INTERNATIONAL STANDARD

ISO 9022

Redline version
compares Second edition to
First edition

Optics and photonics — Environmental test methods —

Part 12: Contamination

Optique et photonique — Méthodes d'essais d'environnement — Partie 12: Contamination

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1.x ...	— Heading numbers containg modifications are highlighted in yellow in the Table of Contents

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This Redline version provides you with a quick and easy way to compare the main changes between this edition of the standard and its previous edition. It doesn't capture all single changes such as punctuation but highlights the modifications providing customers with the most valuable information. Therefore it is important to note that this Redline version is not the official ISO standard and that the users must consult with the clean version of the standard, which is the official standard, for implementation purposes.

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Contents

Page

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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).

~~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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

~~International Standard~~The committee ~~ISO 9022-12 was prepared by Technical Committee~~responsible for this document is ISO/TC 172, *Optics and* ~~*optical instruments*~~*photonics*, Subcommittee SC 1, *Fundamental standards*.

This second edition cancels and replaces the first edition (ISO 9022-12:1994), of which it constitutes a minor revision.

ISO 9022 consists of the following parts, under the general title *Optics and* ~~*optical instruments*~~*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*~~*6: Dust*

~~— *Part 6: Dust*~~

— *Part 7:* ~~*Drip,*~~*Resistance to drip or rain*

— *Part 8: High* internal *pressure, low* internal *pressure, immersion*

— *Part 9: Solar radiation* and weathering

~~— *Part 10: Combined sinusoidal vibration, dry heat or cold*~~

— *Part 11: Mould growth*

— *Part 12: Contamination*

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— *Part 13: Combined shock, bump or free fall, dry heat or cold*

— *Part 14: Dew, hoarfrost, ice*

— *Part 15: Combined random vibration wide band: reproducibility medium, in dry heat or cold*

— *Part 16: Combined bounce or steady-state acceleration, in dry heat or cold*

— *Part 17: Combined contamination, solar radiation*

— *Part* 18: Combined damp heat and low internal pressure20: Humid atmosphere containing sulfur dioxide or hydrogen sulfide

— *Part* 19: Temperature cycles combined with sinusoidal22: Combined cold, dry heat or temperature change with bump *or random vibration*

— *Part* 20: Humid atmosphere containing sulfur dioxide or hydrogen sulfide23: Low pressure combined with cold, ambient temperature and dry and damp heat

Annex A forms an integral part of this part of ISO 9022.

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Introduction

Optical instruments are affected during their use by a number of different environmental parameters which they are required to resist without significant reduction in performance and to remain 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 the tropics and subtropics 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 exposure of the instrument to a range of simulated environmental parameters under controlled laboratory conditions. The severity of these conditions is often increased 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, ISO 9022 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 special to optical instruments.

~~It should be noted that, as~~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~~is to be assessed to determine which International Standard should be used for testing. If the optical function is of primary importance, then ~~ISO 9022~~ISO 9022 is applicable, but if other functions take precedence then the appropriate International Standard in the field concerned should be applied. Cases ~~may~~can arise where application of both ~~ISO 9022~~ISO 9022 and other appropriate International Standards will be necessary.

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Optics and photonics — Environmental test methods —

Part 12: Contamination

1 Scope

This part of ISO 9022 specifies ~~methods for the testing~~the methods relating to the environmental tests of optical instruments ~~and instruments containing optical components~~including additional assemblies from other fields (e.g. mechanical, chemical, and electronic devices), under equivalent conditions, for their ability to resist the influence of contamination, i.e. contact with corrosive chemical substances (hereafter called test agents).[1)]

However, complete instruments or assemblies are only tested as specified in this part of ISO 9022 in exceptional cases (see 5.3). Normally, representative samples such as material items or surface coatings on representative substrates are used for testing.

The tests described in this part of ISO 9022 are designed for the selection of materials and components for instruments likely to suffer contamination during service life, rather than for regular production control.

The purpose of testing is to investigate the resistance of an instrument and, in particular, of instrument surfaces, coatings, or synthetic materials, to a short exposure to the test agents.

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2 Normative ~~reference~~references

The following ~~standard contains provisions which, through reference in this text, constitute provisions of this part of~~documents, in whole or in part, are normatively referenced in this document and are indispensable for its application~~ISO 9022~~. ~~At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of~~For dated references, only the edition cited applies. For undated references, ~~ISO 9022 are encouraged to investigate the possibility of applying the most recent~~the latest edition of the ~~standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards~~referenced document (including any amendments) applies.

