

Second edition
2004-08-01

Corrected version
2004-11-01

**Ophthalmic optics — Spectacle frames —
Requirements and test methods**

*Optique ophtalmique — Montures de lunettes — Exigences et
méthodes d'essai*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 12870:2004](https://standards.iteh.ai/catalog/standards/sist/0d65ca55-da39-4028-96d4-0cdea62c617b/iso-12870-2004)

<https://standards.iteh.ai/catalog/standards/sist/0d65ca55-da39-4028-96d4-0cdea62c617b/iso-12870-2004>



Reference number
ISO 12870:2004(E)

© ISO 2004

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 12870:2004

<https://standards.iteh.ai/catalog/standards/sist/0d65ca55-da39-4028-96d4-0cdea62c617b/iso-12870-2004>

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Requirements	2
4.1 General	2
4.2 Physiological compatibility	3
4.3 Measurement system	3
4.4 Dimensional tolerances on nominal size	3
4.5 Tolerance on screw threads	4
4.6 Dimensional stability at elevated temperature	4
4.7 Resistance to perspiration	4
4.8 Mechanical stability	4
4.9 Resistance to ignition	5
4.10 Resistance to optical radiation	5
5 Selection of test samples	5
5.1 General	5
5.2 Testing for nickel release	5
5.3 Change in spectacle frame model	5
6 Preparation and conditioning of test samples	6
6.1 Test lenses	6
6.2 Sample conditioning and test conditions	6
7 Testing, inspection and compliance	6
7.1 Testing	6
7.2 Inspection and examination	7
7.3 Compliance	7
8 Test methods	8
8.1 General	8
8.2 Test for dimensional stability at elevated temperature	8
8.3 Test for resistance to perspiration	9
8.4 Bridge deformation test	10
8.5 Endurance test	12
8.6 Test for resistance to ignition	14
8.7 Test for resistance to optical radiation	14
8.8 Nickel release	15
9 Marking	16
10 Additional information to be supplied by the manufacturer or other person (agent) placing the product on the market	17
11 Reference to ISO 12870	18
Annex A (informative) Recommendations for the design of spectacle frames	19
Annex B (informative) Examples of layout of test equipment	22
Annex C (informative) Examples of cutting metal spectacle frames before testing for nickel release	25
Bibliography	26

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 12870 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 7, *Ophthalmic optics and instruments*.

This second edition cancels and replaces the first edition (ISO 12870:1997), which has been technically revised. As this International Standard incorporates a revision of the text of ISO 9456:1991 that International Standard is also cancelled and replaced by the current edition of ISO 12870.

This corrected version of ISO 12870:2004 incorporates the following corrections: Figure B.2 has been modified.

ISO 12870:2004
<https://standards.iteh.ai/catalog/standards/sist/0d65ca55-da39-4028-96d4-0cdea62c617b/iso-12870-2004>

Ophthalmic optics — Spectacle frames — Requirements and test methods

1 Scope

This International Standard specifies fundamental requirements for unglazed spectacle frames designed for use with all prescription lenses, and is applicable to frames at the point of sale to the retailer, by the manufacturer or supplier.

It is applicable to all spectacle frame types including rimless mounts, semi-rimless mounts and folding spectacle frames. This International Standard is applicable to spectacle frames made from natural organic materials.

NOTE See Annex A for recommendations on the design of spectacle frames.

This International Standard is not applicable to complete custom-made spectacle frames or to products designed specifically to provide personal eye protection.

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 105-B02:1994, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ISO 3160-1, *Watch-cases and accessories — Gold alloy coverings — Part 1: General requirements*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 7998, *Optics and optical instruments — Spectacle frames — Vocabulary and lists of equivalent terms*

ISO 8596, *Ophthalmic optics — Visual acuity testing — Standard optotype and its presentation*

ISO 8624, *Ophthalmic optics — Spectacle frames — Measuring system and terminology*

ISO 11380, *Optics and optical instruments — Ophthalmic optics — Formers*

ISO 11381, *Optics and optical instruments — Ophthalmic optics — Screw threads*

ISO/TS 24348, *Ophthalmic optics — Spectacle frames — Method for the simulation of wear and detection of nickel release from coated metal and combination spectacle frames*

3 Terms and definitions

For the purposes of this document, the definitions given in ISO 7998 and ISO 8624 and the following apply.

**3.1
spectacle frame model**

spectacle frame produced to a common design, using the same materials (but not necessarily the same pigmentation) and surface treatment

**3.2
natural organic material**

material that has not been synthesized from other raw organic materials and, when processed, remains essentially in its original state

NOTE 1 Processing in this case is defined as cutting, shaping, bending, polishing and heating.

