SLOVENSKI STANDARD
SIST EN 12460:1999

01-december-1999

Biotehnologija - Procesi in proizvodnja v industrijskem obsegu - Navodilo za izbiro in postavitev opreme glede na biološko tveganje

Biotechnology - Large-scale process and production - Guidance on equipment selection and installation in accordance with the biological risk

Biotechnik - Verfahren in Großmaßstab und Produktion - Leitfaden zur Auswahl und Installation von Geräten und Ausrüstungen entsprechend dem biologischen Risiko

Biotechnologie - Procédé a grande échelle et production - Guide pour la sélection et l'installation des équipements en fonction du risque biologique

Ta slovenski standard je istoveten z: **EN 12460:1998**

ICS:

07.080 Biologija. Botanika. Zoologija Biology. Botany. Zoology

SIST EN 12460:1999 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12460

February 1998

ICS 07.080

Descriptors: biotechnology, work safety, classifications, hazards, micro-organisms, transgenic organisms, contamination, accident prevention, environmental protection, laboratory equipment, containment enclosures

English version

Biotechnology - Large-scale process and production - Guidance on equipment selection and installation in accordance with the biological risk

Biotechnologie - Procédé à grande échelle et production - Guide pour la sélection et l'installation des équipements en fonction du risque biologique

Biotechnik - Verfahren in Großmaßstab und Produktion - Leitfaden zur Auswahl und Installation von Geräten und Ausrüstungen entsprechend dem biologischen Risiko

This European Standard was approved by CEN on 31 January 1998.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 233 "Biotechnology", the secretariat of which is held by AFNOR.

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 August 1998, and conflicting national standards shall be withdrawn at the latest by August 1998.

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

1 Scope

This European Standard gives guidance on the selection and risk analysis of biotechnological equipment and the subsequent assembly of these into a plant in order to attain the appropriate biosafety containment levels. This includes verification of installation, operation and maintenance. It also applies when a new process or significant changes are introduced into an existing plant.

This European standard applies if the biotechnological process includes the use of hazardous or potentially hazardous microorganisms and/or if the emission of such microorganisms into the working place and/or environment are restricted.

However this should be considered only as a part of the total safety approach required. Attention is drawn to relevant European and national regulations.

2 Definitions

For the purposes of this standard, the following definitions apply :

2.1 ancillary unit of equipment

Unit of equipment that is not in direct contact with the product, but which is nevertheless necessary to perform a process.

NOTE : Examples of ancillary units of equipment are solvent recovery units for reuse of solvents, Cleaning In Place (CIP) units for preparation and storage of cleaning solutions.

2.2 component of equipment

Technical entity which forms part of a unit of equipment.

NOTE : Examples of components of equipment are vessels, valves and sensors.

2.3 hazard

Intrinsic potential property or ability of something (e.g. any agent, equipment, material or process) to cause harm [EN 1620].

NOTE : Harm is an injury or damage to health of people and/or to the environment.

2.4 microorganism

Any microbiological entity, cellular or non cellular, capable of replication or of transferring genetic material [EN 1619].

NOTE : For the purpose of this standard, the term microorganism covers the term of biological agent, according to the Directive 90/679/EEC : microorganisms, including those which have been genetically modified, cell cultures and human endoparasites, which may be able to provoke any infection, allergy or toxicity.

2.5 physical containment

System for confining a microorganism or organism or other entity within a defined space [EN 1620].

2.6 primary physical containment

System of physical containment which limits the escape of a microorganism or organism into the working environment.

NOTE : This can involve the use of closed containers or appropriate equipment together with secure operating procedures.

2.7 process

Combination of unit operations for the production of a defined product and waste.

2.8 process equipment

Unit of equipment which is in direct contact with the product.

NOTE : Examples of process equipment are bioreactors, filters and separators.

2.9 process microorganism

Microorganism used for production purposes in a biotechnological process or constituting (part of) the product itself.

2.10 process step

Individual defined part of the process which performs a specific function.

