# International Standard 4433

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION



# Polyolefin pipes — Resistance to chemical fluids — Immersion test method — System for preliminary classification

*Tubes en polyoléfines — Résistance aux fluides chimiques — Méthode d'essai par immersion — Système de classification préliminaire*

**First edition — 1984-07-15**

**UDC 621.643.29 : 678.742.2 : 620.193.4** **Ref. No. ISO 4433-1984 (E)**

**Descriptors** : plastic tubes, polyolefines, tests, immersion tests, determination, chemical resistance, classifications.



Price based on 13 pages

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (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 authorized 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 4433 was developed 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 1983.

It has been approved by the member bodies of the following countries :

| | | |
|---|---|---|
| Australia | India | Romania |
| Austria | Israel | South Africa, Rep. of |
| Belgium | Italy | Spain |
| Canada | Japan | Sweden |
| Czechoslovakia | Morocco | Switzerland |
| Finland | Netherlands | United Kingdom |
| France | Norway | USA |
| Germany, F. R. | Poland | USSR |

No member body expressed disapproval of the document.



Printed in Switzerland

# Contents


Page

**0** Introduction ..... 1

**1** Scope and field of application ..... 1

**2** References ..... 1

**3** Symbols ..... 2

**4** Principle of method ..... 2

**Section one : Test method**

**5** General test conditions ..... 3

**6** Immersion test procedure ..... 4

**7** Determination of the change in mass as a function of the immersion period ..... 5

**8** Determination of changes in tensile properties ..... 6

**Section two : System for preliminary classification**

**9** Classification in the general case on basis of yield strengths ..... 8

**10** Classification modified by certain particular cases ..... 8

**11** Report ..... 9

**Annexes**

**A** Change in mass-curve ..... 10

**B** Change of mass with time of immersion — Types of curves ..... 11

**C** Classification diagram — General case ..... 12

**D** Example of report ..... 13

# Polyolefin pipes — Resistance to chemical fluids — Immersion test method — System for preliminary classification



## 0 Introduction

Because of their varied applications, polyolefin pipes are frequently required to convey or be in contact with chemical products, fuels, lubricants, etc. and sometimes their vapours.

Under the action of a liquid, the wall of a polyolefin pipe can be the location for several concurrent phenomena; on the one hand, absorption of liquid and/or extraction of its soluble constituents from the pipe walls into the liquid; on the other hand, a chemical reaction usually involving a significant change in the properties of the pipe. The phenomena also differ according to the external and internal stresses affecting the pipes conveying the products (temperature, pressure, wall thickness, etc.).

By stresses are meant those forces caused by internal or external factors such as temperature, variation of temperature, inside pressure, bending, internal stresses, etc. Internal stress could be caused, for instance, by fast quenching of thick-walled pipes.

The extrapolation of the results obtained with this method, to any kind of pipes, can be made only when strong internal stresses are not induced in the pipes.

As the conditions of use vary a great deal, it is important to carry out a preliminary determination of the chemical resistance of polyolefin pipes by means of simple, straightforward tests.

The purpose of this International Standard is to provide :

— a procedure;

— a standardized system for preliminary classification relating to the behaviour of pipes in relation to the chemical agents directly applicable to the transport of fluids in the absence of pressure.

If the pipes are to be used under stress, for example for transporting fluids under pressure, the method only allows incompatibilities between the fluid and the material to be detected; a "satisfactory" or "limited" result must be confirmed by subsequent tests according to a method under study in TC 138/SC 3, with the "corrosion factor" being determined under stress.

Some fluids may induce environmental stress-cracking effects.[1)]

## 1 Scope and field of application

**1.1** This International Standard specifies a method to be used when carrying out a preliminary evaluation of the behaviour of polyolefin pipes in relation to the chemical fluids transported.

**1.2** This standardized method of classification provides information on the suitability of pipes for transporting chemical fluids in the absence of pressure or stresses (earth loads, dynamic stresses, internal stresses, etc.).

**1.3** A full procedure for carrying out the test is also reported in ISO 175, devoted to plastics in general, not in particular to polyolefin pipes.

## 2 References

ISO 175, *Plastics — Determination of the action of liquid chemicals, including water.*

ISO 527, *Plastics — Determination of tensile properties.*[2)]

ISO 1516, *Paints, varnishes, petroleum and related products — Flash/no flash test — Closed cup equilibrium method.*

ISO 3680, *Paints, varnishes, petroleum and related products — Flash/no flash test — Rapid equilibrium method.*

ISO 4451, *Polyethylene (PE) pipes and fittings — Determination of reference density of uncoloured and black polyethylene.*

ISO 6259, *Polyethylene (PE) pipes — Determination of tensile properties.*[3)]

1) For these cases, see ISO 4600 and ISO 4652.

2) At present at the stage of draft. (Revision of ISO/R 527-1966.)

3) At present at the stage of draft.