WATER

TECHNICAL DOCUMENT

Valves-Hydraulic Fountain Fittings

Technical document 197-01

Complementary specifications applicable to all product families

Technical document 197-01 rev. 07
16/08/2023

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MODIFICATION HISTORY

Revision no.	Date	Modifications
05	**01/07/2017**	**Update to the document introduction and reference.** **Basic modifications:** - General comments: The numbering of chapters, tables and certain headings has been modified. - Purpose and field of application: Modification to the introduction. The chapter has been split into two. - Chapter 2: the standard references have been supplemented and updated. - Addition to Chapter 3, "Terms and definitions" in place of Appendix A. - Chapter 4 Test methods: modification to the introduction and headings of certain paragraphs. - Paragraph 4.4: addition of specifications for the operating procedures and characteristics required. - Addition of Paragraph 4.6, "Non-porosity". - Paragraph 4.7 Impact resistance test: addition of validation through a non-porosity check. - Paragraph 4.8 Resistance to accelerated ageing: reference to standard NF EN 16474-2 and standard NF EN ISO 11664-4 (The calculation formula for the ΔE CIELAB is identical to the former standard NF ISO 7724-3). - Paragraph 4.9 Salt spray test: the period of exposure to AASS has been extended to 480 hours. - Part II Verification of conformity - Table 2: addition of a non-porosity test and modification to the introduction. - Part II Verification of conformity - Products subjected to testing: addition of conditions of use of the specimen. - Part II Verification of conformity - Table 3: Deletion of the bonding test, addition of the non-porosity test and withdrawal of "Specimen testing". - Withdrawal of the following appendices: "Terms and definitions" and "non-porosity".
06	**04/06/2021**	- Chapter 2: the normative references have been completed and updated. - Paragraph 4.4.2: update of the operating mode.
07	**16/08/2023**	- Chapter 2: Removal of some normative references.

		- Chapter 3: Addition of three new definitions (designated areas, average and local coating thickness). - Chapter 4.2: Addition of specifications in case of coating repair. - Chapter 4.3: Definition of a new specification and new requirements. - Chapter 4.4: Modification of a requirement for polyester coatings. - Chapter 4.6: Modification of the test procedure. - Part II: Modification of Table 3. - Part II: Addition of Table 4 and definition of in-process requirements.

Table of contents

I. SPECIFICATIONS AND MINIMUM REQUIREMENTS FOR THE CORROSION PROTECTION OF VALVES DESIGNED FOR WATER SUPPLY SYSTEMS

Purpose

The purpose of this document is to define:

- the minimum technical performance required by anticorrosion coatings
- the corresponding testing and assessment methods
- the control measures to be established for initial qualification of the coating and process and for monitoring production (refer to part II of this document)

This document (ACS) does not describe verification of the compatibility of materials or coatings in contact with drinking water.

The coating must meet the appearance, functional properties and ageing behaviour requirements.

1. Field of application

This protection can be applied as an internal and external coating to valve components of water supply systems (gate valves, fire hydrants, etc.)

2. Standard references

NF EN ISO 4628-1: 2016	Paints and varnishes — Evaluation of coating degradation — Description of quantity and size of defects, and of intensity of uniform changes in appearance — Part 1: General introduction and description system
NF EN ISO 4628-2: 2016	Paints and varnishes — Evaluation of coating degradation — Description of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering.
NF EN ISO 4628-3: 2016	Paints and varnishes — Evaluation of coating degradation — Description of quantity and size of defects, and of intensity of uniform changes in appearance — Part 3: Assessment of degree of rusting.
NF EN ISO 2808: 2019	Paints and varnishes — Determination of film thickness.
NF EN ISO 4624: 2016	Paints and varnishes — Pull-off test for adhesion.
NF EN ISO 2812-2: 2018	Paints and varnishes — Determination of resistance to liquids — Part 2: Water immersion method.
NF EN ISO 2813: 2014	Paints and varnishes — Determination of gloss value at 20°, 60° and 85°.
NF EN ISO 2409: 2020	Paints and varnishes — Cross-cut test.
NF EN ISO 16474-2: 2014	Paints and varnishes — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps
NF EN ISO 11664-4: 2011	Colorimetry - Part 4: CIE 1976 L*b* colour space

