

..... design of
CLEAN ROOMS
a classified list of selected
references — 1955-1964

Compiled by
Gertrude W. Fox, *Reference Librarian*
National Institutes of Health Library
Division of Research Services

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service, National Institutes of Health
Division Research Services, Bethesda, Maryland, 1964

DESIGN OF
CLEAN ROOMS

A Specialized List of Selected

Publications — 1955-1964

Public Health Service Publication No. 1219

Public Health Bibliography Series No. 54

For sale by Superintendent of Documents, U.S. Government Printing Office,
Washington, D.C., 20402. Price 15 cents.

PREFACE

THE SUBJECT of clean room design, construction and maintenance has appeared in the literature only within the last decade. Requirements for vehicle components in the space program have demanded rooms much cleaner than the present day hospital operating room. This fact has caught the attention of health-research-oriented individuals. It is feasible that techniques developed in achieving air free of microscopic particles for the assembly of parts for space instrumentation may be applied in the design of surgical suites, sterile rooms, germfree animal quarters, laboratories of virology, bacteriology and tissue culture, etc.

SINCE TECHNICAL information in this field is new, the references were obtained by searching the journal literature, *Engineering Index* (1958-64) and *Applied Science and Technology Index* (1958-64). Emphasis in compiling this list has been placed on biomedical applications. References were limited to those written in the English language from 1955-64. Entries have been made alphabetically by author under broad subject headings. Some brief annotations and an author index have been included.

TABLE OF CONTENTS

	Page
PREFACE	iii
I. GENERAL WORKS	1
A. Bibliographies	1
B. General aspects	1
C. Descriptions of specific clean rooms or areas	2
II. BIOMEDICAL APPLICATIONS	4
A. Animal facilities	4
B. Hospitals	5
C. Miscellaneous	6
III. METHODS OF CONTROL	7
A. Air cleaning devices	7
B. Maintenance	8
C. Monitoring	9
D. Sources of contaminants	9
IV. PORTABLE UNITS	10
V. STANDARDS	10
ADDENDUM: REFERENCES 1963-64	10
PERIODICALS CITED	13
PERSONAL AUTHOR INDEX	15

I. GENERAL WORKS

A. Bibliographies

1. Animal Care Panel. Biological Safety Committee. Microbiological safety bibliography. Argonne, Ill., 1961. 24 p. See especially p. 12-16: Equipment, engineering, apparatus, building design, masks and respirators, ultraviolet irradiation, ventilation and filtration of air. References 1940-61.
2. Controlled Environment, inc., Needham, Mass. Bibliography of information relating to clean rooms and contamination control (Section 1) and sampling and monitoring air in clean rooms (Section 2). Needham, 1962. 16 p. References, 1949-62.
3. North American Aviation, inc., Autonetics Division. Bibliographical study on dust control engineering; methods, equipment, and applications. Prepared by G. I. Chandler. Downey, Calif., 1960. Unpagged. References from 1827-1959. Emphasis on information published between 1950-59.
4. U.S. Armed Services Technical Information Agency. Clean room environment; a report bibliography 1959-present. Arlington, Va. May 1962. 15 p.

B. General aspects

5. Avery, R. H. The meaning of clean air. Pt. I. *Air Eng.*, 1959, 1(1): 29-32. Pt. II. *Air Eng.*, 1959, 1(2): 29-32. Pt. III. *Air Eng.*, 1959, 1(3): 28-31. Discussion of dust particle size, air conditioning requirements, filter selection and the design of the clean room itself.
6. Clean rooms: the plant engineer's latest challenge. *Plant Eng.*, 1962, 16(3): 110-26. A series of five articles on clean room problems from the view of the plant engineer.
7. Giffells, C. A. Materials of construction. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 7 p.
8. Gregory, P. H. The microbiology of the atmosphere. New York, Interscience, 1961. 251 p. Discussion of airborne particles as a worldwide phenomenon. Deals with dispersal, deposition, air sampling techniques, etc.
9. In search of a clean room. *Heating Piping & Air Cond.*, 1963, 35(1): 187-202. HPAC Engineering data file.
10. Jerome, W. R. Super clean white rooms for precision components. Pt. I. *Air Eng.*, 1961, 3(5): 28-32. Pt. II. *Air Eng.*, 1961, 3(6):

