



Date of Report: July 7 2008

ISO 14644 Cleanroom Certificate for CONTOUR FABRICATORS, INC., Fenton, Michigan

Testing Organization:

ATIGROUP
3419 Pierson Pl.
Flushing, MI 48433

Date of Test:

3 July 2008

Location of Cleanrooms tested:

ECA #1, and ECA #2

Cleanroom Criteria Certified:

ISO 14644-1:1999(E) Class 8, Operational State, Considered Particle Sizes of 1.0u and 5.0u

Test Method Used

ISO 14644-1:1999(E) Annex B, using a MetOne Laser Particle Counter, Model 227B, S/N 970600331, last calibrated 8/2/2007, programmed for 1 minute counts at 2.832L sample volume. 3 counts were performed at each location in ECA-1, and 2 counts per location in ECA-2 for averaging purposes. Location quantities were calculated according to the Standard, then rounded up to a number appropriate to the shape of the room. Air Pressure Differentials were measured with a Shortridge ADM860-C digital manometer last calibrated on 27 September 2007. Temperature and Humidity were measured with a Hanna Thermohygrometer, Model HI93640, S/N 223619, last calibrated on 10/102007.

STATEMENT OF CERTIFICATION

I hereby certify that on the day of testing, the above-mentioned cleanrooms met the minimum requirements for an ISO 14644 Class 8 Cleanroom. All location averages and the mean of the averages were below the Class 8 limits. 95% Upper Confidence Limit calculations were not required due to the number of locations in each room being greater than 9.

Michael D. Wacyk (electronic signature certified)

Michael D. Wacyk, NEBB, ASHRAE, LEED-AP
Director of Engineering Services

ATIGROUP
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CONTOUR FABRICATORS, INC.

FENTON, MICHIGAN

Project Number

P1819

Date of Test

3 July 2008

Cleanroom Test Performance Specifications

Company Name CONTOUR FABRICATORS
 Address 14241 FENTON RD.
 City FENTON State MICHIGAN Current ISO 14644-1:1999(E)

Project Number P1819 Date JULY 3, 2008 Current Company SOP N/A
 Frequency 12 MONTHS

Classification CLASS 8 - Test with process equipment operating and personnel present.

Tests Performed

- | | |
|---|---|
| <input checked="" type="checkbox"/> Particle Counts | <input checked="" type="checkbox"/> Pressurization Checks |
| <input checked="" type="checkbox"/> Temperature and Humidity | <input type="checkbox"/> Sound Level dbA <input type="checkbox"/> Octaveband <input type="checkbox"/> |
| <input type="checkbox"/> Airflow Testing | <input type="checkbox"/> Other Tests |
| <input type="checkbox"/> HEPA Testing Aerosol <input type="checkbox"/> | Visual <input type="checkbox"/> |

Specifications: Area Served _____ **ECA #1** Cleanroom Class ISO 8

1. Temperature <u>68-75°F</u> Humidity <u>50-70%</u>	Room Size in Feet x W	Room Size in Meters x W	Number of Test Points
2. Airflow <u>N/A</u> Min FPM, Air Changes, <u>N/A</u> Min per hr.	41.00 x 84.00	12.5 x 25.6	N = A ^{1/2}
3. Pressurization POS To PLANT & GOWNING	3444 sq. ft.	320.3 sq. m.	N = 17.90
4. Partical Count Sizes: 1.0µm <u>832,000</u>	5.0µm <u>29,300</u>		

Comments

ACTUAL NUMBER OF TESTING LOCATIONS IS ROUNDED TO 18

Specifications: Area Served _____ **ECA #2** Cleanroom Class ISO 8

1. Temperature <u>68-75°F</u> Humidity <u>50-70%rh</u>	Room Size in Feet x W	Room Size in Meters x W	Number of Test Points
2. Airflow <u>N/A</u> Min FPM, Air Changes, <u>N/A</u> Min per hr.	68.0 x 32.0	20.7 x 9.8	N = A ^{1/2}
3. Pressurization POS To PLANT FLOOR	2176 sq. ft.	202.4 sq. m.	N = 14.23
4. Partical Count Sizes: 1.0µm <u>832,000</u>	5.0µm <u>29,300</u>		

Comments

ACTUAL NUMBER OF TESTING LOCATIONS IS 16

Pressure Differentials

The figures listed below represent the static pressure differential, as measured in inches of water, that existed at the completion of the test performed for this report. Any adjustments that may have been required to the Cleanroom systems were made prior to taking measurements for record. Instrumentation utilized was a Shortridge ADM860-C last calibrated on 27 September 2007.

<u>Location</u>	<u>Pressure - Inches W.C.</u>
	<u>3-Jul-08</u>
1. ECA-1 CLEANROOM TO PLANT FLOOR	+0.07"w.c.
2. ECA-1 TO VESTIBULE	+0.04"w.c.
3. ECA-1 VESTIBULE TO GOWNING	+0.02"w.c.
4. ECA-1 GOWNING TO PLANT FLOOR	+0.01"w.c.
5. ECA-2 TO PLANT FLOOR	+0.02"w.c.
6. ECA-1 TO ECA-2	+0.05"w.c.

Comment: PRESSURE DIFFERENTIALS ARE ACCEPTABLE

Particle Counts

Particle counts were taken throughout the designated areas to determine if performance levels are within performance specifications.

The instrumentation utilized for this test was a Met One Particle Counter with a 0.1 CFM sampling rate. All particle count readings were calculated to cubic meters to relate to the ISO 14644-1 standard. Instrument serial number is 970600331 and the last calibrated on 2 August 2007.

