American National Standard

ANSI/AAMI ST67:2019

Sterilization of health care products—Requirements and guidance for selecting a sterility assurance level (SAL) for products labeled "sterile"

AAMI
Advancing Safety in Health Technology

American National Standard

ANSI/AAMI ST67:2019
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Sterilization of health care products—Requirements and guidance for selecting a sterility assurance level (SAL) for products labeled “sterile”

Developed by
Association for the Advancement of Medical Instrumentation

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Abstract: This standard establishes requirements, guidance and a risk framework for identification of acceptable approach(es) for assurance of sterility and for selection of alternative SAL(s) or aseptic processing for health care product that cannot be terminally sterilized to achieve an SAL value of 10^{-6}.

Keywords: sterility assurance level (SAL), terminal sterilization, aseptic processing, biologics, combination devices

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Foreword

This standard was developed by the AAMI Assurance of Sterility Working Group under the auspices of the AAMI Sterilization Standards Committee.

The purpose of this standard, for product to be labelled as sterile, is to provide requirements, guidance and a risk framework for identification of acceptable approach(es) for assurance of sterility and for selection of alternative SAL(s) or aseptic processing for health care products that cannot be terminally sterilized to achieve an SAL value of 10^{-6}.

Compared with the previous edition of the standard, changes in ANSI/AAMI ST67:2019 include:

- addition of a section of alternate SAL;
- addition of a section on aseptic processing;
- inclusion of a new annex on modification strategies to achieve terminal sterilization at an SAL of 10^{-6};
- new tables for risk aspects to consider for individual patients; and
- new tables for product SAL requirements.

This standard reflects the conscientious efforts of health care professionals, in cooperation with medical device and equipment manufacturers, to develop recommendations for quality systems for the processing of medical devices. It is not intended that these recommendations be construed as universally applicable in all circumstances. Also, it is recognized that in many cases these recommendations might not be immediately achievable. Therefore, the document should be used to guide personnel towards desirable performance objectives, and all of its provisions should be considered and applied in the light of professional judgment and experience.

As used within the context of this document, “shall” indicates requirements strictly to be followed to conform to the standard. “Should” indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action should be avoided but is not prohibited. “May” is used to indicate that a course of action is permissible within the limits of the standard. “Can” is used as a statement of possibility and capability. Finally, “must” is used only to describe “unavoidable” situations, including those mandated by government regulation.

The provisions of this standard should be reviewed routinely by departmental managers and quality management representatives and adapted to the needs of their particular institutions. Written policies, procedures, and work instructions should be developed and implemented in consultation with appropriate hospital committees (e.g., safety, infection prevention and control, and hazardous materials).

The concepts incorporated in this standard should be considered flexible and dynamic. The recommendations set forth in this document are reviewed and updated periodically to assimilate progressive technological developments. AAMI policies and procedures require that AAMI standards and recommended practices be reviewed and, if necessary, revised at least once every five years.

Suggestions for improving this standard are invited. Comments and suggested revisions should be sent to Technical Programs, AAMI, 901 N. Glebe Rd, Suite 300, Arlington, VA 22203.

NOTE—This foreword does not contain provisions of the AAMI Standard, *Sterilization of health care products—Requirements and guidance for selecting a sterility assurance level (SAL) for products labeled “sterile”* (AAMI ST67:2019), but it does provide important information about the development and intended use of the document. American National Standard ANSI/AAMI ST67:2019.

Introduction

Sterility (or the state of being sterile) is defined as being free of viable microorganisms. The sterility of a health care product can be achieved through validation and control of a terminal sterilization process (or processes), through aseptic processing (i.e., product components are separately sterilized prior to final aseptic assembly) when terminal sterilization is not feasible, or a combination of the two processes. Regardless of the process, there are other considerations to assuring that the outcome is a sterile product. Some of these considerations are product design, the manufacturing process, quality control of raw materials, process control and the method used to qualify the process. For health care products labeled 'sterile' attention to product and sterile barrier system or container characteristics, manufacturing facilities, controls, and other aspects of a quality system are required as defined in standards and government regulations. [1]

The AAMI/ISO standards recognize that there are certain processes used in manufacturing for which the results cannot be fully verified by subsequent inspection and testing of the product. Examples of such processes are those that reduce the risk of microbial contamination, e.g., terminal sterilization and aseptic processing. For this reason, terminal sterilization and aseptic processing processes must be validated and monitored.

