

Institute of Environmental Sciences and Technology

IEST-RP-CC013.3

Contamination Control Division
Recommended Practice 013.3

Calibration Procedures and Guidelines for Select Equipment Used in Testing Cleanrooms and Other Controlled Environments



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

This Recommended Practice is published by the Institute of Environmental Sciences and Technology 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.

This Recommended Practice was prepared by and is under the jurisdiction of Working Group 013 of the IEST Contamination Control Division.

Copyright © 2012 by the Institute of Environmental Sciences and Technology

Second printing, July 2017

ISBN: 978-1-937280-04-8 (Electronic Format)

ISBN: 978-1-937280-05-5 (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 USA
Phone: (847) 981-0100 • Fax: (847) 981-4130
E-mail: information@iest.org • Web: www.iest.org

Calibration Procedures and Guidelines for Select Equipment Used in Testing Cleanrooms and Other Controlled Environments

IEST-RP-CC013.3

CONTENTS

SECTION

1	SCOPE AND LIMITATIONS.....	5
2	REFERENCES.....	5
3	TERMS AND DEFINITIONS.....	6
4	BACKGROUND AND PURPOSE.....	8
5	GENERAL PROCEDURES.....	8
6	AEROSOL GENERATORS.....	10
7	PHOTOMETERS.....	11
8	ANEMOMETERS.....	15
9	AIRFLOW CAPTURE HOODS.....	16
10	TEMPERATURE MEASUREMENT SYSTEMS AND DEVICES.....	17
11	PRESSURE AND VACUUM GAUGES.....	21
12	POLYMER MICROSPHERE (PSL) GENERATORS.....	25
13	AEROSOL DILUTERS.....	26
14	CONDENSATION NUCLEI COUNTERS.....	27

FIGURE

1	DETAILS OF A LASKIN NOZZLE.....	10
2	SETUP FOR VERIFYING A LASKIN-NOZZLE-TYPE DOP GENERATOR.....	10
3	100 µG/L AEROSOL SOURCE.....	11
4	PRESSURE/VACUUM ACCURACY.....	23
5	VACUUM ACCURACY.....	24
6	PRESSURE ACCURACY USING A DEADWEIGHT TESTER STANDARD.....	24
7	RESTRICTION DILUTER.....	26
8	AIRFLOW DILUTERS.....	27
C1	TYPES OF WIND TUNNELS (FROM WIND TUNNELS OF NASA).....	31

TABLE

1	RECOMMENDED INITIAL CALIBRATION INTERVALS.....	8
D1	ACCURACY OF ICE BATHS.....	32
D2	THERMOCOUPLE (T/C) TYPE LETTER DESIGNATIONS	33
D3	RESISTANCE TEMPERATURE DEVICE (RTD) SENSORS.....	33
D4	“AS FOUND” UUT READINGS.....	34

APPENDIX

A	PROPER INSTRUMENT CARE PROTOCOL.....	29
B	EXAMPLES OF PHOTOMETER TEST PROCEDURES	30
C	WIND TUNNELS	31
D	TEMPERATURE MEASUREMENT SYSTEMS AND DEVICES.....	32
E	AIRFLOW DILUTION SETUP 10:1 EXAMPLE	35
F	BIBLIOGRAPHY.....	36

Calibration Procedures and Guidelines for Select Equipment Used in Testing Cleanrooms and Other Controlled Environments

IEST-RP-CC013.3

1 SCOPE AND LIMITATIONS

1.1 Scope

This Recommended Practice (RP) covers procedures for calibrating and verifying equipment used in characterizing cleanrooms and for determining intervals of calibration. The RP includes general procedures for calibrating aerosol generators, photometers, anemometers, airflow capture hoods, temperature measurement systems and devices, pressure and vacuum gauges, polymicrosphere (PSL) generators, aerosol diluters, and condensation nuclei counters. Where available, references for calibrating other instruments are provided.

1.2 Limitations

Future revisions of this document will include calibration procedures for additional instruments that require procedures.

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

2 REFERENCES

The cited editions of the following documents are incorporated into this RP to the extent specified herein. Users are encouraged to investigate the possibility of applying the most recent editions of the references.

2.1 References and applicable documents

ANSI/NCSL Z540.3: Requirements for the Calibration of Measuring and Test Equipment.

Echols, W.H. and J.A. Young. 1963. *Studies of Portable Air-Operated Aerosol Generators.* US Naval Research Laboratory (NRL) Report 5929. Washington, DC.

IEST-RP-CC001.5: HEPA and ULPA Filters

ISO 10012:2003 Measurement management systems—Requirements for measurement processes and measuring equipment.

2.2 Sources and addresses

IEST

Institute of Environmental Sciences and Technology
1827 Walden Office Square, Suite 400 |
Schaumburg, IL 60173 USA
Phone: 847-981-0100
Fax: 847-981-4130
www.iest.org