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## Rubber, vulcanized or thermoplastic — Determination of the effect of liquids

*Caoutchouc vulcanisé ou thermoplastique — Détermination de l'action  
des liquides*



Reference number  
ISO 1817:2011(E)

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## Contents

Page

Foreword .....	iv
Introduction.....	v
1 Scope .....	1
2 Normative references.....	1
3 Apparatus .....	1
4 Calibration.....	3
5 Test liquids.....	3
6 Test pieces .....	3
6.1 Preparation.....	3
6.2 Dimensions .....	4
6.3 Time interval between vulcanization and testing.....	4
6.4 Conditioning .....	4
7 Immersion in the test liquid.....	5
7.1 Temperature.....	5
7.2 Duration.....	5
8 Procedure.....	5
8.1 General .....	5
8.2 Change in mass .....	6
8.3 Change in volume.....	6
8.4 Change in dimensions .....	7
8.5 Change in surface area .....	8
8.6 Change in hardness .....	8
8.7 Change in tensile stress-strain properties .....	9
8.8 Testing with liquid on one surface only.....	9
8.9 Determination of extractable matter .....	10
9 Test report.....	11
Annex A (normative) Reference liquids.....	12
Annex B (normative) Calibration schedule .....	15

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1817 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This fifth edition cancels and replaces the fourth edition (ISO 1817:2005), which has been technically revised principally to update the clause on reference oils (Clause A.2) and to include a calibration schedule for the apparatus used (see Annex B).

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## Introduction

The action of a liquid on vulcanized or thermoplastic rubber can generally result in:

- a) absorption of the liquid by the rubber;
- b) extraction of soluble constituents from the rubber;
- c) a chemical reaction with the rubber.

The amount of absorption [a]) is usually larger than that of extraction [b]) so that the net result is an increase in volume, commonly termed "swelling". The absorption of liquid can profoundly alter physical and chemical properties and hence change tensile strength, extensibility and hardness of the rubber, so it is important to measure these properties after treatment of the rubber. The extraction of soluble constituents, especially plasticizers and antidegradants, can likewise alter the rubber's physical properties and chemical resistance after drying (assuming the liquid to be volatile). Therefore, it is necessary to test these properties following immersion or drying of the rubber. This International Standard describes the methods necessary for determining the changes in the following properties:

- change in mass, volume and dimensions;
- extractable matter;
- change in hardness and tensile stress-strain properties after immersion and after immersion and drying.

Although in some respects these tests might simulate service conditions, no direct correlation with service behaviour is implied. Thus, the rubber giving the lowest change in volume is not necessarily the best one in service. The thickness of the rubber needs to be taken into account since the rate of penetration of liquid is time-dependent and the bulk of a very thick rubber product might remain unaffected for the whole of the projected service life, especially with viscous liquids. Moreover, it is known that the action of a liquid on rubber, especially at high temperatures, can be affected by the presence of atmospheric oxygen. The tests described in this International Standard can, however, provide valuable information on the suitability of a rubber for use with a given liquid and, in particular, constitute a useful control when used for developing rubbers resistant to oils, fuels, or other service liquids.

The effect of a liquid might depend on the nature and magnitude of any stress within the rubber. In this International Standard, test pieces are tested in an unstressed condition.