NF EN ISO 9227:2017	Corrosion tests in artificial atmospheres — Salt spray tests.
NF EN ISO 8501-1: 2007	Preparation of steel substrates before application of paints and related products – Visual assessment of substrate cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after complete removal of previous coatings
NF EN ISO 11357-1: 2016	Plastics — Differential scanning calorimetry (DSC) — Part 1: General principles.
NF EN ISO 29601: 2011	Paints and varnishes - Corrosion protection by protective paint systems - Assessment of porosity in a dry film.

3. Terms and definitions

Organic coating (paint)

Coating using liquid or powder paints applied to a base material.

Pre-treatment before coating

Mechanical and/or chemical treatment, intended to remove surface impurities (grease, soiling, corrosion products) and to boost the bonding strength of the painting system.

Designated areas

Areas of a molded part where due to assembly tolerance restrictions, testing difficulties or the presence of gasket material etc., a lower level of coating performance is unavoidable (bolt hole, ribs, edges, etc.

Average coating thickness

Arithmetic average of all thicknesses performed on a coated component.

Local coating thickness

Thickness measurement at any point of a coated outside designated areas.

Application techniques

Selecting the application technique depends on:

- the coating (powder or liquid),
- the parts: shape, dimensions and quantities of parts to treat,
- desired thickness of the coating.

Coating by dipping in fluidised bath

The part is preheated to a temperature above that of the powder, then dipped into a container where the powder is suspended by blowing air. The powder melts upon contact with the part and forms a film.

The thickness of the coating is determined by the length of time the part is immersed in the bath and the temperature to which it was preheated.

Post-heating is necessary for large parts (when the heat retained is insufficient to harden the polymer).

Coating by electrostatic spraying

The electrically charged powder is sprayed directly onto the pre-heated part. Upon contact with the part, the powder melts, forms a uniform layer and then polymerises under the influence of the heat.

Coating by spray gun

The spray gun splits the jet of paint into a mass of small droplets and deposits them on the base structure.

Coating by electrophoresis

The part is immersed in a water-soluble paint bath. Direct voltage is established between this part, which acts as a cathode, and a counter-electrode and causes the particles suspended in the bath to migrate. The paint particles settle uniformly along the entire submerged surface, resulting in build-up of equal thickness over the entire part.

Baking then ensures the coating is polymerised.

Coating applicator

The entity that applies the coating to the base structure.

Polymerisation

Chemical reaction between the epoxy and a hardener, enabling the coating to form.

Porosity

Discontinuity in a coating.

4. Test Methods

The methods described below are used for inspecting finished products.

Whenever it is not possible to perform the tests on the product itself, the tests are performed on test specimens made of the same material, the same grade and which follow the same processing cycle as the product to be inspected (refer to Table 4 - Quality assurance in production).

Edges or irregular points (interface, holes, marking, etc.) are not taken into account when assessing the quality of the coating.

4.1. Preparation of the surface

The surface state must guarantee proper bonding strength for the coating.

Before starting the coating process, the surface to be coated must be clean and free from oil, grease and moisture.

This surface shall, as a minimum, comply with the EN ISO 8501-1 Sa 2½ level of stripping.

Visual verification is carried out based on the instructions defined by the manufacturer.

4.2. Appearance and uniformity of the coating

The coating shall:

- uniformly cover the whole surface of the part,
- be of uniform colour and gloss,
- be free of defects (blisters, pits, scratches, etc.) liable to impair its ability to function.

Colour shade variations due to exposure during storage and retouching are permissible.

In the event of a repair operation, the materials used to repair the defects must be suitable for the service conditions of the coated products and be compatible in all respects with the original epoxy coating.

The final repair must meet the values specified in the manufacturer4s data sheet. The coating thickness of the repaired area must not be less than the manufacturer4s specifications (see 4.3).

