

MIL-HDBK-407
 NOTICE 1
 20 January 1984

MILITARY HANDBOOK
 CONTAMINATION CONTROL TECHNOLOGY
 PRECISION CLEANING
 METHODS AND PROCEDURES

TO ALL HOLDERS OF MIL-HDBK-407:

1. THE FOLLOWING PAGES OF MIL-HDBK-407 HAVE BEEN REUSED AND SUPERSEDE THE PAGES LISTED:

<u>NEW PAGE</u>	<u>DATE</u>	<u>SUPERSEDED PAGE</u>	<u>DATE</u>
39	31 January 1972	REPRINTED WITHOUT CHANGE	
40	20 January 1984	40	31 January 1972
41	20 January 1984	41	31 January 1972
42	31 January 1972	REPRINTED WITHOUT CHANGE	

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-HDBK-407 will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the Military Handbook is completely revised or cancelled.

Custodians:
 Army-MI
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 Air Force-99

Preparing Activity:
 Army-MI
 (Project 3694-0032)

Review Activities:
 Army- ER, AR, ME, AT
 Navy- SA, SH
 Air Force- 22, 13, 15, 16, 17, 19,
 43, 84

User Activities:
 Defense Supply Cnter- GS, PS, ES
 Civil Agencies- JFK, MSF, FAA

FSC 3694

MIL-HDBK-407

31 January 1972

larger. For statistical purposes, the particle counts are taken during normal work activity periods and at locations where the air approaches the work area. The clean room classes defined in Federal Standard 209a are:

Table I.
Federal Standard 209a - Air cleanliness classes

Maximum number of particles per cubic foot 0.5 micron and larger (per liter)*	Class English System (metric system)*	Maximum number of particles per cubic foot 5.0 microns and larger (per liter)*
100 (3.5)*	100 (3.5)*	Counts below 10 (0.35) particles per cubic foot (liter) are unreliable except when a large number of samplings is taken.
10,000 (350)*	10,000 (350)*	65 (2.3)*
100,000 (3500)*	100,000 (3500)*	700 (25)*

*Metric System

- a) Class 100 (3.5 liter). Particle count not to exceed a total of 100 particles per cubic foot. (3.5 particles per liter) of a size 0.5 micron and larger.
- b) Class 10,000 (350 liter). Particle count not to exceed a total of 10,000 particles per cubic foot (350 particles per liter) of a size of 0.5 micron and larger of 65 particles per cubic foot (2.3 particles per liter) of a size 5.0 microns and larger.
- c) Class 100,000 (3500 liter). Particle count not to exceed a total of 100,000 particles per cubic foot (3500 particles per liter) of a size 0.5 micron and larger or 700 particles per cubic foot (25 particles per liter) of a size 5.0 microns and larger.

4.2.3 Mil-Std-1246A. In 1962 a military standard was developed - Mil-Std-1246(MI); on 18 August 1967 this standard became Mil-Std-1246A. The purpose of the document was to establish requirements and guidelines to enable the achievement of the degree of cleanliness essential to meet product reliability or quality specifications. The following Table shows

MIL-HDBK-4G7
20 January 1984

the classification of cleanliness levels as established by Mil-Std-1246A.

Table II.

Mil-Std-1246A - Classification of product cleanliness levels

Cleanliness Level	μ Range Surface and Fluids	Quantity of Particulates
10	5	Less than 3
25	5	21
	15	Less than 4
	25	1
50	5	180
	15	25
	25	7
	50	1
100	15	280
	25	75
	50	11
	100	1
200	15	4100
	25	1100
	50	180
	100	16
300	25	7000
	50	1000
	100	90
	250	Less than 3
500	50	11000
	100	950
	250	25
	500	1
750	100	6500
	250	170
	500	7
	750	1
1000	250	1000
	500	45
	750	7
	1000	1

MIL-HDBK-407
20 January 1984

Non volatile residue

Level	Quantity NVR
A	Less than 1.0 mg
B	1.0 mg to 2.0 mg
C	2.0 mg to 3.0 mg
D	3.0 mg to 4.0 mg
E	4.0 mg to 5.0 mg
F	5.0 mg to 7.0 mg
G	7.0 mg to 10.0 mg
H	10.0 mg to 15.0 mg
J	15.0 mg to 25.0 mg

MIL-HDBK-407
31 January 1972

Two levels may be used when necessary to designate particles and fibres separately. Example: Cleanliness level 100 particles, 1000 fibres.

4.2.4 NAS 1638. In 1964, the Aerospace Industries Association of America introduced the NAS 1638 cleanliness requirements of parts ^{used in} hydraulic systems.

4.3 References.

1. Clean Room and Work Station Requirements, Controlled Environment, Federal Standard No. 209a, August 16, 1966.
2. Clean Room Technology, James W. Useller, Lewis Research Center, NASA SP-5074, 1969.
3. Contamination Control Principles, Sandia Corporation, NASA SP-5045, 1967.
4. Grumman Aerospace Corporation.
5. Hospital Sanitation - Past, Present, and Future, Contamination Control, Jon W. Leemhorst, Vol, IX No. 8 & 10, Sept. - Oct, 1970.
6. Department of the Navy, Naval Weapons Center, China Lake, California.
7. Particle Size Measurement, ASTM Special Tech. Publ. No. 234, Philadelphia, Pa., 1958.
8. Product Cleanliness Levels and Contamination Control Program, Military Standard 1246A, August 18, 1967.
9. Technical Order Standards and Guidelines for the Design and Operation of Clean Rooms and Clean Work Stations, T.O. 00-25-203.
10. The Starting Point for Contamination Control, Whitby, K. T., Am. Assoc. (Cont. Control, Boston, May 1963).