



Holding Fixtures for use in Clean Rooms Contents

- A. Clean Room Classification 2
- B. The Correct Holding Fixture for use in Clean Rooms ---- 3



IV. Holding Fixtures for use in Clean Rooms

A. Clean Room Classification

Clean rooms have long been classified according to Fed Std 209E. The classifications were specified according to how much particulate of specified sizes existed per **cubic foot** and were measured over a specified time. The “cleanest” was a class 1 and the “dirtiest” a class 100,000. Fed Std 209E is now being superceded by the new international standards ISO 14644-1 through –8. The new clean room classifications will be according to how much particulate of specified sizes exist per **cubic meter** measured over a specified time. The “cleanest” ISO class will be a class 1 and the “dirtiest” a class 9 with the ISO class 3 being approximately equal to the FS209E class 1 and the ISO class 8 being approximately equal to the FS209E class 100,000.

Airborne Particulate Cleanliness Class Comparison

ISO 14644-1	FED STD 209E	
ISO Class	English	Metric
1		
2		
3	1	M 1.5
4	10	M 2.5
5	100	M 3.5
6	1,000	M 4.5
7	10,000	M 5.5
8	100,000	M 6.5
9		



Airborne Particulate Cleanliness Classes Per ISO 14644-1

Class	Particles Per Cubic Meter by Micrometer Size					
	.1 <i>um</i>	.2 <i>um</i>	.3 <i>um</i>	.5 <i>um</i>	1 <i>um</i>	5 <i>um</i>
ISO 1	10	2				
ISO 2	100	24	10	4		
ISO 3	1,000	237	102	35	8	
ISO 4	10,000	2,370	1,020	352	83	
ISO 5	100,000	23,700	10,200	3,520	832	29
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293
ISO 7				352,000	83,200	2,930
ISO 8				3,520,000	832,000	29,300
ISO 9				35,200,000	8,320,000	293,000

Other requirements may be specified for a particular clean room such as allowable liquids, liquid vapors or gases. Contamination from certain oils is often a concern. Humidity and temperature control may also be required.

B. The Correct Holding Fixture for use in Clean Rooms

How one designs a clean room to meet the above mentioned requirements will not be addressed here, however, if a FLOTRON holding fixture is desired to be used in a clean room the following points should be considered:



1. Particulate Generation

A prime source of concern is particulate generation. If a FLOTRON holding fixture is thoroughly cleaned prior to being introduced into a clean area, very little particulate generation will follow. Many different FLOTRON fixtures have been successfully used in FS209E class 10,000 (ISO class 7) clean rooms. This is because all external steel surfaces are either painted or zinc plated. These finishes will take a fair amount of abuse without chipping or sloughing-off as well as effectively minimizing corrosion, especially in the usually temperature and humidity controlled clean room atmosphere. Although, painting and plating does not coat the internal surfaces of open-ended tubes, these openings are all covered or capped.

2. Lubrication

All clean room gearboxes on FLOTRON fixtures are lubricated with Mobil SHC-007. The optional SR and DR gearboxes offered on the 600 and 700 series as well as the standard gearboxes on all 800 and larger series are all pressure checked at 5 PSI for 12 hours to verify that no leakage exists for these critical applications.



3. Clean Room Option

For more critical applications, the “Clean Room Option” (C) should be ordered.

This option replaces the afore-mentioned finishes with electroless nickel-plating on nearly all parts except the gearbox. The gearbox case is painted in gloss white epoxy and most miscellaneous hardware is stainless steel. Because electroless nickel will plate on the inside as well as the outside of open-ended tubes, there is almost no chance of corrosion taking place. Also, the nickel is much harder and more robust than either the zinc plating or the standard paint. Another consideration is that in some aerospace applications, zinc should not come in contact with critical parts. By specifying the “**Clean Room Option**” only nickel-plating is in the area of the critical parts.