- 35-40. Design, construction, personnel training, and dust monitoring.
11. Lieberman, A. Clean rooms—white to whiter. *Res./Develop.*, 1962, 13(1): 4-13.
 12. Lough, W. J. For a clean room on a budget; know its basic needs, then fill them properly. *Plant Eng.*, 1962, 16(3): 110-15.
 13. Marsh, R. C. The adaptability of laminar air flow for contamination control. *J. Amer. Assn. Contamination Control*, 1963, 2(5): 7-11. Includes some discussion of medical applications of laminar airflow principles.
 14. Schmid, C. E. Insuring cleanliness in the white room. Pt. I. *Test Eng.*, 1961, 5(4): 18-22. Pt. II. *Test Eng.*, 1961, 5(5): 24, 34.
 15. Schwab, C. E. How to control temperature, pressure, and humidity in super-clean areas. *Air Eng.*, 1961, 3(8): 20-3. Selection and use of controls for precise degrees of thermal environment in contamination control areas.
 16. Symposium on Dust Control and White Rooms, Phoenix Chapter, American Institute of Plant Engineers. Tempe, Ariz., Arizona State College, November 1960. Seven papers available from American Association for Contamination Control, Post Office Box 308, Canoga Park, Calif.
 17. Whitfield, W. J. A new approach to clean room design. Albuquerque, N. Mex., Sandia Corp., 1962. 28 p. SC4673(RR).
 18. Whitfield, W. J. State-of-the-art (contamination control) and laminar air flow concept. Paper presented at Conference on Clean Room Standards held at Sandia Corp., Albuquerque, N. Mex., Apr. 9-10, 1963, 9 p. The use of laminar airflow principles in a new system of airborne contamination control and its effectiveness compared with conventional clean rooms.
 19. Young, O. The special techniques of clean room construction. *Test Eng.*, 1962, 7(5): 11-15.

C. Descriptions of specific clean rooms or areas

20. Battis, J. W. Clean room. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 6 p. Accessory Products Co. Whittier, Calif.
21. Biddle, K. R. Clean room design . . . notes from a successful "do it yourself" project. *Plant Eng.*, 1962, 16(8): 138-139. Sundstrand Aviation Division, Sundstrand Corp., Rockford, Ill.
22. Bokemeier, S. H. Designing a clean room facility. *Missiles & Space*, 1961, 7(6): 48, 51, 88. Design considerations involved. Flexonics, Bartlett, Ill.
23. Borders, R. H. Dust control "to order" in this eight-room clean area. *Plant Eng.*, 1962, 16(3): 122-124. Autonetics, Anaheim, Calif.

24. Cash, R. L. White room—two approaches. Pt. I. *Test Eng.*, 1961, 5(2): 28, 36. Pt. II. *Test Eng.*, 1961, 5(3): 22, 24, 30, 34. Describes one large clean room (65,000 sq. ft.) and a small clean laboratory (600 sq. ft.) for work with semi-conductor devices at Texas Instruments, Inc., Dallas, Tex.
25. Controlled air at GE gives longer life to key electronic tubes for missiles. *Air Eng.*, 1960, 2(4): 20. Describes an "area as clean as a hospital operating room" at GE's power tube plant, Scranton, Pa.
26. The Cover; revolutionary General Dynamics clean room. *J. Amer. Assn. Contamination Control*, 1963, 2(5): 1, 18. General Dynamics, Pomona, Calif.: "200 times cleaner than the conventional hospital surgical room." Application of the principle of laminar airflow "will achieve the first truly germ-free room."
27. Design of a white room . . . will it be obsolete? How soon? *Plant Eng.*, 1962, 16(3): 116-118. Description of GE's New Departure Division clean room at Sandusky, Ohio.
28. Dust-free air for gyroscopes. *Air Eng.*, 1959, 1(2): 40-42. Lear, Inc. Grand Rapids, Mich.
29. Freeman, G. V. Superclean air for super-clean klystrons. *Air Eng.*, 1961, 3(4): 20-23, 40. The San Carlos plant of the Litton Industries at San Carlos, Calif.
30. Horton, W. L. The most advanced standards lab in the world. *I.S.A.J.*, 1961, 8(12): 30-34. Design of an underground facility for calibration of instruments at U.S. Air Force Health Annex, Newark, Ohio.
31. Kartsher, H. S. Operation purezone. *Machinery*, 1962, 68(10): 102-105. Cleanliness requirements in manufacturing electronic products at GE's Pinellas Peninsula Plant, St. Petersburg, Fla.
32. Kline, G. R. White rooms for Project Mercury. *Air Eng.*, 1960, 2(11): 28-32, 58. Details on white room design, construction and maintenance at McDonnell Aircraft Corp., St. Louis, Mo.
33. Mildon, J. R. Design for upgrading gives clean room a future. *Plant Eng.*, 1962, 16(12): 130-132. Design and construction of clean rooms at Instrument Division of Lear-Siegler, Inc., Grand Rapids, Mich.
34. Pekkala, A. White room design for Project Mercury capsule assembly proved satisfactory. *Heating Piping & Air Cond.*, 1962, 34(7): 130-131. Criteria listed for clean room needs at McDonnell Air Craft Corp., St. Louis, Mo., in connection with Project Mercury.
35. Russell, J. A., Waite, R. E., and Kindig, E. V. New super (Class IV) clean room for final assembly of solar cells. Pt. I. *Air Eng.*, 1963, 5(3): 25-30. Pt. II. *Air Eng.*, 1963, 5(4): 26-30, 39. GE's Space Technology Center in King of Prussia, Pa., completed February 1962, is one of country's cleanest. Author gives complete description of rooms. Pt. II is concerned with maintenance, employee training, air showers, dust monitoring, and vacuum system and equipment.

