

# Valves-Hydraulic Fountain Fittings

## Technical document 197-02

Cast-iron gate valves

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## MODIFICATION HISTORY

Revision no.	Date	Modifications
05	01/07/2017	<p><b>Update to the document introduction and reference.</b></p> <p><b>Basic modifications:</b></p> <ul style="list-style-type: none"> <li>- General comments: The numbering of chapters, tables and certain headings has been modified. The introduction is based on the numbering of the standard NF EN 1074-2.</li> <li>- Purpose and field of application: Modification to the presentation. The chapter, "Purpose" has been supplemented.</li> <li>- Chapter 2: the standard references have been supplemented and updated.</li> <li>- Paragraph 4.1: Table 1 has been modified.</li> <li>- Paragraph 4.4.1: addition of a new type of connection.</li> <li>- Paragraph 4.5.1: table supplemented with 5 new denominations.</li> <li>- Paragraph 4.5.2: addition of the positioning key specification.</li> <li>- Paragraph 5.1.4: Table 4 - Modification of mST values for DN 40, DN50, DN65, DN80, DN &gt; 300.</li> <li>- Table 5 – Minimum quality assurance operations during production: Bringing into compliance with standard NF EN 12266-1.</li> <li>- Table 7 - Inspections carried out by the CSTB: Updating of inspection procedures.</li> </ul>
06	08/04/2019	<ul style="list-style-type: none"> <li>- Paragraph 5.2.3: addition of the modification carried out in appendix C of standard NF EN 1074-2.</li> </ul>
07	01/08/2020	<ul style="list-style-type: none"> <li>- Paragraph 4.5.2: Addition of a type profile regarding the operating device.</li> <li>- Part II, paragraph 1 - Table 5: Further details regarding the validation of the tests conducted during production.</li> </ul>
08	04/06/2021	<ul style="list-style-type: none"> <li>- Editorial update according to the structure in force following the creation of the Technical management appendix of the NF197 reference system rev. 07.</li> <li>- Paragraph 4.4.1: Addition of details on flanges connections.</li> </ul>
09	17/06/2022	<ul style="list-style-type: none"> <li>- Update of the year of a standard.</li> </ul>

## Table of contents

<b>I.</b>	<b>RULES FOR THE APPLICATION OF STANDARD NF EN 1074-2 AND COMPLEMENTARY SPECIFICATIONS.....</b>	<b>5</b>
1.	Scope and field of application (extended).....	5
2.	Standard references (extended) .....	5
3.	Definitions.....	5
3.1.	Kv flow coefficient .....	5
3.2.	Shut-off valve .....	5
3.3.	Full flow valves and fittings .....	5
3.4.	Continuous flow valves and fittings .....	5
3.5.	Gate valve (added) .....	5
4.	Design requirements (supplemented).....	6
4.1.	Materials (added) .....	6
4.2.	Compatibility with the water carried.....	6
4.3.	Coating (added) .....	6
4.4.	Design (added).....	6
4.5.	Specific suitability for use .....	8
5.	Performance requirements .....	9
5.1.	Mechanical strength.....	9
5.2.	Leak-tightness.....	10
5.3.	Hydraulic characteristics .....	0
5.4.	Resistance to disinfection products.....	0
5.5.	Endurance .....	0
6.	Assessment of compliance .....	0
7.	Marking.....	0
8.	Packaging (supplemented) .....	0
8.1.	Delivery condition.....	0
9.	Designation (added) .....	0
10.	Additional specifications regarding service (added).....	1
10.1.	Families of products.....	1
10.2.	Availability of the products.....	1
10.3.	Technical and sales documentation .....	2

# I. RULES FOR THE APPLICATION OF STANDARD NF EN 1074-2 AND COMPLEMENTARY SPECIFICATIONS

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## Purpose

The purpose of this section is to clarify some clauses in standard NF EN 1074-2 (2000) using the same numbering and to complete this European baseline on quality criteria judged to be fundamental as part of the NF mark.

The extended, modified and added articles are identified in the title of the chapters.

## 1. Scope and field of application (extended)

Cast-iron gate valves are characterised by:

- The design of the closing and tightness system.
- The DN (Nominal Diameter).
- The “Pression de Fonctionnement Admissible” (Allowable Operating Pressure).

