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**Ductile iron pipelines — Rubber sealing  
rings for pipelines carrying potable water**

**iTeh STANDARD PREVIEW**  
*Canalisations en fonte ductile — Bagues d'étanchéité en caoutchouc pour  
canalisations véhiculant de l'eau potable*  
**(standards.iteh.ai)**

ISO 10221:1993

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## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10221 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Sub-Committee SC 2, *Cast iron pipes, fittings and their joints*.

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# Ductile iron pipelines — Rubber sealing rings for pipelines carrying potable water

## 1 Scope

This International Standard lays down the material specifications of solid vulcanized rubber sealing rings used in ductile iron pipelines carrying potable water. It also specifies requirements for their effect on the organoleptic properties (colour, taste and odour) and the total organic carbon content of water.

In the case of composite seals (which comprise, for example, both rubbers which are rigid and rubbers which are flexible), this International Standard is applicable only to the requirement for their effect on the total organic carbon content of water.

Cellular and closed-cell rubber seals are not covered by this International Standard.

NOTE 1 This International Standard is applicable only in the absence of more stringent national standards and regulations.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4633:1983, *Rubber seals — Joint rings for water supply, drainage and sewerage pipelines — Specification for materials*.

ISO 7887:1985, *Water quality — Examination and determination of colour*.

ISO 8245:1987, *Water quality — Guidelines for the determination of total organic carbon (TOC)*.

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 base liquid; initial test liquid:** Liquid used for the organoleptic tests and for the total organic carbon test.

**3.2 test liquid:** Base liquid in which the test specimen is immersed for 24 h, and which is examined for the determination of certain characteristics.

**3.3 blank test liquid; control liquid:** Base liquid that has been treated simultaneously with, and under identical conditions to, the test liquid but in which no test specimen has been immersed.

## 4 Requirements

### 4.1 Material specifications

The material shall meet the requirements specified in ISO 4633 except the second sentence of subclause 4.2.

### 4.2 Effect of the material on the organoleptic properties and the total organic carbon content of water

#### 4.2.1 Effect on organoleptic properties

##### 4.2.1.1 Colour

The difference in colour between each of the test liquids and the blank test liquid shall not exceed 5 mg/l Pt (standard units of colour). In addition, at least two of the three differences in colour shall be less than or equal to 5 mg/l Pt.

#### 4.2.1.2 Taste

There shall be no perceivable difference in taste between the blank test liquid and the sample test liquid.

#### 4.2.1.3 Odour

There shall be no perceivable difference in odour between the blank test liquid and the sample test liquid.

#### 4.2.2 Effect on total organic carbon (TOC) content

The mean of the differences between the total organic carbon content of each of the test liquids and the total organic carbon content of the blank test liquid shall not exceed 3 mg/l.

### 5 Sampling

#### 5.1 Material specifications

Sampling shall be carried out in accordance with ISO 4633.

#### 5.2 Effect of the material on the organoleptic properties and the total organic carbon content of water

By preference, the test specimens should be rubber plates of 2 mm thickness, prepared from the same batch of rubber mix used for the production of joint seals, and vulcanized under conditions which are comparable to those used in production.

Test specimens cut from joint seals may also be used.

Prepare three test specimens with the following dimensions for each test:

- a) for the organoleptic tests (i.e. 9 specimens): 20 mm × 21 mm × 2 mm;
- b) for the total organic carbon test (i.e. 3 specimens): 55 mm × 42 mm × 2 mm.

Store freshly prepared test specimens in air for 4 weeks at ambient temperature before testing.

### 6 Test methods

#### 6.1 Material specifications

The material shall be tested in accordance with ISO 4633.

#### 6.2 Effect of the material on the organoleptic properties and the total organic carbon content of water

##### 6.2.1 Principle

Determination of the effect of the material on the colour, odour, taste and total organic carbon content of water by immersion of the test specimens in a base liquid for 24 h at laboratory temperature. Up to three such immersions are carried out.

##### 6.2.2 Reagents

**6.2.2.1 Disinfectant**, comprising 25 mg/l of chlorine in water.

**6.2.2.2 Base liquid for the colour test**, comprising 420 mg/l of sodium bicarbonate in distilled water.

**6.2.2.3 Base liquid for the taste and odour tests**, comprising 420 mg/l of sodium bicarbonate and 0,5 mg/l of chlorine in distilled water.

**6.2.2.4 Base liquid for the total organic carbon test**, comprising demineralized or distilled water.

**6.2.2.5 Sodium thiosulfate**, 0,1 mol/l solution.

##### 6.2.3 Apparatus

**6.2.3.1 Conical flasks**, of capacity suitable for accommodating the test specimens (5.2), provided with odourless stoppers.

**6.2.3.2 Glass supports**, of dimensions suitable to fit in the conical flasks (6.2.3.1), for supporting the test specimens.

##### 6.2.4 Preparation of test specimens

**6.2.4.1** Wash the test specimens in flowing tap water for at least 2 min.

**6.2.4.2** To simulate the disinfection carried out on a pipeline in service, immerse the test specimens for 24 h in a volume of the chlorine solution (6.2.2.1) calculated in accordance with the ratio of surface area to volume specified in 6.2.5.

**6.2.4.3** Store the test specimens in distilled or demineralized water for 1 week, using a volume of water calculated in accordance with the ratio of surface area to volume specified in 6.2.5.

##### 6.2.5 Ratio of surface area to volume

The ratio of the specimen total surface area to the volume of liquid shall be as follows.

- a) For the organoleptic tests: 0,1 dm<sup>2</sup>/l.

