TECHNICAL REPORT

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Second edition
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Plastics — Use of polyethylene reference specimens (PERS) for monitoring laboratory and outdoor weathering conditions

Plastiques — Utilisation d'éprouvettes de référence en polyéthylène pour l'évaluation des conditions de vieillissement climatique

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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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

This second edition cancels and replaces the first edition (ISO/TR 19032:2006), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the shipping address of PERS in 3.1 has been cancelled;

— a cautionary sentence has been added in Clause 4.

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 method described in this document demonstrates the use of polyethylene reference specimens (PERS) for monitoring conditions in weathering tests used for plastics. PERS has double bonds in its molecular structure, which are easily oxidized to produce carbonyl groups. The change in carbonyl index of PERS is produced by the combined effects of ultraviolet (UV) and temperature. Therefore, the carbonyl groups proportionally increase, depending on the received UV and temperature. Based on this relationship, the effect of UV radiation and temperature on PERS can be expressed quantitatively. For laboratory-accelerated exposures, PERS is also sensitive to changes in the chamber air temperature. The effect of moisture was not determined in the study.

Plastics — Use of polyethylene reference specimens (PERS) for monitoring laboratory and outdoor weathering conditions

1 Scope

This document describes a method that demonstrates the use of polyethylene reference specimens (PERS) for monitoring laboratory and outdoor conditions in weathering tests used for plastics.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Background information

Degradation of plastics in an outdoor environment is mainly influenced by the ultraviolet radiation received, environmental temperature, moisture, etc. Especially in photo-oxidation induced from ultraviolet radiation, temperature plays a very important role. Measuring the ultraviolet radiation during the exposure period is useful for comparison of the result of the exposure test, but it is not enough to compare the exposure results. Therefore, it is very important to find some index that can be used to evaluate the complex effect of received ultraviolet radiation and environmental temperature. PERS is used to characterize the level of combined effect of ultraviolet radiation and temperature, and its characteristic proportionally increases depending on the UV radiation and temperature received.

NOTE The test results presented in this document were generated with PERS from Japan Weathering Test Center 1-3-7 Shibakoen Minatoku Tokyo Japan. This material is no longer available. No new material has been qualified to be used as a replacement in this document at the time of its publication.

5 Material

5.1 General

PERS is high-density polyethylene polymerized using molybdenum dioxide as a catalyst, containing the trans-form vinylene group. Other basic properties are as follows:

— absorbance ratio of trans-form vinylene group to methylene group: 1,0 to 1,3;

— melt flow rate (2,16 kg, 190 °C): 0,2 g to 0,4 g/10 min;

— density: 950 kg/m^3 to 965 kg/m^3;

— thickness: (0,2 ± 0,02) mm.