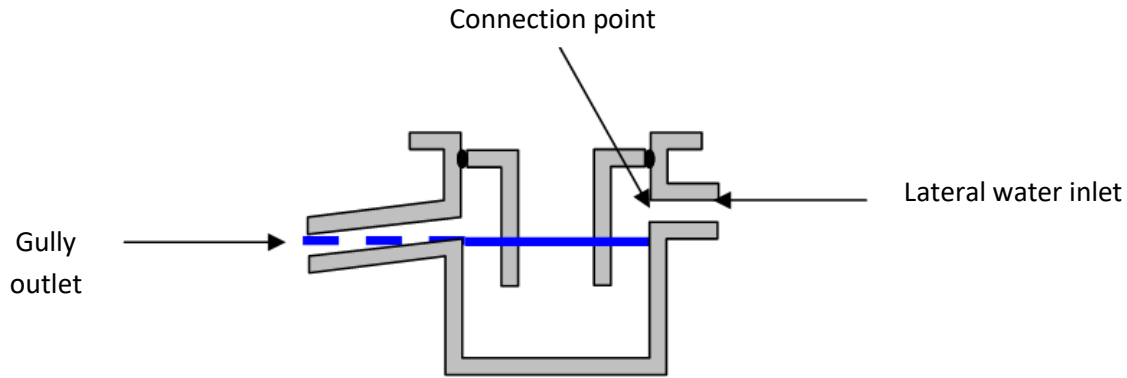
### 5.2 Position of side water inlets

This article is supplemented as follows:

The lowest connection point of the side water inlet(s) shall be above the water level.

#### **Procedure**

Place the gully on an appropriate horizontal support, connect the side water inlet with a pipe approximately 10 cm long and with an appropriate DN, fill the gully with water and check that the water drains first through the gully outlet.



**Figure 2: Position of side inlets**

## 5.3 Water seal

### 5.3.1 Depth of water seal

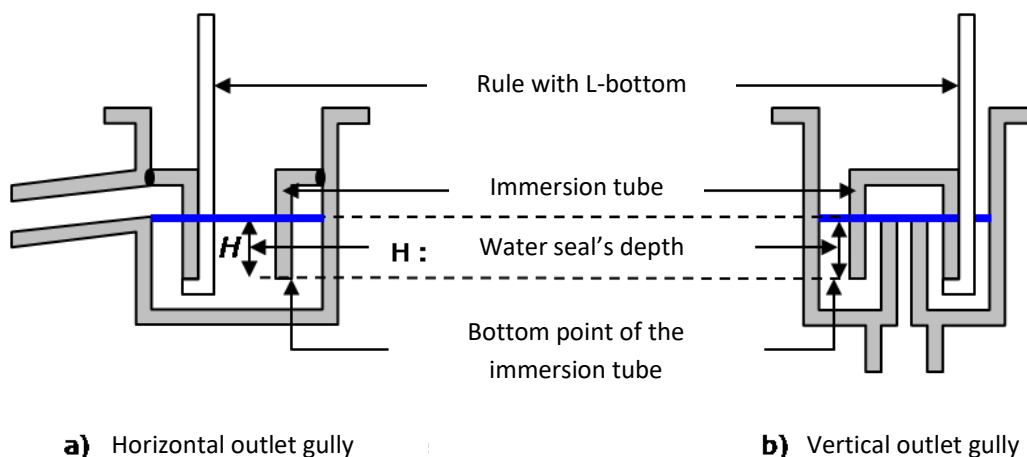
This paragraph proposes a method to determine the water seal depth under conditions similar to gully usage conditions.

#### **Procedure**

Set the gully on a suitable horizontal support. Introduce water until it spills out through the gully's outlet, then measure the water seal's depth using appropriate instruments, such as depth gauge with L-bottom or rule with L-bottom as shown in Figure 3.

**Note:** If the measurement cannot be made as described above, the check shall be made based on drawings supplied by the applicant.

The depth of water seal is defined as being the distance between the bottom point of the immersion tube and the water's surface (Figure 3).



**Figure 3: Measurement of the depth of water seal**

#### **Required characteristics**

The depth of water seal shall be equal to or greater than the value stated by the manufacturer.