4.3. Thickness of the coating

The thickness of the coating shall be measured according to one of the methods described in Standard NF EN ISO 2808.

The manufacturer’s quality assurance procedures must specify:

- the method used,
- the frequency of this measuring,
- the measurement points on each inspected part (see annex 3).

In his control plan, the manufacturer must define his minimum specifications for local and average thicknesses as well as those of the designated areas.
During a verification, no measured value should be lower than the minimum value specified by the manufacturer. A minimum of ten measurements uniformly distributed over the product under test shall be taken with a measuring instrument accurate to within +/- 5%.

No measured value shall be less than the minimal value specified by the manufacturer.

4.4. Checking the degree of polymerisation

The test consists of verifying the proper polymerisation of the coating.

The inspection is based on a solvent resistance test and a differential thermal analysis, if necessary.
The test is performed on a room at room temperature (23 ± 2°C).

4.4.1 Solvent resistance test

The test consists of rubbing part of the coated surface with a white cotton cloth.

The specified solvent is a ketone solvent (MIBC, MEC, etc.) or one which is specified by the manufacturer of the coating. It can be applied directly or indirectly to the coated surface.

The manufacturer's quality assurance procedures must specify:

- the method and solvent used,
- the testing frequency and
- the assessment scale for the degree of polymerisation as well as the methods used to reach it.

4.4.1.1 Operating procedure

a) Direct method

- On a coated, horizontal surface, deposit 5 drops of solvent.
- Cover the drops with a watch glass and leave it to work for about 30 seconds.
- Wipe by rubbing the surface with a white cotton cloth, completing at least 5 full back-and-forth swipes.
- Note the appearance as well as the colour of the cloth and the surface of the coating.

b) Indirect method

- Take a piece of white cotton cloth soaked with solvent.
- Wipe by rubbing the surface, completing at least 5 full back-and-forth swipes.
- Note the appearance as well as the colour of the cloth and the surface of the coating.

4.4.1.2 Assessment

The two following assessment methods are applicable:

1st method: comparison of the results based on a manufacturer test carried out on a reference sample. In case of a transfer of colour onto the cloth and/or if the coating's surface presents discolouration, matting or soiling, the appearance and the colour of the cloth and of the coating's surface shall be compared with the defined limits of discolouration, matting and soiling by wiping the coating product's reference sample (see Annex 4)

2nd method: comparison of the results based on a transfer scale supplied by the powder manufacturer. Considering that the colour transfer is related to the formulation of the powder and not to poor polymerisation, it must be compared to the transfer assessment scale supplied by the powder manufacturer.

Regardless of the method used, for polyester coatings (e.g. red for poles), only the loss of gloss on the tested product is assessed visually; the deposit observed on the fabric is not included in the conformity assessment.

4.4.1.3 Required characteristics

For an assessment, according to the 1st method, the required characteristics are those defined in table 1 below:

Table 1 – Polymerisation quality assessment scale

Scale	Comment	Evaluation
Level 1	No loss of the coating's gloss. No transfer of colour onto the cloth.	Good polymerisation
Level 2	Slight loss of the coating's gloss. Colour transfer slightly perceptible.	
Level 3	Mat film. Colour transfer very clearly perceptible on the cloth.	Poor polymerisation, requires additional tests.
Level 4	Very mat and considerably softened film. Very definite transfer of colour onto the cloth.	

For an evaluation according to the 2nd method, the transfer must comply with the indications of the powder manufacturer.

In the case of colour transfer onto the cotton cloth (for example, levels 3 and 4 for the first method), verifying the following is recommended:

- the parameters of the process since they influence polymerisation (specifications pertaining to temperature, duration of polymerisation, etc.).
- the polymerisation by measuring the temperature of the glass transition (ΔTg) of the coating in the uncertain zone and comparing it to the one given by the manufacturer.

4.4.2 Glass transition temperature measurement by differential thermal analysis or DSC (Differential Scanning Calorimeter)

The test principle consists of monitoring consecutive enthalpy variations during physical or chemical transformations undergone by the material subjected to temperature cycling.