ISO 9022-1~~:1994~~[2)], *Optics and ~~optical instruments~~photonics — Environmental test methods — Part 1: Definitions, extent of testing*~~.~~

3 General information and test conditions

The test shall be conducted under ambient atmospheric conditions in accordance with ISO 9022-1.

The test agents listed from each conditioning method (Clause 4) represent different chemical groups.

3.1 Specimen

Unless the testing of complete instruments or assemblies is required in the relevant specification, representative samples shall be used for testing. Representative ~~materials~~sample sheets of at least

1) Another possible source of service contamination to which optical instruments can be exposed is radioactive elements and isotopes, and hazardous chemical substances (e.g. 2:2-dichlorodiethysulfide). However, as these materials may only be handled, used for testing, and stored by special, officially approved laboratories, they were not used as test reagents.

2) ~~To be published.~~

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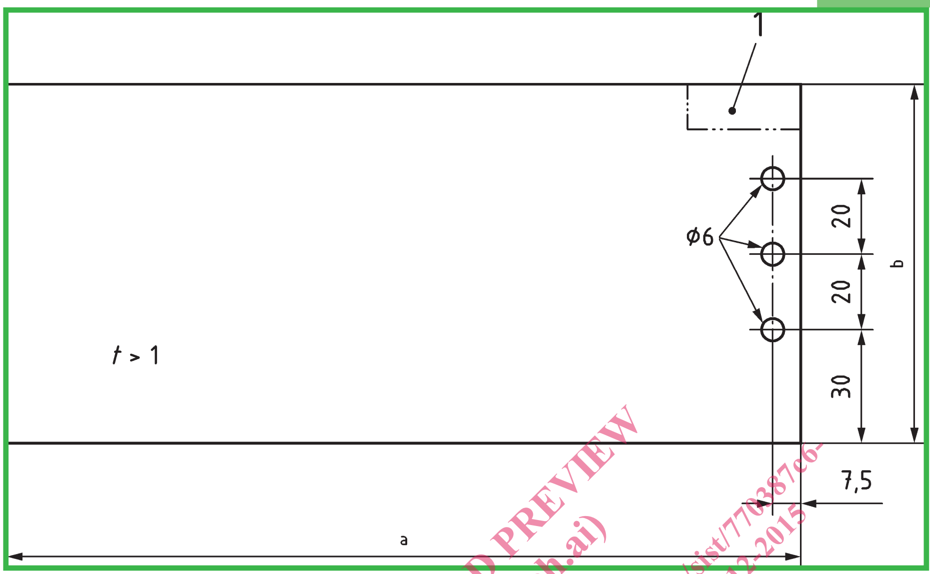
1 mm thickness and having dimensions as shown in Figure 1 shall be used as substrates for the testing of non-metallic coatings.

NOTE ~~1~~ Sample sheets of 140 mm ± 2 mm or 280 mm ± 2 mm in length ~~may~~can also be specified in the relevant specification.

Dimensions in millimetres



Key

1 marking area (on the back)

a 210 ± 2 (280 ± 2)

b 95 ± 5 (140 ± 2)

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Figure 1 — Sample sheet

Coatings to be tested shall be of the same structure as the coating intended for the instrument or for parts of the instrument.

Prior to applying the coating, prepare the surface of the ~~specimen~~sample sheet in the same manner as required for the original instrument. The coating shall completely surround the ~~specimen~~sample sheet so as to cover, particularly, edges, corners, and edges of holes. The coating shall not be degraded by identification marking; numbers, etc. shall be punched prior to applying the coating.

Particular care shall be taken to apply the coating in such a manner that the dry film will meet the thickness required for the instrument with a tolerance of ± 5 ~~μm~~µm. The specimens shall be protected from contamination until commencement of the tests.

If ~~specimens~~sample sheets as shown in Figure 1 are not available, as level a surface as possible of representative instrument parts shall be used as test areas for testing synthetic materials. Where such surfaces are not sufficient in size to support the test pad (3.2), the specimen shall be half immersed in the test agent in order to permit testing under the required conditions.

3.2 Test pad

Felt pads having the following characteristics and drenched with test agent shall be used as test media:

~~colour: white~~

colour: white

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mass density:	0,25 g/cm^3 to 0,30 g/cm^3
pH:	5 to 8 (for measurement, see Annex A)
thickness:	1 mm
diameter	9 mm

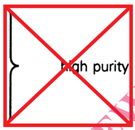
~~mass density: 0,25 g/cm^3 to 0,30 g/cm^3~~

~~pH: 5 to 8 (for measurement, see annex A)~~

~~thickness: 1 mm~~

~~diameter: 9 mm~~

The felt pads shall be used only once.



