

# Cleanroom Specifications

## U.S. Federal Standard 209E Cleanroom Standards\*

Class	Maximum Particles / ft <sup>3</sup>					ISO Equivalent
	≥0.1 μm	≥0.2 μm	≥0.3 μm	≥0.5 μm	≥5 μm	
1	35	7	3	1		ISO 3
10	350	75	30	10		ISO 4
100		750	300	100		ISO 5
1,000				1,000	7	ISO 6
10,000				10,000	70	ISO 7
100,000				100,000	700	ISO 8

\*US FED STD 209E was cancelled by the General Services Administration on November 29, 2001.

## IEST ISO 14644-1 International Standard for Cleanrooms

Class	Maximum Particles / m <sup>3</sup>						U.S. Federal Standard 209E Equivalent
	≥0.1 μm	≥0.2 μm	≥0.3 μm	≥0.5 μm	≥1 μm	≥5 μm	
ISO 1	10	2					
ISO 2	100	24	10	4			
ISO 3	1,000	237	102	35	8		Class 1
ISO 4	10,000	2,370	1,020	352	83		Class 10
ISO 5	100,000	23,700	10,200	3,520	832	29	Class 100
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293	Class 1000
ISO 7				352,000	83,200	2,930	Class 10,000
ISO 8				3,520,000	832,000	29,300	Class 100,000

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## Biosafety Levels

Biosafety levels define the levels of containment required for handling various types of biological hazards. In the United States, there are four levels of containment as specified by the Centers for Disease Control and Prevention (CDC). The table below is based on information provided by in CDC publications.

Containment Level	Description
Biosafety Level 1 (BSL-1)	Basic level of protection, appropriate for agents that are not known to cause disease in normal, healthy humans.
Biosafety Level 2 (BSL-2)	Level of protection appropriate for handling moderate-risk agents that cause human disease of varying severity by ingestion or through percutaneous or mucous membrane exposure.
Biosafety Level 3 (BSL-3)	Level of protection appropriate for agents of indigenous or exotic origin with a known potential for aerosol transmission that may cause serious and potentially lethal infections after inhalation.
Biosafety Level 4 (BSL-4)	Highest level of protection, appropriate for exotic agents that pose a high individual risk of life-threatening disease by infectious aerosols and for which no treatment is available.

## Additional Information

Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition Published by the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Institutes of Health; Fifth Edition, Feb 2007

## European Standard

Grade	Air Changes per Hour
Grade A	480-600
Grade B	35-70
Grade C	20
Grade D	20
Controlled Non-Classified	NA