

Composites

CLEANROOM WALL SYSTEM TECHNICAL REFERENCE

ISO CLASSIFICATION

Cleanrooms are classified from ISO 5 to 8 based upon foreign particle size and number of particles per cubic foot. The ISO class for a particular room is determined for the entire room and not for individual component or material. As an example, ISO class 5 (or class 100) cleanrooms can have a maximum allowable number of 100 particles at a size of 0.5 micrometers, 300 of 0.3 µm and 750 of 0.2 µm. Previously, US standards (Fed. Std. 209 E) ranged from 1 to 10,000.

Cleanroom ISO Classes (new)	Cleanroom ISO Class- es (old)	Class Limits "Not to Exceed" Particles per CU. FT. for Particle Sizes Shown				
		0.1 µm	0.2 µm	0.3 µm	0.5 µm	5.0 µm
3	1	35	7.5	3	1	-
4	10	350	75	30	10	-
5	100	-	750	300	100	-
6	1000	-	-	-	1000	7
7	10000	-	-	-	10000	70
8	100000	-	-	-	100000	700

PARTICLE EMISSION (ISO 14644-1)

- Tribological stress test was performed on Fire-X Glasbord (FSFM) using normal force of 300N against PA6 Nylon
- The level of particle concentration emitted during the testing lies within the permissible value of the corresponding Air Cleanliness Class ISO Class 5 in accordance with ISO 14644-1

Specimen	Material Pairing		ISO Class
	Counter Specimen	Lubricant	
Fire-X Glasbord FSFM	PA6 Nylon	(none)	5

Load	Normal Force	Detected Particle Size (calculated in accordance to ISO 14644-1)					
		0.1 µm	0.2 µm	0.3 µm	0.5 µm	1.0 µm	4.1 µm
REEL-ON-DISK Test	300N	3.1	3.7	3.9	3.8	3.6	4.1

BIOLOGICAL RESISTANCE (ISO 846)

- The test was performed on Fire-X Glasbord (FSFM) in accordance with ISO 846 to assess if the sample is inert or interacts with molds or bacteria.
- After molds (procedure A) and bacteria (procedure C) were applied, the samples were incubated at 24°C with a relative humidity of 95%.
- Samples were visually inspected for mold and bacteria growth after a period of 4 weeks.
- All Surfaseal products have been certified via ISO 846 by an independent third party.

RATING KEY (CLEANROOM SUITABLE MATERIALS SM CLASSIFICATION ACCORDING TO ISO 846)

- Excellent (0): No growth visible under microscope inspection
- Very good (1): No Growth visible by eyesight, but with microscopic inspection
- Good (2): Growth visible by eyesight, and up to 25% of the sample surface is covered
- Weak (3): Growth visible by eyesight, and up to 50% of the sample surface is covered
- Very weak (4): Strong growth visible by eyesight, and over 50% of the sample surface is covered
- None (5): Strong growth visible by eyesight, and whole sample surface is covered

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Method	Results	Overall Results
Fungi (procedure A)	Excellent (0)	Excellent (0)
Bacteria (procedure B)	Excellent (0)	

VOLATILE ORGANIC COMPOUND (ISO 16000-9)

- FSFM panel was tested per ISO 16000-9 to determine quantities of Volatile Organic Compounds (VOC) emitted for a 28 day period.
- VOC of seam sealant and adhesives were determined by manufacture.

State	Fire-X Glasbord Panel (FSFM)	Polyurethane Seam Sealant (R53827)	Advanced Polymer Adhesive (R53829)	Fast Grab Adhesive (R53828)
During Cure (grams/liter)	NA	0	35	2.6
Post Cure (grams/liter)	2.216×10^{-5}	0	0	0

CHEMICAL RESISTANCE (ISO 2812-1)

- Test was performed per ISO 2812-1 at room temperature.
- Seam Sealant was cured for 24 hours at room temperature prior to testing.
- Samples were immersed in a variety of chemicals for 24 hours and inspected at 1, 3 and 24 hours.
- Ratings are based on visual observations. Performance ratings are not necessarily valid outside of the temperature range and exposure time tested.

RATING KEY

- E (Excellent): Suitable for use in most exposure conditions.
- G (Good): Probably suitable for use; testing under specific exposure conditions is suggested.
- F (Fair): Possibly unsuitable for use; testing under specific exposure conditions is recommended.
- P (Poor): Unsuitable for use in most exposure conditions.
- NT: Not tested

Chemical	Fire-X Glasbord Panel (FSFM)	Polyurethane Seam Sealant (R53827)	Comments
Acetone	E	E	
Ammonium Hydroxide, 25%	E	E	
Benzene	E	NT	
Butyl Acetate	E	NT	
Diethyl Ether	E	NT	
Distilled Water	E	E	
Ethyl Alcohol, 100%	E	E	
Formaldehyde, 37%	E	NT	
Hydrochloric Acid, 5%	E	E	
Hydrogen Peroxide, 3%	NT	E	
Hydrogen Peroxide, 30%	E	NT	
Isopropanol, 70%	E	E	
Peracetic Acid, 1%	E	NT	
Soap Solution	NT	E	
Sodium Hydroxide Solution, 20%	F	E	Panel had no issues up to 3 hours exposure
Sulfuric Acid, 5%	E	E	

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Product	Manufacturer	Glasbord (FSFM)	Glasbord (FSI)	Glasbord (PSIF)	Sealant (R53827)	Comments
Clorox Regular Bleach	The Clorox Company	E	E	E	E	
Cidecon	Decon Laboratories Inc.	E	E	E	E	
HDQ Neutral	Spartan Chemical Company	E	E	E	E	
Lophene St	Decon Laboratories Inc.	E	E	E	G	
Lysol IC	Reckitt Benckiser	E	E	E	E	
Sepithold Sterile	STERIS Corporation	E	E	E	E	
Spor Klenz Ready for Use	STERIS Corporation	E	E	E	G	No issue up to 24 hour exposure. Possible discoloration with sealant only after extended exposure.
Peridox RTU	BioMed Protect, LLC	E	E	E	E	
Process Vesphene List	STERIS Corporation	E	E	E	F	Minor yellowing observed with sealant at 24 hour exposure. No issue up to 3 hour exposure.
Process LPHST	STERIS Corporation	E	E	E	F	Minor yellowing observed with sealant at 24 hour exposure. No issue up to 3 hour exposure.
14 Antibacterial All Purpose Cleaner	Ecolab	E	E	E	E	

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cranecomposites.com | 1.800.435.0080 | sales@cranecomposites.com