SLOVENSKI STANDARD
SIST EN ISO 11137-2:2007

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Nadomeġļ a:
SIST EN 552:2000
SIST EN 552:2000/A1:2000
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SIST EN ISO 11137-2:2006

Sterilizacija izdelkov za zdravstveno nego - Sevanje - 2. del: Doloļ anje odmerka sterilizacije (ISO 11137-2:2006, popravljena verzija 2006-08-01)

Sterilization of health care products - Radiation - Part 2: Establishing the sterilization dose (ISO 11137-2:2006, corrected version 2006-08-01)

Sterilisation von Produkten für die Gesundheitsfürsorge - Strahlen - Teil 2: Festlegung der Sterilisationsdosis (ISO 11137-2:2006, korrigierte Fassung 2006-08-01)

Stérilisation des produits de santé - Irradiation - Partie 2: Établissement de la dose stérilisante (ISO 11137-2:2006, version corrigée 2006-08-01)

Ta slovenski standard je istoveten z: **EN ISO 11137-2:2007**

ICS:

11.080.01	Sterilizacija in dezinfekcija na splošno	Sterilization and disinfection in general

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11137-2

May 2007

ICS 11.080.01

Supersedes EN ISO 11137-2:2006

English Version

Sterilization of health care products - Radiation - Part 2: Establishing the sterilization dose (ISO 11137-2:2006, corrected version 2006-08-01)

Stérilisation des produits de santé - Irradiation - Partie 2: Établissement de la dose stérilisante (ISO 11137-2:2006, version corrigée 2006-08-01)

Sterilisation von Produkten für die Gesundheitsfürsorge - Strahlen - Teil 2: Festlegung der Sterilisationsdosis (ISO 11137-2:2006, korrigierte fassung 2006-08-01)

This European Standard was approved by CEN on 12 May 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of ISO 11137-2:2006, corrected version 2006-08-01 has been prepared by Technical Committee ISO/TC 198 "Sterilization of health care products" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11137-2:2007 by Technical Committee CEN/TC 204 "Sterilization of medical devices", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2007, and conflicting national standards shall be withdrawn at the latest by May 2010.

This document supersedes EN ISO 11137-2:2006.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 11137-2:2006, corrected version 2006-08-01 has been approved by CEN as EN ISO 11137-2:2007 without any modifications.

ANNEX ZA
(informative)

Relationship between this International Standard and the Essential Requirements of EU Directives 90/385/EEC of 20 June 1990 concerning active implantable medical devices, 93/42/EEC of 14 June 1993 concerning medical devices and 98/79/EC of 7 December 1988 concerning *in vitro* diagnostic medical devices

This International Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive, EU Directives 90/385/EEC of 20 June 1990 concerning active implantable medical devices, 93/42/EEC of 14 June 1993 concerning medical devices and 98/79/EC of 7 December 1998 concerning *in vitro* diagnostic medical devices.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this International Standard and Directive (EU Directives 90/385/EEC of 20 June 1990 concerning active implantable medical devices, 93/42/EEC of 14 June 1993 concerning medical devices and 98/79/EC of 7 December 1988 concerning in vitro diagnostic medical devices)

Clause(s)/Sub-clause(s) of this EN	Essential Requirements (ERs) of Directive 90/385/EEC	Essential Requirements (ERs) of Directive 93/42/EEC	Essential Requirements (ERs) of Directive 98/79/EC	Qualifying remarks/Notes
4,5,6,7,8,9,10,11,12	7	8.3	B.2.3	In part
4,5,6,7,8,9,10,11,12		8.4	B.2.4	

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

INTERNATIONAL STANDARD

ISO 11137-2

First edition
2006-04-15

Corrected version
2006-08-01

Sterilization of health care products — Radiation —

Part 2: Establishing the sterilization dose

Stérilisation des produits de santé — Irradiation —

Partie 2: Établissement de la dose stérilisante

Reference number
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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

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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.

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 11137-2 was prepared by Technical Committee ISO/TC 198, *Sterilization of health care products*.

This first edition, together with ISO 11137-1 and ISO 11137-3, cancels and replaces ISO 11137:1995.