NOTE 2 Examples of natural organic materials are natural horn and wood.

**3.3
custom-made spectacle frame**

spectacle frame made to special order for a named patient

NOTE Examples of custom-made frames are those specially manufactured for wearers with unusual facial characteristics.

4 Requirements

4.1 General

iTeh STANDARD PREVIEW

The requirements applicable to the different types of spectacle frames are given in Table 1. All spectacle frame types covered by this International Standard shall comply with the requirements identified as general (g). Requirements marked "O" are optional, but may be required by legislation in some countries.

ISO 12870:2004

Table 1 — Requirements applicable to the different types of spectacle frames

Frame type	Subclause (see Note 1)									
	4.2.1	4.2.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.10
Rimless and semi-rimless mounts	g	O	O	O	g	g	g	g	g	O
All other spectacle frames (see Note 2)	g	O	g	g	g	g	g	g	g	O

Key

g Spectacle frame type shall comply with this subclause in order to pass this International Standard.

O Compliance with this subclause is optional.

4.2.1 General physiological compatibility

4.2.2 Nickel release

4.3 Measurement system

4.4 Dimensional tolerances

4.5 Tolerance on screw threads

4.6 Dimensional stability at elevated temperature

4.7 Resistance to perspiration

4.8 Mechanical stability

4.9 Resistance to ignition

4.10 Resistance to optical radiation

NOTE 1 Under European legislation, subclauses 4.2.1, 4.2.2, 4.5, 4.6, 4.7, 4.8 and 4.9 give fundamental requirements.

NOTE 2 "All other frame types" includes plastic and metal spectacle frames, including folding spectacle frames, having a rim completely surrounding the lens periphery.

4.2 Physiological compatibility

4.2.1 General physiological compatibility

The manufacturer of spectacle frames shall exclude from contact with the skin, any materials that, amongst a significant proportion of users, during wear are known to cause irritation, allergic or toxic reaction to skin in a normal state of health.

NOTE Rare or idiosyncratic reaction to any material may occur and may indicate the need for the individual to avoid particular types of material. Adverse skin reaction may be due to other causes, e.g. excessive contact pressure.

4.2.2 Nickel release

Those parts of metal and combination spectacle frames which come into direct and prolonged contact with the skin of the wearer shall have a nickel release of less than $0,5 \mu\text{g}/\text{cm}^2/\text{week}$ when tested in accordance with 8.8.

The parts to be tested shall include:

- the rear surface of rims;
- the rear and lower surface of the bridge, the rear and upper surface of any bracebar and any other nasal bearing surfaces, including metal nose pads;
- sides, excluding the joints and the zone immediately around the joints, and parts intended to be protected by plastics endcovers (tips).

Metal frames that are uncoated and made of homogeneous alloys or metals do not require a wear pre-treatment (such as specified in 8.8.2) and shall be tested directly in accordance with 8.8.3.

[ISO 12870:2004](https://standards.iteh.ai/catalog/standards/sist/0d65ca55-da39-4028-96d4-0cdea62c617b/iso-12870-2004)

4.3 Measurement system

<https://standards.iteh.ai/catalog/standards/sist/0d65ca55-da39-4028-96d4-0cdea62c617b/iso-12870-2004>

The stated nominal dimensions of the spectacle frame shall be in accordance with the measuring system specified in ISO 8624.

4.4 Dimensional tolerances on nominal size

When measured with a linear measuring device having an accuracy of greater than 0,1 mm, the following tolerances shall apply to the marked dimensions of the unglazed spectacle frame using the boxed lens measurement method described in ISO 8624:

- a) horizontal boxed lens size: $\pm 0,5 \text{ mm}$;
- b) distance between lenses: $\pm 0,5 \text{ mm}$;
- c) bridge width: $\pm 0,5 \text{ mm}$;
- d) overall length of side: $\pm 2,0 \text{ mm}$.

To improve the accuracy of measurement of the overall length of side, it is recommended that the drop should be physically straightened. Sinuosity in the intended vertical plane, or pronounced curvature in the intended horizontal plane in the part of the side before the earbend should be ignored, see Figure 1. The overall length of the side should be taken as the length of the straight line between the dowel screw and the end of the side. Gentle bowing of the side to go round the width of the head should be straightened.

NOTE To simplify the edging of lenses for any single frame model, tighter tolerances in the lens aperture size from one frame to another of the same nominal size may be a matter of agreement between supplier and purchaser.