~~**Figure 1 — Sample sheet**~~

3.3 Test weight and arrangement of test pads

For the duration of the test, the felt pad, drenched in test agent, shall be weighted by means of a high-grade steel (e.g. X 5 CrNi 18 9 or X 5 CeNi 18 10) weight as shown in Figure 2.

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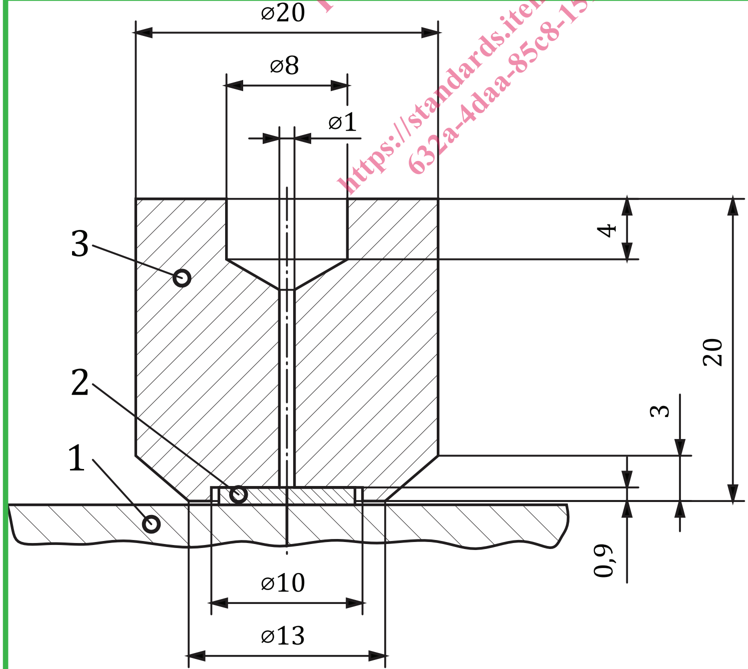
Dimensions in millimetres



Tolerances

Dimension	Tolerance
0,5 to 6	± 0,1
> 6 to 30	± 0,2
> 30 to 120	± 0,3

Key

1 specimen

2 drenched felt pad

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3 weight approx. 43 g

Figure 2 — Weight and test arrangement

Where corrosive agents (such as concentrated acids or acids developing corrosive vapour) capable of attacking the weight are used for testing, the test pad shall be covered with a polytetrafluoroethylene (PTFE) capsule as shown in Figure 3 before placing the weight on it.

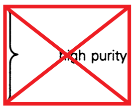

Figure 2 — Weight and test arrangement

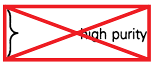

Figure 3 — Capsule

Normally, up to 21 test pads can be placed on a specimen with dimensions as shown in Figure 1, provided that the pads are arranged in seven lines of three exposure areas each. Care shall however be taken to leave sufficient space between the exposure areas to prevent mutual contamination of the test agents. Each exposure area shall be appropriately identified by means of a pressure-sensitive label showing the test agent used and the degree of severity. Direct lettering in pencil or by similar means is unacceptable.

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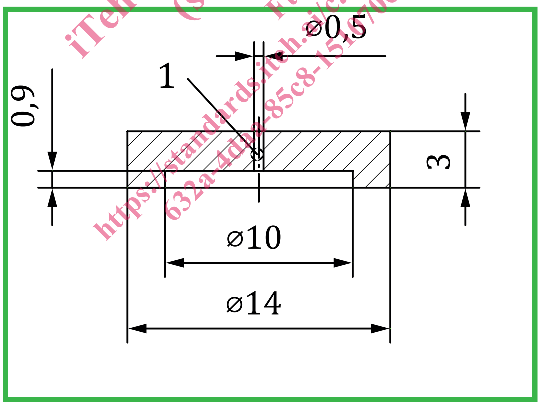
Dimensions in millimetres
Tolerances as shown in Figure 2



Key

1 ventilation capillary

Figure 3 — Capsule

4 Conditioning

Each of the test agents listed for a conditioning method shall be included in the test performed in accordance with that conditioning method.

4.1 General

Each of the test agents listed for a conditioning method shall be included in the test performed in accordance with that conditioning method.

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