Refer to standard NF EN ISO 11357-1 for the test method.

The operating conditions are:
- Taking an epoxy scale sample ~ 5 à 10mg,
- Preconditioning the sample at 80°C in the boat to be used for analysis,
- Raising first the temperature from 25°C to 250°C at 10°C/min (nitrogen flushing),
- Determining the glass transition temperature TG1-mid-point,
- Cooling the temperature down quickly to 25°C,
- Then raising the temperature from 25°C to 250°C at 10°C/min,
- Determining the glass transition temperature TG2-mid-point,
- Noting the difference (ΔTg=TG2 - TG1).

The coating is polymerised if the difference between the two glass transition temperatures (ΔTg) is ≤ 5°C.

4.5. Checking the Bonding Strength of the Film

The test consists of measuring the bonding level of a coating on a base structure.

The method for checking the bonding strength and the corresponding specification depend on the film's thickness:

Grid line test

This test is only applicable to coating thicknesses ≤ 250 µm.

It is carried out as described in the NF EN ISO 2409 standard.Operating procedure

- Make a grid on the coated surface, with cut spacing of:
  - 1 mm for coating thicknesses where: 0 <t ≤ 60 µm
  - 2 mm for coating thicknesses where: 60 <t ≤ 120 µm
  - 3 mm for coating thicknesses where: 120 <t ≤ 250 µm
- Apply adhesive tape to each of the grid lined zones by applying equal pressure to the entire surface,
- Then pull off the tape,
- Use the naked eye to examine the grid lined surface of the coating,
- Assess the bonding strength of the coating in relation to the classification of results table (NF EN ISO 2409, Table 1).

Required characteristics

The coating's bonding strength must satisfy classification 1, corresponding to a "*Breaking off of small flakes of coating where the incisions intersect. Less than 5% of the grid lined zone is affected*." "

Tensile test

This test is only applicable to coating thicknesses > 250 µm.

Operating procedure

It is carried out as described in the NF EN ISO 4624 standard.

- Glue a 20 mm diameter pad to the coating,
- Wait for the glue to dry,
- Make an incision in the periphery of the bonded area,
- Measure the force required to unstick the pad from the surface.

Required characteristics

The bonding strength of a coating must reach a value of at least 8 MPa.

4.6. Non-porosity

The test consists of looking for possible pores in the coating the medium.

Two types of detectors can be used depending on the average thickness :

- Low voltage wet sponge detector (9V or 90V to be defined between the interested parties) for average thicknesses less than 500 µm,
- High voltage electric brush detector (1kV to 30kV) for average thicknesses greater than or equal to 250 µm,

Operating procedure

Carry out the tests in accordance with NF EN ISO 29601 (chapter 5).

Required characteristics

Absence of porosity over the entire controlled surface.

Case of the electric broom test:

During an electrical brush test, the voltage is adjusted to the value given in the table below corresponding to the average thickness determined by the tests described in 4.3.

If a spark is observed during this preliminary test, the test will be repeated on the basis of the average thickness value specified by the manufacturer. Compliance will be assessed on this second test.

Table 2 – Voltage scale for non-porosity test

Average measured thickness (µm)	Test voltage (kV)
E ≤ 500	2,3
500<E≤600	2,9
600<E≤700	3,5
700<E≤800	4
800<E≤900	4,5
900<E≤1000	5
1000<E≤1100	5,5
1100<E≤1200	6,5
1200<E≤1300	7

4.7. Impact resistance test

The test consists of checking the resistance of the coating to the impact of a given mass falling perpendicular to the surface at a given height to generate a shock with an energy of 5Nm ± 5%.

Operating procedure

- The test is carried out on the part at ambient temperature,
- First complete a porosity test to verify the absence of defective points,
- Complete according to the NF EN ISO 6272-1 standard, on a flat surface with:
    - a 1 kg steel mass equipped with a spherical indenter (25 ± 0.3) mm in diameter, falling from a height of 0.5 m,

or

    - a 0.5 kg steel mass equipped with a spherical indenter (25 ± 0.3) mm in diameter, falling from a height of 1 m.

