SLOVENSKI STANDARD
oSIST prEN ISO 16672:2018

01-november-2018

Očesni vsadki (implantati) - Sredstva za notranjo očesno tamponado (ISO/DIS 16672:2018)

Ophthalmic implants - Ocular endotamponades (ISO/DIS 16672:2018)

Ophthalmische Implantate - Okulare Endotamponaden (ISO/DIS 16672:2018)

Implants ophtalmiques -- Produits de tamponnement endoculaires (ISO/DIS 16672:2018)

Ta slovenski standard je istoveten z: **prEN ISO 16672**

ICS:

11.040.70	Oftalmološka oprema	Ophthalmic equipment

oSIST prEN ISO 16672:2018 **en**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 16672

ISO/TC **172**/SC **7** Secretariat: **DIN**

Voting begins on: **2018-07-30**

Voting terminates on: **2018-10-22**

Ophthalmic implants — Ocular endotamponades

Implants ophtalmiques — Produits de tamponnement endoculaires

ICS: 11.040.70

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 16672:2018(E)

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Published in Switzerland

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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).

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 voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 16672:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

a) the following terms and their definitions have been included: "secondary packaging", surgical invasive medical product" and "minimum utilization pressure";

b) the subclause on chemical description and contaminants has been substantially revised;

c) the bacterial endotoxin limit has been revised from 0,5 to 0,2 Endotoxin Units per ml;

d) the total level of EO in the product has been revised: it shall not exceed 1,25 µg/dose for EO and 5,0 µg/dose for ethylene chlorohydrin (ECH);

e) a new subclause on "Perfluorocarbon liquids (PFCL) cytotoxicity testing" has been added;

f) minimum utilization pressure has been included in the list of information supplied by the manufacturer;

g) subclause B.2.2 giving the clinical variables in a clinical investigation has been revised;

h) Annex C "Method for quantifying incompletely fluorinated contaminants in perfluorocarbon liquids" has been added.

Ophthalmic implants — Ocular endotamponades

1 Scope

This document applies to ocular endotamponades (OE), a group of non-solid surgically invasive medical devices introduced into the vitreous cavity of the eye to flatten and position a detached retina onto the retinal pigment epithelium (RPE), or to tamponade the retina.

With regard to the safety and efficacy of OE, this document specifies requirements for their intended performance, design attributes, pre-clinical and clinical evaluation, sterilization, product packaging, product labelling and the information supplied by the manufacturer.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 10993-1, *Biological evaluation of medical devices — Part 1: Evaluation and testing within a risk management process*

ISO 10993-2, *Biological evaluation of medical devices — Part 2: Animal welfare requirements*

ISO 10993-6, *Biological evaluation of medical devices — Part 6: Tests for local effects after implantation*

ISO 11135, *Sterilization of health-care products — Ethylene oxide — Requirements for the development, validation and routine control of a sterilization process for medical devices*

ISO 11137-1+Amd.1, *Sterilization of health care products — Radiation — Part 1: Requirements for development, validation and routine control of a sterilization process for medical devices*

ISO 11607-1+Amd.1, *Packaging for terminally sterilized medical devices — Part 1: Requirements for materials, sterile barrier systems and packaging systems*

ISO 13408-1+Amd.1, *Aseptic processing of health care products — Part 1: General requirements*

ISO 14155, *Clinical investigation of medical devices for human subjects — Good clinical practice*

ISO 14630, *Non-active surgical implants — General requirements*

ISO 14971, *Medical devices — Application of risk management to medical devices*

ISO 15223-1, *Medical devices — Symbols to be used with medical device labels, labelling and information to be supplied — Part 1: General requirements*

ISO 17665-1, *Sterilization of health care products — Moist heat — Part 1: Requirements for the development, validation and routine control of a sterilization process for medical devices*

ISO 20857, *Sterilization of health care products — Dry heat — Requirements for the development, validation and routine control of a sterilization process for medical devices*

EN 1041+A1, *Information supplied by the manufacturer with medical devices*

OECD Guidelines for the Testing of Chemicals. Section 1: Physical-Chemical properties, Test No. 104: Vapour Pressure

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
delivery system
sealed container in which the product is supplied including any additional component provided to introduce the product into the eye

3.2
dynamic viscosity
quotient of shear stress and shear velocity

Note 1 to entry: The dynamic viscosity is expressed in pascal seconds (Pa·s).