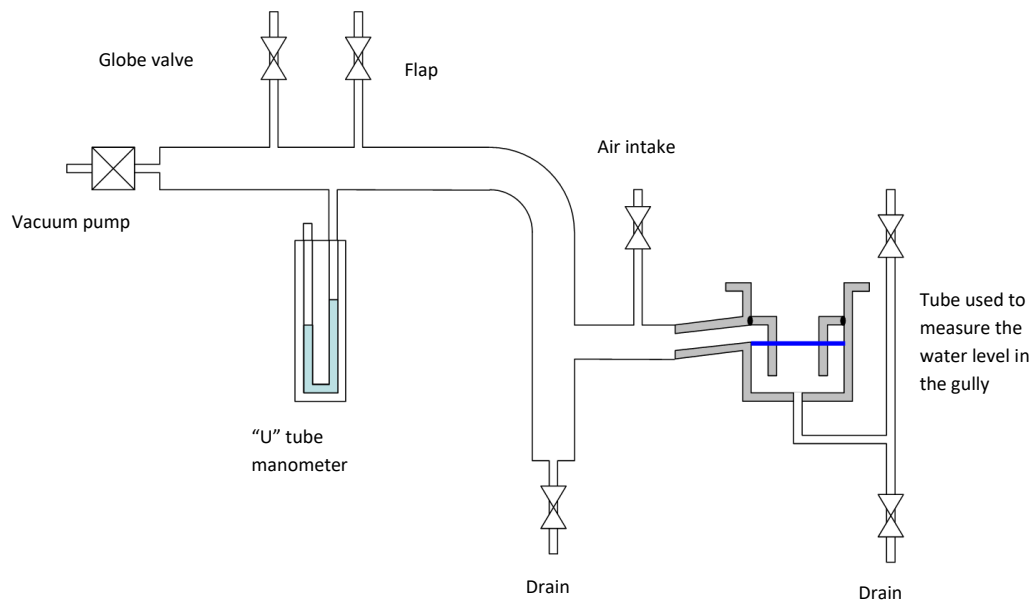
### 5.3.2 Resistance of water seal to pressure

This paragraph proposes a modification to the test apparatus illustrated in Figure 4 of Standard NF EN 1253-1.

#### **Test conditions:**

The manometer of the test apparatus is replaced by a differential pressure measurement system (refer to Figure 4 below for the test configuration).

The negative pressure and the positive pressure to be applied are expressed by a water depth.



**Figure 4: Test apparatus for measuring the water seal's resistance to pressure**

#### **Required characteristics**

The pressure applied to enable the passage of air shall be greater than 400 Pa.

### 5.4 Blockage prevention (not modified)

### 5.5 Thermal behaviour (not modified)

### 5.6 Loading test (not modified)

### 5.7 Mechanical strength (not modified)

### 5.8 Tightness

#### 5.8.1 Odour-tightness (not modified)

## 5.8.2 Watertightness of gully bodies and extensions

Two cases should be considered for this test, depending on the design of the gully.

- Leak tightness between the gully body and its components (upstand, inlet, etc.) (Figure 5 a and c): leak tightness is checked on all the elements.
- No leak tightness between the gully body and its components (Figure 5 b): only the leak tightness of the body itself is checked.

### Note:

The diagrams in Figure 5 are schematic diagrams and are not installation diagrams under any circumstances.

The arrows shown on these schematic diagrams indicate the risk (backflow, infiltration under tiles, etc.) taken into account in the design of the gully.

The function of the gully is not to correct improper installation (for example waterproofing problem under the tiles, etc.).

