

BS EN ISO 13408-1:2011+A1:2013



BSI Standards Publication

Aseptic processing of health care products

Part 1: General requirements

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This British Standard is the UK implementation of EN ISO 13408-1:2011+A1:2013. It is identical to ISO 13408-1:2008, incorporating amendment 1:2013. It supersedes BS EN ISO 13408-1:2011, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee CH/198, Sterilization of medical devices.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2013. Published by BSI Standards Limited 2013

ISBN 978 0 580 76083 9

ICS 11.080.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 October 2011.

Amendments/corrigenda issued since publication

Date	Text affected
30 June 2013	Implementation of ISO amendment 1:2013 with CEN endorsement A1:2013

English Version

Aseptic processing of health care products - Part 1: General requirements (ISO 13408-1:2008)

Traitement aseptique des produits de santé - Partie 1:
Exigences générales (ISO 13408-1:2008)

Aseptische Herstellung von Produkten für die
Gesundheitsfürsorge - Teil 1: Allgemeine Anforderungen
(ISO 13408-1:2008)

This European Standard was approved by CEN on 10 June 2011.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, 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: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of ISO 13408-1:2008 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 13408-1:2011 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 December 2011, and conflicting national standards shall be withdrawn at the latest by December 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13824:2004.

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 Directives.

For relationship with EU Directives, see informative Annexes ZA, ZB, or ZC, which are integral parts 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, Croatia, 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 the United Kingdom.

Endorsement notice

The text of ISO 13408-1:2008 has been approved by CEN as a EN ISO 13408-1:2011 without any modification.

Foreword to amendment A1

This document (EN ISO 13408-1:2011/A1:2013) has been prepared by Technical Committee ISO/TC 198 "Sterilization of health care products" in collaboration with Technical Committee CEN/TC 204 "Sterilization of medical devices" the secretariat of which is held by BSI.

This Amendment to the European Standard EN ISO 13408:2011 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2013, and conflicting national standards shall be withdrawn at the latest by November 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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 Directives.

For relationship with EU Directives, see informative Annex ZA, B and C, which are integral parts 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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 13408-1:2008/Amd 1:2013 has been approved by CEN as EN ISO 13408-1:2011/A1:2013 without any modification.

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 90/385/EEC on Active Implantable Medical Devices

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 90/385/EEC on active implantable medical devices.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the 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 European Standard and Directive 90/385/EEC

Clauses of this EN	Essential Requirements (ERs) of Directive 90/385/EEC	Qualifying remarks/Notes
4,5,6,7,8,9,10,11	7	This relevant Essential Requirement is only partly addressed in this European Standard. Packaging for maintenance of sterility during transportation and storage are not covered

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

Annex ZB (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 93/42/EEC on Medical Devices

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 93/42/EEC on medical devices.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZB.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 ZB.1 — Correspondence between this European Standard and Directive 93/42/EEC

Clauses of this EN	Essential Requirements (ERs) of Directive 93/42/EEC	Qualifying remarks/Notes
4,5,6,7,8,9,10,11	8.3	This relevant Essential Requirement is only partly addressed in this European Standard. Packaging for maintenance of sterility during transportation and storage are not covered
4,5,6,7,8,9,10,11	8.4	

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

Annex ZC (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/79/EC on *in vitro* diagnostic medical devices

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 98/79/EC on *in vitro* diagnostic medical devices.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZC.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 ZC.1 — Correspondence between this European Standard and Directive 98/79/EC

Clauses of this EN	Essential Requirements (ERs) of Directive 98/79/EC	Qualifying remarks/Notes
4,5,6,7,8,9,10,11	B.2.3	This relevant Essential Requirement is only partly addressed in this European Standard. Packaging for maintenance of sterility during transportation and storage are not covered
4,5,6,7,8,9,10,11	B.2.4	

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

Contents

Page

Foreword.....	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	2
4 Quality system elements.....	7
4.1 General.....	7
4.2 Assignment of responsibilities	7
4.3 Calibration	7
5 Aseptic process definition	8
5.1 General.....	8
5.2 Risk management	8
6 Manufacturing environment	10
6.1 General.....	10
6.2 Manufacturing environment design	11
6.3 Layout	12
6.4 Material and personnel flow	14
6.5 HVAC system	15
6.6 Cleanroom qualification	17
6.7 Utility services and ancillary equipment	17
6.8 Environmental and personnel monitoring programmes	17
7 Equipment	21
7.1 Qualification	21
7.2 Maintenance of equipment	23
8 Personnel.....	23
8.1 General.....	23
8.2 Training for APA qualification	24
8.3 Gowning procedures	25
8.4 General employee health	26
9 Manufacture of the product	27
9.1 Attainment and maintenance of sterility	27
9.2 Duration of the manufacturing process	27
9.3 Aseptic manufacturing procedures	28
9.4 Cleaning and disinfection of facilities	28
9.5 Cleaning, disinfection and sterilization of equipment	30
10 Process simulation	31
10.1 General.....	31
10.2 Media selection and growth support	32
10.3 Simulation procedures	32
10.4 Incubation and inspection of media filled units	33
10.5 Initial performance qualification	33
10.6 Periodic performance requalification	34
10.7 Repeat of initial performance qualification	35
10.8 Documentation of process simulations	35
10.9 Disposition of filled product	36
11 Test for sterility	37