3.3
interfacial tension
tension against liquids

Note 1 to entry: The interfacial tension is expressed in newton per metre (N/m).

3.4
kinematic viscosity
quotient of dynamic viscosity and gravity

Note 1 to entry: The kinematic viscosity is expressed in square metres per second (m^2/s).

3.5
ocular endotamponade
OE
non-solid surgically invasive medical devices introduced into the vitreous cavity of the eye to flatten and position a detached retina onto the RPE, or to tamponade the retina

3.6
primary container
container providing mechanical and microbiological protection of the content

3.7
sterile barrier system
minimum package that prevents ingress of microorganisms and allows aseptic presentation of the product at the point of use

3.8
storage container
part of the packaging intended to protect the device during transport and storage, containing the sterile barrier

3.9
secondary packaging
container external to and providing protection and support for the primary container

3.10
surface tension
tension against air

Note 1 to entry: Surface tension is expressed in newton per metre (N/m).

3.11
surgically invasive medical device
invasive device which penetrates inside the body through the surface the with the aid or in the context of a surgical operation

3.12
vapour pressure
pressure exerted by the vapour of a liquid OE when in equilibrium with the liquid OE

Note 1 to entry: Vapour pressure is expressed in Pascal (Pa) at (35 ± 2) °C.

3.13
minimum utilization pressure
limiting value of the pressure below which the gas or gases mixture shall no longer be withdrawn from the container for its intended use

4 Intended performance

The general requirements for the intended performance of non-active surgical implants specified in ISO 14630 shall apply.

This document describes surgically invasive medical devices that are compatible with the internal ocular environment and, through a primary mechanical action, are used to reposition and/or tamponade a detached retina. They are used either intra-operatively and removed at the end of surgery, as in the case of perfluorocarbon liquids, or are designed to remain in the vitreous cavity until removal at a later date as in the case of silicone oils, or they are completely absorbed as in the case of gaseous OE.

The manufacturer shall describe and document the functional characteristics of the OE in terms of its chemical composition and physical properties, the intended surgical applications, the conditions of use and the maximum duration of contact with, and effects upon ocular tissues, with particular regard to safety.

All available published standards and published scientific and clinical literature, validated test results, clinical investigations, and pre-clinical and clinical evaluations shall be considered in determining the intended device.

5 Design attributes

5.1 General

The general requirements for non-active surgical implants specified in ISO 14630 shall apply.

All testing requirements specified below shall be performed with finished and sterilized product, ready for release. Any analytical methods utilized shall be validated.

NOTE Tests described herein are intended to apply when qualifying materials and not necessarily as a routine quality assurance/control programme.

5.2 Chemical description and contaminants

The manufacturer shall provide a description of each of the components in the finished product, and their respective quality specifications and concentrations.

If the component material is derived from biological sources, the organism from which it is obtained shall be stated along with its source.

Whenever possible, for all polymers, the backbone, any side groups and end-groups shall be identified.

The identification of potentially hazardous chemical or biological contaminants shall be determined by a risk analysis. For raw materials of biological origin, these impurities may include proteins, nucleic acids, or other biological materials.

The identification of potentially hazardous chemical or biological contaminants shall be determined by a risk analysis. Contaminants of the finished product derived from the source materials or from the manufacturing process, such as by-products, residual monomers, cross-linking agents and antioxidants, that are potentially hazardous either systemically or to the tissues of the eye, shall be identified and quantified, whenever possible, and their concentration in the finished product reported. Limits for identified contaminants shall be set and documented. Testing of the biological effects of these contaminants during evaluation of biological safety may be required if the risk analysis determines it necessary. Chemical changes during transport and storage shall be considered. Any contaminant being identified to cause, directly or by being the source for other contaminants, considerable harm to the patient, the user or any third party must be reduced to a level that the health risk associated with the contaminant is considered acceptable.