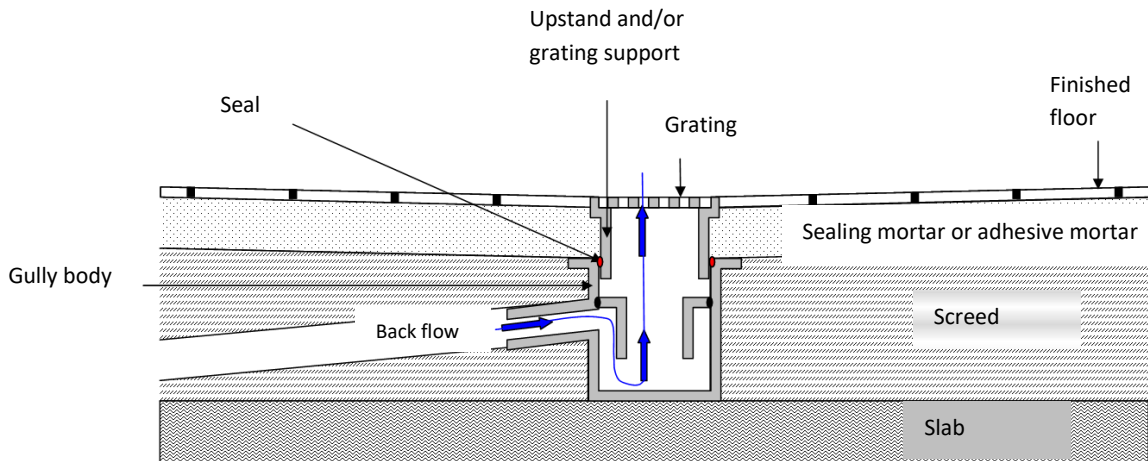


Figure 5 a): leak tightness of the upstand + gully body

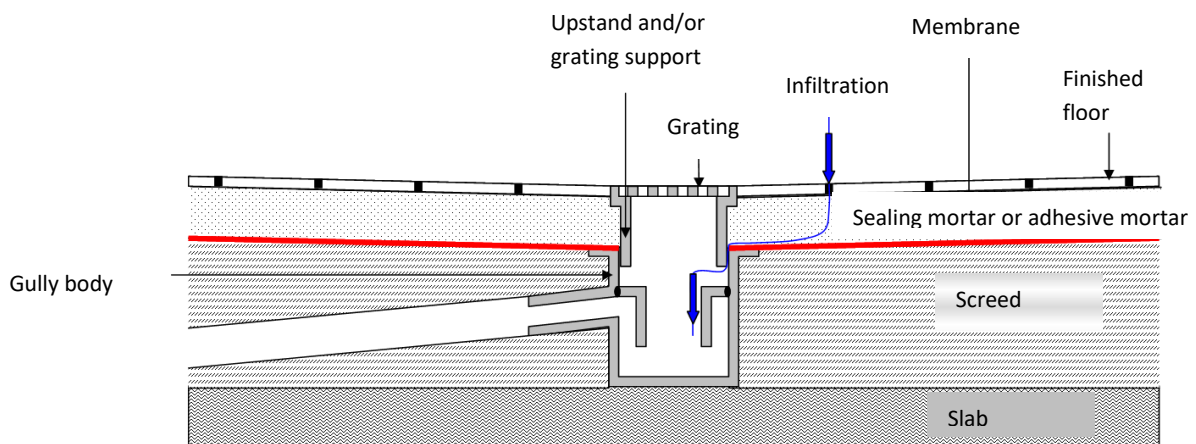


Figure 5 b): leak tightness of the gully body only

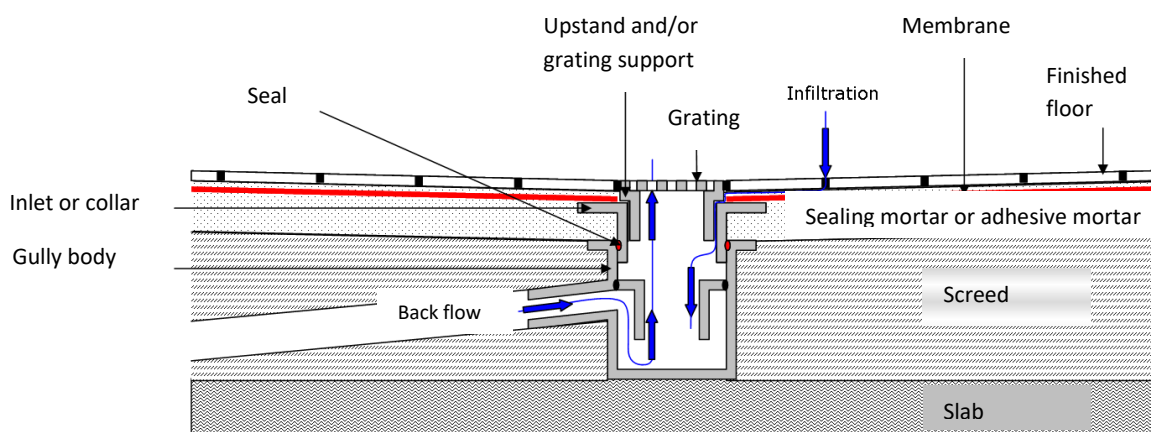


Figure 5 c): leak tightness of the inlet or collar and gully body

**Figure 5: Leak tightness checked as a function of the gully design**

There shall be no leak in the gully assembly (gully body, gully components (upstand) and sealing elements (seals, etc.) when a pressure of 0.01 MPa (100 mbar or 1 m water column) is applied to it.