Required characteristics

- Use the naked eye to examine the coating. It must not show signs of cracking or detachment or any other visible defect at the location of the impact.
- Verify the coating's continuity using a porosity test (article 4.6).

4.8. Test of resistance to accelerated ageing

The test consists of subjecting samples to continuous radiation from a xenon arc lamp.

Only the above-ground parts of pillar fire hydrants and suction devices undergo this test.

The test is carried out as described in standard NF EN 16474-2 (method A) for 500 hours, under the following conditions:

- relative humidity: 50%
- light wattage:
    - 60 W/m² (300 – 400 nm) or
    - 550 W/m² (290 – 800 nm) or

- 0.51 W/(m².nm) (340 nm)

- black standard temperature (BST): (65 ± 3) °C
- demineralised water or water from the water network
- temperature of the test chamber: (38 ± 3) °C
- cycles of 18 minutes in exposure medium and 102 minutes in dry medium

At the end of the test, rinse the samples with demineralised water and verify the variation of the:

- gloss (according to standard NF EN ISO 2813) at an angle of 60°,

If the surface is too small or not accessible enough to enable a measurement with the instrument, the gloss is to be compared visually to that of the reference sample, at the same angle of observation.

- colour change (measurement of ΔE CIELAB formula according to standard NF EN ISO 11664-4).

The colour shall be measured on the test pieces submitted for the test, as well as on the control test pieces at three points, at least 50 mm away from one another.

The value of ΔE is calculated on a minimum of 5 measurements.

Required characteristics

- The loss of gloss shall be less than 50% of the initial value
- The colour change shall not exceed 10 at an observation angle of 10° between the test pieces subjected to the test and the control test pieces.

4.9. Corrosion resistance test

Salt spray test

This test is designed to qualify the external protective coating with regard to the ambient atmosphere.

It shall be carried out in accordance with the NF ISO 9227 standard,

- away from areas where paint has collected or run,
- for 480 hours,
- in Neutral Salt Spray (NSS) for iron structures

Example of relevant products: Valves intended for underground, above-ground or valve chamber use; Above-ground parts of fire hydrants, etc.

- to Acetic Acid Salt Spray (AASS) for aluminium alloy structures

Example of relevant products: fire hydrant housing, etc.

Operating procedure

On each sample, the coating shall be engraved down to the metal with an inverted “V” (Λ) (see annex 2):

- with a line width of at least 1 mm,
- a height of at least 50 mm,
- and an angle of about 60°.

Required characteristics

At the end of the test, the parts shall be examined and assessed according to the following:

- standard NF EN ISO 4628-2 for blistering,
- standard NF EN ISO 4628-3 to characterise rusting,
- and standard NF EN ISO 2409 or NF EN ISO 4624 for the bonding strength of the film.

The corresponding specifications depend on the thickness of the film, as indicated below:

Evaluation criteria and specifications	**t ≤ 70 µm**	**t > 70 µm**
Level of rusting	≤ Ri 2	≤ Ri 1
Level of blistering	size ≤ S2 and degree ≤ 2	
Film bonding strength (grid lines)	class ≤ 1	class ≤ 1 (t ≤ 250 µm)
Film bonding strength (removal)		> 6 MPa (t > 250 µm)
Spread of rust under the primer level coating at Λ	≤ 10 mm total	

Water immersion test

This test is designed to qualify the internal protective coating with regard to immersion in water. It shall be carried out in accordance with the NF EN ISO 2812-2 standard,

- Temperature: 40 °C
- Exposure time: 480 hours, regardless of the outside environment of the material (underground or above-ground products)
- Demineralised water.

Operating procedure

On each sample, the coating shall be engraved down to the metal with an inverted “V” (Λ) (see annex 2):

- with a line width of at least 1 mm,
- a height of at least 50 mm,
- and an angle of about 60°.