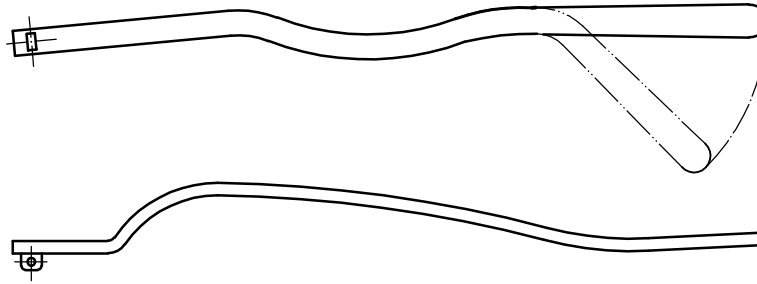


Figure 1 — Illustration of overall length of side

4.5 Tolerance on screw threads

The tolerances on the screw threads used in the spectacle frame shall conform to ISO 11381.

4.6 Dimensional stability at elevated temperature

When the spectacle frame with test lenses fitted is tested in accordance with 8.2, the distance between the tips of the sides shall not alter by more than + 6 mm or – 12 mm. For small spectacle frames where the tip of the side is less than 100 mm from the back plane of the front, these tolerances are reduced to + 5 mm or – 10 mm.

iTeh STANDARD PREVIEW

4.7 Resistance to perspiration

(standards.iteh.ai)

When the spectacle frame is tested in accordance with 8.3, there shall be

ISO 12870:2004

- a) no spotting or colour change anywhere on the frame, excluding joints and screws, after testing for 8 h and
- b) no corrosion, surface degradation or separation of any coating layer on the parts liable to come into prolonged contact with the skin during wear, i.e. the insides of the sides, bottom and lower parts of the rim and the inside of the bridge, after testing for a total of 24 h.

0cdea62c617b/iso-12870-2004

Such defects shall be visible under the inspection conditions described in 7.2.

4.8 Mechanical stability

4.8.1 Bridge deformation

When tested in accordance with 8.4, the spectacle frame with the test lenses fitted shall not:

- a) fracture or crack at any point;
- b) be permanently deformed from its original configuration by more than 2 % of the distance between the boxed centres of the spectacle frame.

4.8.2 Lens retention characteristics

The spectacle frame shall be considered to demonstrate acceptable lens retention characteristics if, when tested in accordance with 8.4, neither test lens is dislodged wholly or partially from its original location in the groove or mount.

4.8.3 Endurance

When tested in accordance with 8.5, the spectacle frame with the test lenses fitted shall not:

- a) fracture at any point;
- b) be permanently deformed from its original position by more than 5 mm after 500 cycles;
- c) except for frames fitted with sprung joints, require more than light finger pressure to open and close the sides;
- d) for frames that are not fitted with sprung joints, have a side that closes under its own weight at any point in the opening/closing cycle, or for sides with fitted with sprung joints, the side shall still support its weight in the open position (i.e. opened to the fullest natural extent without activating the spring mechanism).

4.9 Resistance to ignition

When the spectacle frame is tested in accordance with 8.6, there shall be no continued combustion after withdrawal of the test rod.

4.10 Resistance to optical radiation

When tested in accordance with 8.7, there shall be no

- a) colour change greater than grade 3 of the grey scale in ISO 105-B02:1994, or
- b) loss of lustre on bright surfaces,

when compared with an untested sample under the inspection conditions described in 7.2.

<https://standards.iteh.ai/catalog/standards/sist/0d65ca55-da39-4028-96d4-0cdea62c617b/iso-12870-2004>

5 Selection of test samples

5.1 General

The minimum level of conformity testing requires that two test specimens of each spectacle frame model shall be selected by an established random sampling technique. These specimens shall be identified as test sample 1 and test sample 2, and shall be conditioned as described in Clause 6 before testing as described in Clauses 7 and 8.

5.2 Testing for nickel release

For metal and combination spectacle frames, additional test samples 3 and 4 shall be selected by an established random sampling technique, and shall be conditioned as described in Clause 6 before testing as described in 8.8.

5.3 Change in spectacle frame model

If a range of spectacle frame models is made from the same material(s) and with the same manufacturing procedures including surface treatments, it is acceptable to perform test sequences 3 (subclause 8.3), 7 (subclause 8.6) and, if required, 8 (subclause 8.7) and/or 9 (subclause 8.8) on only one of the spectacle frame models.