### 5.8.3 Floor gullies for use with sheet floor coverings, membranes or liquid applied membranes (not modified)

## 5.9 Flow rates

This paragraph supplements article 5.9 of Standard NF EN 1253-1 and describes a measurement method allowing measurement of the flow rate through the grating and its maximum flow capacity, as well as the required specifications.

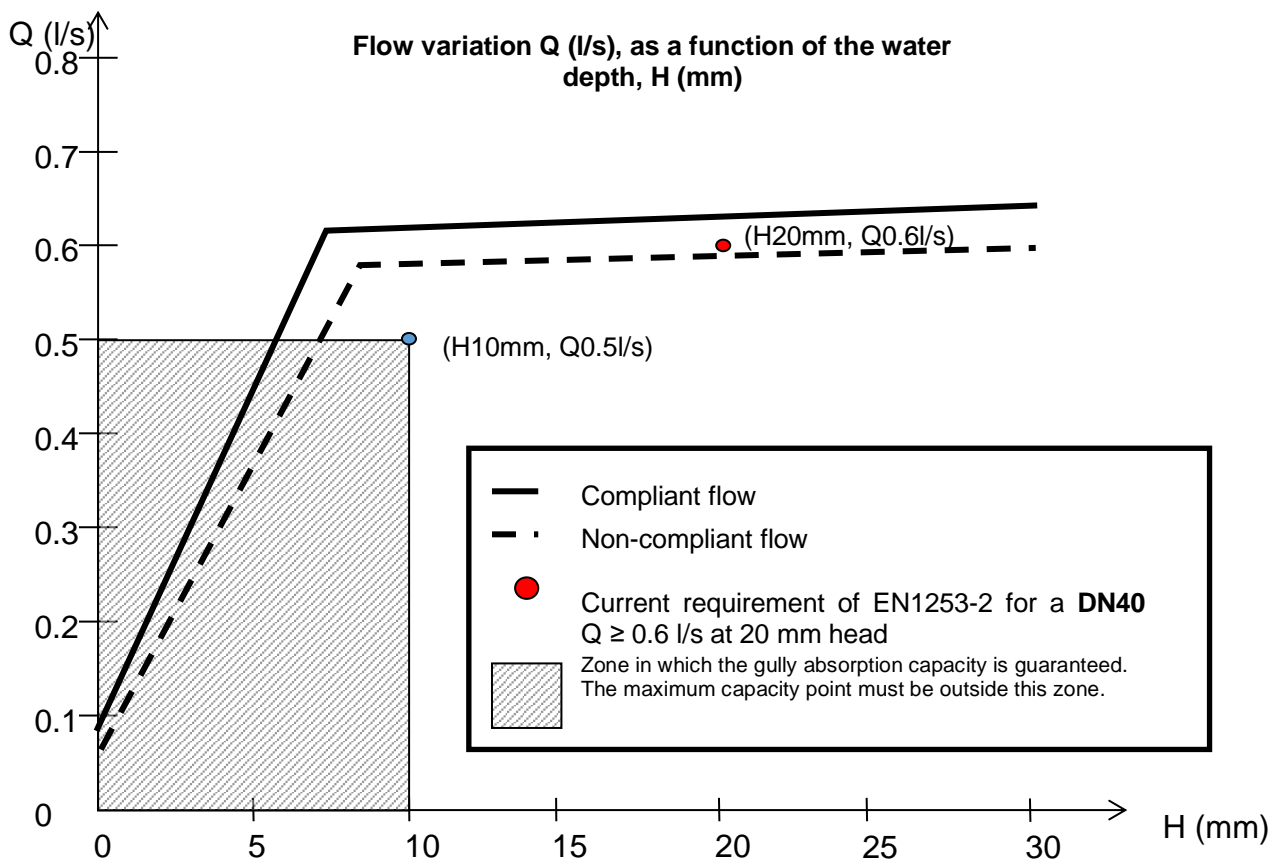
### Test principle

The principle of the test is to determine the maximum flow capacity of the gully.

The test consists of:

- measuring a water depth (a) for different flow values and
- plotting the curve 'Q = f(a)'

The maximum flow capacity of the gully is equal to the point at which the gradient of the curve Q=f(a) changes, (see figure 6).



