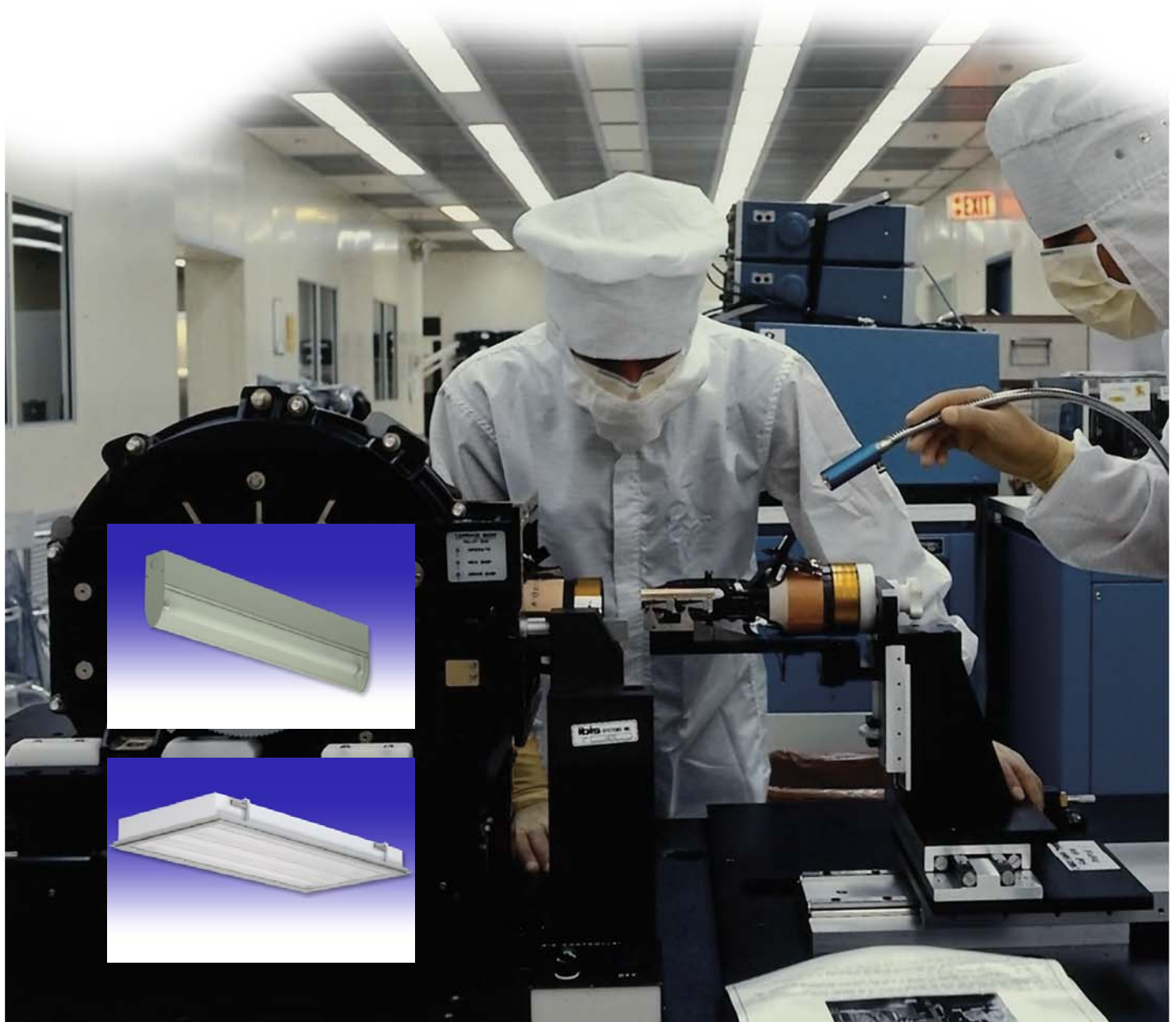


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# Spotless Lighting Performance for Clean Environments

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# We have the luminaires for your environment

## Troffers or Laminar Flow

### **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® Troffers:**

- Classes 100-100,000 (ISO Classes 5-9)
- Totally sealed luminaires, IP-65 rated versions available
- Surface-mount or recessed (flange or grid-mount) models
- Extruded aluminum lens frames with mechanically-retained gaskets or one-piece stainless steel lens frames
- Gel-type grid system models available
- High efficiency Flow-Thru units suitable for most HEPA or ULPA filters (Classes 10-100,000; ISO Classes 4-9)

### **Techniseal Surgical Suite Illumination:**

- Classes 100-100,000 (ISO Classes 5-9)
- Totally sealed luminaires
- Asymmetric and Symmetrical distribution lens
- Radio frequency interference shielding available



## Applications

- Pharmaceutical Labs and Production Facilities
- Biohazard Research Labs
- Electronics Manufacturing
- Surgical Suites
- Hospital Patient Rooms



# Paramount helps set the standard

Paramount's cleanroom luminaires for the pharmaceutical, medical and electronics markets are designed and built to the most exacting standards, for high illumination with integrity. Lighting with an unyielding shield against contamination!

## New standards from ISO

### 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). These classes are specified in the recently adopted ISO 14644-1 cleanroom 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. When a spec described a luminaire as suitable for "Class 100 or less clean," it was suitable for classes 100 to 100,000.

The U.S. GSA cancelled Federal 209E in favor of the new ISO standard in 2001. See the chart 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.

