

Professional Certification in Biosafety Cabinet Selection, Installation & Safe Use – Examination Content, Sample Questions, & References

The IFBA's Professional Certification (PC) in Biosafety Cabinet Selection, Installation & Safe Use identifies individuals with demonstrated competencies in the fundamental principles & practices of selecting and safely using biosafety cabinets for the handling of infectious materials. Candidates applying for this certification must first successfully complete the PC in Biorisk Management before they are eligible for examination.

The PC in Biosafety Cabinet Selection, Installation & Safe Use is suited to a wide range of professionals working with and around biological materials in functions such as biorisk management & biosafety officers, laboratory scientists, technicians, researchers, facility operations & maintenance personnel, biocontainment design engineers & architects, biosafety cabinet certifiers, educators, consultants and policy makers. Individuals holding this certification possess the knowledge and skills in sufficient degree to properly select and use biosafety cabinets in the laboratory and healthcare setting. The Body of Knowledge (BOK) below identifies 4 domains (topic areas) and 42 knowledge/task statements that define the competency for certification. The content of the examination is based on this BOK and each question is linked to one of the statements below.

Domain A – Biosafety Cabinet Guidelines & Standards

1. Identify the international guidelines & standards applicable to the selection, safe use, maintenance and certification of biosafety cabinets;
2. Understand how local laws, regulations, standards and guidelines relevant to biosafety cabinets are used in conjunction with international biosafety cabinet guidelines & standards;
3. Know how to interpret the guidelines & standards with respect to purchasing the appropriate type of biosafety cabinets and its proper installation within the facility;
4. Be familiar with European Standard EN12469 Biotechnology- Performance Criteria for Microbiological Safety Cabinets;
5. Be familiar with NSF/ANSI International Standard 49 Biosafety Cabinetry: Design, Construction, Performance, and Field Certification;
6. Understand the meaning of biosafety cabinet product listings related to factory performance testing and acceptance standards;
7. Understand how biosafety cabinets are an effective engineering control within a biorisk management system as described by CWA 15793 Laboratory Biorisk Management;

Domain B- Types, Proper Selection and Placement of Biosafety Cabinets

8. Define primary containment;
9. Describe how primary containment minimizes exposure to biological, chemical and radiological hazards;
10. Understand how biosafety cabinets enable working safely with infectious microorganisms;
11. Describe the 3 Classes of biosafety cabinets and types within each Class;
12. Explain the type of protection provided by each Class and type of biosafety cabinet;
13. Explain personnel, product and environmental protection;
14. Define HEPA filtration and understand its application and function in biological safety cabinets;
15. Understand what type of hazards can be safely handled within the different classes and types of biosafety cabinets including microorganisms, chemicals and radioisotopes;
16. Understand the limitations of working with hazardous vapor generating materials and radioactive isotopes in biosafety cabinets;
17. Understand the differences between a biosafety cabinet, laminar flow clean bench and fume hood;
18. Understand the importance of selecting the proper type and size of biosafety cabinet based on a localized situation-specific risk assessment;
19. Describe the factors and exhaust requirements to be considered when selecting the proper type of biosafety cabinet to meet specific operational needs;
20. Describe the factors to be considered when installing and selecting the proper placement of biosafety cabinets to avoid disrupting the proper airflow functioning of biosafety cabinets;
21. Know how to place the biosafety cabinet within a room to ensure its proper functioning;
22. Understand the engineering and room requirements needed for the proper placement and installation of biosafety cabinets;
23. Understand how ducted biosafety cabinets may interact with the operational integrity of the room ventilation system;
24. Understand the benefits, limitations and implications of a ducted vs a non-ducted biosafety cabinet;

Domain C – Safe Use and Maintenance of Biological Safety Cabinets

25. Understand the airflow patterns when working with materials in the biosafety cabinet in order to maintain containment and avoid cross-contamination;
26. Know how to recognize the proper functioning of a biosafety cabinet and conduct simple inward airflow tests before starting work;
27. Understand the function of magnehelic gauges and alarms;