36. Schiesser, R. J. Design for white rooms. *Air Eng.*, 1960, 2(7): 42-45. MIT's Instrumentation Laboratory, Cambridge, Mass.
37. Snowflake rooms. C. P. Clare Company produces precision electronic equipment in a specially constructed dust-free room. *PPG Products*, 1961, 69(1): 16-18. Walls are glass, floor vinyl and ceiling plastic coated at C. P. Clare Co., Chicago, Ill.
38. Waging war on dust. *Factory*, 1962, 120(3): 119-121. Minneapolis Honeywell: Clean rooms in its Aeronautical Division building in Minneapolis, Minn., are described.
39. Wheeler, S. Construction supplements air conditioning in dust-proofing instrument assembly rooms. *Air Cond. Heating & Vent.*, 1963, 60(4): 84-85. Clean room for instrumentation for the space program at Century Electronics & Instruments, Inc., Tulsa, Okla.
40. Workable housing for a clean environment. *Comfort Eng.*, 1961, 1(2): 6-7. Gray and ultra-clean rooms are described at Flexonics, Bartlett, Ill.

II. BIOMEDICAL APPLICATIONS

A. Animal facilities

41. Cumming, C. N. W. The commercial production of rats under SPF conditions. *J. Anim. Tech. Assn.*, 1962, 12: 75-81.
42. Cumming, C. N. W. and Elias, C. The establishment by a commercial company of a colony of rats free from certain pathogens. *Proc. Anim. Care Panel*, 1957, 7: 41-49.
43. Darlow, H. M. The provision of clean air. *Laboratory Animals Centre Collected Papers*, 1961, 10: 65-69.
44. Davey, D. G. Establishing and maintaining a colony of specific pathogen free mice, rats and guinea-pigs. *Laboratory Animals Centre Collected Papers*, 1959, 8: 17-39.
45. Foster, H. L. The development of specific pathogen free and germfree animals. *Bio-Medical Purview*, 1961, 1: 76-85.
46. Foster, H. L. Housing of disease-free vertebrates. *Ann. N.Y. Acad. Sci.*, 1959, 78: 80-88.
47. Foster, H. L. Large scale production of rats free of commonly occurring pathogens and parasites. *Proc. Anim. Care Panel*, 1958, 8: 92-100.
48. Graham, W. R. A program for the development of pathogen free laboratory animals. *Proc. Anim. Care Panel*, 1958, 8: 54-66.
49. Reyniers, J. A. The control of contamination in colonies of laboratory animals by the use of germfree techniques. *Proc. Anim. Care Panel*, 1957, 7: 9-29.