Required characteristics

At the end of the test, the parts shall be examined and assessed according to the following standard(s):

- NF EN ISO 4628-2 for blistering,
- NF EN ISO 4628-3 to characterise rusting,
- and NF EN ISO 2409 or NF EN ISO 4624 for the bonding strength of the film.

Intersections or individual points (interfaces, holes, etc.) are not taken into account.

The corresponding specifications depend on the thickness of the film, as indicated below:

Evaluation criteria and specifications	**e ≤ 70 µm**	**e > 70 µm**
Level of rusting	≤ Ri 2	≤ Ri 1
Level of blistering	size ≤ S2 and degree ≤ 2	
Film bonding strength (grid lines)	class ≤ 1	class ≤ 1 (e ≤ 250 µm)
Film bonding strength (removal)		> 6 MPa (e > 250 µm)
Spread of rust under the primer level coating in Λ	≤ 10 mm total	

II. VERIFICATION OF CONFORMITY

1 Tests for initial qualification and for subsequent qualification inspection

The purpose of these tests is to assess the corrosion protection system's suitability for satisfying the necessary performance requirements based on the application technique and the implementation process.

The definitions are below:

- Qualification test: a type of initial test of the product, carried out to prove that the product satisfies the performance specifications. It is carried out before the product is placed on the market and after each significant modification of a parameter or of a component that might influence the coating's quality.
- Subsequent qualification inspection: a test carried out during a periodic inspection (at least once each year) to ensure the consistency of the performances of the process and of the final product.

Table below lists the tests to be performed, as part of the tests for qualification and subsequent qualification inspection, depending upon the application.

Table 3: Qualification tests and subsequent qualification inspection

Article of this document	**External coatings**		**Interior coatings**	**Test on test specimen**
	Above-ground parts of fire hydrants (*)	**Underground parts of valves and fittings of water supply systems (*)**	**of valves and fittings of water supply systems (*)**	
Audit, procedure and quality assurance plan	X	X	X	
4.3 Thickness of the coating	X	X	X	
4.4 Checking the degree of polymerisation	X (***)	X	X	
4.5 Checking the Bonding Strength of the Film	X	X	X	
4.6 Non-porosity	X	X	X	
4.7 Impact resistance test	X	X	X	
4.8 Test of resistance to accelerated ageing (**)	X (****)			X
4.9 Corrosion resistance test Salt spray test	X	X		
Water immersion test			X	

(*): The tests may be performed on the product or on a sample taken from the product.
(**) : During the follow-up qualification tests, the conformity of the test is evaluated with respect to the average thickness of the sample tested by applying the voltage indicated in table 2. If a spark is observed during this pre-test, the test shall be repeated based on the nominal thickness value specified by the manufacturer. Its compliance will be assessed on this second test.

(***):For polyester coatings, only the loss of gloss on the tested product is assessed visually; the deposit observed on the fabric is not included in the conformity assessment.

(****): This test is carried out every 5 years or in the event of a change in process or supplier.

2 Products subjected to tests

The quality certification procedure shall specify the nature of the products to be tested based on the following recommendations:

- The products to be tested shall be sampled from a production batch manufactured in accordance with the manufacturing methods appropriate for the final end use of the product.
- The size and the morphology of the sampled products shall be consistent with the method used to test the accelerated corrosion performance and shall allow the results to be evaluated.

It is permissible that the ageing test be carried out on test specimens, the dimensions of which are specified in Annex 1. The test specimens, being of the same material nature as the product, must be positioned on a standard product to follow the same surface preparation and coating process.

The product's positioning accessories shall also be tested.

A positioning accessory is a part or a device that is fixed to the positioning rod of the plugging system of the valve and fitting item considered.

This accessory is designed to facilitate the positioning of the plugging device.

The following can be mentioned in this respect:

- positioning key.
- Handwheel.
- positioning unit.
- angular gear.
- Reducer.
- electric, pneumatic, hydraulic actuator.
- …

Apart from the actuators, the accessories' performances are the entire responsibility of the manufacturer of the valve and fitting devices onto which these accessories are fixed.

