INTERNATIONAL STANDARD

ISO 9022-8

Redline version
compares Second edition to
First edition

Optics and photonics — Environmental test methods —

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

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

Partie 8: Pression interne élevée, pression interne faible, immersion

Reference number
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IMPORTANT — PLEASE NOTE

This is a mark-up copy and uses the following colour coding:

Text example 1 — indicates added text (in green)

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— indicates added graphic figure

— indicates removed graphic figure

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

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 9022-8 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 9022-8:1994), 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~~6: Dust~~, low air pressure~~

~~— *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 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 pressure~~20: Humid atmosphere containing sulfur dioxide or hydrogen sulfide

— *Part* ~~19: Temperature cycles combined with sinusoidal~~22: Combined cold, dry heat or temperature change with bump *or random vibration*

— *Part* ~~20: Humid atmosphere containing sulfur dioxide or hydrogen sulfide~~23: Low pressure combined with cold, ambient temperature and dry and damp heat

~~Annex A of this part of ISO 9022 is for information only.~~

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 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 8: High internal pressure, low internal pressure, immersion

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 high pressure, low pressure, or immersion.

The purpose of testing is to investigate to what extent the optical, ~~thermal~~climatic, mechanical, chemical, and electrical performance characteristics of the specimen are affected by high pressure, low pressure, or immersion.

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~~[1)], *Optics and ~~optical instruments~~photonics — Environmental test methods — Part 1: Definitions, extent of testing~~:*

3 General information and test conditions

~~Three~~The following are the three different test methods ~~are~~ used to test the pressure-resistance of optical instruments:

— conditioning method 80: high internal pressure~~:~~;

— conditioning method 81: low internal pressure~~:~~;

— conditioning method 82: immersion.

~~Environmental conditions for conditioning method 80: clean dry air or dry nitrogen, relative humidity less than 30 %.~~

~~Conditioning method 82 shall be used for instruments that may undergo immersion during service.~~

Environmental conditions for conditioning method 80: clean dry air or dry nitrogen, relative humidity less than 30 %. Conditioning method 82 shall be used for instruments that might undergo immersion during service. The immersion test shall be carried out in an open water container or in a water pressure chamber using softened or demineralized water. The immersion depth specified relates to the uppermost point of the specimen. The water temperature shall be between 10 °C and 25 °C. During

1) ~~To be published.~~

exposure, the temperature of the specimen shall not be lower than the water temperature nor shall it exceed that temperature by more than 10 K.

4 Conditioning

4.1 Conditioning method 80: High internal pressure

See Table 1.

4.2 Conditioning method ~~80~~81: Low internal pressure

See Table 2.

4.3 Conditioning method 82: Immersion

See Table 3.

Table 1 — Degrees of severity for conditioning method 80: High internal pressure

Degree of severity		01	02	03	04	05	06	07	08	09	10	11	12	13
Difference from ambient pressure	hPa	100 ± 2						400 ± 5						
Maximum pressure drop	hPa	75	50	20	10	5	2	300	200	100	50	20	10	5
Exposure time	min	10												
State of operation		1 or 2[a]												

[a] See 5.4.

Table 2 — Degrees of severity for conditioning method 81: Low internal pressure

Degree of severity		01	02	03	04	05	06	07	08	09	10	11	12	13
Difference from ambient pressure	hPa	100 ± 2						400 ± 5						
Maximum pressure drop	hPa	75	50	20	10	5	2	300	200	100	50	20	10	5
Exposure time	min	10												
State of operation		1 or 2[a]												

[a] See 5.4.

Table 3 — Degree of severity for conditioning method 82: Immersion

Degree of severity		01	02	03	04	05	06
Immersion depths	m	1	4	10	50	200	400
	Allowable deviation	±10 %					
Exposure time	h	2					
State of operation		1 or 2					

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 Conditioning method 82: Preconditioning of specimen and initial test

Prior to exposure, the specimen shall be conditioned at a temperature of 40 °C ± 2 °C and a relative humidity of less than 40 % for a period of 4 h.

~~**Table 1 — Degrees of severity for conditioning method 80: High internal pressure**~~

Degree of severity		01	02	03	04	05	06	07	08	09	10	11	12	13
Difference from ambient pressure	hPa	100 ± 2						400 ± 5						
Maximum pressure drop	hPa	75	50	20	10	5	2	300	200	100	50	20	10	5
Exposure time	min	10												
State of operation		1 or 2 [1]												

~~1) See 5.4.~~

~~**Table 2 — Degrees of severity for conditioning method 81: Low internal pressure**~~

Degree of severity		01	02	03	04	05	06	07	08	09	10	11	12	13
Difference from ambient pressure	hPa	100 ± 2						400 ± 5						
Maximum pressure rise	hPa	75	50	20	10	5	2	300	200	100	50	20	10	5
Exposure time	min	10												
State of operation		1 or 2 [1]												

~~1) See 5.4.~~

~~**Table 3 — Degrees of severity for conditioning method 82: Immersion**~~

Degree of severity		01	02	03	04	05	06
Immersion depths	m	1	4	10	50	200	400
	Allowable deviation	± 10 %					
Exposure time	h	2					
State of operation		1 or 2					

5.3 Conditioning methods 80 and 81: Pressure change curve

If required by the relevant specification, a graphical representation of the pressure change time history shall be recorded during testing. In the event that a suitable recorder is not available, the pressure change curve shall be plotted from not less than 10 values measured at equal intervals (see Annex A).