

**INSTITUTE OF
ENVIRONMENTAL
SCIENCES AND
TECHNOLOGY**

**Contamination Control Division
Recommended Practice 003.3**

IEST-RP-CC003.3

**Garment System Considerations
for Cleanrooms and Other
Controlled Environments**

INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY

Arlington Place One
2340 S. Arlington Heights Road, Suite 100
Arlington Heights, IL 60005-4516
Phone: (847) 981-0100 • Fax: (847) 981-4130
E-mail: iest@iest.org • Web: www.iest.org



COPYING IS ILLEGAL

This Recommended Practice is published by the INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY to advance the technical and engineering sciences. Its use is entirely voluntary, and determination of its applicability and suitability for any particular use is solely the responsibility of the user.

This Recommended Practice was prepared by and is under the jurisdiction of Working Group CC003 of the IEST Contamination Control Division.

Copyright © 2003 by the **INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY**

Fifth printing, September 2008

ISBN 978-1-877862-95-3

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 those who use 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/proposal/form.html.

INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY

Arlington Place One
2340 S. Arlington Heights Road, Suite 100
Arlington Heights, IL 60005-4516
Phone: (847) 981-0100 • Fax: (847) 981-4130

COPYING IS ILLEGAL

Garment System Considerations for Cleanrooms and Other Controlled Environments

IEST-RP-CC003.3

CONTENTS

SECTION

1	SCOPE AND LIMITATIONS	7
2	REFERENCES	7
3	TERMS AND DEFINITIONS	9
4	BACKGROUND AND PURPOSE	10
5	PRODUCT CONSIDERATIONS	11
6	PROCESSING CONSIDERATIONS	21
7	USAGE CONSIDERATIONS	26
8	QUALITY MANAGEMENT	28

TABLE

TABLE 1–ISO 14644-1 AIR CLEANLINESS CLASSES FOR CLEANROOMS AND CLEAN ZONES	23
TABLE B1–RELEASABLE PARTICLE GARMENT CLEANLINESS	36
TABLE B2–HELMKE GARMENT CLEANLINESS CLASSIFICATION	39

FIGURE

FIGURE 1–EDGE FINISHING STITCH AND HEAT-SEALED OR FUSED, BEADED EDGE	16
FIGURE 2–LAPPED SEAM WITH DOUBLE-NEEDLE STITCHING AND BOUND SEAM WITH SINGLE-NEEDLE STITCHING	16
FIGURE 3–SINGLE-NEEDLE EDGE FINISHING SEAM AND DOUBLE-NEEDLE EDGE FINISHING SEAM	16
FIGURE 4–CUFF CONFIGURATIONS	17
FIGURE 5–RAGLAN AND SET-IN SLEEVES	18
FIGURE 6–BOUFFANT-STYLE HAIR COVER	18
FIGURE 7–SNOOD CAPS	18
FIGURE 8–HOODS	19
FIGURE 9–FROCK	19
FIGURE 10–COVERALLS	20

FIGURE 11–SHOE COVER	20
FIGURE 12–BOOTS.....	20
FIGURE 13–THE GARMENT CLEANING PROCESS	24
FIGURE B1–PARTICLE PENETRATION APPARATUS	31
FIGURE B2–APPARATUS FOR MEASURING EQUIVALENT PORE DIAMETER	33
FIGURE B3–SUPPORT GRID FOR PARTICLE ANALYSIS	35
FIGURE B4–BODY BOX.....	37
FIGURE B5–HELMKE DRUM.....	40
FIGURE B6–AIR SAMPLING TUBE.....	41
FIGURE B7–POSITION OF INTAKE TUBE.....	42
FIGURE B8–PROPER METHOD OF FOLDING GARMENT.....	43
FIGURE B9–SCHEMATIC OF TEST APPARATUS FOR BIOPENETRATION TEST.....	45

APPENDIX

A RECOMMENDED GARMENT CONFIGURATIONS	30
B TESTING.....	31
C BIBLIOGRAPHY	47

INSTITUTE OF ENVIRONMENTAL SCIENCES AND TECHNOLOGY
Contamination Control Division
Recommended Practice 003.3

Garment System Considerations for Cleanrooms and Other Controlled Environments

IEST-RP-CC003.3

1 SCOPE AND LIMITATIONS

1.1 Scope

This Recommended Practice (RP) addresses the gowning of personnel as an important aspect of cleanroom contamination control. It provides non-mandatory guidance for the selection, specification, maintenance, and testing of apparel and accessories appropriate for use in nonaseptic and aseptic cleanrooms and other controlled environments.

1.2 Limitations

This RP does not prescribe design or performance requirements for garments, or control limits for specific cleanroom applications, such as food processing. It does not address personal protection or health and safety requirements as related to cleanroom apparel and accessories. Limitations, applicability, precision, and interpretation of data obtained from recommended testing as presented in Appendix B should be considered.

2 REFERENCES

2.1 American Association of Textile Chemists and Colorists (AATCC)

AATCC Test Method 22: Water Repellency—Spray Test

AATCC Test Method 118: Hydrocarbon Resistance Test

AATCC Test Method 127: Water Resistance—Hydrostatic Pressure Test

2.2 Association of the Nonwoven Fabrics Industry (INDA)

INDA Standard Test Method: IST 80.8—Alcohol Repellency of Nonwoven Fabrics

2.3 ASTM International

ASTM D737: Test Method for Air Permeability of Textile Fabrics

ASTM D2261: Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)

ASTM D3776: Standard Test Methods for Mass Per Unit Area (Weight) of Fabric

ASTM D3786: Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method

ASTM D3884: Standard Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)

ASTM D3885: Standard Test Method for Abrasion Resistance of Textile Fabrics (Flexing and Abrasion Method)

ASTM D5034: Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)