3 Quality assurance in production

These operations are intended to ensure that the products manufactured are presumed to be in conformity with the products qualified. The basic principle consists in ensuring that the protection system applied has not changed and that its application leads to the same results.

The manufacturer will need to prove its proficiency in the use of the coating system and of its application process.

Testing operations during production shall be carried out in accordance with the manufacturer's quality system, after CSTB's agreement.

The Table summarizes the checks to be carried out during production and defines a minimum frequency.

Table 4 - Quality assurance in production

Type of control	Prescription	Test	Minimum frequency
4.1 Surface preparation	Sa 2,5	Visual	100 %
4.2 Appearance and uniformity of the coating	Uniform, free of ponholes and bubbles	Visual	100 %
4.3 Coating thickness	Average ≥ manufacturer's specification	Non-destructive device	Once/shift and/or per type of process
4.4 Control of the degree of polymerization(*)	Annex 4	Ketone type solvent (MIBC, MEC...) or specified by the coating manufacturer	Once/shift and/or per type of process

4.6 Non-porosity	No spark	High or low voltage detectors according to average thickness	Once/shift and/or per type of process
4.7 Impact test (*)	Absence of cracking or detachment	Shock at 5 Nm	Once/shift and/or per type of process

The frequency and type of product tested must be indicated by the manufacturer in his control plan.

(*) A test with scotch tape can be carried out..

(**) These tests should be carried out when the part has returned to room temperature (<40°C) and polymerisation is complete.

III. REFERENCE FILE

The reference file, drawn up by the manufacturer, shall ensure that the following specific information is available:

- the corrosion protection system;
- the implementation process;
- the production control plan;
- the performances.

The file shall include the following:

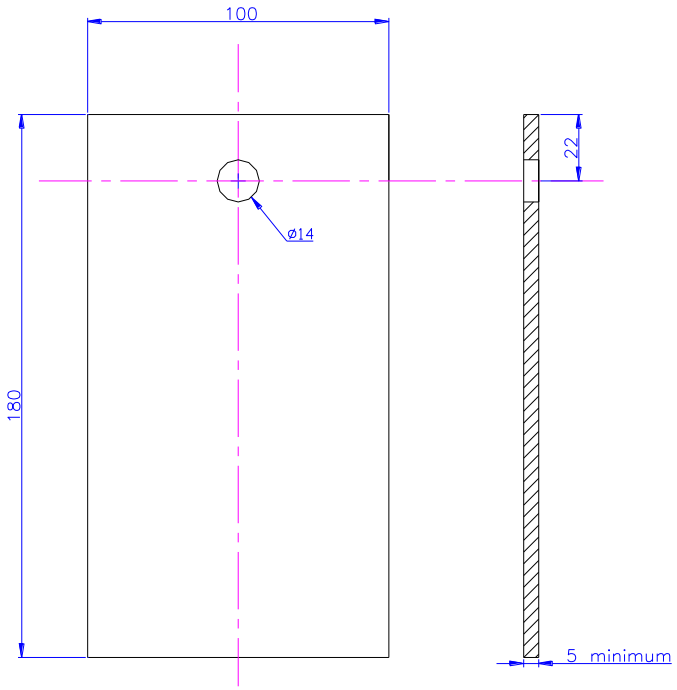
- the definition of the protection system: nature of the coating, thickness, number of layers, etc.;
- the application process, part preparation job breakdown, application job breakdowns, etc.;
- the production control plan specifying the tests performed as well as their frequency;
- the rating report based on the results of the performance tests.

Any modification of an element affecting the final result will need to undergo a new qualification of that model.

IV. APPENDICES

ANNEX 1
Test specimen dimensions

The test specimens shall be flat and have the dimensions specified below.



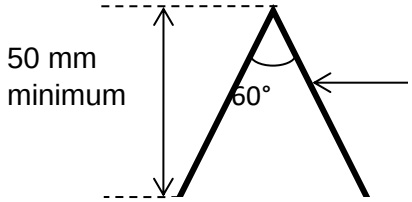
Recommended dimensions (in mm)

General tolerance: +/- 1 mm

Nature of the material identical to what is used for the valves and fittings of water supply systems.

