Institute of Environmental Sciences and Technology

IEST-RP-CC001.7

Contamination Control Division
Recommended Practice 001.7

HEPA and ULPA Filters

1827 Walden Office Square, Suite 400
Schaumburg, IL 60173
Phone: (847) 981-0100 • Fax: (847) 981-4130
E-mail: information@iest.org • Web: www.iest.org

This Recommended Practice was prepared by and is under the jurisdiction of Working Group 001 of the IEST Contamination Control Division (WG-CC001). The following WG voting members contributed to the development of this edition of this Recommended Practice.

R. Vijayakumar, WG-CC001 Chair, AERFIL

Taguhi Arakelian, Jet Propulsion Laboratory

Eugene Bryan, QVA Test Solutions, LLC

Keith Flyzik, Steris Corporation

Nick Karlowsky, Filtech, Inc.

Donna Kasper, Hollingsworth & Vose

Don Largent, AAF Flanders

Timothy McDiarmid, Air Techniques International

Rick Meyer, Superior Laboratory Services, Inc.

Mark Renn, AAF Flanders

Matt Smyers, Technical Safety Services

Andrew Stillo, Camfil USA, Inc.

The Working Group also wishes to acknowledge the contributions of members who prefer to remain anonymous.

First printing, October 2022

ISBN: 978-1-937280-52-9 (Electronic format)

ISBN: 978-1-937280-51-2 (Print format)

PROPOSAL FOR IMPROVEMENT: The Working Groups of the Institute of Environmental Sciences and Technology are continually working on improvements to their Recommended Practices and Reference Documents. Suggestions from users of these documents are welcome. If you have a suggestion regarding this document, please use the online Proposal for Improvement form found on the IEST website at www.iest.org.

Institute of Environmental Sciences and Technology

1827 Walden Office Square, Suite 400

Schaumburg, IL 60173

Phone: (847) 981-0100 • Fax: (847) 981-4130

E-mail: information@iest.org • Web: www.iest.org

NOTICE AND DISCLAIMER: This Recommended Practice is published by the Institute of Environmental Sciences and Technology (IEST) to advance the technical and engineering sciences. Use of this document is entirely voluntary, and determination of its applicability and suitability for any particular use is solely the responsibility of the user. Use of this Recommended Practice does not imply any warranty or endorsement by IEST.

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among all persons participating in the development of this document.

IEST standards, recommended practices, and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and seeks out the views of persons who have an interest in the topic covered by this publication. While IEST administers the process to promote fairness in the development of consensus, the organization does not write the document and does not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in IEST standards, recommended practices, and guideline publications.

IEST disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. IEST disclaims and makes no guaranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of the particular purposes or needs of users of the document. IEST does not guarantee the performance of any individual manufacturer or seller's products or services by virtue of this standard or guide.

In publishing and making this document available, IEST is not undertaking to render professional or other services for or on behalf of any person or entity, nor is IEST undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

IEST has no power, nor does it undertake to police or enforce compliance with the contents of this document. IEST does not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health or safety-related information in this document shall not be attributable to IEST and is solely the responsibility of the certifier or maker of the statement.

RP-CC001.7 WHAT IS NEW AND IMPROVED

What is new:

• An Appendix with a draft of an alternate filter classification scheme relating classes to filter efficiency consistently instead of the nonsequential letter Types. This being a new proposed scheme, it is included in an appendix for user comments and suggestion and may be considered as a recommended filter class in a future revision.

• An Appendix providing guidelines for system qualification for testing filter sizes with high aspect ratio, i.e., narrow and long. This is based on work done at NASA to test the filters used on the International Space Station.

• Appendix describing operation and results of a low output 'thermal' aerosol generator for testing filters. Based on feedback from users, this may be included as a recommended generator in future revisions of the RP.

What is improved:

• Text on the testing of filters made with ePTFE or charged media.

• Table D2 edited for improved clarity.

• Cautionary notes on the use of solid aerosol challenge and charge on it.

HEPA and ULPA Filters
IEST-RP-CC001.7

CONTENTS

SECTION

FIGURES

TABLES

APPENDIXES

HEPA and ULPA Filters
IEST-RP-CC001.7

1 SCOPE AND LIMITATIONS

This Recommended Practice (RP) covers basic provisions for HEPA (high-efficiency particulate air) and ULPA (ultra-low penetration air) filter units as a basis for agreement between customers and suppliers.

Filters that meet the requirements of this RP are suitable for use in clean air devices and cleanrooms that fall within the scope of ISO 14644 and for use in supply air and contaminated exhaust systems that require extremely high filter efficiency (99.97% or higher) for submicrometer (µm) particles.

This RP describes 11 levels of filter performance, or types, and six grades of filter construction. For the types and grades that require scanning, these filter types generally apply to rectangular filters. Semi-circular, cylindrical, V-bank filters, and other construction configurations may not be readily scanned and thus will not meet the requirements of the filter types requiring scanning. While many of the performance measurement techniques can be adapted to other filter configurations, the filter types as described in this RP should be applied only to rectangular, flat panel filters. The customer's purchase order should specify the level of performance and grade of construction required. The customer should also specify the filter efficiency required if the efficiency level is not covered by the performance levels specified in this RP.

NOTE: Products and procedures discussed in this RP may involve hazardous materials, operations, and equipment. This RP does not purport to address all of the safety problems associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use of this RP.

2 REFERENCES

The following documents are incorporated into this RP to the extent specified herein. If no specific edition is cited, the most recent edition should be used. Where specific editions are cited, subsequent revisions of these publications do not automatically supersede the cited editions and users should investigate the applicability of revised editions.

2.1 Reference Documents

ANSI A208.1: Particleboard, Mat-Formed Wood

APA PS 1: Structural Plywood

ASME AG-1: Code on Nuclear Air and Gas Treatment

ASTM A176: Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

ASTM A240: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