## 2. Standard references (extended)

In addition to standard NF EN 1074-2:

NF EN 558: 2022	Industrial valves and fittings - face to face and centre to face dimensions - PN and Class designated valves.
NF EN 1563: 2012	Founding - Spheroid graphite cast-iron
NF EN 1092-2: 1997	Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated. Part 2: Cast iron flanges
NF EN 545: 2010	Ductile iron pipes, fittings, accessories and their assemblies for water pipes - Requirements and test methods
NF EN 12266-1:2012	Industrial valves and fittings - Tests on metal valves - Part 1: pressure tests, test procedures and acceptance criteria - Mandatory requirements

## 3. Definitions

### 3.1. Kv flow coefficient

### 3.2. Shut-off valve

### 3.3. Full flow valves and fittings

### 3.4. Continuous flow valves and fittings

### 3.5. Gate valve (added)

The gate valve is a tapware device, whose gate disk or passage setting disk moves perpendicularly to the fluid flow axis. It is designed to be used in open or closed position.

## 4. Design requirements (supplemented)

### 4.1. Materials (added)

The mechanical characteristics shall be such that the gate valves will be able to withstand the bending stresses that might be created by the conduit to which they are connected.

The materials used shall have the characteristics indicated in Table 1 below:

**Table 1 - Materials**

Component	Material	Specification
<b>Sleeve</b> (bonnet and body)	<b>Coated nodular cast iron</b>	In compliance with one of the grades defined in Standard NF EN 1563.  The minimal values shall be: – tensile strength: 350 MPa. – elongation to break: 3 % min;
<b>Gate disk</b>	<b>Coated cast iron, stainless steel or other...</b>	Shall be made of a material, the corrosion resistance of which is at least equal to that of the body and of the bonnet.
<b>Internal parts</b> (stem, stem nut, etc.)	<b>Copper alloy, stainless steel, other...</b>	Shall be made of a material, the corrosion resistance of which is at least equal to that of the body and of the bonnet.  For non-metallic materials, complementary tests are to be determined to check the stability of the material over time.
<b>Tightness contact surface</b>		Flexible
<b>Positioning key</b>	<b>All materials</b>	For all materials, they must enable leaks to be identified

### 4.2. Compatibility with the water carried

The gate valves' materials, which are in contact with water intended for human consumption, shall not be susceptible to altering the quality of the water.

They shall conform to the French Regulations in force.

### 4.3. Coating (added)

The internal and external coatings shall comply with the requirements of Technical Document 01 of the NF 197 Reference system.

### 4.4. Design (added)

#### 4.4.1. Types of end pieces and interchangeability

The gate valves can be fitted with various types of endings, adapted to particular pipe systems.

1) **Gate valves with flanges** shall comply with the specifications below:

- the seal contact surface must be of type B - raised seal face, and its dimensions must comply with standard NF EN 1092-2,
- multi-drilling and oblong holes are permitted,
- the face-to-face dimensions must comply with standard NF EN 558-1+A1, series 14 and 15
- parallelism deviations (t) between the faces of the seal of the machined flanges shall fall within the following specified tolerances:

**Table 2 – Parallelism deviation tolerances**

Nominal Diameter (DN)	Parallelism tolerances “t”
≤ 250	0.4
250 ≤ DN ≤ 500	0.6
500 ≤ DN ≤ 800	0.8
800 ≤ DN ≤ 1000	1.0
1000 ≤ DN ≤ 1600	1.2

- 2) **For gate valves equipped with spigot and socket connections for cast iron pipes,** assemblies shall satisfy the standard requirements in standard NF EN 545.
- 3) **For gate valves equipped with spigot and socket connections for pipes not made of cast iron,** assemblies shall satisfy standard requirements in force for the corresponding pipe systems.
- 4) **For gate valves fitted with spigots for all types of piping,** assemblies shall satisfy standard requirements for the pipes concerned. For PE end pieces, the pipe must be certified according to NF114.

#### **4.4.2. Operation**

The gate valve can be operated by manual control or by actuator.

If the control is manual, it can be:

- direct, on the stem by T-key, hand-wheel, etc.
- with step-down mechanism.

The gate valve's design, with or without intermediate part, shall make it possible to fit an actuator.

#### **4.4.3. Operating stem**

The operating stem is turning, non-rising.

#### **4.4.4. Stem nut**

If the gate valve's design includes a stem nut, this nut is to be made of a material that provides a coefficient of friction with the stem's material, that is best adapted to the application.

#### **4.4.5. Leak-tightness at the stem's passage**

The leak-tightness at the stem's passage is provided by an injected seal or by O-rings.

If the leak-tightness comes from O-rings, at least two rings are used.

The gaskets or seals shall be able to be replaced while the gate valve is under pressure and in full opening position (the user is warned that slight leaks may occur during that operation).

#### **4.4.6. Number of idle turns**

The gate valves with flexible seat, closed by applying the maximal operating torque (MOT), shall work with a maximum of two turns of the operating stem not causing the gate disk to move.