Figure 1 – Geometrical characteristics of the test specimens for the corrosion test

ANNEX 2
Cut for the corrosion test



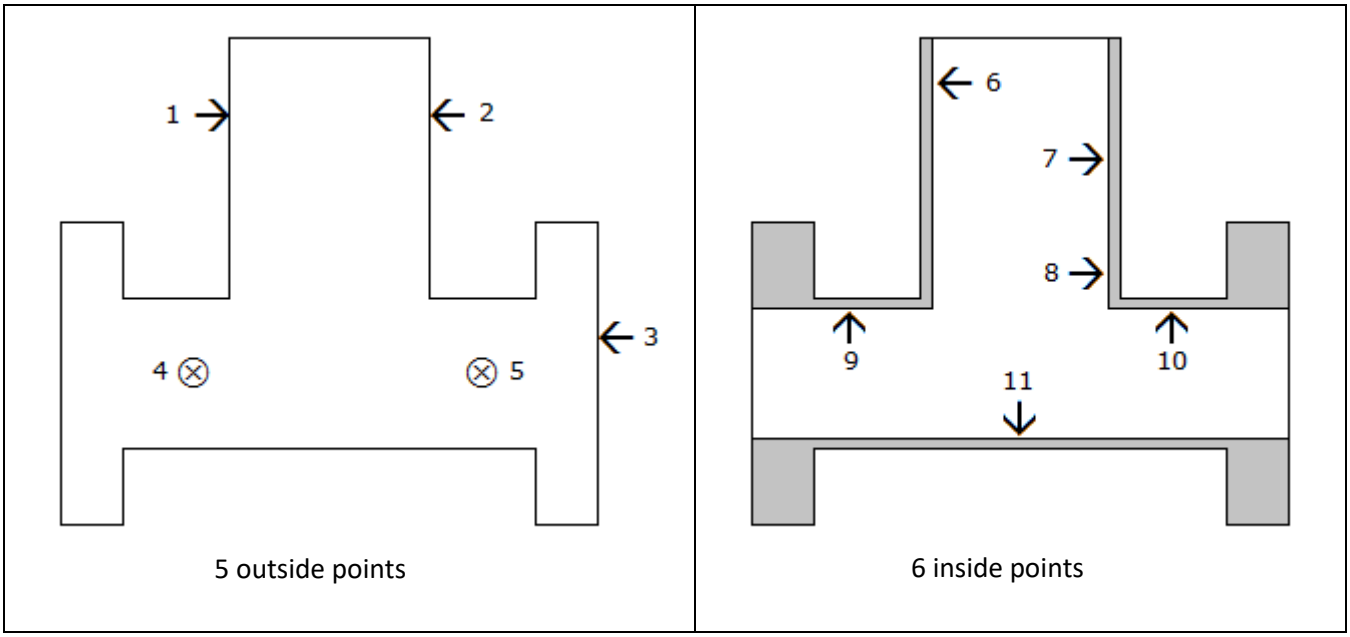
Cut width: 1 mm

The cut must reach the metal.

Recommended dimensions for test specimens:

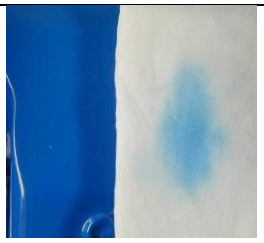
- length: 180 mm
- width: 100 mm
- General tolerance: ± 1 mm

ANNEX 3
Example of a coating thickness check



Locating measurement points on a valve

ANNEX 4
Example transfer scale for testing the degree of polymerisation

Level	Transfer degree	Comment	State of the cotton cloth	Deviation Δ(Tg)
1	Unchanged	transfer		= 0
2	Slight	perceptible transfer		≤ 5
3	Medium	very perceptible transfer: additional test		> 5
4	Very definite	Extreme transfer: poor polymerisation		>> 5