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INTERNATIONAL STANDARD ISO 3114

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Unplasticized polyvinyl chloride (PVC) pipes for potable water supply — Extractability of lead and tin — Test method

Tubes en polychlorure de vinyle (PVC) non plastifié pour l'alimentation en eau potable — Extractibilité du plomb et de l'étain — Méthode d'essai

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3114 was drawn up by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids,* and was circulated to the Member Bodies in May 1973.

It has been approved by the Member Bodies of the following countries :

Australia	Ireland	Portugal
Austria	Israel	Romania
Belgium	Italy	Spain
Bulgaria	Japan	Sweden
Czechoslovakia	Korea, Dem. P. Rep. of	Switzerland
Denmark	Mexico	Thailand
Egypt, Arab Rep. of	Netherlands	Turkey
Finland	Norway	United Kingdom
India	Poland	Yugoslavia

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Canada
U.S.A.

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Unplasticized polyvinyl chloride (PVC) pipes for potable water supply — Extractability of lead and tin — Test method

0 INTRODUCTION

Studies concerning the extractability of lead and tin from unplasticized PVC pipes are being continued. They could lead to the drafting of further requirements which will be included in this International Standard either in the form of an addendum or at the time of its revision.

1 SCOPE

This International Standard specifies a method of test for the determination of the extractability of certain stabilizers of unplasticized PVC in order to verify that the extracted quantities do not exceed a certain concentration.

2 FIELD OF APPLICATION

This test method applies to unplasticized PVC pipes intended for the transport of potable water. It only relates to the extractability of two types of stabilizer :

— lead salts;

— organic derivations of tin, mainly dialkyl tin, C_4 and higher homologues.

3 PRINCIPLE

Pre-washing of tubular test pieces during a fixed time. Filling of the test pieces with acidified distilled water, and determination of the quantity of the extracted stabilizer after a fixed time.

NOTE — The methods to be used for the determination of the quantity of material taken into solution are not laid down. They shall, however, allow the analysis to be carried out with a precision of 0,01 mg/l for lead and of 0,001 mg/l for tin.

4 APPARATUS

4.1 Lengths of glass pipe, fitted with a glass stopcock.

4.2 Stoppers of polyethylene or any other material which will not affect the test results.

4.3 Distilled water, acidified to a pH of 4,5 ± 0,1 by bubbling a current of carbon dioxide through it.

5 TEST PIECES

For each test, take three pieces of the pipe, each 500 mm in length and with an internal volume at least equal to the volume of the extracting liquid required to determine the amount of dissolved material with the required precision.

6 PROCEDURE

6.1 Pre-washing

6.1.1 Close one end of each test piece with one of the stoppers, fitted centrally with one of the lengths of glass pipe fitted with a stopcock.

6.1.2 Place the test pieces vertically with the open end upwards.

6.1.3 Let tap water with a pH of 7 to 8 flow into the test pieces in such a way that the rate of flow, regulated with the aid of the stopcock, is equal to 3 m/min and the test pieces are continuously filled with water.

6.1.4 Maintain the water flow during a fixed period of between 1 and 6 h.

6.1.5 At the end of this period, stop the water flow, remove the stoppers and rinse out the test pieces with distilled water.

6.2 Extractability test

6.2.1 Close one end of each test piece which has been subjected to the pre-washing, using a stopper.

6.2.2 Fill each test piece with distilled water (4.3).

NOTE — For each series of tests, use fresh distilled water (4.3).

Close the other end by means of a stopper and maintain the filled test pieces at 20 ± 2 °C for 48 h.

6.2.3 *First extraction :* At the end of 48 h, empty the water from the test pieces into suitable containers and determine the quantity of lead if this is the sample for lead determination.

6.2.4 *Second extraction :* Fill the test pieces again with fresh acidified water (4.3) and maintain the test pieces, after having closed them again, at 20 ± 2 °C for 48 h. At the end of this period, pour the water out of the test pieces.

having closed them again, at 20 ± 2 °C for 48 h. At the end of this period, pour the water out of the test pieces.

6.2.5 *Third extraction :* Refill the test pieces for the third time under the same conditions as described for the preceding extractions. At the end of 48 h, empty the water into suitable containers and, depending on the substance to be determined, proceed to the second determination of the quantity of lead or to the determination of the quantity of tin.

7 EXPRESSION OF RESULTS

7.1 Lead

7.1.1 Calculate for the three test pieces the arithmetic mean of the quantities of lead found in the extracts after the first and the third extraction.

7.1.2 Express the results in milligrams per litre, with a precision of 0,02 mg/l.

7.2 Tin

7.2.1 Calculate for the three test pieces the arithmetic mean of the quantities of tin found in the extracts after the third extraction.

7.2.2 Express the results in milligrams per litre, with a precision of 0,004 mg/l.

8 TEST REPORT

The test report shall include the following information :

a) complete identification of the pipe tested;

b) the number of test pieces;

c) the method used for the determination of the quantity of lead in aqueous solution;

d) the method used for the determination of the quantity of tin in aqueous solution;

e) the quantities of extracted lead found for each test piece after the first and the third extractions;

f) the arithmetic mean of the quantities of extracted lead for the pipe after the first and the third extractions;

g) the quantities of extracted tin found for each test piece after the third extraction;

h) the arithmetic mean of the quantities of extracted tin for the pipe after the third extraction;

i) details of the procedure which have not been provided for by this test method, and also any accidental circumstances which might have affected the results.