11.1 General 37

11.2 Investigation of positive units from tests for sterility 37

Annex A (informative) Example of a flow chart 38

Annex B (informative) Typical elements of an aseptic process definition 39

Annex C (informative) Examples of specific risks 40

Annex D (informative) Comparison of classification of cleanrooms 41

Annex E (informative) Specification for water used in the process 42

Annex F (informative) Aseptic processing area 44

Bibliography 45

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 13408-1 was prepared by Technical Committee ISO/TC 198, *Sterilization of health care products*.

This second edition cancels and replaces the first edition (ISO 13408-1:1998), which has been technically revised. Any normative and informative clauses on subjects which have meanwhile been addressed in Part 2 to Part 6 of ISO 13408 have been removed from this part.

ISO 13408 consists of the following parts, under the general title *Aseptic processing of health care products*:

- *Part 1: General requirements*
- *Part 2: Filtration*
- *Part 3: Lyophilization*
- *Part 4: Clean-in-place technologies*
- *Part 5: Sterilization in place*
- *Part 6: Isolator systems*

Introduction

Health care products that are labelled “sterile” are prepared using appropriate and validated methods under stringent control as part of a quality management system. For pharmaceuticals and medical devices there might be various requirements including compliance with ISO standards, GMP regulations and pharmacopoeial requirements.

Wherever possible, healthcare products intended to be sterile should be sterilized in their final sealed container (terminal sterilization). ^{A1} ISO/TC 198 has prepared standards for terminal sterilization of health care products by irradiation (ISO 11137 series), by moist heat (ISO 17665 series), by dry heat (ISO 20857), by ethylene oxide (ISO 11135) and by liquid chemical sterilants (ISO 14160). ^{A1}

When a health care product is intended to be sterile and cannot be terminally sterilized, aseptic processing provides an alternative. Presterilization of product, product parts and/or components and all equipment coming into direct contact with the aseptically-processed product is required. Aseptic processing intends to maintain the sterility of the pre-sterilized components and products during assembling. The resulting product is required to be sterile in its final container. Aseptic processing can also be used to prevent contamination of biological product or biological systems (e.g. tissues, vaccines).

While terminal sterilization involves the control of a well-defined process of known lethality delivered to the product and a sterility assurance level (SAL) can be extrapolated from sterilization data, this is not applicable to aseptic processing.

Examples of applications in which aseptic processing are used include:

- aseptic handling and filling of solutions, suspensions, semisolids and powders;
- aseptic handling, transfer and packaging of solid products including solid medical devices;
- aseptic handling, transfer and packaging of combination products;
- aseptic handling of tissues or biological production systems.

Sterilization procedures which render components and/or parts sterile as a prerequisite for further aseptic processing can be treated as separate procedures. They have to be evaluated and validated separately and it is important that their risk of failure is minimal. The aseptic process definition encompasses all production steps following the sterilization of product and components until the final container or package is sealed. To keep the aseptic process definition clear and workable, this part of ISO 13408 is focused on the risks to the maintenance of sterility.

It is important to control all possible sources of contamination in order to maintain the sterility of each and every component. To achieve this, a risk-based aseptic process definition is established encompassing each product and applied in a comprehensive way considering product, package design, environment and manufacturing process designs. The product is processed in a controlled environment where microbial and particulate levels are maintained at defined minimal levels and where human intervention is minimized. Validated systems, adequately trained personnel, controlled environments and well-documented systematic processes are applied to assure a sterile finished product.

The aseptic process is divided into unit operations (e.g. sterilization of product or components including sterile filtration, assembly of components, handling and storage of sterilized product) and it is necessary that potential sources of contamination from materials, components, product, personnel, facility, equipment and utilities such as water systems be considered and minimized. Only if all risks of contamination have been recognised, wherever possible minimized, eliminated or controlled and finally have been evaluated as

acceptable, can the controls on the aseptic process be considered to be acceptable. Appropriate validation of the specified elements of the aseptic process is needed, of which process simulation studies are an essential **A1** component **A1**.

This revision of ISO 13408-1:1998 is intended to adopt this International Standard to the actual state of technology in the field.