**Figure 6: Flow curve**

### Procedure

#### a) Flow through the grating

The gully shall be connected to a discharge pipe, minimal length 1 m with the same diameter as the gully outlet with a slope ranging from 1.4 to 1.6 cm/m.

The discharge pipe shall be connected to a length of pipe of DN 100 for wastewater outlets of DN  $\leq$  100 and of DN equal to that of the outlet for a DN  $>$  100 (vertical vent pipe).

In case of a gully with adjustable height grating support, the flow rate shall be measured at the minimal height indicated by the manufacturer.

Open the water supply progressively and record the flow value corresponding to each water depth, after allowing it to stabilise for 5 minutes.

**b) Flow through the grating and the side water inlet**

The side water supply passes through a bend and a 200 mm long pipe with the same diameter as the diameter of the side water inlet.

Adjust the water supply flow to 0.8 l/s through the side water inlet and progressively open the water supply. Record the flow value corresponding to each water depth, after allowing it to stabilise for 5 minutes.

**c) Flow through the side water inlet**

The side water supply passes through a bend and a 200 mm long pipe with the same diameter as the diameter of the side water inlet.

Open the water supply progressively until the water rises just above the grating.

Measure the corresponding flow rate value.

**Specifications:**

The gully is deemed to be compliant if the following two conditions are satisfied.

- The maximum flow capacity shall be equal to at least the values given in table 5 in this document.
- The flow at 20 mm head complies with the specifications in Table 3 in Standard NF EN 1253-1.

**Table 5: Minimum flow rates**

Nominal inside or outside outlet diameter (mm)	Flow at 10 mm head (l/s)	Flow at 20 mm head (l/s)
$32 \leq \varnothing < 40$	$\geq 0.3$	$\geq 0.4$
$40 \leq \varnothing < 50$	$\geq 0.5$	$\geq 0.6$
$50 \leq \varnothing < 100$	$\geq 0.7$	$\geq 0.8$

5.9.1 Water through the grating (not modified)

5.9.2 Water through the grating and side inlets (not modified)

5.9.3 Test arrangement (not modified)

**5.10 Clogging test for gullies and gutters with water seal < 50 mm (added)**

**5.10.1 General**

The expected mechanical performance shall be the same at the end of the test as before the test, and must display the same hydraulic characteristics before and after the test.

After the test, the gully must not display any other signs of damage of any kind likely to impair its operation.

**5.10.2 Test solution**

The test solution is produced in accordance with Table 6.

**Table 6 — Test solution**

Component	CAS number	Concentration (cm) <sup>a</sup> mg/l
Lactic acid	50-21-5	100
Shredded hemp fibres 50% short fibres (15 ± 5) mm 50% long fibres (100 ± 5) mm	b	50
Sodium dodecyl sulphate	151-21-3	50
Glycerol	56-81-5	200
Sodium hydrogen carbonate	144-55-8	70
Sodium sulphate	7757-82-6	50
<sup>a</sup> This aqueous solution can be replaced by oakum (hemp, etc.) <sup>b</sup> The fibres must have a diameter of between 0.05 and 0.10 mm (exactly like a human hair)		

The test solution must be prepared using water with the following characteristics:

- pH between 6.5 and 7.5
- Hardness of 25 to 32 °fH (120 to 180 mg/l)
- Total volume of the solution: 12 l

Note 1: Drinking water compliant with the above-mentioned characteristics can be used.

