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

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

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This seventh edition cancels and replaces the sixth edition (ISO 1817:2015), which has been technically revised.

The main changes are as follows:

— Clause 2, normative references, has been updated;

— methods A to E have been defined and the apparatus to be used has been updated in Clause 4;

— the question about liquid replacement or not has been clarified in 9.2.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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 and drying of the rubber. This document 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 may 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 may 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 document 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 may depend on the nature and magnitude of any stress within the rubber. In this document, test pieces are tested in an unstressed condition.