INTERNATIONAL STANDARD

ISO 9022-22

First edition
2012-04-15

Optics and photonics — Environmental test methods —

Part 22: Combined cold, dry heat or temperature change with bump or random vibration

Optique et photonique — Méthodes d'essais d'environnement —

Partie 22: Chaleurs sèche, froid ou changement de température combinés avec choc ou vibration aléatoire

Reference number
ISO 9022-22:2012(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword ... iv
Introduction ... v
1 **Scope** ... 1
2 **Normative references** ... 1
3 **Terms and definitions** ... 1
4 **General information and test conditions** ... 1
5 **Conditioning** ... 2
5.1 **General** ... 2
5.2 **Conditioning method 22: Cold, dry heat or temperature change combined with bump or random vibration** ... 2
6 **Procedure** ... 3
6.1 **General** ... 3
6.2 **Test sequence with cold or dry heat testing** ... 3
6.3 **Test sequence with temperature change** ... 3
6.4 **Operating condition of specimen** ... 3
6.5 **Mechanical conditioning of specimen** ... 4
7 **Environmental test code** ... 4
8 **Specification** ... 5
Annex A (informative) **Explanatory notes** ... 6
Bibliography ... 7

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 9022-22 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 1, *Fundamental standards*.

This first edition cancels and replaces ISO 9022-10:1998, ISO 9022-13:1998, ISO 9022-15:1998, ISO 9022-16:1998 and ISO 9022-19:1994 which have 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*[1)]

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 22: Combined cold, dry heat or temperature change with bump or random vibration

1 Scope

This part of ISO 9022 specifies methods for the testing of optical instruments, including additional assemblies from other fields (e.g. mechanical, chemical and electronic devices) under equivalent conditions, for their ability to resist combined bump or random vibration, in cold, dry heat or temperature change.

The purpose of testing is to investigate to what extent the optical, thermal, chemical and electrical performance characteristics of the specimen are affected by combined cold, dry heat or temperature change with bump or random vibration.

2 Normative references

The following referenced documents are indispensable for the application 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 9022-1, *Optics and photonics — Environmental test methods — Part 1: Definitions, extent of testing*

ISO 9022-2, *Optics and optical instruments — Environmental test methods — Part 2: Cold, heat and humidity*

ISO 9022-3, *Optics and optical instruments — Environmental test methods — Part 3: Mechanical stress*

IEC 60068-2-47, *Environmental testing — Part 2-47: Tests — Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 60068-2-64, *Environmental testing — Part 2-64: Tests — Test Fh: Vibration, broadband random and guidance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9022-1 apply.

4 General information and test conditions

Exposure of the specimen to combined stress conditions renders the test much more severe than separate exposure to any of the environmental conditions cited. Stress conditions such as cold, dry heat or temperature change, combined with bump or random vibration, correspond to real conditions under use. In the case of the lifetime test, tests with higher degrees of severity for time reduction, damage-provoked tests, etc., combined test methods such as Burn-In, Run-In or Environmental Stress Screening (ESS) are useful.

Burn-In, Run-In or ESS are test methods for optical instruments and instruments containing optical components and/or their electronic assembly, in which the system is switched off or in operation, and exposed to their operating, storage, shipping or other temperature cycles, combined with sinusoidal or random vibration and operation with under or excess voltage.

The aforementioned methods of combined tests are suitable to force potential faults to be detected during first use and to eliminate them before delivery. There are stress factors with different impacts. The choice of combination of test methods should be specific to the products and is therefore not standardized.