28. Know how to set up the biosafety cabinet before starting work with infectious materials to establish proper airflow patterns, and to establish a proper workflow to maintain containment and avoid cross-contamination;
29. Know how to safely sit at and work in the biosafety cabinet without disrupting its airflow patterns;
30. Know how to complete work and shut down the biosafety cabinet after use;
31. Describe the procedures for disinfection of the biosafety cabinet before and after use;
32. Know how to properly and safely surface disinfect a biosafety cabinet before and after each use;
33. Know what to do during a power interruption or if the biosafety cabinet alarm indicates a loss of containment and improper functioning of the biosafety cabinet;
34. Understand the limitations of using ultraviolet light to decontaminate the surfaces of the biosafety cabinet;
35. Describe the procedures for properly maintaining a biosafety cabinet to sustain its operational integrity;

Domain D – Certification of Biosafety Cabinets

36. Define biosafety cabinet certification;
37. Know how often and when to certify biosafety cabinets;
38. Understand the different circumstances that lead to the need for biosafety cabinets to be certified;
39. Understand the importance of manufacturer’s specifications as related to biosafety cabinet certification;
40. Understand the indications of HEPA filter loading within the biosafety cabinet;
41. Describe the on-site field testing procedures that are performed to certify biosafety cabinets and the purpose of each test;
42. Understand how to properly and safely prepare a biosafety cabinet prior to certification including disinfection & decontamination as may be required.

Exam Blueprint

The following represents the percentage of questions in each domain that are included in the examination:

| Exam Blueprint Professional Certification in Biosafety Cabinet Selection, Installation & Safe Use Passing Score – 70% | |
|---|---------------------|
| Domain | Number of Questions |
| A) Biosafety Cabinet Guidelines & Standards | 13 |
| B) Types, Proper Selection and Placement of Biosafety Cabinets | 43 |
| C) Safe Use and Maintenance of Biological Safety Cabinets | 29 |
| D) Certification of Biosafety Cabinets | 15 |

Sample Questions

In order to familiarize candidates with the nature and form of the examination questions, the following are provided as examples. An asterisk marks the correct answer.

1. The minimum performance requirements for biosafety cabinets covered under EN12469 include
 - a) leak tightness, retention at the front opening, product protection, and cross contamination.*
 - b) leak tightness, retention at the front opening, personnel protection, and cross contamination.
 - c) vibration, leak tightness, product protection, and personnel protection.
 - d) stability, vibration, retention at the front opening, and cross contamination

2. According to NSF/ANSI 49, a Class II Type B2 biosafety cabinet should maintain a minimum average inward air velocity of _____ through the front access opening.
 - a) 0.13 metres/second (25 feet/minute)
 - b) 0.25 metres/second (50 feet/minute)
 - c) 0.51 metres/second (100 feet/minute)*
 - d) 1 metre/second (200 feet/minute)

3. How many HEPA filters are installed in a Class II Type A2 biosafety cabinet?
 - a) One HEPA filter providing both product and environmental protection
 - b) One HEPA filter providing product protection and a second HEPA filter providing environmental protection*
 - c) One HEPA filter providing product protection, a second HEPA filter providing environmental protection, and a third HEPA filter providing personnel protection
 - d) One or two HEPA filters depending on the manufacturer and design of the cabinet

4. Which of the following statements is TRUE regarding the proper use of a Class II biosafety cabinet?
 - a) All materials should be placed as far back in the cabinet as practical, toward the rear edge of the work surface.*
 - b) Arms should be moved in and out using a sweeping motion across the work access opening.
 - c) Biohazard discard bags which are too bulky to be placed inside the cabinet can be taped to the outside edge of the cabinet for waste collection.
 - d) Equipment may be placed on the front air grille of the cabinet when it does not interfere with the airflow inside the cabinet.

5. The _____ test performed onsite during certification directly relates to a biosafety cabinet's ability to contain infectious aerosols.
- inflow velocity*
 - vibration
 - biological spore
 - air volume

References

Some suggested preparation for examination might include, but should not be limited to, the following resources:

- Laboratory Biosafety Manual. World Health Organization. 2004.
- NSF/ANSI 49 Biosafety Cabinetry: Design, Construction, Performance, and Field Certification. 2012.
- EN 12469 Biotechnology: Performance Criteria for Microbiological Safety Cabinets. 2000.
- Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets. Appendix A BMBL. CDC/NIH. 2009.
- Laboratory Biorisk Management. CEN Workshop Agreement 15793. January 2011.

(All of these resources and others are available for download on the IFBA website at www.internationalbiosafety.org)