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Standard Guide for Biocompatibility Evaluation of Medical Device Packaging Materials[1]

This standard is issued under the fixed designation F2475; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide provides information to determine the appropriate testing for biocompatibility of ~~materials (or packaging materials) in sterile barrier systems used to contain a medical device.~~medical device packaging materials that have the potential to contact the patient directly or indirectly.

1.2 This guide does not apply to secondary or tertiary packaging materials.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate ~~safety~~ safety, health, and ~~health~~environmental practices and ~~to~~ determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F17 Terminology Relating to Primary Barrier Packaging

2.2 *Other Standards:*

~~ANSI/AAMI/ISO 11607 Packaging for Terminally Sterilized Medical Devices~~

ISO ~~10993-1:2009~~ 10993-1:2018 Biological ~~Evaluation~~evaluation of ~~Medical Devices~~medical devices – Part 1: Evaluation and ~~Testing~~testing within a risk management process[3]

~~USP <1031>~~ANSI/AAMI/ISO 11607-1:2006(R2010) ~~The Biocompatibility of Materials Used in Drug Containers, Medical Devices, and Implants~~Packaging for terminally sterilized medical devices – Part 1: Requirements for materials, sterile barrier systems, and packaging systems[4]

FDA ~~–~~Center for Devices and Radiological Health: ~~Required Biocompatability Training and Toxicology Profiles for Evaluation of Medical Devices (#G95-1)~~2016 Biocompatibility Guidance: Use of International Standard ISO 10993-1, "Biological evaluation of medical devices – Part 1: Evaluation and testing within a risk management process" (June 16, 2016)

3. Terminology

3.1 *Definitions*—For terminology related to barrier materials for medical packaging see Terminology F17.

3.2 *Definitions of Terms Specific to This Standard:*

~~3.2.1 *biocompatibility*—the inherent ability of a material to remain biologically inert with the host in its intended application.~~

~~3.2.2 *biocompatibility testing*—the series of chemical and biological tests that a material is subjected to in order to determine the ability of the material to remain biologically inert with the host in its intended application.~~

[1] This guide is under the jurisdiction of ASTM Committee F02 on ~~Flexible~~Primary Barrier Packaging and is the direct responsibility of Subcommittee F02.15 on Chemical/Safety Properties.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, http://www.iso.org.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

3.2.1 *extent of contact*—~~the~~ degree to which the packaged device will contact the patient (refer to ISO ~~10993-1 for levels of contact of the device with the human body).~~ 10993-1). When referring to the packaging, extent of contact refers to the degree to which the packaging will interact with the device. Degree of packaging contact (interaction) is related to the physical-chemical nature of the packaging materials and the device, the intended use of the device ~~(levels~~ (which relates to the categorization of contact with the body), and the extent to which the packaging may negatively impact the contained device.

3.2.2 *packaging biocompatibility*—inherent ability of a material to protect against a chemical change in the packaged medical device that could result in an adverse response to the host in its intended application.

3.2.3 *packaging biocompatibility testing*—series of chemical and biological tests that a material is subjected to in order to determine the ability of the packaging material to protect against a chemical change in the packaged medical device that could result in an adverse response to the host in its intended application.

3.2.4 *sterile barrier system*—minimum package that prevents ingress of microorganisms and allows aseptic presentation of the product at the point of use.

4. Summary of Practice

4.1 Materials used in packaging are to be evaluated per defined guidelines, such as AAMI/ANSI/ISO 11607. The effect of packaging on the patient should be first and foremost addressed through the biocompatibility evaluation of the device itself as this represents the clinical exposure. Additional biocompatibility testing for packaging materials may be required based on the conditions and extent of packaging material contact with the ~~contained~~ medical device, the subsequent degree to which the ~~packaged~~medical device ~~(product)~~ will contact the patient, and the intended use of the device. ~~When selecting the appropriate tests for biological evaluation of medical devices, the chemical characteristics~~While the scope of ISO 10993-1, and CDRH's 2016 Biocompatibility Guidance referenced in 2.2 ~~of the device materials, as well as the nature, degree, frequency and duration of the device's exposure to the body must be considered. Similar testing may be considered for medical packaging, when there is not a history of safe use of packaging materials for their intended sue or there may be a question as to whether the packaging may negatively impact the contained device. Guidelines for biocompatibility verification of medical device packaging are based on FDA guidance (Memorandum #G-95), ANSI/AAMI/ISO 10993-1 and USP <1031> The Biocompatibility of Materials Used in Drug Containers, Medical Devices, and Implants. While the scope of these standards does~~ do not directly apply to medical device packaging, use of ~~them~~ these documents will address the intent of ~~ISO~~AAMI/ANSI/ISO 11607.

~~The reader is advised to consult these standards in determining which tests apply for a given packaging application. All medical device packages are considered to have indirect patient contact, at a minimum. Therefore, the tests selected will not typically require more extensive testing than that required for medical devices intended for indirect patient contact.~~

~~However, test selection should also be based on the extent of contact between the package and the device, and the probability that the package may negatively impact the properties of the contained medical device. For example, a device that is a solid structure is less likely to interact with its packaging than a device composed of a semi-solid or liquid material.~~

4.2 The reader is advised to consult these standards and guidances in determining which evaluations apply for a given packaging application, and whether testing would be needed to address those evaluations. If chemical information is needed to support that there is no interaction between the device and the packaging, the need for analytical chemistry information, and the type of physical or chemical testing selected (some options can include Fourier-transform infrared spectroscopy (FTIR), Scanning Electron Microscopy (SEM) and extractable or leachable analyses) should also be based on the extent of contact between the package and the device or the package and device materials, to assess whether the package may negatively impact the properties of the contained medical device. For example, a device that is a solid structure may be less likely to interact with its packaging than a device composed of a semi-solid or liquid material. The chemical stability of the packaging materials over the shelf life of the product, and the potential for interaction between the packaging and the device should be considered and justified by an appropriately qualified individual using experimental data or preexisting information.

5. Significance and Use

5.1 The compatibility of packaging materials with a medical device is a requirement of many regulatory bodies. Since most medical devices are used or implanted in, around, or on the human body, the benefits of these devices must ~~do no harm.~~outweigh the risks. Therefore, the packaging materials that come in contact with the medical device must also be evaluated and determined to be safe for use with the human body in that they have no negative impact on the physical, chemical, or biological properties of the device. ~~.~~This evaluation may include both a study of relevant experience with, and actual testing of, packaging materials. Such an evaluation may result in the conclusion that no testing is needed if the material has a demonstrable history of safe use in the specific role that is the same as that of the package under design.

~~The medical device manufacturer determines the need for appropriate testing, with consideration of the device/package interactions, if any. The responsibility of the packaging supplier is typically limited to the performance of cytotoxicity testing.~~

5.2 The medical device manufacturer determines the need for appropriate testing, with consideration of the device/package interactions, if any. When screening information is needed regarding the biocompatibility of the packaging, cytotoxicity testing from the supplier is typically performed.