For example, for a test specimen of dimensions 20 mm × 21 mm × 2 mm, the total surface area is 0,1 dm<sup>2</sup> and therefore the volume of liquid shall be 1 l.

NOTE 2 The ratio 0,1 dm<sup>2</sup>/l represents the worst case occurring in practice, i.e. a DN 40 pipeline with a joint every 3 m.

- b) For the total organic carbon determination: 2,5 dm<sup>2</sup>/l.

For example, for a test specimen of dimensions 55 mm × 42 mm × 2 mm, the total surface area is 0,5 dm<sup>2</sup> and therefore the volume of liquid shall be 0,2 l.

NOTE 3 A ratio 25 times that in a) is selected in order to obtain test TOC values which are well above the detection limit of the method.

## 6.2.6 Colour test

### 6.2.6.1 Procedure

**6.2.6.1.1** Add to each of three conical flasks (6.2.3.1) the volume of base liquid (6.2.2.2) calculated in accordance with the ratio of surface area to volume specified in 6.2.5, a glass support (6.2.3.2) and a test specimen.

**6.2.6.1.2** Prepare a blank by adding to a fourth conical flask the same volume of the base liquid (6.2.2.2) and a glass support.

**6.2.6.1.3** Fit the stoppers to the flasks and leave them to stand for 24 h at laboratory temperature.

### 6.2.6.2 Determination

Determine the colour of the test liquid in each of the four flasks in accordance with the visual method specified in ISO 7887:1985, section two.

## 6.2.7 Taste and odour tests

### 6.2.7.1 Procedure

**6.2.7.1.1** For each test, add to each of three conical flasks (6.2.3.1) the volume of base liquid (6.2.2.3) calculated in accordance with the ratio of surface area to volume specified in 6.2.5, a glass support (6.2.3.2) and a test specimen.

**6.2.7.1.2** For each test prepare a blank by adding to a fourth conical flask the same volume of the base liquid (6.2.2.3) and a glass support.

**6.2.7.1.3** Fit the stoppers to the flasks and leave them to stand for 24 h at laboratory temperature.

**6.2.7.1.4** Eliminate all free active chlorine in the base liquid in each conical flask by adding a volume of the sodium thiosulfate solution (6.2.2.5) equivalent to the chlorine present.

### NOTES

4 As a guide, 0,14 mg (3 drops) of the sodium thiosulfate solution (6.2.2.5) are normally sufficient to eliminate 0,5 mg/l of free active chlorine.

5 Normally, the quantity of free active chlorine remaining after a test period of 24 h will be less than 0,5 mg/l. However, even if all chlorine has been consumed during the test, an excess of 3 drops of the sodium thiosulfate solution (6.2.2.5) will not modify the taste and odour of the base liquid in a perceptible manner.

## 6.2.7.2 Determination

### 6.2.7.2.1 Taste

**6.2.7.2.1.1** Constitute a tasting panel of three people certified by a competent authority.

**6.2.7.2.1.2** Transfer approximately 100 ml of the test liquid from each of the four flasks to four separate beakers, indicating which beaker contains the blank test liquid. Ask the three panel members to note whether they perceive any difference in taste between the blank test liquid and each of the sample test liquids respectively.

**6.2.7.2.1.3** Determine which of the responses (positive or negative) is in the majority, and take this as the test result.

### 6.2.7.2.2 Odour

**6.2.7.2.2.1** Constitute a panel of three people certified by a competent authority.

**6.2.7.2.2.2** Ask each of the panel members to determine whether they perceive any difference in odour between the blank test liquid and each of the sample test liquids respectively by carrying out the following procedure.

Select the conical flask containing the blank test, shake the contents vigorously, remove the stopper and sniff the contents. Then select a conical flask containing a test sample, repeat the operations described above and note whether any difference in odour is perceived. Carry out this comparison of the blank test with the two other sample test liquids.

**6.2.7.2.2.3** Determine which of the responses (positive or negative) is in the majority, and take this as the test result.

## 6.2.8 Total organic carbon test

### 6.2.8.1 Procedure

**6.2.8.1.1** Add to each of three conical flasks (6.2.3.1) the volume of distilled or demineralized water (6.2.2.4) calculated in accordance with the surface area to volume ratio specified in 6.2.5, a glass support (6.2.3.2) and a test specimen.

**6.2.8.1.2** Prepare a blank by adding to a fourth conical flask the same volume of distilled or demineralized water (6.2.2.4) and a glass support.

**6.2.8.1.3** Fit the stoppers to the flasks and leave them to stand for 24 h at laboratory temperature.

### 6.2.8.2 Determination

Determine the total organic carbon content of the test liquid in each of the four flasks in accordance with ISO 8245.

## 6.2.9 Acceptance criteria

Determine whether the test results found in 6.2.6.2, 6.2.7.2.1, 6.2.7.2.2 and 6.2.8.2 meet the requirements specified in 4.2.1.1, 4.2.1.2, 4.2.1.3 and 4.2.2 respectively.

If one or several of the requirements is/are not met for all the test specimens, discard the unsatisfactory test results and repeat the corresponding test or tests (i.e. carry out a second test procedure) using the same test specimens but using fresh base liquid. Determine whether the test results thus found meet the requirements specified in 4.2.1 and 4.2.2.

If one or several of the requirements is/are not met for all the test specimens, discard the unsatisfactory test results and repeat the corresponding test or tests (i.e. carry out a third test procedure) using the same test specimens but using fresh base liquid. Determine whether the test results thus found meet the requirements specified in 4.2.1 and 4.2.2.

If one or several of the requirements is/are not met for all the test specimens after the third test procedure, the material shall be deemed not to meet the requirements of this International Standard.

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