B. Hospitals

50. Allen, H. F. Air hygiene for hospitals. Part II. JAMA, 1959, 170: 261-267. A laboratory and operating room study of filtration of bacteria by means of fibrous filters.
51. Avery, R. H. Hospital-clean air. Hosp. Topics, 1963, 41(5): 103-105.
52. Barton, J. Control is the key to new surgical suite. Mod. Hosp., 1962, 99(6): 79-85, 143-144.
53. Blowers, R. and Crew, B. Ventilation of operating theatres. J. Hyg. (Camb.), 1960, 58: 427-448.
54. Cambridge Filter Corporation. Air filters for hospitals: Cambridge filters for hospitals. Syracuse, N.Y., 1961? 1V. (various paging.)
55. Conference on the Relation of the Environment to Hospital-Acquired Staphylococcal Disease. Proceedings. Atlanta, Georgia, Dec. 1-2, 1958. Atlanta, U.S. Communicable Disease Center, 1958. 95 p.
56. DeVan, E. A. A new approach to air distribution in operating rooms. Arch. Rec., 1960, 127(4): 251-253. An attempt to improve sterility of air in the vicinity of the operating table at NIH surgical wing.
57. Fairbrother, M. R. The new way of cleaning up our hospital operating rooms. Grand Rapids, Mich., Dynamic Air Engineering Corp., n.d. 6 p.
58. First, M. W. Controlling airborne bacteria . . . how well can it be done with today's air sanitation methods? Pt. I. Air Eng., 1960, 2(4): 29-33. Pt. II. Air Eng., 1960, 2(5): 43-45, 61. Part I discusses staphylococcus infections in hospitals; Part II points out how the engineering of air can keep airborne bacteria at a minimum.
59. Gaulin, R. P. How to keep infection out of the air. Mod. Hosp., 1963, 100(3): 93-98.
60. Goddard, K. R. 100% outside air less costly than recirculated air. Air Eng., 1962, 4(10): 22-27, 42. Discussion of air conditioning system to control airborne bacteria in hospitals.
61. Greene, V. W., Bond, R. G. and Michaelson, M. D. Air handling systems must be planned to reduce the spread of infection. Mod. Hosp., 1960, 95(2): 136-144.
62. Jacobs, R. H. The architect's guide to surgical infection. JAIA, 1962, 39(1): 75-83.
63. Jacobs, R. H. The surgical center; an environmental approach to the control of wound infection. Hosp. Topics, 1963, 41(4): 73-76, 85.
64. Kethley, T. W., Cown, W. B., and Fincher, E. L. Mock-up surgery tests air flow patterns. Mod. Hosp., 1963, 100(3): 99-102. Three basic types of air supply systems were studied: (1) End-wall grille, (2) single central ceiling diffuser, and (3) perforated ceiling panels.

65. Kethley, T. W., Cown, W. B. and Fincher, E. L. Operating room ventilation evaluated. *Arch. Rec.*, 1963, 133(3): 204-208. In a simulated operating room, multiple ceiling diffusers were found superior in the final three of the following four major factors studied: "(1) Overall ventilation effectiveness, (2) ventilation, (3) deposition of particles, and (4) transport of particles."
66. Kranz, P. Jet stream ventilation for extreme air cleanliness. *ASHRAE J.*, 1962, 4(8): 37-39. "Jets of air are used to provide a high degree of cleanliness . . . of special significance for hospital operating rooms."
67. Lidwell, O. M. and Blowers, R. Design and ventilation of operating room suites for control of infection and for comfort. *Instn. Heating & Vent. Engrs. J.*, 1962, 30: 320-328.
68. Lidwell, O. M. and Williams, R. E. The ventilation of operating theatres. *J. Hyg. (Camb.)*, 1960, 58: 443-464.
69. Markey, W. A. Hospitals and industrial techniques of contamination control. *J. Amer. Assn. Contamination Control*, 1963, 2(3): 6-9, 18-21. ". . . we suspect that many clean room techniques can be used almost directly in some aspects of hospital contamination control . . ."
70. Markey, W. A. Some aspects of hospital contamination problems. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 10 p.
71. Meckler, G. and Meckler, M. Unique air conditioning system for hospitals. *Air Eng.*, 1959, 1(8): 18-20, 49.
72. Michaelson, G. S. When designing hospital operating room ventilation. . . *ASHRAE J.*, 1961, 3(10): 60-62.
73. Pickens, W. R. and Mousel, L. H. Surgical suite at Swedish hospital is designed to reduce contamination. *Mod. Hosp.*, 1962, 98(3): 105-110, 122-124.
74. Smith, W. Planning the surgical suite. New York, Dodge, 1960. 471 p. See p. 362-369.
75. Smylie, H. G. and Dudley, H. A. F. Special series on hospital planning. X. Some principles in operating theatre design. *Scot. Med. J.*, 1961, 6: 588-596.
76. Snow, D. L. et al. Design and maintenance of operating room air conditioning and ventilation systems. *Amer. J. Public Health*, 1961, 51: 1896-1906.
77. U.S. Public Health Service. Division of Hospital and Medical Facilities. Design features affecting asepsis in the hospital. Washington, 1963. 20 p.