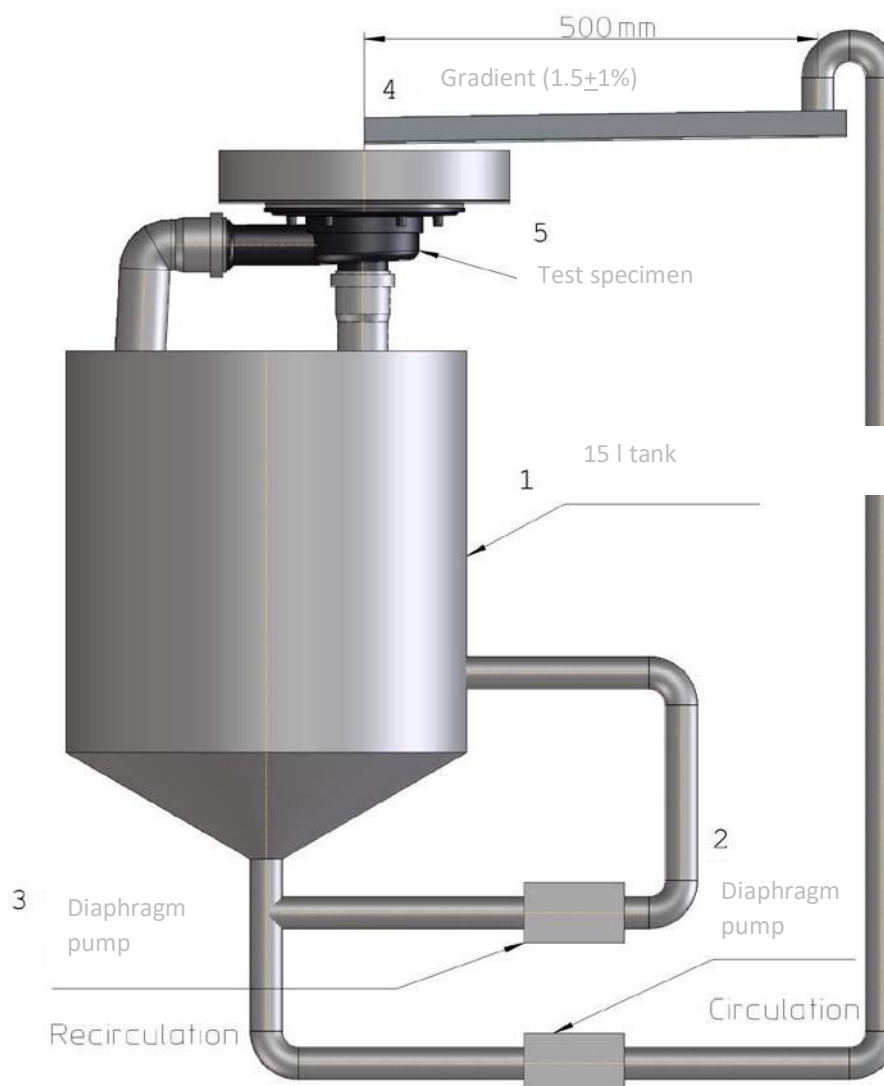
Note 2: Water with different characteristics to those mentioned above may be used on condition that the actual values are recorded in the test report.

EXAMPLE Test solution for V = 10 l of solution:

mLactic acid	= 1 g
mCellulose	= 0.5 g
mSodium dodecyl sulphate	= 0.5 g
mGlycerol	= 2 g
mSodium hydrogen carbonate	= 0.7 g
mSodium sulphate	= 0.5 g

### 5.10.3 Test apparatus

The test apparatus must comply with Figure 7 below.



