



**ISO 877-1:2025(en)**

Second edition

2025-08

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## **Plastics — Methods of exposure to solar radiation —**

### **Part 1: General guidance**

*Plastiques — Méthodes d'exposition au rayonnement solaire —*

*Partie 1: Lignes directrices générales*

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## Contents

Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	2
4 Principle.....	2
5 Apparatus.....	3
5.1 General requirements.....	3
5.2 Apparatus for measurement of climatic factors.....	3
6 Test specimens.....	5
6.1 Form, shape and preparation.....	5
6.2 Number of test specimens.....	6
6.3 Conditioning and storage.....	6
7 Conditions of exposure of the test specimens.....	6
7.1 Classes of climate.....	6
7.2 Types of exposure used for specimens.....	7
8 Exposure stages.....	7
8.1 General considerations.....	7
8.2 Duration of exposure.....	7
8.3 Solar radiant exposure.....	7
9 Procedure.....	8
9.1 Mounting of test specimens.....	8
9.2 Mounting of reference materials.....	9
9.3 Climatic observations.....	9
9.4 Exposure of test specimens.....	9
9.5 Determination of changes in properties, if required.....	9
10 Expression of results.....	9
10.1 Determination of changes in properties.....	9
10.2 Levels (values) of exposure stages.....	10
10.3 Climatic conditions.....	10
11 Test report.....	10
Annex A (informative) Classification of climates.....	13
Bibliography.....	16

## 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.

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](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, *Plastics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 877-1:2009), which has been technically revised.

The main changes are as follows:

- addition of new term and definition ([Error! Reference source not found.](#)) "natural weathering";
- addition of a requirement for the area beneath and in the vicinity of racks in [5.1](#);
- addition of new NOTE 2 in 9.2 referring to ISO/TR 19032;
- addition of information to be included in the test report ([11](#)).

A list of all parts in the ISO 877 series can be found on the ISO website.

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](http://www.iso.org/members.html).

**This corrected version of ISO 877-1:2025 incorporates the following corrections:**

- in [6.1](#), information on test specimens have been corrected.**

## Introduction

Outdoor-exposure tests of the type specified in the ISO 877 series are needed to evaluate the performance of plastics when exposed to solar radiation. The results of such tests should be regarded only as an indication of the effect of exposure to direct weathering (ISO 877-2:2025, method A) or to indirect weathering using glass-filtered solar radiation (ISO 877-2:2025, method B) or to intensified solar radiation (ISO 877-3) by the methods described. Results from tests conducted in accordance with any of the parts of the ISO 877 series will show some variability when comparing results from repeat exposures conducted at the same location at a different time. This is much more important for materials that show significant change after a year or less of exposure. In general, results from repeat exposures at the same location are necessary to determine the range of performance of a material subjected to exposure to solar radiation as specified in the ISO 877 series. Since the type of climate can have a significant effect on the rate and type of degradation, results from exposures conducted in different types of climate are necessary to fully characterize the outdoor durability of a material. For solar-concentrating exposures conducted in accordance with ISO 877-3, exposure duration is defined in terms of the total solar UV radiant exposure. This reduces the effect of annual and seasonal variations in solar ultraviolet radiation.

Fresnel-reflecting concentrators of the type described in ISO 877-3, are utilized to intensify natural solar radiation, in an attempt to accelerate outdoor-exposure testing of plastics materials.

A system of classifying and characterizing climates in different parts of the world is given in [Annex A](#).

The test method chosen is usually that designed to expose the material to the most severe conditions associated with any particular climate. It should, therefore, be borne in mind that the severity of exposure in actual use is, in most cases, likely to be less than that specified in this document, and allowance should be made accordingly when interpreting the results. For example, vertical exposure at 90° from the horizontal is considerably less severe in its effects on plastics than near-horizontal exposure, particularly in tropical regions, where the sun is most powerful at high zenith angles.

Polar-facing surfaces are much less likely to be degraded than equator-facing surfaces because they are less exposed to solar radiation. However, the fact that they can remain wet for longer periods can be of significance for materials affected by moisture or for materials that are susceptible to microbial growth.

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# Plastics — Methods of exposure to solar radiation —

## Part 1: General guidance

### 1 Scope

This document provides information and general guidance on the selection and use of the methods of exposure to solar radiation described in detail in subsequent parts of the ISO 877 series. These methods of exposure to solar radiation are applicable to plastics materials of all kinds as well as to products and portions of products.

It also specifies methods for determining radiant exposure.

It does not include direct weathering using black-box test fixtures, which simulate higher end-use temperatures in some applications.

NOTE ASTM G7<sup>[0]</sup> and ASTM D4141<sup>[0]</sup> describe black-box exposure tests.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 472, *Plastics — Vocabulary*

ISO 877-2:2025, *Plastics — Methods of exposure to solar radiation — Part 2: Direct weathering and exposure behind window glass*

ISO 877-3, *Plastics — Methods of exposure to solar radiation — Part 3: Intensified weathering using concentrated solar radiation*

ISO 2818, *Plastics — Preparation of test specimens by machining*

ISO 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to glass-filtered solar radiation, natural weathering or laboratory radiation sources*

ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance and requirements*

ISO 9370, *Plastics — Instrumental determination of radiant exposure in weathering tests — General guidance and basic test method*

ISO 10640, *Plastics — Methodology for assessing polymer photoageing by FTIR and UV/visible spectroscopy*

ASTM G179, *Standard Specification for Metal Black Panel and White Panel Temperature Devices for Natural Weathering Tests*

ASTM G183, *Standard Practice for Field Use of Pyranometers, Pyrheliometers and UV Radiometers*