C. Miscellaneous

78. Animal Care Panel. Biological Safety Committee. Microbiological safety bibliography. Argonne, Ill., 1961. 24 p. References, 1910-61.

79. Conference on Airborne Infection, Miami Beach, Dec. 7-10, 1960. Edited by W. McDermott. Baltimore, Williams & Wilkins, 1961. 382 p.
80. Draft-free air diffusion protects laboratory. *Comfort Eng.*, 1963, 2(2): 32-33. Ventilation in a sterile research laboratory via ceiling diffusers.
81. Kethley, T. W. Questions & answers: Are white rooms germ free? *Air Eng.*, 1962, 4(3): 43-45.
82. Riley, R. L. and O'Grady, F. Airborne infection: transmission and control. New York, Macmillan, 1961. 180 p.
83. Trexler, P. C. The control of microbic contamination in biology and medicine. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 8 p. Clean room application to the rearing of germfree animals for research.
84. U.S. Army. Biological Laboratories. Fort Detrick, Md. Laboratory design for study of infectious disease, by E. Hamel, G. B. Phillips and G. G. Gemillion. Frederick, Md., Office of the Safety Director, 1962. 29 p. (Technical manuscript No. 1.)
85. U.S. Communicable Disease Center, Atlanta. Selected materials on environmental aspects of staphylococcal disease. Washington, D.C., 1959. 289 p. Collection of reprints of journal articles on airborne infection.
86. Vaccine plant kept sterile, world's cleanest building. New York Herald Tribune press release, Feb. 6, 1962. 1 p. Tissue culture center of the Pitman Moore Co., Zionsville, Ind.
87. Wells, W. F. Airborne contagion and air hygiene. Cambridge, Mass., Harvard U. Press, 1955. 423 p.

III. METHODS OF CONTROL

A. Air cleaning devices

88. Avery, R. H. Super-interception filters and contamination control. *J. Amer. Assn. Contamination Control*, 1963, 2(1): 25-28.
89. Avery, R. H. Super-interception filters and contamination control. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 12 p.
90. Cambridge Filter Corporation. Air filters for hospitals. Syracuse, N.Y. [1961?] 1V. (various paging.) Collection of reprints and trade literature on air filters.
91. Can statically charged screens control airborne dust? *Heating Piping & Air Cond.*, 1962, 34(9): 166-169. Conclusions drawn show no observable differences between control and experimental situation. However, light scattering technique was not used in counting particles or determining size of particles.

92. Clean air aids industry. Maintenance, 1963, 13(3): 8. Use of ultra-filtration equipment consisting of cloth tubes.
93. Cleaner rids air of fine particles; Georgia Tech. develops air cleaner that operates on centrifugal principle, also shows promise as classifier. Chem. & Eng. N., 1961, 39(51): 50.
94. Decker, H. M. Air filtration of microbial particles [by] Herbert M. Decker [and others] Washington, D.C., 1962. 43 p. (Public Health Service publication no. 953) A joint publication of the Dept. of the Army, U.S. Army Chemical Corps, Ft. Detrick, Frederick, Md. and the U.S. Dept. of Health, Education, and Welfare, Communicable Disease Center, Atlanta, Ga.
95. Frederick, E. R. How dust filter selection depends on electrostatics. Chem. Eng., 1961, 68(13): 107-114. Guide to selection of filter medium with electrostatic polarity.
96. Goddard, K. R. A procedure for microbiological testing of air filters. ASHRAE J., 1963, 5(2): 75-82.
97. Know rating methods when selecting air cleaning devices. Heating Piping and Air Cond., 1962, 34(1): 181-185. Standards in testing air cleaning devices.
98. Lindeken, C. L. Selection, installation and maintenance of white room filters. Air Eng., 1963, 5(2): 20-24, 50-51. "Gives criteria for evaluating, testing and selecting filters . . . Tips on installations, uncrating, maintenance, capacity loading."
99. Rivers, R. D. Why you need . . . How to get . . . How to monitor . . . clean air. Plant Eng., 1962, 16(3): 119-121. Describes filters useful in clean rooms.