ISO 11137 consists of the following parts, under the general title *Sterilization of health care products — Radiation*:

— *Part 1: Requirements for development, validation and routine control of a sterilization process for medical devices*

— *Part 2: Establishing the sterilization dose*

— *Part 3: Guidance on dosimetric aspects*

This corrected version of ISO 11137-2:2006 incorporates changes in the following subclauses:

4.3.1.3, 5.1.1, 7.1, 7.2.3.2, 7.3.4.2, 7.4, 8.1, 8.2.3.1.1, 8.2.3.3.1, 8.2.6.3, 8.3.3.3.1, 8.3.6.3, 9.2.3.2, 9.2.4, 9.3.4.2, 9.3.5, 9.3.6.2, 9.4.1.2, 9.4.3.2, 9.4.5.2, 9.5.2.2, 9.5.4.2, 9.5.6.2, 10.2.5.2, 10.2.6.1, 10.3.3.2, 10.3.6.4.2, 11.3.

Introduction

This part of ISO 11137 describes methods that may be used to establish the sterilization dose in accordance with one of the two approaches specified in 8.2 of ISO 11137-1:2006. The methods used in these approaches are:

a) dose setting to obtain a product-specific dose;

b) dose substantiation to verify a preselected dose of 25 kGy or 15 kGy.

The basis of the dose setting methods described in this part of ISO 11137 (Methods 1 and 2) owe much to the ideas first propounded by Tallentire (Tallentire, 1973 [17]; Tallentire, Dwyer and Ley, 1971 [18]; Tallentire and Khan, 1978 [19]). Subsequently, standardized protocols were developed (Davis *et al*., 1981 [8]; Davis, Strawderman and Whitby, 1984 [9]) which formed the basis of the dose setting methods detailed in the AAMI *Recommended Practice for Sterilization by Gamma Radiation* (AAMI 1984, 1991 [4], [6]).

Methods 1 and 2 and the associated sterilization dose audit procedures use data derived from the inactivation of the microbial population in its natural state on product. The methods are based on a probability model for the inactivation of microbial populations. The probability model, as applied to bioburden made up of a mixture of various microbial species, assumes that each such species has its own unique D_{10} value. In the model, the probability that an item will possess a surviving microorganism after exposure to a given dose of radiation is defined in terms of the initial number of microorganisms on the item prior to irradiation and the D_{10} values of the microorganisms. The methods involve performance of tests of sterility on product items that have received doses of radiation lower than the sterilization dose. The outcome of these tests is used to predict the dose needed to achieve a predetermined sterility assurance level, SAL.

Methods 1 and 2 may also be used to substantiate 25 kGy if, on performing a dose setting exercise, the derived sterilization dose for an SAL of 10^{-6} is $\leqslant$ 25 kGy. The basis of the method devised specifically for substantiation of 25 kGy, Method VD_{max}, was put forward by Kowalski and Tallentire (1999) [14]. Subsequent evaluations involving computational techniques demonstrated that the underlying principles were soundly based (Kowalski, Aoshuang and Tallentire, 2000) [13] and field trials confirmed that Method VD_{max} is effective in substantiating 25 kGy for a wide variety of medical devices manufactured and assembled in different ways (Kowalski *et al*., 2002) [16].

A standardized procedure for the use of VD_{max} for substantiation of a sterilization dose of 25 kGy has been published in the AAMI Technical Information Report *Sterilization of health care products — Radiation sterilization — Substantiation of 25 kGy as a sterilization dose — Method VD_{max}* (AAMI TIR27:2001) [5], a text on which the method described herein is largely based. Method VD_{max} is founded on dose setting Method 1 and, as such, it possesses the high level of conservativeness characteristic of Method 1. In a similar manner to the dose setting methods, it involves performance of tests of sterility on product items that have received a dose of radiation lower than the sterilization dose. The outcomes of these tests are used to substantiate that 25 kGy achieves an SAL of 10^{-6}.

To link the use of VD_{max} for the substantiation of a particular preselected sterilization dose, the numerical value of the latter, expressed in kGy, is included as a superscript to the VD_{max} symbol. Thus, for substantiation of a sterilization dose of 25 kGy the method is designated VD_{max}^{25}.

Method VD_{max}^{15} is based on the same principles as Method VD_{max}^{25} described above. The test procedure is the same as Method VD_{max}^{25}, but VD_{max}^{15} is limited to product with average bioburden $\leqslant$ 1,5. The outcomes of these tests are used to substantiate that 15 kGy achieves a sterility assurance level of 10^{-6}.

This part of ISO 11137 also describes methods that may be used to carry out sterilization dose audits in accordance with ISO 11137-1:2006, Clause 12. Following establishment of the sterilization dose, sterilization dose audits are performed routinely to confirm that the sterilization dose continues to achieve the desired SAL.

