



BSI Standards Publication

Biological safety cabinets

Part 2: BSC class II

National foreword

This British Standard is the UK implementation of EN 12469-2:2025. Together with BS EN 12469-5:2025 and BS EN 12469-1:2025, it partially supersedes BS EN 12469:2000.

The UK participation in its preparation was entrusted to Technical Committee LBI/1/1, Laboratory furniture and fittings.

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

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II

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European foreword

This document (EN 12469-2:2025) has been prepared by Technical Committee CEN/TC 332 “Laboratory Equipment”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by May 2026, and conflicting national standards shall be withdrawn at the latest by May 2026.

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

This document, together with EN 12469-1:2025, prEN 12469-3:—¹, prEN 12469-4:—² and EN 12469-5:2025, will partially supersede EN 12469:2000.

EN 12469-2:2025 includes the following significant technical changes with respect to EN 12469:2000:

- the structure has been changed to emphasize different classes of biological safety cabinets (BSC);
- additional test of the stability of protective functions;
- the text of the entire document has been revised and references have been updated.

EN 12469 consists of the following parts, under the general title *Biological safety cabinets*:

- Part 1: Classes, terminology and basic requirements
- Part 2: BSC class II
- Part 3: BSC class III
- Part 4: BSC class I
- Part 5: Installation, commissioning and routine testing

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

¹ Under preparation.

² Under preparation.

Introduction

Biological safety cabinets (BSC) are designed to protect the operator and the environment against the risks associated with the handling of biological agents. Depending on the classes, a BSC can additionally protect the product.

Each BSC class has its own design and performance criteria. The choice of a BSC class depends on the type of protection required and the assessment of the risk to be controlled.

EN 12469 describes the BSC classes, their design, correct usage, and testing principles.

This document is a product standard. Occupational health and safety assessments methods are not included.

1 Scope

This document specifies the specific requirements for class II BSC with respect to design, construction, safety and hygiene.

It sets the specific performance criteria for class II BSC for work with biological agents and specifies test procedures with respect to protection of the operator, the environment and product protection including cross-contamination.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 12469-1:2025, *Biological safety cabinets - Part 1: Classes and basic requirements*

EN ISO 14644-7:2004, *Cleanrooms and associated controlled environments - Part 7: Separative devices (clean air hoods, gloveboxes, isolators and mini-environments) (ISO 14644-7:2004)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12469-1:2025 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Tests

For the different test sets different requirements shall be verified. Table 1 gives an overview about the test sets and the requirements to be verified for the different sets.

Table 1 — Requirements to be verified for different tests

Clause	Requirement: X = mandatory, R = recommended, O = optional			
	Type test	Factory test	Commissioning	Routine test
5 Design and construction				
5.1 General	X		X	
5.2 Stability	X			
5.3 Ergonomics	X			
5.4 Lighting	X			
5.5 UV lamps ^a	X			
5.6 Sound and vibration	X			
5.7 Glazing	X			
5.8 Carcass	X			
5.9 Filter System	X	X	X	X
5.9.1 Liquid protection test	X			
5.10 Alarm Indicators and alarms				
5.10.1 Alarm indicators	X			
5.10.2 Alarms	X	X	X	X
5.11 Gas supply ^a	X	R	X	R
5.12 Electrical safety	X	X		
5.13 Stop/start of BSC	X	X	X	X
5.14 Connection to exhaust system ^a			X	X
5.15 Cleanability	X			
5.16 Decontaminability	X			
5.17 Spillage tray	X			
5.18 Intake grille	X			
6 Airflow velocities				
6.2 Downflow	X	X	X	X
6.3 Inflow	X	X	X	X
6.4 Visualization of airflows	X		X	X
7 Protective functions				
7.2 Operator protection				
According to A.1	X			
According to A.2	O		O	O
7.3 Product protection	X			
7.4 Cross-contamination protection	X			
7.5 Stability of the protective functions	X			
8 Accompanying documents ^b				
8.1 Operating manual	X	X	X	X
8.2 Equipment logbook	X	X	X	X
8.3 Brief instruction for use	X	X	X	X

Clause	Requirement: X = mandatory, R = recommended, O = optional			
	Type test	Factory test	Commissioning	Routine test
9 Marking	X	X	X	X
^a if installed ^b for type test check content, for other test check if the documents are available				

5 Design and construction

5.1 General

The general design and construction shall be in accordance with EN 12469-1:2025.

5.2 Stability

The stability shall be in accordance with EN 12469-1:2025.

5.3 Ergonomics

The ergonomics shall be in accordance with EN 12469-1:2025.

5.4 Lighting

5.4.1 General

The lighting shall be in accordance with EN 12469-1:2025.

5.4.2 Testing

The lighting shall be tested according to EN 12469-1:2025.

For testing the following measuring grid shall be used: the first measuring line on the work surface shall start 10 cm behind the intake slots. Starting point from left to right is 15 cm from the side walls. Divide the lines into equally spaced sections with a maximum of 20 cm. The second line shall be 20 cm behind the first line.

5.5 UV lamps

If installed, the UV lamps shall be in accordance with EN 12469-1:2025.

5.6 Sound and vibrations

Sound and vibration levels shall be in accordance with EN 12469-1:2025.

5.7 Glazing

5.7.1 General

The glazing material and construction shall be in accordance with EN 12469-1:2025.