B. Maintenance

100. Lieberman, A. General provisions for clean room maintenance. J. Amer. Assn. Contamination Control, 1962, 1(2): 4, 7-8.
101. Questions and answers on super-clean room design. Air Eng., 1960, 2(9): 48-50. Answers to questions on dust monitoring, personnel dust off and clothing.
102. Renzetti, N. Maintenance of clean room areas. Mod. Sanitation and Bldg. Maintenance, 1963, 15(5): 19-22, 52-53. Seven years of experience in maintaining clean rooms at Sperry Gyroscope Co., Great Neck, N.Y.
103. Truslow, J. Maintenance of clean rooms. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 8 p.
104. Williamsen, C. T. Control and maintenance of a large volume clean room production area. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 9 p.

C. Monitoring

105. American Conference of Governmental Industrial Hygienists. Air sampling instruments for evaluation of atmospheric contaminants. Cincinnati, Ohio, 1962. 1V. (various paging.) Principles of air sampling and technical discussions on specific types of instruments.
106. Armour Research Foundation, Chicago. Clean room monitoring, by Alvin Lieberman and John D. Stockham. Chicago, 1959. 22 p. ARF Project C 800. Describes test procedures and results on performance of clean room installation at Sperry-Farragut plant, Bristol, Tenn.
107. Cadé, R. D. Various methods for particle monitoring and particle classification. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 8 p.
108. How to determine contamination in clean rooms—with minimum error. Gelman Solutions, 1963, 11(2): 2-3.
109. Lieberman, A. and Stockham, J. Automatic techniques of airborne particle counting. Pt. I. Air Eng., 1960, 2(12): 40-42. Pt. II. Air Eng., 1961, 3(1): 37-39. Report from Armour Research Foundation, Chicago, Ill.
110. Marsh, R. C., Whitfield, W. J. and Kodol, I. M. Dry slide technique. Air Eng., 1962, 4(4): 44-48, 53. A practical approach to clean room monitoring.
111. Pilcher, J. M. How clean is the room? ASHRAE J., 1963, 5(5): 35-42. 38 references.
112. Rivers, R. D. Why you need . . . how to get . . . how to monitor . . . clean air. Plant Eng., 1962, 16(3): 119-121. Describes techniques of dust monitoring.

D. Sources of contaminants

113. Allison, F. M. Control of airborne particulate contamination. J. Amer. Assn. Contamination Control, 1963, 2(2): 17-20. "Analysis revealed that employees' street clothing is major source of contamination."
114. Benstock, G. M. Dust-free clothing for "white rooms." Air Eng., 1960, 2(12): 45, 60.
115. Chase, H. H. White room control procedures. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 10 p.
116. Hoffman, D. P. "Fingerprinting" airborne dusts. Air Eng., 1960, 2(10): 51-55. Methods of tracing and identifying dust particles in clean rooms. (Convair Division, General Dynamics Corp., San Diego, Calif.)
117. Israel, M. Factors which influence uniform design for clean rooms; primer of textiles with an up-to-date analysis of clean room garments. Paper presented at meeting of American Association for Contamination Control, May 28-30, 1962. San Francisco, Calif. 12 p.

118. Looney, J. Controlling contaminants for air cleaner effectiveness. *ASHRAE J.*, 1962, 4(7): 22-26, 86. Discusses sources of contaminants and methods of decreasing air contamination.

IV. PORTABLE UNITS

119. Marsh, R. C. and Whitfield, W. J. Operating manual for the Sandia clean bench. Albuquerque, N. Mex., 1962. 15 p. SC 4733 (M).
120. Mashburn, J. C., Neitzel, W. E. and Whitfield, W. J. A portable clean work station. Albuquerque, N. Mex., 1962. 11 p. SC 4690 (RR). Sandia Corp.
121. New ultra-clean room outfilters then all. *Plant Eng.*, 1962, 16(3): 125-126. A portable chamber developed at Sandia Corp., Albuquerque, N. Mex. Floor and wall act as filters.
122. White room you can afford. *Mod. Plastics*, 1962, 39(8): 108. Description of a clean cabinet at which one operator can work.