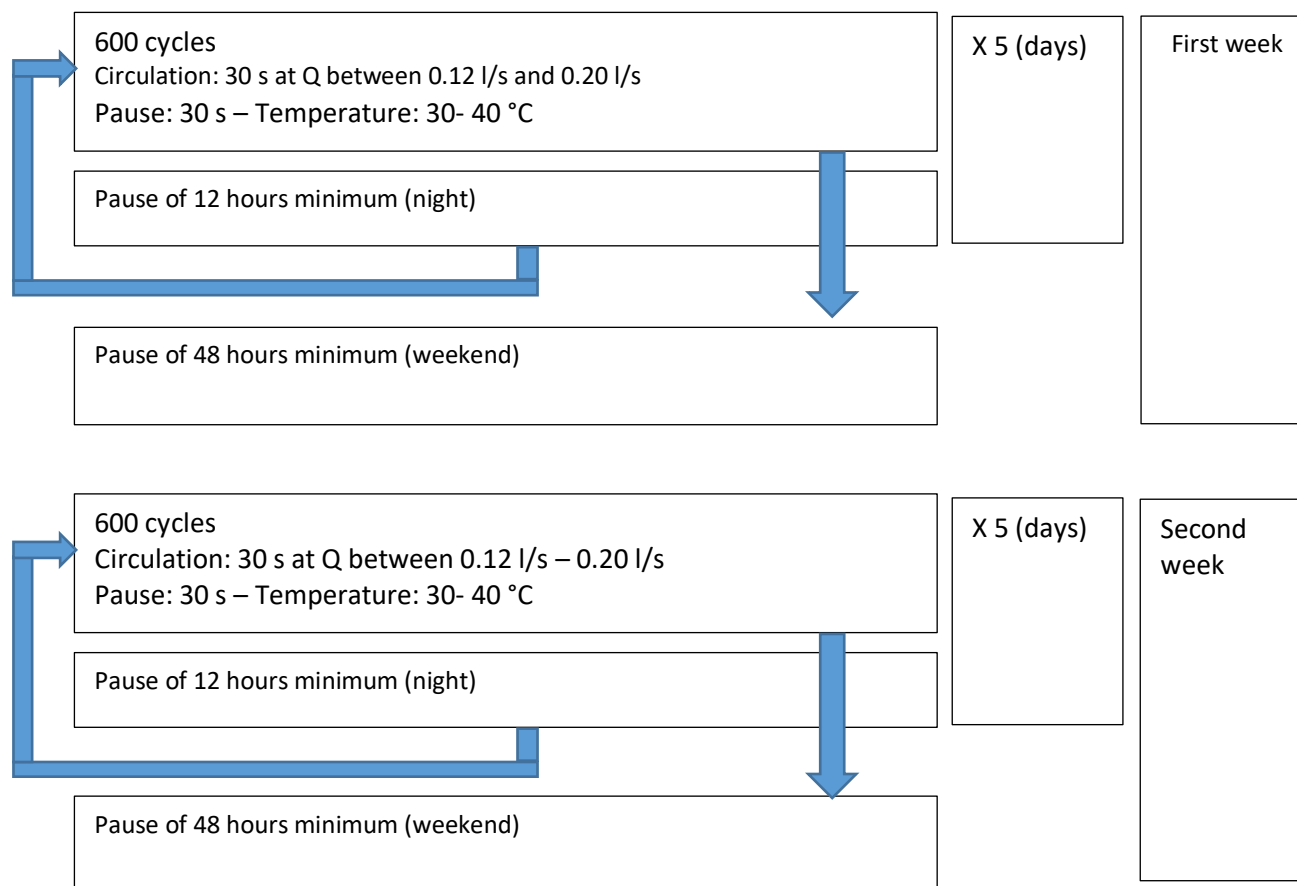
#### Key words:

- 1 tank, the form of which avoids sedimentation, filled with test solution
- 2 pump that does not affect the test solution, e.g. diaphragm pump or screw pump
- 3 pump with controllable flow rate that does not affect the test solution, e.g. diaphragm pump or screw pump
- 4 sloping channel
- 5 test specimen with horizontal/vertical outlet

**Figure 7 — Standard test device to test the anti-blockage function of gullies**

### 5.10.4 Procedure

For 14 days, the gully undergoes the operating procedure according to Figure 8. If the grating and filter are positioned in the standard manner, they must be cleaned after 600 cycles and the 'hair' must be returned to the tank or new fibres can be added depending on the required amount.



**Figure 8 — Illustration of the test method**

### 5.10.5 Parameter of the test method above

The temperature of the solution shall be between 30°C and 40°C.

Adjust the flow rate from 0.12 to 0.20 l/s during the flow phases.

### 5.10.6 Final check

After the test described in Part 5.10.4, a functional check shall be performed on the gully without cleaning, apart from the grating, according to the following sequence:

- Carefully fill the gully with water again to compensate for any evaporation due to the presence of fibres on the grating.
- Carry out the water seal pressure resistance test according to article 5.3.2. The requirements specified in article 4.1.6 must be complied with.
- Perform the odour-tightness test according to article 5.8.1. The requirements specified in article 4.1.6 must be complied with.



## 6 Allocation and sequence of tests (not modified)

## 7 Marking

This article is supplemented by the following paragraphs:

*a) Presentation at delivery*

The floor gullies or gutters shall be stored and delivered packed in a single element, grouping together the gully's components.

The grating may be delivered separately in some cases, provided that it is marked according to Table 1 of the certification reference system.

*b) Technical documents*

Each pack shall:

- Specify the following information at least in the language of the country where the product is distributed. Access to this information may be electronic. In this case, the link giving direct access to this information (QR code, electronic address, etc.) must be stated on the packaging:
  - usage location (wet room, kitchen, etc.)
  - resistance class (if there is no reference to this class on gully components: e.g. K3)
  - evacuation flow
  - gully outlet and pipe diameter
  - pipe connection method (glued, screwed, etc.)
  - overall dimensions of the gully for the opening to be left in the slab
  - depth of water seal
- Contain installation and assembly instructions that shall be understandable and complete and that shall mention the recommended gradient for the discharge pipe and the method of achieving the seal.