Healthcare products produced under standard manufacturing conditions in accordance with requirements for quality management systems typically have microorganisms on them and are nonsterile. The microbial load on product can be reduced by controlling bioburden of raw materials, personnel and the manufacturing environment in conjunction with:

a) a terminal sterilization process; and/or

b) a combination of component (e.g., raw materials, drug or biologic product, containers and/or devices) sterilization and aseptic processing.

During terminal sterilization processes, the manufactured product within its sterile barrier system or container is sterilized using a defined microbicidal process. The purpose of terminal sterilization is to achieve sterility by inactivating product bioburden using a validated process. Inactivation studies with microorganisms exposed to sterilizing agents (e.g., dry heat, moist heat, ethylene oxide, or radiation) approximates an exponential rate of kill. Mathematically there is always a finite probability that a microorganism might survive, regardless of the extent of treatment applied. For a given extent of treatment, the probability of survival is influenced by the number and resistance of microorganisms and the environment in which the microorganisms exist during treatment. Sterility in these cases is defined in terms of the probability of a viable microorganism on/in the product following sterilization. This mathematical probability is commonly referred to as a sterility assurance level (SAL).

The purpose of this standard, for product to be labelled as sterile, is to provide requirements, guidance and a risk framework for identification of acceptable approach(es) for assurance of sterility and for selection of alternative SAL(s) or aseptic processing for health care products that cannot be terminally sterilized to achieve an SAL value of 10^{-6}.

[1] For medical devices, refer to U.S. Food and Drug Administration's (FDA's) 21 CFR 820, International Organization for Standardization's (ISO's) ISO 13485, and European Medical Device Regulation. ANSI/AAMI/ISO 13485 is an application of the ISO 9000 series of quality management system standards.

For pharmaceutical products, refer to U.S. FDA's 21 CFR 210/211 and European Medical Device Regulation and biologics U.S. FDA's 21 CFR 600/601

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1 Scope

1.1 Inclusions

1.1.1 This standard specifies requirements and provides guidance on selecting approaches to establish assurance of sterility for a health care product labelled as “sterile.” Approaches to assurance of sterility include terminal sterilization at the accepted SAL appropriate for the product (e.g., 10^{-6} or 10^{-3}), terminal sterilization at alternative SALs and aseptic processing.

1.1.2 This standard as it pertains to terminal sterilization applies to sterilization processes in which microorganisms are inactivated by physical and/or chemical means.

1.2 Exclusions

1.2.1 This standard does not address health care products that are not labeled “sterile.” For example, nonsterile health care products that possess antimicrobial properties or contain preservatives for the control of microbial levels are not addressed.

1.2.2 This standard is not applicable to the sterilization of used or reprocessed health care products.

1.2.3 This standard is not applicable to sterilization of health care products by filtration**.**

1.2.4 This standard does not specify requirements for development, validation and routine control of a process for inactivating the causative agents of spongiform encephalopathies such as scrapie, bovine spongiform encephalopathy and Creutzfeldt-Jakob disease. Specific recommendations have been produced in particular countries for the processing of materials potentially contaminated with these agents.

NOTE—See also ISO 22442-1, ISO 22442-2 and ISO 22442-3.

1.2.5 This standard does not attempt to define what is considered an acceptable level of risk to justify an alternative SAL. This risk assessment must be based on valid clinical and/or scientific data. As such, what is considered an acceptable level of risk might vary from product to product.

2 Normative references

The following normative references contain provisions that, through reference in the text, constitute provisions of this standard. For any dated reference, subsequent amendments to or revisions of the reference do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative references indicated below.

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

U.S. FOOD AND DRUG ADMINISTRATION. Current good manufacturing practice in manufacturing, processing, packing, or holding of drugs; general. Code of Federal Regulations, Title 21, Part 210/211.

U.S. FOOD AND DRUG ADMINISTRATION. Biological products: General. Code of Federal Regulations, Title 21, Part 600/601.