5.7.2 Testing of the sash

5.7.2.1 Test procedure

Set the sash to the test sash position. Disconnect one of the suspension devices of the sash.

Repeat the test with the other suspension device.

5.7.2.2 Acceptance criteria

The sash shall not endanger the operator in case of single fault.

5.8 Carcass

5.8.1 General

The carcass shall be in accordance with EN 12469-1:2025.

For a BSC class II the carcass includes the exterior surfaces, welds, gaskets and seals etc. The carcass shall be leak tight.

There are two alternative methods to check leak tightness. The two methods are described in 5.8.2.1 and 5.8.2.2.

5.8.2 Testing

5.8.2.1 Pressure decay test

5.8.2.1.1 Material and Equipment

- manometer, capable of reading in the range 0 Pa to 500 Pa with an accuracy of ± 5 Pa
- plates to seal opening as needed (provided by the manufacturer).

5.8.2.1.2 Test procedure

The BSC is tested for leakage by subjecting it to an internal pressure.

- seal all openings in the cabinet by any convenient means. The sash can be removed
- attach a manometer to the test area to indicate the internal pressure relative to the room
- pressurize the cabinet to 250 Pa + 20 Pa
- turn off the pressurizing air and measure the internal pressure after 1 min.

5.8.2.2 Constant pressure test

5.8.2.2.1 Material and Equipment

- a volumetric flow meter with an accuracy of 0,1 times the expected leakage rate. Example for class 4 as per Table 2 the accuracy is $0,1 \cdot 1,67 \text{ l} \cdot \text{min}^{-1} \cdot \text{m}^{-3}$
- manometer, capable of reading in the range 0 Pa to 500 Pa. With an accuracy of ± 5 Pa
- plates to seal any opening as needed (provided by the manufacturer).

5.8.2.2.2 Test procedure

- seal all openings in the cabinet by any convenient means
- attach a manometer to the test area to indicate the interior pressure
- pressurize the cabinet to an internal positive pressure of 250 Pa + 20 Pa.

The volumetric flow meter is installed in the hose via which the test air is fed into the cabinet (positive pressure test). For air feed, a very finely controllable positive pressure connection is required. The introduced flow rate is regulated in order to maintain the positive pressure at its specific value. This flow rate divided by the net volume of the cabinet corresponds to the hourly leak rate.

To avoid the effect of atmospheric pressure and temperature changes, the measurement shall be less than 10 min long.

5.8.2.3 Acceptance criteria

The leak tightness shall not be less than class 4 according to EN ISO 14644-7:2004, Table E.1 (see Table 2).

Table 2 — Comparison of classification of containment enclosures according to their hourly leakage rate and pressure loss

Class	Hourly leak rate R_h h^{-1}	Calculated pressure loss per minute ^a Δp Pa	Calculated leakage rate per 1 m ³ volume of the cabinet R_V l/min
1	$\leq 5 \cdot 10^{-4}$	0,84	$8,3 \cdot 10^{-3}$
2	$< 2,5 \cdot 10^{-3}$	4,2	0,041
3	$< 10^{-2}$	16,9	0,167
4	$< 10^{-1}$	168,9	1,67
^a at atmospheric pressure (101 325 Pa). NOTE The calculation is based on requirements of EN ISO 14644-7:2004, Table E.1			

5.9 Filter system

5.9.1 General

The filter system shall be in accordance with EN 12469-1:2025.

5.9.2 Liquid protection test

The liquid protection test shall be in accordance with EN 12469-1:2025.

5.10 Alarm indicators and alarms

5.10.1 Alarm indicators

The alarm indicators for type test shall be in accordance with EN 12469-1:2025.

5.10.2 Alarms

For class II BSC the critical parameters for alarms are:

- downflow: low and high alarm
- inflow: low and high alarm
- sash not in working position.

Check if audible and visual alarms are working correctly.

5.11 Gas supply

If installed, the gas supply shall comply with the requirements of EN 12469-1:2025.

5.12 Electrical safety

The electrical safety shall be in accordance with EN 12469-1:2025.

5.13 Stop / start of BSC

The stop / start shall be in accordance with EN 12469-1:2025.

5.14 Connection to exhaust systems

If the BSC is connected to an exhaust system, it shall be in accordance with EN 12469-1:2025.

5.15 Cleanability

The cleanability shall be in accordance with EN 12469-1:2025.

5.16 Decontaminability

The decontaminability shall be in accordance with EN 12469-1:2025.

5.17 Spillage tray

The spillage tray shall be in accordance with EN 12469-1:2025.

5.18 Intake grille

The design should ensure that the intake grill cannot be obstructed by operator's arms.

The delivery area for the air to the working space should be without interposed projections or cavities that could interfere with containment performance.

6 Airflow velocities

6.1 General

The target values for airflow velocities, as specified by the manufacturer, are essential to ensure comprehensive protection for the operator, environment, product, and against cross-contamination.

These four types of protection are detailed in Annex A (A.1), Annex B, and Annex C.

Achieving the correct balance between downflow and inflow velocities is critical to maintaining the protective functions that a class II BSC offers.

Proper calibration and adherence to these specified airflow velocities are fundamental to the effective operation and safety of the BSC.

6.2 Downflow

6.2.1 General

The downflow velocity specified by the manufacturer shall ensure that the intended protection function of the BSC is met. The manufacturer's specification shall be noted on the data plate of the BSC.