Aseptic processing of health care products —

Part 1: General requirements

1 Scope

1.1 This part of ISO 13408 specifies the general requirements for, and offers guidance on, processes, programmes and procedures for development, validation and routine control of the manufacturing process for aseptically-processed health care products.

1.2 This part of ISO 13408 includes requirements and guidance relative to the overall topic of aseptic processing. Specific requirements and guidance on various specialized processes and methods related to filtration, lyophilization, clean-in place (CIP) technologies, sterilization in place (SIP) and isolator systems are given in other parts of ISO 13408.

NOTE This part of ISO 13408 does not supersede or replace national regulatory requirements, such as Good Manufacturing Practices (GMPs) and/or pharmacopoeial requirements that pertain in particular national or regional jurisdictions.

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.

A1 *Text deleted* **A1**

ISO 11135-1, *Sterilization of health care products — Ethylene oxide — Part 1: Requirements for development, validation and routine control of a sterilization process for medical devices*

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

ISO 11137-2, *Sterilization of health care products — Radiation — Part 2: Establishing the sterilization dose*

ISO 13408-2, *Aseptic processing of health care products — Part 2: Filtration*

ISO 13408-3, *Aseptic processing of health care products — Part 3: Lyophilization*

ISO 13408-4, *Aseptic processing of health care products — Part 4: Clean-in-place technologies*

ISO 13408-5, *Aseptic processing of health care products — Part 5: Sterilization in place*

ISO 13408-6, *Aseptic processing of health care products — Part 6: Isolator systems*

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

ISO 14160, *Sterilization of single-use medical devices incorporating materials of animal origin — Validation and routine control of sterilization by liquid chemical sterilants*

ISO 14644-1:1999, *Cleanrooms and associated controlled environments — Part 1: Classification of air cleanliness*

ISO 14644-2, *Cleanrooms and associated controlled environments — Part 2: Specifications for testing and monitoring to prove continued compliance with ISO 14644-1*

ISO 14644-3, *Cleanrooms and associated controlled environments — Part 3: Test methods*

ISO 14644-4, *Cleanrooms and associated controlled environments — Part 4: Design, construction and start-up*

ISO 14644-5, *Cleanrooms and associated controlled environments — Part 5: Operations*

ISO 14644-7, *Cleanrooms and associated controlled environments — Part 7: Separative devices (clean air hoods, gloveboxes, isolators and mini-environments)*

ISO 14698-1, *Cleanrooms and associated controlled environments — Biocontamination control — Part 1: General principles and methods*

ISO 14698-2, *Cleanrooms and associated controlled environments — Biocontamination control — Part 2: Evaluation and interpretation of biocontamination data*

ISO 14937, *Sterilization of health care products — General requirements for characterization of a sterilizing agent and the development, validation and routine control of a sterilization process for medical devices*

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

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*

ICH Guidance for Industry — Q9 Quality Risk Management ¹⁾

3 Terms and definitions

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

3.1 action level

established microbial or particulate monitoring results requiring immediate follow-up and corrective action

3.2 airlock

room with interlocked doors designed to maintain pressure control between adjacent rooms of different cleanliness class

3.3 alert level

established microbial or particulate monitoring results giving early warning of potential drift from normal operating conditions which are not necessarily grounds for definitive corrective action but which could require follow-up investigation

^{A1} Text deleted ^{A1}

^{A1} 1) ^{A1} Available at: <http://www.ich.org>

3.4

aseptic processing

handling of sterile product, containers and/or devices in a controlled environment, in which the air supply, materials, equipment and personnel are regulated to maintain sterility

NOTE This includes sterilization by membrane filtration which cannot be separated from the subsequent aseptic process.

3.5

aseptic processing area

APA

facilities for **aseptic processing** (3.4), consisting of several zones

3.6

bioburden

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

[ISO/TS 11139:2006, definition 2.2]

NOTE For the purposes of aseptic processing, the bioburden of concern is that on or in the product including all factors affecting it such as raw material, intermediates, other components and equipment.

3.7

bio-decontamination

removal of microbiological contamination or its reduction to an acceptable level

 Text deleted 

3.8

cleaning

removal of contamination from an item to the extent necessary for further processing or for intended use

[ISO/TS 11139:2006, definition 2.7]

3.9

combination product

product comprised of drug/device, biologic/device, drug/biologic or drug/device/biologic, that are physically, chemically, or otherwise combined or mixed and produced as a single entity

3.10

correction

action to eliminate a detected nonconformity

NOTE A correction can be made in conjunction with a corrective action.

[ISO 9000:2005; definition 3.6.6]

3.11

corrective action

action to eliminate the cause of a detected nonconformity or other undesirable situation

[ISO 9000:2005, definition 3.6.5]

NOTE 1 There can be more than one cause for a nonconformity.