V. STANDARDS

123. Austin, P. R. The proposed Air Force Standard clean room. *J. Amer. Assn. Contamination Control*, 1963, 2(3): 15-19. Need for standards for clean room emphasized.
124. Riemondy, A. A. and Miner, H. E. The U.S.A.F. clean room story. *Air Eng.*, 1963, 4(5): 35-39. Discussion of T. O. 00-25-203.
125. Sandia Corporation, Albuquerque, N.M. Clean room and work station requirements, controlled environment: a proposed Federal Standard. Prepared by the Sandia Corp. for the Atomic Energy Commission, March 28, 1963. 44 p.
126. U.S. Air Force. Standards and guidelines for the design and operation of clean rooms and clean work stations. 1963. 1V. (various paging.) T.O. 00-25-203.
127. U.S. Federal Supply Service. Clean room and work station requirements; controlled environment. Washington, D.C., 1963. 21 p. Federal Standard No. 209.
128. U.S. Redstone Arsenal, Huntsville, Ala. Degree of cleanliness and clean room requirements. Huntsville, Alabama, 1962. 17 p. MIL-STD-1246.

ADDENDUM: REFERENCES 1963-1964

129. American Society for Testing and Materials. Tentative methods for sizing and counting airborne particulate contamination in clean

- rooms and other dust-controlled areas designed for electronic and similar applications. Philadelphia, Pa., 1963. 12 p. (ASTM F25-63 T)
130. Bures, F. S. Clean room construction with commercial materials. *J. Amer. Assn. Contamination Control*, 1963, 2(7): 7-12.
 131. Close, G. C. Tailor-made cleanroom for bearings. *Mill & Factory*, 1963, 72(6): 102-103. Clean room at Raytee Co., Los Angeles, Calif.
 132. A commentary of Federal Standard 209 based on an interview with Mr. J. Gordon King. *J. Amer. Assn. Contamination Control*, 1964, 3(2): 14-17.
 133. Hamilton, H. A. The sanitation engineer and his job in the white room. *Mod. Sanitation & Bldg, Maint.*, 1964, 16(2): 19-21, 50-52.
 134. Helfman, H. N. Sterile air in hospitals. *ASHRAE J.*, 1963, 5(11): 59-61. Describes the Potapenko Aseptic Air system used in operating rooms in two California hospitals.
 135. Jerome, W. R. The "Buddy System" for clean room training. *J. Amer. Assn. Contamination Control*, 1963, 2(9): 17-20.
 136. Society of Automotive Engineers, Inc. Procedures for the determination of particulate contamination of air in dust-controlled spaces by the particle count method. New York, 1962. 7 p. (Aerospace recommended practice, ARP 743.)
 137. Thomas, S. B. et al. Airborne contamination in bacteriological laboratories. *Lab. Practice*, 1963, 12(4): 345-348, 353.
 138. Top Michigan clean room has fine facilities. *J. Amer. Assn. Contamination Control*, 1964, 3(2): 39. Michigan-Dynamics, Inc., Detroit, Michigan.
 139. Wathen, P. and Lough, W. Clean rooms don't just happen—Define need, then design room. *Plant Eng.*, 1963, 17(12): 106-109. Clean room design factors (temperature, humidity, light, air showers) and layouts.

PERIODICALS CITED IN THIS LIST OF REFERENCES

There is no standard list of abbreviations for many of the journals searched. Abbreviations used in *Applied Science and Technology Index*, *Engineering Index*, and *Index Medicus* were used as models whenever feasible.

AIR CONDITIONING HEAT- ING & VENTILATING

Air Cond Heating & Vent

AIR ENGINEERING

Air Eng

AMERICAN JOURNAL OF PUBLIC HEALTH

Amer J Public Health

AMERICAN SOCIETY OF HEATING REFRIGERAT- ING & AIR CONDITION- ING ENGINEERS JOURNAL

ASHRAE J

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

Ann NY Acad Sci

ARCHITECTURAL RECORD

Arch Rec

BIO-MEDICAL PURVIEW

Bio-Medical Purview

CHEMICAL & ENGINEERING NEWS

Chem & Eng N

CHEMICAL ENGINEERING

Chem Eng

COMFORT ENGINEERING

Comfort Eng

FACTORY

Factory

GELMAN SOLUTIONS

Gelman Solutions

HEATING PIPING & AIR CON- DITIONING

Heating Piping & Air Cond

HOSPITAL TOPICS

Hosp Topics

INSTITUTION OF HEATING & VENTILATING ENGI- NEERS JOURNAL

Instn Heating & Vent Engrs J

INSTRUMENT SOCIETY OF AMERICA JOURNAL

ISA J

JOURNAL OF HYGIENE (Cam- bridge)