#### **4.4.7. Gate disk (added)**

The gate disk must be:

- entirely coated with elastomer.
- guided for the full length of its travel

## 4.5. Specific suitability for use

The gate valves shall comply with a minimum of performances so as to be compatible with the particular applications, specific to water supply and distribution.

### 4.5.1. Full flow

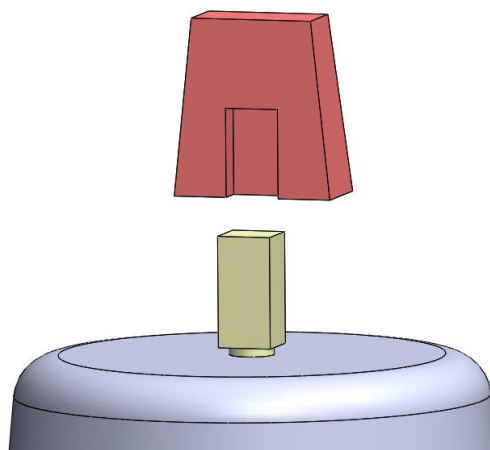
The gate valves must allow full flow (diameter of the fluid passage), in compliance with the values defined in Table 3 when the gate disk is completely raised:

- enabling the cleaning of the conduits without damaging any component of the gate valve,
- enabling the assumption of the load via the gate valve,

**Table 3 - Full flow**

Nominal Diameter (DN)	Minimum passage diameter (mm)
40	37.5
50	47
65	62
80	77
100	97
125	121.5
150	146.5
200	196.5
250	246
300	296
350	345.5
400	395
450	444
500	493.5
600	592

### 4.5.2. Positioning key (30x30)



Type profile for a positioning key



The gate valves shall enable the transmission of the vibrations from the pipe, created by a water leak. This transmission is provided by a metal-metal contact between the anchoring point of the valve on the pipe and the extremity of the operating device upon which the vibration sensor is to be installed.

To optimally receive that vibration, the contact surface of the operating square key shall enable the installation of a sensor, at least 20 mm in diameter via a direct and precise magnetic contact on a rigorously flat surface, whether continuous or not (example: fixing hole for the square key).

The positioning key must be:

- in maximum direct metal to metal contact with the valve shaft
- firmly attached, making it rigid and stand-alone.

## 5. Performance requirements

### 5.1. Mechanical strength

**5.1.1. Internal pressure resistance of the sleeve and all components subjected to pressure**

**5.1.2. Resistance of the gate disk to differential pressure**

**5.1.3. Bending strength of the valves**

**5.1.4. Resistance of the valves to operating forces (modified)**

The valves must withstand in fully open and fully closed positions the minimum strength torque (mST) defined in Table 4, without suffering damage that could alter their aptitude for use.

**Table 4 - Minimum strength torque**

Nominal Diameter (DN)	Minimum Strength Torque (mST)
40	180
50	180
65	300
80	300
100	300
125	375
150	450
200	600
250	750
300	900
350	975
400	1050
450	1275
≥500	1575

## 5.2. Leak-tightness

The permissible maximal leak rate for all the tests of tightness of the jacket and of all the components subjected to pressure corresponds to rate A, in compliance with standard NF EN 12266-1: "No leak visibly detectable for the duration of the test".

### 5.2.1. Leak-tightness of the sleeve and all components subjected to pressure

### 5.2.2. Leak tightness of the seat

### 5.2.3. Maximal operating torque (MOT) for the operation and for the tightness

The requirements are those specified in Standard NF EN 1074-2 Article 5.2.3 Sub-paragraph b)

$MOT = 1 \times DN$  (Nm)

The appendix C of standard NF EN 1074-2 is modified as follows:

## Appendix C

### Test method for the operation of valves (see 5.2.3)

#### C.1 General

The test shall be performed at ambient temperature on a valve in its delivery state.

The test shall begin with the obturator in the fully open position.

#### C.2 Test procedure

Fill both sides of the test assembly with water and vent the air.

Close the obturator and apply a torque at least equal to MOT.

On one side of the obturator, increase the water pressure until it reaches PFA maintaining it at least 1 minute.

Under pressure, open the obturator by ensuring that the operating torque does not exceed MOT. Once the pressure poured, go on the opening during ten turns.

Note the maximum torque required during the test and check that it does not exceed MOT.

### 5.2.4. Leak-tightness of reducers under external pressure

### 5.3. Hydraulic characteristics

### 5.4. Resistance to disinfection products

### 5.5. Endurance

At the completion of the fatigue test (which tests endurance), according to Appendix D of Standard NF EN 1074-2, the gate valve shall comply with the validation tests by applying a torque which shall not exceed the MOT defined in Standard NF EN 1074-2, Article 5.2.3, Sub-paragraph b), without visible leak during the duration of the tests.