6 Preparation and conditioning of test samples

6.1 Test lenses

Prior to testing for the requirements described in 4.6 to 4.10, test samples 1 and 2 shall be fitted with a pair of suitable test lenses.

NOTE These shall preferably be supplied or specified by the manufacturer. If these are not supplied or specified, then the following types shall be used depending upon the type of spectacle frame:

- 1) for rimless frames, organic lenses of polycarbonate with a vertex power of $0,00\text{ D} \pm 0,25\text{ D}$, a centre thickness of $2,00\text{ mm} \pm 0,2\text{ mm}$ and a radius of curvature of the concave surface of $90\text{ mm} \pm 10\text{ mm}$;
- 2) for semi-rimless frames, organic lenses of allyl diglycol carbonate¹⁾ or polycarbonate with a vertex power of $0,00\text{ D} \pm 0,25\text{ D}$, a centre thickness of $2,00\text{ mm} \pm 0,2\text{ mm}$ and a radius of curvature of the concave surface of $90\text{ mm} \pm 10\text{ mm}$;
- 3) for all other frame types, including folding and all rimmed spectacles, either organic lenses as in 2 above, or silicate glass with a vertex power of $0,00\text{ D} \pm 0,25\text{ D}$, a centre thickness of $2,25\text{ mm} \pm 0,25\text{ mm}$ and a radius of curvature of the concave surface of $100\text{ mm} \pm 20\text{ mm}$.

Prior to any wear pre-treatment for nickel release as specified in 4.2.2, test samples 3 and 4 shall be fitted with a pair of suitable organic lenses of power in the range $-1,00\text{ D}$ to $+1,00\text{ D}$ and edge thickness of between $1,5\text{ mm}$ and $2,5\text{ mm}$.

For all test samples, these test lenses shall be edged either in accordance with the manufacturer's electronic instructions or using a digitally controlled edging machine following tracing of the individual test sample or, where appropriate, a mechanical former in accordance with ISO 11380.

The bevel angle of the edged lens shall be $(120, \pm 3)^\circ$ for spectacle frames featuring a rim with a groove.

6.2 Sample conditioning and test conditions

Immediately before starting the series of tests, the test samples shall be conditioned for at least 4 h at an ambient temperature of $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$, in the as-received condition from the manufacturer or supplier, without prior realignment, adjustment or lubrication.

Carry out the testing in an atmosphere maintained within the same temperature range.

7 Testing, inspection and compliance

7.1 Testing

The testing shall be carried out with the conditioned test samples (see 6.2) in the sequence specified in Table 2 at an ambient temperature of $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$.

1) A trade name for this polymer is CR 39. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

Table 2 — Sequence of testing

Identification of test	Requirement clause	Test method clause	Sequence	Sample 1	Sample 2	Samples 3 and 4
Dimensional tolerance	4.3; 4.4	4.4	1	*		
Dimensional stability	4.6	8.2	2	*		
Resistance to perspiration	4.7	8.3	3	*		
Bridge deformation	4.8.1	8.4	4		*	
Lens retention	4.8.2	8.4	5		*	
Endurance	4.8.3	8.5	6		*	
Resistance to ignition	4.9	8.6	7	*		
Resistance to optical radiation	4.10	8.7	8		*a	
Nickel release	4.2.2	8.8	9			*b
* Indicates that the test shall be applied.						
a This test is optional.						
b This test is a legal requirement in some countries, e.g. those in Europe.						

7.2 Inspection and examination

Where visual inspection is required, the inspection and examination of test samples shall be carried out, without the aid of a magnifying lens, by an observer with a visual acuity of at least 1,0, when tested using optotypes conforming to ISO 8596. Any visual correction required for the observation distance shall be worn.

During the examination, expose the test specimen to an illuminance of 1 000 lx to 2 000 lx and carry out the inspection against a matt black background.

7.3 Compliance

If all test samples of the spectacle frame model pass the tests specified in Table 1 and listed in Table 2, the product shall be deemed to comply with this International Standard (see Figure 2).

If either sample 1 or sample 2 fails any one of the tests in the complete test sequence, an additional sample shall repeat the test that was failed. If this additional sample passes the failed and subsequent tests specified in Table 1 and listed in Table 2, the product shall be deemed to comply with this International Standard. If one or more tests in the sequence result in failure, the product shall be deemed not to comply with this International Standard.

If two or more of the tests carried out on the first set of test samples result in failure, no additional samples shall be tested and the product shall be deemed not to comply with this International Standard.

In the case of non-compliance, this clause does not preclude resubmitting the frame for testing after improvements have been made to its design or manufacture.