J Hyg (Camb)

JOURNAL OF THE AMERI- CAN ASSOCIATION FOR CONTAMINATION CON- TROL

J Amer Assn Contamination
Control

JOURNAL OF THE AMERI- CAN INSTITUTE OF AR- CHITECTS

J AIA

JOURNAL OF THE AMERI- CAN MEDICAL ASSOCIA- TION

JAMA

**JOURNAL OF THE ANIMAL
TECHNICIANS ASSOCIATION**

J Anim Tech Assn

**LABORATORY ANIMALS
CENTRE COLLECTED PA-
PERS**

**Laboratory Animals Centre
Collected Papers**

LABORATORY PRACTICE

Lab Practice

MACHINERY

Machinery

MAINTENANCE

Maintenance

MILL & FACTORY

Mill & Factory

MISSILES & SPACE

Missiles & Space

MODERN HOSPITAL

Mod Hosp

MODERN PLASTICS

Mod Plastics

**MODERN SANITATION AND
BUILDING MAINTENANCE**

Mod Sanitation & Bldg Maint

**PITTSBURGH PLATE GLASS
PRODUCTS**

PPG Products

PLANT ENGINEERING

Plant Eng

**PROCEEDINGS OF THE ANI-
MAL CARE PANEL**

Proc Anim Care Panel

**R/D RESEARCH/DEVELOP-
MENT**

Res/Develop

**SCOTTISH MEDICAL JOUR-
NAL**

Scot Med J

TEST ENGINEERING

Test Eng

PERSONAL AUTHOR INDEX

Name	Item No.	Name	Item No.
Allen, H. F	50	Kline, G. R	32
Allison, F. M	113	Kranz, P	66
Austin, P. R	123	Lidwell, O. M	67, 68
Avery, R. H	5, 51, 88, 89	Lieberman, A	11, 100, 109
Barton, J	52	Lindekin, C. L	98
Battes, J. W	20	Looney, R. J	118
Benstock, G. M	114	Lough, W. J	12
Biddle, K. R	21	Markey, W. A	69, 70
Blowers, R	53, 67	Marsh, R. C	13, 110, 119
Bokemeier, S. H	22	Mashburn, J. C	120
Borders, R. H	23	Meckler, G	71
Bures, F. S	130	Meckeler, M	71
Cadle, R. D	107	Michaelson, G. S	72
Cash, R. L	24	Mildon, J. R	33
Chase, H. H	115	Miner, H. E	124
Cloce, G. C	131	Mousel, L. H	73
Cumming, C. N. W	41, 42	Neitzel, W. E	120
Crew, B	53	O'Grady, F	82
Darlow, H. M	43	Pekkala, A. A	34
Davey, D. G	44	Pickens, W. R	73
Decker, H. M	94	Pilcher, J. M	111
DeVan, E. A	56	Renzetti, N	102
Dudley, H. A. F	75	Reyniers, J. A	49
Elias, C	42	Riemony, A. A	124
Fairbrother, M. R	57	Riley, R. L	82
First, M. W	58	Rivers, R. D	99, 112
Foster, H. L	45, 46, 47	Russell, J. A	35
Frederick, E. R	95	Schiesser, R. J	36
Freeman, G. V	29	Schmid, C. E	14
Gaulin, R. P	59	Schwab, C. E	15
Giffells, C. A	7	Smith, W	74
Goddard, K. R	60, 96	Smylie, H. G	75
Graham, W. R	48	Snow, D. L	76
Greene, V. W	61	Stockham, J	109
Gregory, P. H	8	Thomas, S. B	137
Hamilton, H. A	133	Trexler, P. C	83
Helfman, H. N	134	Truslow, J	103
Hoffman, D. P	116	Waite, R. C	35
Horton, W. L	30	Wathen, P	139
Israel, M	117	Walls, W. F	87
Jacobs, R. H	62, 63	Wheeler, S	39
Jerome, W. R	10, 135	Whitfield, W. J	17, 18, 119, 120
Kartsher, H. S	31	Williams, R. E	68
Kethley, T. W	64, 65, 81	Williamsen, C. T	104
Kindig, E. V	35	Young, O	19