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DISCLAIMER

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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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).

~~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).

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

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 9022-20 was prepared by Technical Committee responsible for this document is ISO/TC 172, *Optics and optical photonics instruments*, Subcommittee SC 1, *Fundamental standards*.

This second edition cancels and replaces the first edition (ISO 9022-20:1997), 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

- ~~— Part 13: Combined shock, bump or free fall, dry heat or cold~~
- Part 14: Dew, hoarfrost, ice
- ~~— Part 15: Combined digitally controlled broad band random vibration (medium reproducibility) and 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 pressure~~
- ~~— Part 19: Temperature cycles combined with sinusoidal or random vibration~~
- Part 20: Humid atmosphere containing sulfur dioxide or hydrogen sulfide
- ~~Part 21: Combined low pressure and ambient temperature or dry heat~~ 22: Combined cold, dry heat or temperature change with bump or random vibration
- Part 23: Low pressure combined with cold, ambient temperature and dry and damp heat

~~Annexes A and B~~ of this part of ISO 9022 are for information only.

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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~~ **signification** 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 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 and other appropriate International Standards will be necessary.

Optics and photonics — Environmental test methods —

Part 20:

Humid atmosphere containing sulfur dioxide or hydrogen sulfide

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 sulfur dioxide (SO₂) or hydrogen sulfide (H₂S) in a humid atmosphere.

The purpose of the ~~test~~ testing is to investigate to what extent optical, climatic, mechanical, chemical, and electrical performance characteristics of the specimen are affected by sulfur dioxide or hydrogen sulfide.

This part of ISO 9022 is not applicable to the testing of material and surface coatings for their corrosion resistance using high concentrations of sulfur dioxide, for which representative samples are generally used as specimens. The appropriate material standards apply to tests of this type.

2 Normative ~~reference~~ references

The following ~~standard~~ 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, ~~Optics and optical instruments~~ photonics — Environmental test methods — Part 1: Definitions, extent of testing:

3 General requirements

The sulfur dioxide and the hydrogen sulfide used as the test gases shall be chemically pure, taken from commercially available compressed gas cylinders. A suitable test facility is described in Annex A. The test specimen shall not be exposed to direct sunlight during conditioning. No condensation shall be produced in the test chamber or on the specimen itself during conditioning. Prior to insertion into the test chamber, the test specimen shall therefore be heated to 2 K or 3 K above the temperature of the test chamber which has already been set to the test temperature. If several specimens are to be tested at the same time, they shall not touch each other or the walls of the test chamber. The total volume of the specimens shall not be more than 50 % of the volume of the test chamber (exposure zone). The required conditioning values shall be attained by the test specimen(s) within 2 h after commencement of the test. The test shall not be interrupted during the required exposure time.

When the test gases are changed, the test gas last used shall be exhausted in its entirety from the test chamber. No materials which absorb sulfur dioxide or hydrogen sulfide shall be used in the test chamber.

4 Conditioning

The required exposure time shall begin as soon as the required conditioning values have been attained in the test chamber.

4.1 Conditioning method 41: Humid atmosphere containing sulfur dioxide (SO₂)

See Table 1.

~~Table 1 — Degrees of severity for conditioning method 41: Humid atmosphere containing sulfur dioxide (SO₂)~~

Degree of severity	01	02	03	04	05	06	07	08
SO₂ content of test atmosphere, cm³/m³	1 to 2			20 to 30			10 to 15	
Test chamber temperature, °C			25 ± 2				35 ± 2	
Relative humidity, %				70 to 80				
Exposure time, days	21	56	4	10	21	1	4	10
State of operation	1 or 2¹⁾							
1) Mainly for checking electrical functional safety.								

Table 1 — Degrees of severity for conditioning method 41: Humid atmosphere containing sulfur dioxide (SO₂)

Degree of severity	01	02	03	04	05	06	07	08
SO ₂ content of test atmosphere, cm ³ /m ³	1 to 2		20 to 30			10 to 15		
Test chamber temperature, °C	25 ± 2					35 ± 2		
Relative humidity, %	70 to 80							
Exposure time, days	21	56	4	10	21	1	4	10
State of operation	1 or 2 ^a							
a	Mainly for checking electrical functional safety.							

4.2 Conditioning method 42: Humid atmosphere containing hydrogen sulfide (H₂S)

See Table 2.

~~Table 2 — Degrees of severity for conditioning method 42: Humid atmosphere containing hydrogen sulfide (H₂S)~~

Degree of severity	01	02	03	04	05	06	07	08	09
H₂S content of test atmosphere, cm³/m³	0,5 to 1			10 to 15				4 to 6	
Test chamber temperature, °C			25 ± 2					35 ± 2	
Relative humidity, %				70 to 80					
Exposure time, days	21	56	1	4	10	21	1	4	10
State of operation	1 or 2¹⁾								
1) Mainly for checking electrical functional safety.									

Table 2 — Degrees of severity for conditioning method 42: Humid atmosphere containing hydrogen sulfide (H₂S)

Degree of severity	01	02	03	04	05	06	07	08	09
H ₂ S content of test atmosphere, cm ³ /m ³	0,5 to 1		10 to 15			4 to 6			
Test chamber temperature, °C	25 ± 2					35 ± 2			
Relative humidity, %	70 to 80								
Exposure time, days	21	56	1	4	10	21	1	4	10
State of operation	1 or 2 ^a								
^a Mainly for checking electrical functional safety.									

5 Procedure

5.1 General

The test shall be conducted in accordance with the requirements of the relevant specification and with ISO 9022-1.

5.2 Preconditioning

If not specified in the relevant specification, the greasing of areas at risk of corrosion as stipulated in ISO 9022-1 shall not be required.

6 Environmental test code

The environmental test code shall be as defined in ISO 9022-1, giving a reference to ISO 9022 and the codes for the conditioning method chosen, the degree of severity and the state of operation.

EXAMPLE The environmental test of optical instruments for their resistance to sulfur dioxide in a humid atmosphere, in accordance with conditioning method 41, degree of severity 02, state of operation 1, shall be identified as:

~~Environmental test ISO 9022-41-02-1~~

Environmental test ISO 9022-41-02-1

7 Specification

The relevant specification shall contain the following details:

- environmental test code;
- number of specimens;
- preconditioning;
- type and scope of initial test;
- period of operation for state of operation 2;
- type and scope of intermediate test for state of operation 2;
- recovery;
- type and scope of final test;
- criteria for evaluation;