NOTE 2 Corrective action is taken to prevent recurrence whereas **preventive action** (3.29) is taken to prevent occurrence.

NOTE 3 There is a distinction between correction and corrective action.

NOTE 4 Corrective actions might be subject to change control.

3.12

critical processing zone

location within the aseptic processing area in which product and critical surfaces are exposed to the environment

3.13

critical surface

surface that may come into contact with or directly affect a product or its containers or closures

3.14

depotrogenation

validated process designed to remove or deactivate endotoxins

3.15

design qualification

verification that the proposed specification for the facility, equipment or system is suitable for the intended use

[ISO/TS 11139:2006, definition 2.12]

3.16

direct support zone

protective area directly surrounding a critical processing zone

3.17

disinfectant

chemical agent that is able to reduce the number of viable microorganisms

3.18

disinfection

removal, destruction or de-activation of microorganisms on objects or surfaces

[ISO 14644-5:2004;definition 3.1.4]

3.19

endotoxin

lipopolysaccharide component of the cell wall of Gram-negative bacteria which is heat stable and elicits a variety of inflammatory responses in animals and humans

3.20

environmental isolates

microorganisms present in and/or isolated from processing or manufacturing environments

3.21

gowning procedure

defined steps to reduce the risk of contamination while putting on the protective garments needed to enter the APA (3.5)

3.22

health care product

medical device(s), including *in vitro* diagnostic medical device(s), or medicinal product(s), including biopharmaceutical(s)

[ISO/TS 11139:2006, definition 2.20]

3.23

high efficiency particulate air filter HEPA filter

retentive matrix having a minimum particle-collection efficiency of 99,97 % (that is, a maximum particle penetration of 0,03 % for 0,3 µm particles)

3.24

indirect support zone

location within the aseptic processing area which protects the direct support zone

A1 NOTE The required grade of cleanliness of the indirect support zone depends on the aseptic processing technologies and activities performed. **A1**

3.25

installation qualification

IQ

process of obtaining and documenting evidence that equipment has been provided and installed in accordance with its specification

[ISO/TS 11139:2006, definition 2.22]

3.26

isolator

enclosure capable of preventing ingress of contaminants by means of physical interior/exterior separation, and capable of being subject to reproducible interior bio-decontamination

NOTE An isolator can range in size from a small box to a large room.

3.27

operational qualification

OQ

process of obtaining and documenting evidence that installed equipment operates within predetermined limits when used in accordance with its operational procedures

[ISO/TS 11139:2006, definition 2.27]

3.28

performance qualification

PQ

process of obtaining and documenting evidence that the equipment, as installed and operated in accordance with operational procedures, consistently performs in accordance with predetermined criteria and thereby yields product meeting its specification

[ISO/TS 11139:2006, definition 2.30]

3.29

preventive action

action to eliminate the cause of a potential nonconformity or other undesirable potential situation

[ISO 9000:2005, definition 3.6.4]

NOTE 1 There can be more than one cause for a potential nonconformity.

NOTE 2 Preventive action is taken to prevent occurrence whereas **corrective action** (3.11) is taken to prevent recurrence.

3.30

qualification

documented process used by the health care product manufacturer to assure the reliability and capability of equipment and/or processes before approval for use in manufacturing

NOTE Qualification of equipment and/or processes generally includes **installation qualification** (3.25), **operational qualification** (3.27) and **performance qualification** (3.28).

3.31

risk control

process in which decisions are made and measures implemented by which risks are reduced to, or maintained within, specified levels

[ISO 14971:2007, definition 2.19]

3.32

separative device

equipment utilizing constructional and dynamic means to create assured levels of separation between the inside and outside of a defined volume

NOTE Some industry-specific examples of separative devices are clean air hoods, containment enclosures, gloveboxes, isolators and mini-environments.

[ISO 14644-7:2004, definition 3.17]

3.33

shift

scheduled period of work or production staffed by a single defined group of workers

NOTE This is usually not more than 12 h in length.

3.34

sterile

free from viable microorganisms

[ISO/TS 11139:2006, definition 2.43]

NOTE In practice, no such absolute statement regarding the absence of microorganisms can be proven, see **sterilization** (3.35).

3.35

sterilization

validated process used to render a product free from viable microorganisms

[ISO/TS 11139:2006, definition 2.47]

3.36

terminal sterilization

process whereby product is sterilized within its sterile barrier system

[ISO/TS 11139:2006, definition 2.52]

3.37

ultra low penetration air filter

ULPA filter

matrix with minimum 0,3 µm particle retaining efficiency of 99,999 %

3.38

unidirectional airflow

air stream which has a defined direction

3.39

unit operation

defined chemical or physical step in a manufacturing process

NOTE See example of a flowchart in Annex A.