NOTE : One combination of unit operations constitutes a process step. For example, downstream process could consist of separation, extraction, concentration and drying.

2.11 risk

Probability of occurrence of a hazard causing harm and the degree of severity of the harm.

2.12 secondary physical containment

System of physical containment which limits the escape of a microorganism or organism into the environment or into other working areas.

NOTE : This can involve the use of rooms with specially designed air handling, the existence of airlocks and/or sterilizers for the removal of materials and secure operating procedures. In many cases it can add to the effectiveness of primary physical containment.

2.13 unit of equipment

Assembly of components used to perform one or more unit operations.

2.14 unit operation

Operation to perform a single chemical, physical or mechanical activity.

NOTE : Examples of unit operation are heat transfer, mixing, separation (including filtration and centrifugation) and sterilization.

2.15 utilities

Units of equipment which supply energy and media.

NOTE : Examples of utilities are units of equipment to generate and supply steam and pressurised air.

3 Procedure for selection of equipment

3.1 General approach

In order to achieve a safe process through a selection of the appropriate equipment, it is necessary to define the process microorganism and the product, the process itself and the equipment proposed. An initial risk analysis should be carried out in order to determine the appropriate performance criteria of the proposed equipment.

Based on this initial risk analysis, a detailed design should be carried out and equipment selected.

This should be followed by a detailed risk analysis, based on the specifications of equipment selected and its anticipated assembly into a plant.

After the plant is assembled, verification should be carried out with respect to installation, operation and maintenance. Any subsequent changes in microorganism, process and/or equipment should lead to a repeat of the initial risk analysis as a minimum.

NOTE : An example of how to perform such a risk analysis is given in annex A.

3.2 Microorganism(s)

The microorganism(s) used in the process should be classified in accordance with its hazards. National and European rules of classification should be followed (see annex B [1] and [2]).

NOTE : Consideration should be given not only to pathogenicity, but also to the other biological hazards such as allergenicity, irritation, toxicity or harm to the environment.

3.3 Process and equipment description

A fully written process description should be prepared with all process steps listed and their relationships defined.

NOTE 1 : Flow sheets and/or block diagrams may be used as part of a detailed process description.

The process equipment should be listed along with any ancillary units of equipment and utilities. This list facilitates the evaluation of the process with respect to hazard and risk.

NOTE 2 : For each process step (e.g. downstream process) there are a number of unit operations (e.g. separation, extraction, concentration) which require process equipment (e.g. centrifuge, filter, homogeniser) assembled from components (e.g. vessel, membrane support, valves, sensor).

NOTE 3 : It is possible for a piece of process equipment to be used for more than one process step and potentially involving different unit operations e.g. a fermenter vessel can be used for fermentation (fermentation process step) or as a kill tank (downstream process step)

3.4 Initial risk analysis

An initial risk analysis should be made of the draft process and equipment description as generated under 3.3. This analysis should be made with regard to the biological hazards, the probability of emission of microorganisms from the equipment and the potential routes of exposure of workers and of the environment, in accordance with national regulations.

NOTE 1 : Chemical or physical hazards should be identified and considered alongside the biological hazards to ensure that the overall risks are not increased, for example using disinfectant to kill microorganisms where the use of disinfectant is more of a risk than the living microorganisms.

The objective of the risk analysis is to ensure the selection of and installation of the necessary process equipment in order to remove or reduce as far as possible the identified risks while still achieving the main objective of making a product.

The depth and/or detail of the risk analysis will be dependent on a number of factors, such as :

- the type and/or magnitude of hazards involved ;
- the history and/or experience of the industry ;
- the practical evidence of safe use of the components and process equipment ;
- the tradition or novelty of the process.

NOTE 2 : A suggested approach to the hazard or risk evaluation is to use established techniques such as HAZOP (see annex B [3], [4]) and HACCP (see annex B [5], [6], [7]) which are used in the chemical and food industries respectively or other approaches of risk assessment (see annex B [8]).