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**Optics and photonics — Environmental  
test methods —**

**Part 1:  
Definitions, extent of testing**

*Optique et photonique — Méthodes d'essais d'environnement —  
Partie 1: Définitions, portée des essais*



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## 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 9022-1 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 1, *Fundamental standards*.

This second edition cancels and replaces the first edition (ISO 9022-1:1994), which has been technically revised.

ISO 9022 consists of the following parts, under the general title *Optics and photonics — Environmental test methods*:

- *Part 1: Definitions, extent of testing*
- *Part 2: Cold, heat and humidity*
- *Part 3: Mechanical stress*
- *Part 4: Salt mist*
- *Part 5: Combined cold, low air pressure*
- *Part 6: Dust*
- *Part 7: Resistance to drip or rain*
- *Part 8: High pressure, low pressure, immersion*
- *Part 9: Solar radiation*
- *Part 11: Mould growth*
- *Part 12: Contamination*
- *Part 14: Dew, hoarfrost, ice*
- *Part 17: Combined contamination, solar radiation*
- *Part 18: Combined damp heat and low internal pressure*
- *Part 20: Humid atmosphere containing sulfur dioxide or hydrogen sulfide*
- *Part 21: Combined low pressure and ambient temperature or dry heat*
- *Part 22: Combined cold, dry heat or temperature change with bump or random vibration*
- *Part 23: Low pressure combined with cold, ambient temperature and dry or damp heat<sup>1)</sup>*

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1) Under preparation.

## Introduction

Optical and photonic instruments, including additional assemblies from other fields (e.g. mechanical, chemical and electronic devices) are affected during their use by a number of different environmental and handling parameters which they are required to resist without significant reduction in performance, while still remaining within defined specifications.

The type and severity of these parameters depend on the conditions of use of the instrument (for example in the laboratory or workshop) and on its geographical location. The environmental effects on optical instrument performance in tropical and subtropical climates are totally different from those found when they are used in the arctic regions. Individual parameters cause a variety of different and overlapping effects on instrument performance.

The manufacturer attempts to ensure, and the user naturally expects, that instruments will resist the likely rigours of their environment throughout their life. This expectation can be assessed by cumulated exposure of the instrument to a range of simulated environmental parameters under controlled laboratory conditions. The cumulative combination, degree of severity and sequence of these conditions can be selected to obtain meaningful results in a relatively short period of time.

In order to allow assessment and comparison of the response of optical instruments to appropriate environmental conditions, the ISO 9022 series contains details of a number of laboratory tests which reliably simulate a variety of different environments. The tests are based largely on IEC standards, modified where necessary to take into account features specific to optical instruments.

It should be noted that, as a result of continuous progress in all fields, optical instruments are no longer only precision-engineered optical products, but, depending on their range of application, also contain additional assemblies from other fields. For this reason, the principal function of the instrument must be assessed to determine which International Standard should be used for testing. If the optical function is of primary importance, then the relevant part of ISO 9022 is applicable, but if other functions take precedence, then the appropriate International Standard in the field concerned should be applied. Cases may arise where application of both the relevant part of ISO 9022 and other appropriate International Standards is necessary.



# Optics and photonics — Environmental test methods —

## Part 1: Definitions, extent of testing

### 1 Scope

This part of ISO 9022 defines terms relating to environmental tests of optical and photonic instruments, including additional assemblies from other fields (e.g. mechanical, chemical and electronic devices), and specifies basic features of testing.

### 2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 2.1

##### **environmental test**

laboratory simulation, usually severe, of the climatic, mechanical, biological, electrical (including electrostatic) and chemical environmental influences acting on the specimen during assembly, storage, transport and operation, in order to establish any changes in the behaviour of the specimen in a short time

#### 2.2

##### **optical instrument**

##### **photonic instrument**

instrument whose function is mainly based on optical phenomena, consisting of several assemblies and/or components, illumination systems, instruments with light conduction and instruments which, apart from optical units, contain assemblies and/or components from other fields, e.g. electronic components

#### 2.3

##### **optical assembly**

functional unit consisting of several components, at least one of which has an optical function

#### 2.4

##### **component**

<optical instrument> smallest unit, generally consisting of one piece and one material

#### 2.5

##### **representative sample**

sample which differs from a component only in its geometry

EXAMPLE An optical part or piece of sheet metal.

#### 2.6

##### **specimen**

instrument, assembly, component or representative sample which is being tested

#### 2.7

##### **test**

procedure by which the effect of applied parameters on the properties of a specimen is determined and assessed

#### 2.8

##### **conditioning**

sum of the external influences acting on the specimen during the test, such as the conditioning method and degree of severity employed, and of the internal influences resulting from the state of operation of the specimen, such as movements and/or temperature changes