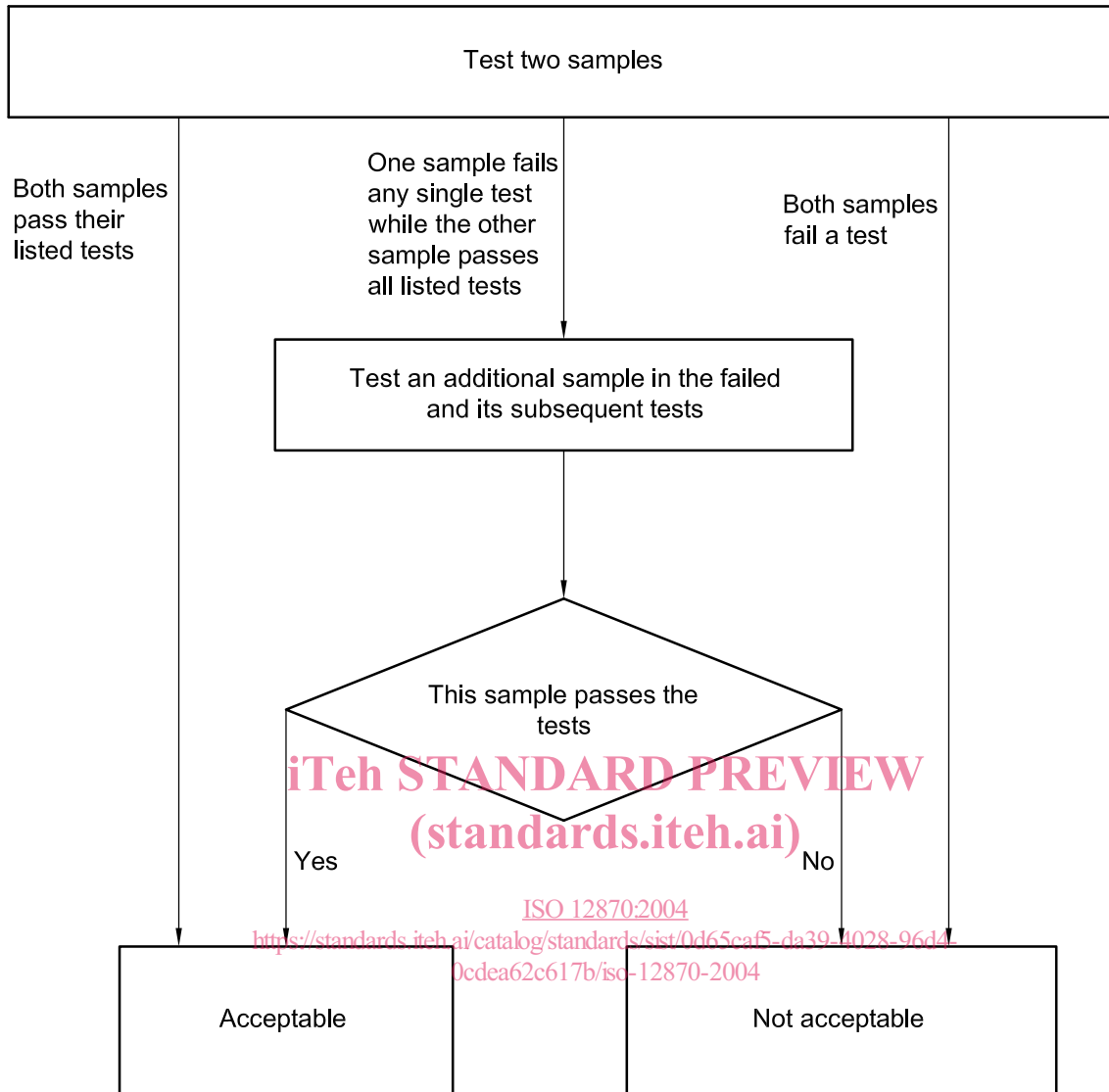


Figure 2 — Flow chart for compliance, excluding testing for nickel release

8 Test methods

8.1 General

The test methods described are reference test methods. Variations or alternatives may be used provided that their results can be shown to be equivalent to those of the relevant reference method. In cases of dispute, the result obtained with the reference method shall have precedence.

8.2 Test for dimensional stability at elevated temperature

8.2.1 Apparatus

8.2.1.1 **Oven**, capable of producing the test temperature of $55\text{ °C} \pm 5\text{ °C}$.

8.2.1.2 **Flat polished plate**, of glass or metal, mounted in the oven (8.2.1.1) either on, or parallel to, the base of the chamber.