## 6. Assessment of compliance

## 7. Marking

The identification plate shall be of a corrosion resistant material and be fixed to the valve by a secure means.

All the markings defined in Article 7 of Standard NF EN 1074-1 are mandatory for all the models.

The gate valve's closing direction will need to be clearly indicated.

## 8. Packaging (supplemented)

### 8.1. Delivery condition

Unless otherwise specified at order-stage, the gate valve shall be delivered ready-to-use with identification of the operating direction and equipped with one of the following operating devices:

- square key, 30 x 30, installed on the gate valve.
- sleeve installed on the gate valve.
- hand-wheel or operating unit installed on the gate valve or supplied with a protection of the operating spindle if it is not installed on the gate valve.

The gate valves shall be able to be transported and installed with the least possible risk of damage by impacts.

Each valve shall be packed and/or protected against mechanical damage and against penetration by foreign bodies. The inside of the valve shall be protected from UV radiation.

The gate disk is to be in non-locked closed position.

## 9. Designation (added)

The cast-iron gate valves referred to in this document, are described in the following way and in order by:

- the type of seating surface (the gate disk's tightness contact surface, the body's tightness contact surface),
- the connection method,
- the face-to-face dimension (short series or long series or description according to the standard),
- closing direction
  - FSH: Clockwise closing or
  - FAH: Anticlockwise closing,
- the nominal diameter, followed by the appropriate number,
- the allowable operating pressure (PFA in French),
- the nominal pressure (PN in French) of the flanges, followed by the appropriate number.

*Example of description:*

*Gate valve, with elastomer/metal seating surface, with PN 16 flanges, long series, (FSH), DN 65, PFA 16.*

## 10. Additional specifications regarding service (added)

To meet the needs of the users of the systems in keeping their installation operational, the holder shall ensure a minimal service level.

### 10.1. Families of products

#### 10.1.1 Gate valves with flanges

As a minimum, the holder shall propose the complete line of gate valves with flanges in the DN's specified below:

Nominal Diameter (DN)	40	50	65	80	100	125	150	200	250	300
Version	<ul style="list-style-type: none"> <li>– long version in accordance with NF EN 558-1 series 15</li> <li>– short version in accordance with NF EN 558-1 series 14</li> </ul>									
Closing type	<ul style="list-style-type: none"> <li>– Closing direction Clockwise (FSH)</li> <li>– Anti-clockwise closing (FAH)</li> </ul>									

#### 10.1.2 Gate valves with other connections

There is no particular requirement in terms of a proposed product line for gate valves with other connections.

### 10.2. Availability of the products

#### 10.2.1 New valves

To ensure continuity of water distribution service, for each valve intended to be installed on metropolitan French territory, the holder shall have a logistics system making it possible to deliver in less than 24 hours during working days.

These deliveries shall be made from one or several depots, located on metropolitan French territory, based on a minimal overall inventory of:

- gate valves with flanges: 600 gate valves with flanges from DN 40 to 300, 80% of which among the DN 80s, 100s and 150s.
- gate valves with other connections: the holder commits itself to keep an inventory of NF certified products, appropriate to the level of its sales.

At admission, the holder has a period of two months to meet this requirement.

#### 10.2.2 Spare parts

The holder shall keep the following available to the applicant:

- books in which the list of spare parts and the list of any special tools are given
- and notes about maintenance instructions.

These documents may be written in several languages, necessarily including French, and they must be available in paper form at least.

The holder must justify that they have a special organisation for processing orders and for supplying requested spare parts for urgent repairs, for parts that could affect product functions:

- either by having a minimum stock of 10 units of spare parts that cannot be fabricated on the production site (seals, sets of fasteners, etc.)
- or by being capable of manufacturing them in 24 hours.

These parts must be made available to the shipper within 24 working hours.

The holder shall be responsible for management of parts that do not affect product functions.

The holder commits to providing this service during at least 30 years after the sale of the products.

### 10.3 Technical and sales documentation

The holder shall keep documentation in French available for all the variants of the gate valves covered by the mark.

The documentation shall include, as a minimum:

- overall drawing of the gate valve.
- dimensional characteristics.
- weight information.
- PFA and the dimensions of the PN flanges or of the connections.
- application precautions.
- reference to the applicable French and European Standards.
- the information given in paragraph 2.5.2.3 of the NF197 Certification reference system - Part 2.
- number of turns to be made for closing or opening.
- nature of the materials used.
- how the closing direction is indicated.

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