Sterilization of health care products — Radiation —

Part 2: Establishing the sterilization dose

1 Scope

This part of ISO 11137 specifies methods of determining the minimum dose needed to achieve a specified requirement for sterility and methods to substantiate the use of 25 kGy or 15 kGy as the sterilization dose to achieve a sterility assurance level, SAL, of 10^{-6}. This part of ISO 11137 also specifies methods of dose auditing in order to demonstrate the continued effectiveness of the sterilization dose.

This part of ISO 11137 defines product families for dose establishment and dose auditing.

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 11137-1:2006, *Sterilization of health care products — Radiation — Part 1: Requirements for the development, validation and routine control of a sterilization process for medical devices*

ISO 11737-1, *Sterilization of medical devices — Microbiological methods — Part 1: Determination of the population of microorganisms on product*

ISO 11737-2, *Sterilization of medical devices — Microbiological methods — Part 2: Test of sterility performed in the validation of a sterilization process*

ISO 13485, *Medical devices — Quality management systems — Requirements for regulatory purposes*

3 Abbreviations, terms and definitions

For purposes of this document, the terms and definitions given in ISO 11137-1 and the following apply.

3.1 Abbreviations

3.1.1
A
dose to adjust the median ffp dose downwards, to the FFP dose

3.1.2
*CD**
number of positive tests of sterility obtained from tests performed individually on 100 product items irradiated in a Method 2 verification dose experiment

3.1.3
*d**
dose derived from an incremental dose experiment performed on product items drawn from a given production batch

3.1.4
*D**
initial estimate of the dose to provide an SAL of 10^{-2} for the test items

NOTE Generally, it is the median of the 3 *d** values derived for a given product.

3.1.5
*D***
final estimate of the dose to provide an SAL of 10^{-2} for the test items, which is used in the calculation of the sterilization dose

3.1.6
*DD**
dose delivered in a Method 2 verification dose experiment

3.1.7
DS
estimate of D_{10} value of microorganisms present on product after exposure to *DD**

3.1.8
D **value**
D_{10} **value**
time or dose required to achieve inactivation of 90 % of a population of the test microorganism under stated conditions

[ISO/TS 11139:2006]

NOTE For the purposes of this document, D_{10} applies to the radiation dose only and not to time.

3.1.9
first fraction positive dose
ffp
lowest dose of an incremental dose series, applied to product items drawn from a given production batch, at which at least one of the associated 20 tests of sterility is negative

3.1.10
First Fraction Positive dose
FFP
dose at which 19 positives out of the 20 tests of sterility are expected to occur, calculated by subtracting *A* from the median of 3 ffp doses

3.1.11
First No Positive dose
FNP
estimate of the dose to provide an SAL of 10^{-2} for the test items, which is used in the calculation of *DS*

3.1.12
VD_{max}^{15}
maximal verification dose for a given bioburden, consistent with the attainment of an SAL of 10^{-6} at a specified sterilization dose of 15 kGy

3.1.13
VD_{max}^{25}
maximal verification dose for a given bioburden, consistent with the attainment of an SAL of 10^{-6} at a specified sterilization dose of 25 kGy

3.2 Terms

3.2.1
batch
defined quantity of product, intended or purported to be uniform in character and quality, which has been produced during a defined cycle of manufacture

[ISO/TS 11139:2006]

3.2.2
bioburden
population of viable microorganisms on or in product and/or sterile barrier system

[ISO/TS 11139:2006]

3.2.3
false positive
test result interpreted as growth arising from the product, or portions thereof, tested when either growth resulted from extraneous microbial contamination or turbidity occurred from interaction between the product, or portions thereof, and the test medium

3.2.4
fraction positive
quotient in which the number of positive tests of sterility is given by the numerator and the number of tests performed is given by the denominator

3.2.5
incremental dose
dose within a series of doses applied to a number of product, or portions thereof, and used in a dose setting method to obtain or confirm the sterilization dose

3.2.6
negative test of sterility
test result for which there is no detectable microbial growth from product, or portion thereof, subjected to a test of sterility

3.2.7
packaging system
combination of the sterile barrier system and protective packaging

[ISO/TS 11139:2006]

3.2.8
positive test of sterility
test result for which there is detectable microbial growth from product, or portion thereof, subjected to a test of sterility

3.2.9
sample item portion
SIP
defined portion of a health care product that is tested

3.2.10
sterile barrier system
minimum package that prevents ingress of microorganisms and allows aseptic presentation of product at the point of use