



*NSF International Standard /
American National Standard*

NSF/ANSI 49 - 2010a

**Biosafety Cabinetry: Design,
Construction, Performance, and
Field Certification**



NSF International, an independent, not-for-profit, non-governmental organization, is dedicated to being the leading global provider of public health and safety-based risk management solutions while serving the interests of all stakeholders.

*This Standard is subject to revision.
Contact NSF to confirm this revision is current.*

Users of this Standard may request clarifications and interpretations, or propose revisions by contacting:

Chair, Joint Committee on Biosafety Cabinetry
c/o NSF International
789 North Dixboro Road, P.O. Box 130140
Ann Arbor, Michigan 48113-0140 USA
Phone: (734) 769-8010 Telex: 753215 NSF INTL
FAX: (734) 769-0109
E-mail: info@nsf.org
Web: <http://www.nsf.org>

**NSF International Standard/
American National Standard
for Biosafety Cabinetry –**

**Biosafety Cabinetry: Design,
Construction, Performance, and
Field Certification**

Standard Developer

NSF International

NSF International

Designated as an ANSI Standard

November 29, 2010

American National Standards Institute

Prepared by
The NSF Joint Committee on Biosafety Cabinetry

Recommended for Adoption by
The NSF Council of Public Health Consultants

Adopted by
The NSF Board of Trustees
June 1976

Revised May 1983
Revised June 1987
Revised May 1992
Revised March 2002
Addendum November 2002
Revised February 2004
Revised September 2004
 Addendum October 2004
 Addendum March 2005
Revised July 2007
Revised October 2008
Revised June 2009
Revised September 2010
Revised November 2010

Published by

NSF International
PO Box 130140, Ann Arbor, Michigan 48113-0140, USA

For ordering copies or for making inquiries with regard to this Standard, please reference the designation "NSF/ANSI 49 – 2010a."

Copyright 2011 NSF International
Previous edition © 2010, 2009, 2008, 2007, 2004, 2002, 1992, 1987, 1983, 1976

Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from NSF International.

Printed in the United States of America.

Disclaimers¹

NSF International (NSF), in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of NSF represent its professional judgment. NSF shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. NSF shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

NSF Standards provide basic criteria to promote sanitation and protection of the public health. Provisions for mechanical and electrical safety have not been included in this Standard because governmental agencies or other national standards-setting organizations provide safety requirements.

Participation in NSF's Standards development activities by regulatory agency representatives (federal, local, state) shall not constitute their agency's endorsement of NSF or any of its Standards.

Preference is given to the use of performance criteria measurable by examination or testing in NSF Standards development when such performance criteria may reasonably be used in lieu of design, materials, or construction criteria.

The illustrations, if provided, are intended to assist in understanding their adjacent standard requirements. However, the illustrations may not include **all** requirements for a specific product or unit, nor do they show the only method of fabricating such arrangements. Such partial drawings shall not be used to justify improper or incomplete design and construction.

Unless otherwise referenced, the annexes are not considered an integral part of NSF Standards. The annexes are provided as general guidelines to the manufacturer, regulatory agency, user, or certifying organization.

¹ The information contained in this Disclaimer is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Disclaimer may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

This page is intentionally left blank.

Contents

1	General	1
1.1	Scope	1
1.2	Minimum requirements	1
1.3	Variations in design and construction	1
2	Normative references	1
3	Definitions	3
4	Materials	9
4.1	General	9
4.2	Interior work surfaces	9
4.3	Exposed interior surfaces	10
4.4	Other interior and exterior surfaces	10
4.5	Materials and finishes	10
5	Design and construction	11
5.1	General	11
5.2	Cleanability	12
5.3	Decontamination	12
5.4	Duct and Plenum design	12
5.5	Internal corners and angles	12
5.6	External corners and angles	12
5.7	Joints and seams	13
5.8	Fastening methods	13
5.9	Welds	13
5.10	Solder	13
5.11	Removable panels	13
5.12	Stability	14
5.13	Provision for mounting	14
5.14	Legs and feet	14
5.15	Reinforcing and framing	14
5.16	Fixed panels	14
5.17	Doors and covers	14
5.18	Louvers and openings	15
5.19	Tracks and guides	15
5.20	Filters	15
5.21	Gaskets and sealants	16
5.22	Stopcocks and service outlets	16
5.23	Alarms	16
5.24	Electrical components	17
5.25	Lighting	17
5.26	Gauges	18
5.27	Drain spillage trough	18
5.28	Diffuser placement	18
5.29	Work area components placement	18
5.30	Height and width	18
5.31	Data plate(s)	18
6	Performance	26
6.1	General	26
6.2	Pressure decay / soap bubble / tracer gas leak	26
6.3	HEPA/ULPA filter leak	26
6.4	Noise level	26
6.5	Lighting intensity	26
6.6	Vibration	26
6.7	Personnel, product, and cross-contamination protection	26
6.8	Stability	27
6.9	Downflow and inflow velocities	27
6.10	Inflow velocity	28
6.11	Airflow smoke patterns	28
6.12	Drain spillage trough leakage	29

