PARAMOUNT INDUSTRIAL LIGHTING

Cleanroom Lighting Details

Paramount's cleanroom luminaires are designed and built to the most exacting standards, for high illumination with integrity. Many are also NSF Certified. Lighting with an unyielding shield against contamination!

Bio-safety

Today, bio-safety (the safe handling of biologically active materials) is increasingly a concern of the industry. The biggest difference between these environments (whether clinical, diagnostic, or for research) and standard cleanrooms is a negative air pressure containment scenario to prevent the spread of pathogens. Different areas are broken down into zones, called biosafety levels, depending on the level of infection risk involved.

Most biosafety work is done in task-appropriate cabinets within cleanrooms. But higher safety levels require lighting that can be decontaminated. Our Techniseal® surface and flange mounted troffers will work well in biosafety environments, including safety levels BL-3 and BL-4, the most hazardous.

AeroLux® and Minilux® Surface Luminaires:

- Tear-drop design for laminar airflow cleanrooms
- Classes 10-100,000 (ISO Classes 4-9)
- Highly efficient light control lens minimizes light on the ceiling
- Innovative lens mounting eases lamp and ballast servicing

Techniseal® Surgical Suite Illumination:

- Classes 100-100,000 (ISO Classes 5-9)
- Symmetrical distribution lens
- Guardcraft® antimicrobial coating available

Techniseal® Troffers:

- Classes 100-100,000 (ISO Classes 5-9)
- Totally sealed luminaires, IP65 rated versions available
- Extruded aluminum or one-piece stainless steel lens frames
- Gel-type grid system models available
- High efficiency units suitable for most HEPA or ULPA filters (Classes 10-100,000; ISO Classes 4-9)
- Guardcraft® antimicrobial coating available

Cleanroom Background and Technical Information

Cleanrooms are defined spaces in which the concentration of airborne particles are controlled to meet specific cleanliness classes. This is normally handled through positive air pressure ventilation. Cleanliness classes range from the most clean (ISO 1) to the least clean (ISO 9). They are specified in the recently adopted ISO 14644-1cleanroom cleanliness standard, as part of the 14000 series of environmental standards.

The new standards were developed from the original US Federal Standard 209, which dates back to 1963. The 209 document provided the first objective, validatable criteria for cleanliness. The U.S. GSA cancelled Federal 209E in favor of the new ISO standard in 2001. See the chart, at side, for a breakdown of the number of particles by size per cubic meter for each class.

Highly efficient HVAC systems can be combined with HEPA (High Efficiency Particulate Air) or ULPA (Ultra Low Penetration Air) filters that are efficient to 99.9995%, to cleanse incoming air of ultra particles as small as 0.02 micrometers. Average room air velocity through this system may be up to 27.4 meters per minute.

Bio-safety Information

The chart to the right describes the different standard biosafety levels. Contact the factory to discuss specifics of the application and details about sealants to determine suitable lighting when quoting biosafety jobs. For further information regarding bio-safety issues, visit the website of the Centers of Disease Control at www.cdc.gov

Cleanliness Levels

Class Name			Class Limits									
			0.1 µm volume units		0.2 µm volume units		0.3 µm volume units		0.5 µm volume units		5 µm volume units	
209E	SI	ISO	m^3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^3
		1	10		2							
		2	100		24		10		4			
	M1		350	9.91	75.7	2.14	30.9	0.875	10.0	0.283	-	-
1	M1.5	3	1,000	35.0	237	7.50	102	3.0	35.0	1.00	-	-
	M2		3,500	99.1	757	21.4	309	8.75	100	2.83	-	-
10	M2.5	4	10,000	350	2,370	75.0	1,020	30.0	352	10.0	-	-
	M3		35,000	991	7,570	214	3,090	87.5	1,000	28.3	-	-
100	M3.5	5	100,000	-	23,700	750	10,200	300	3,520	100	29	-
	M4		-	-	75,700	2,140	30,900	875	10,000	283	-	-
1,000	M4.5	6	1,000,000	-	237,000	-	102,000	-	35,200	1,000	293	7.0
	M5		-	-	-	-	-	-	100,000	2,830	618	17.5
10,000	M5.5	7	-	-	-	-	-	-	352,000	10,000	2,930	70.0
	M6		-	-	-	-	-	-	1,000,000	28,300	6,180	175
100,000	M6.5	8	-	-	-	-	-	-	3,520,000	100,000	29,300	700
	M7		-	-	-	-	-	-	10,000,000	283,000	61,800	1,750
		9							35,200,000		293,000	-

Note: *The particle concentrations shown here are for class purposes only and do not necessarily represent the size distribution found in any particular situation. The concentrations listed have been revised to the new ISO standards.*

Bio-safety Levels

Level	Pathogens	Containment
BL-1	Can cause infection in vulnerable humans.	Typical lab
BL-2	Non-life-threatening; spread through contact, ingestion, inhalation or inoculation	Limited access space; equipment & waste decontaminated after use
BL-3	Can cause serious or possibly lethal disease through contact or aerosol transmission	Access through airlock; negative air pressure; air not recirculated; Class 3 clothing required; equipment & waste decontaminated after use
BL-4	High risk agents of life-threatening disease; easy or unknown risk of transmission	Requires a separate facility or structure; negative air pressure; air not recirculated; requires pressurized personal suit; clothing, equipment & waste decontaminated after use