The following list, although not exhaustive, provides some information on likely contaminants of common endotamponade materials: Materials of biological origin may contain proteins, nucleic acids, or other biological materials as contaminants. Perfluorocarbon liquids may contain oxygen containing compounds and incompletely fluorinated contaminants, including HF. Specifically incompletely fluorinated contaminants, including HF, are likely to occur and they bear a high risk for the patient already at the ppm level. Therefore, the concentration of incompletely fluorinated contaminants, including HF, shall not exceed 10 ppm. A suitable method is described in Annex C.

Silicone oils may contain catalysts, heavy metals, residual monomers and short chain oligomers and polymers as a result from their synthesis.

For any liquid OE, control over synthesis of the tamponade medium according to applicable standards and monographs and analytically controlled purification procedures according to applicable standards or monographs are minimum requirements.

5.3 Density

The density of liquid forms of OE shall be specified in kilograms per cubic metre (kg/m^3).

5.4 Gaseous expansion

For gaseous forms of OE the intraocular gaseous expansion at (35 ± 2) °C and its dependence on atmospheric pressure shall be expressed.

5.5 Interfacial tension

Where applicable, the interfacial tension against water shall be determined and expressed in newton per metre (N/m) at (35 ± 2) °C.

5.6 Kinematic viscosity

Where applicable, the kinematic viscosity at (35 ± 2) °C shall be determined and expressed in millimetres squared per second (mm^2/s).

5.7 Dynamic viscosity

For viscous or viscoelastic OE, the dynamic viscosity shall be determined at (35 ± 2) °C in the range between 0,01 and 100 s^{-1} and expressed in mPa·s.

5.8 Molecular mass distribution

If the OE is a polymer, the average molecular mass, the range of molecular mass distribution and the polydispersity shall be reported.

The manufacturer shall conduct and report such additional tests as necessary to provide an adequate description of the molecular mass distribution of the components in the finished product. Whenever possible, standard methods shall be named and used.

5.9 Particulates

A risk assessment shall evaluate the potential for the formation of and contamination by particulates in the product throughout the life of the product including manufacture, transport and storage under specified conditions, and during use. The potential for associated hazards shall be described.

The manufacturer shall characterize and set limits for the types, range of sizes and levels of particles present in the finished product. Limits according to USP < 789> are deemed acceptable. Alternatively, the manufacturer shall investigate the level of particles in the clinical study. For each type of particle present, a limit which has been validated in a clinical study shall be set and an adequate justification for the limit shall be documented.

5.10 Refractive index

Where applicable, the refractive index between OE and air shall be measured with a refractometer at (35 ± 2) °C and (546 ± 10) nm, or (589±10) nm wavelength.

5.11 Spectral transmittance

The spectral transmittance of the OE shall be measured by transmission spectrophotometry over the range 300 nm to 1 100 nm. Results shall be presented graphically, plotting percentage transmission against wavelength.

5.12 Surface tension

Where applicable, the surface tension shall be determined and expressed in newton per metre (N/m) at (35 ± 2) °C.

5.13 Vapour pressure

If the vapour pressure exceeds 100 Pa, the vapour pressure shall be determined and expressed in Pascal (Pa) at (35 ± 2) °C (OECD Test No. 104: Vapour Pressure).

6 Design evaluation

6.1 General

The OE shall be evaluated for safety by performing a risk assessment in accordance with ISO 14971. The results of the risk assessment shall determine the tests required to evaluate the safety of the OE.

The risk assessment shall take into consideration the following:

a) the type of product and the location and duration of intraocular contact;

b) potential interactions of the OE with other materials and energy sources, e.g. laser likely to be used in ophthalmic surgery;

c) for intraocular gases, any impurity profile changes as the gas is withdrawn from the tank.