6.13	Motor/blower performance.....	29
6.14	Electrical safety	29
6.15	Performance data	29
6.16	Record maintenance	29
Annex A	.....	A1
A.1	Pressure decay / soap bubble	A1
A.2	HEPA/ULPA filter leak test.....	A2
A.3	Noise level test.....	A4
A.4	Lighting intensity test.....	A5
A.5	Vibration test	A5
A.6	Personnel, product, and cross-contamination protection (biological) tests	A6
A.7	Stability tests	A11
A.8	Downflow velocity.....	A13
A.9	Inflow velocity (face velocity) test.....	A15
A.10	Airflow smoke patterns test	A18
A.11	Drain spillage trough leakage test	A19
A.12	Motor/blower performance.....	A20
Annex B	.....	B1
B.1	Method to verify fitness for use of potential direct inflow measurement devices.....	B1
Annex C	.....	C1
C.1	Selection	C1
C.2	Calibration	C1
Annex D	.....	D1
D.1	Chemical resistance.....	D1
D.2	Abrasion resistance.....	D1
Annex E	.....	E1
E.1	Biosafety Consultation Prior to BSC Purchase.....	E1
E.2	Risk Assessment Procedure.....	E1
E.3	Biosafety Cabinet Selection	E3
E.4	Prior to the Purchase	E9
E.5	Inspection.....	E11
E.6	Moving a Permanently Installed Biosafety Cabinet	E11
E.7	Lifespan of BSCs	E11
E.8	Decommissioning process	E12
Annex F	.....	F1
F.1	Field certification preconditions and intervals.....	F1
F.2	Downflow velocity.....	F2
F.3	Inflow velocity (face velocity) test.....	F4
F.4	Airflow smoke patterns test.....	F8
F.5	HEPA/ULPA filter leak test.....	F9
F.6	Pressure decay / soap bubble	F11
F.7	Site installation assessment tests	F13
F.8	Electrical leakage and ground circuit resistance and polarity tests	F14
F.9	Lighting intensity test.....	F14
F.10	Vibration test.....	F14
F.11	Noise level tests	F15
F.12	Record of field certification	F16
Annex G	.....	G1
G.1	Recommended microbiological decontamination procedure	G1
G.2	Recommended HEPA/ULPA Filter Disposal Procedures	G8
Annex H	.....	H1
H.1	Sheet metal and finishes.....	H1
H.2	Glass	H1
H.3	HEPA/ULPA filter gasket materials.....	H1
H.4	HEPA/ULPA filter case – Type IC.....	H2
H.5	Specifications	H2

H.6 Sealants	H2
H.7 Fans	H2
H.8 Components and wiring	H2
Annex I	I1
I.1 Miscellaneous publications	I1
I.2 Federal specifications	I2
I.3 Federal standards	I3
I.4 Military specifications	I3
Annex J	J1
J.1 Helium leak test.....	J1
J.2 Sulfur hexafluoride (SF ₆) leak test	J2
Annex K	K1
K.1 Introduction	K1
K.2 Protocol	K1

This page is intentionally left blank.

Foreword²

The purpose of this Standard is to establish minimum requirements for materials, design, construction, and performance of Biosafety Cabinetry that are designed to protect personnel, product, and the environment. This Standard details requirements for performance testing as well as field certification testing.

This edition of the Standard (NSF/ANSI 49-2010a) includes the following revisions:

Issue 23 - Hard Ducting Cabinets

A correction is included for section 3.4.2.4 **Class II, Type B2 cabinets** from this ballot.

Issue 29 – Uniform and zoned downflow

The purpose of this ballot is to revise sections of the Standard relating to uniform and zoned downflow.

General editorial corrections in various sections

This Standard was developed by the NSF Joint Committee on Biosafety Cabinetry using the consensus process described by the American National Standards Institute.

Suggestions for improvement of this Standard are welcome. Comments should be sent to Chair, Joint Committee on Biosafety Cabinetry, c/o NSF International, Standards Department, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA.

² The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

This is a preview of "NSF/ANSI 49-2010a". [Click here to purchase the full version from the ANSI store.](#)

This page is intentionally left blank.

NSF/ANSI International Standard for Biosafety Cabinetry —

Biosafety Cabinetry: Design, Construction, Performance, and Field Certification

1 General

1.1 Scope

This Standard applies to Class II (laminar flow) biosafety cabinetry designed to minimize hazards inherent in work with agents assigned to biosafety levels 1, 2, 3, or 4. It also defines the tests that shall be passed by such cabinetry to meet this Standard. This Standard includes basic requirements for the design, construction, and performance of biosafety cabinets that are intended to provide personnel, product, and environmental protection; reliable operation; durability and structural stability; cleanability; limitations on noise level; illumination; vibration; and motor/blower performance.

1.2 Minimum requirements

Cabinets qualifying under this Standard shall have passed all of the designated tests. Units with component parts covered under existing NSF standards or criteria shall conform to those applicable requirements.

1.3 Variations in design and construction

Cabinetry varying in design, construction, or installation of accessory equipment may qualify under this Standard, if appropriate tests and investigations indicate that the equipment is durable and reliable, can be cleaned and decontaminated, and performs in conformance to this Standard. Such equipment shall meet the requirements for materials and finishes in this Standard.

Major modifications require appropriate tests for conformance. Major modifications include, but are not limited to, changes in the following: location or capacity or quantity or all three of blower/motor(s); size or design or both of air plenums; position of High Efficiency Particulate Air (HEPA/ULPA) Ultra Low Penetrating Air filters; position or redesign of work surface; work area intake and exhaust air grilles; window placement or design; access opening size; location and size of exhaust port; and built-in accessory equipment (centrifuges, ultraviolet lighting, supports for intravenous drug container, arm rests, etc.). Relocation of utility service equipment (electrical outlets, petcocks, etc.) is not considered a major modification if other provisions of this Standard are not compromised.

2 Normative references

The following documents contain requirements that, by reference in this text, constitute requirements of this Standard. At the time of publication, the indicated editions were valid. All documents are subject to revision, and parties are encouraged to investigate the possibility of applying the most recent editions of the documents indicated below.

ACGIH, *Industrial Ventilation: A Manual of Recommended Practice*³

³ American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Dr., Cincinnati, OH 45240 <www.acgih.org>.