### Cleanliness Levels

209E	SI	ISO	Class Limits																	
			0.1 $\mu\text{m}$		0.2 $\mu\text{m}$		0.3 $\mu\text{m}$		0.5 $\mu\text{m}$		5 $\mu\text{m}$									
			volume units m <sup>3</sup>	volume units ft <sup>3</sup>	volume units m <sup>3</sup>	volume units ft <sup>3</sup>	volume units m <sup>3</sup>	volume units ft <sup>3</sup>	volume units m <sup>3</sup>	volume units ft <sup>3</sup>	volume units m <sup>3</sup>	volume units ft <sup>3</sup>								
		<b>1</b>	10		2		10		4											
		<b>2</b>	100		24		10		4											
	M1		350	9.91	75.7	2.14	30.9	0.875	10.0	0.283	-	-								
	M1.5	<b>3</b>	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	-	-								
	M2.5	<b>4</b>	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	-	-								
	M3.5	<b>5</b>	100,000	-	23,700	750	10,200	300	3,520	100	29	-								
	M4		-	-	75,700	2,140	30,900	875	10,000	283	-	-								
	M4.5	<b>6</b>	1,000,000	-	237,000	-	102,000	-	35,200	1,000	293	7.0								
	M5		-	-	-	-	-	-	100,000	2,830	618	17.5								
	M5.5	<b>7</b>	-	-	-	-	-	-	352,000	10,000	2,930	70.0								
	M6		-	-	-	-	-	-	1,000,000	28,300	6,180	175								
	M6.5	<b>8</b>	-	-	-	-	-	-	3,520,000	100,000	29,300	700								
	M7		-	-	-	-	-	-	10,000,000	283,000	61,800	1,750								
		<b>9</b>	-	-	-	-	-	-	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.*

**Paramount strives to offer a complete line of luminaires that meet the highest standards. In our catalog, you will find the cleanliness level ratings listed for every product. Many now feature IP-65 rated versions for Ingress Protection. We also offer one of the widest ranges of NSF Certified lighting in the industry.**



## Biosafety in numbers

Today, bio-safety is increasingly a concern of industry. Biosafety facilities are areas for the safe handling of biologically active materials. The biggest difference between these environments (whether clinical, diagnostic, or research settings) and standard cleanrooms is a negative air pressure containment scenario to prevent the spread of pathogens. Within these environments, 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.

The chart below describes the different standard biosafety levels, called BL levels. Contact the factory to discuss specifics of the application and details about sealants to determine suitable lighting when quoting biosafety jobs.

### Biosafety 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

Here are some general guidelines for specifying lighting at various levels of biosafety hazards:

**BL-1-** Use sealed troffer

**BL-2-** Use stainless steel troffer

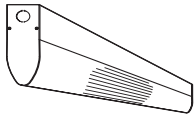
**BL-3-** Use crevice-free stainless steel troffer with extra gasketing

**BL-4-** Use IP-65 rated troffer with crevice-free stainless steel housing and sealed top access

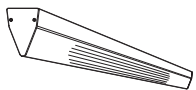
For further information regarding bio-safety issues, visit the website of the Centers of Disease Control at [www.cdc.gov](http://www.cdc.gov)

# Cleanroom Lighting

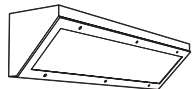
## Available Products:



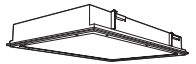
**A1 Series AeroLux®**  
surface luminaire  
1 lamp



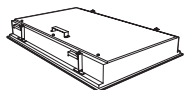
**A9 Series Minilux®**  
surface luminaire  
1 lamp



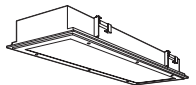
**K0, K7, K8 Series Corner Lite**  
surface luminaire  
1, 2 or 3 lamp



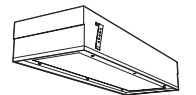
**F0, F1, F2 Series Techniseal®**  
recessed (flange) troffers  
2, 3, 4 or 6 lamp



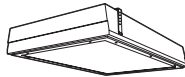
**F3, F4 Series Techniseal**  
rear access flange troffers  
2, 3 or 4 lamp



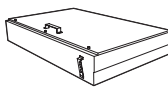
**F7 Series Techniseal**  
surgical flange troffer  
3 or 6 lamp



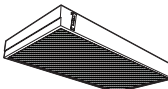
**G0, G9 Series Techniseal**  
gel-type grid troffers  
2, 3, 4 or 6 lamp



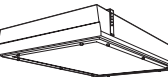
**G1, G2 Series Techniseal**  
recessed (grid) troffers  
2, 3, 4 or 6 lamp



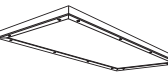
**G3, G4 Series Techniseal**  
rear access grid troffers  
2, 3 or 4 lamp



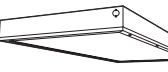
**G6 Series Techniseal**  
flow-thru grid troffer  
2, 3 or 4 lamp



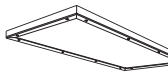
**G7 Series Techniseal**  
surgical grid troffer  
3 or 6 lamp



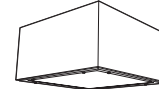
**R7 Series Techniseal**  
low-profile grid troffer  
2, 3, 4 or 6 lamp



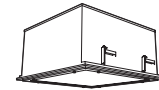
**S0, S1, S2, S3, S4 Series**  
Techniseal surface troffers  
2, 3, 4 or 6 lamp



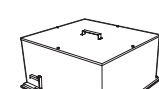
**S7 Series Techniseal**  
low-profile surface troffer  
2, 3, 4 or 6 lamp



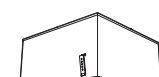
**S8-V7 Series**  
2x2 surface HID



**F8-V6 Series**  
2x2 flange HID



**F5-V5 Series**  
2x2 rear access  
flange HID



**G8-V8 Series**  
2x2 grid HID



**G5-V9 Series**  
2x2 rear access  
grid HID



**High Performance Lighting for Specialized Environments**

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CLR-6/05-WEB

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