Particle count measurements in all cleanrooms were taken 30-36 inches above the floor. The minimum locations of these measurements were determined by specification spelled out in the ISO 14644-1 standard.

Comments:

All areas easily meet the ISO 14644-1 Class 8 Cleanroom requirements.

ECA-1

PARTICLE COUNTS

VALID FOR 1 MIN COUNT @ 2.832 LITERS= 0.1CUBIC FEET/MINUTE

LOCATION #	COUNT 1	PARTICLES/M3	COUNT 2	PARTICLES/M3	COUNT 3	PARTICLES/M3	MEAN	
ECA1								
1.0 MICRON	1	447	157,840	479	169,140	424	149,719	158,900
	2	420	148,306	416	146,894	427	150,778	148,659
	3	379	133,829	483	170,552	495	174,789	159,723
	4	622	219,634	577	203,744	595	210,100	211,160
	5	582	205,510	573	202,332	524	185,030	197,624
	6	494	174,436	438	154,662	465	164,196	164,432
	7	430	151,837	749	264,479	554	195,623	203,980
	8	427	150,778	468	165,255	431	152,190	156,075
	9	405	143,010	355	125,354	376	132,769	133,711
	10	377	133,122	416	146,894	367	129,591	136,536
	11	360	127,120	368	129,944	372	131,357	129,474
	12	466	164,549	443	156,428	460	162,431	161,136
	13	525	185,383	527	186,089	490	173,024	181,499
	14	494	174,436	491	173,377	622	219,634	189,149
	15	472	166,668	475	167,727	440	155,368	163,255
	16	454	160,312	488	172,318	504	177,967	170,199
	17	392	138,419	368	129,944	364	128,532	132,299
	18	396	139,832	397	140,185	469	165,609	148,542
							MEAN=	163,686
5.0 MICRON	1	22	7,768	33	11,653	46	16,243	11,888
	2	35	12,359	17	6,003	29	10,240	9,534
	3	38	13,418	27	9,534	35	12,359	11,770
	4	34	12,006	25	8,828	32	11,300	10,711
	5	22	7,768	40	14,124	23	8,122	10,005
	6	19	6,709	37	13,065	42	14,831	11,535
	7	46	16,243	41	14,478	51	18,009	16,243
	8	54	19,068	43	15,184	70	24,718	19,656
	9	33	11,653	29	10,240	21	7,415	9,769
	10	38	13,418	34	12,006	49	17,302	14,242
	11	25	8,828	29	10,240	39	13,771	10,946
	12	29	10,240	16	5,650	24	8,475	8,122
	13	32	11,300	23	8,122	22	7,768	9,063
	14	57	20,127	42	14,831	62	21,893	18,950
	15	28	9,887	46	16,243	37	13,065	13,065
	16	20	7,062	29	10,240	37	13,065	10,122
	17	30	10,593	28	9,887	26	9,181	9,887
	18	32	11,300	21	7,415	43	15,184	11,300
							MEAN=	12,045

ECA-2

PARTICLE COUNTS

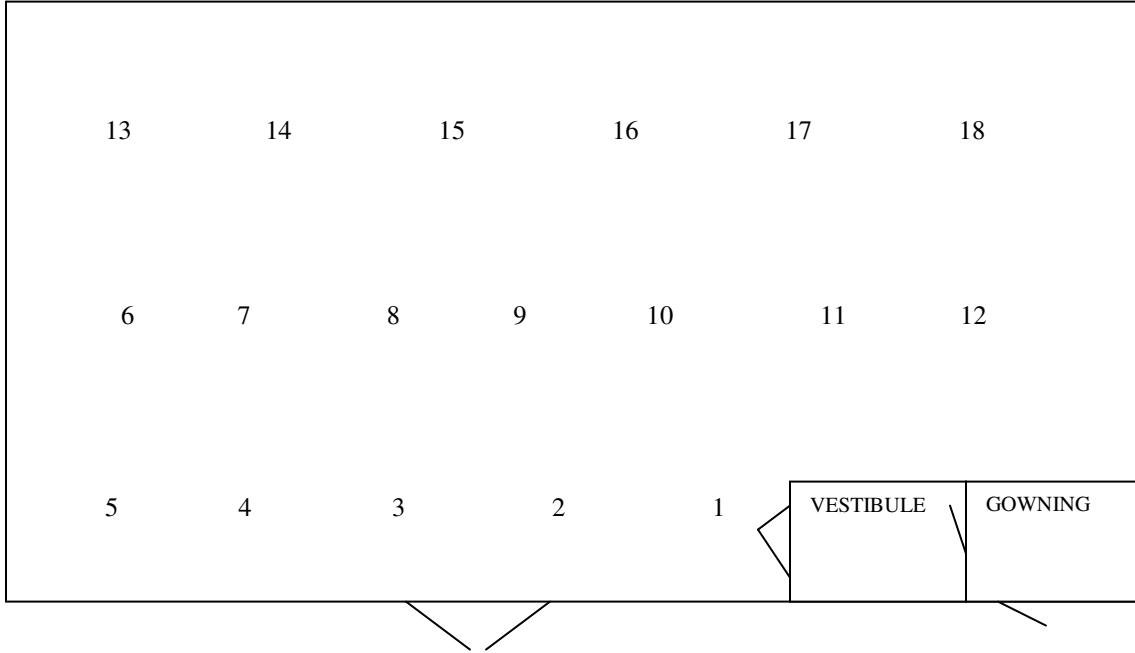
VALID FOR 1 MIN COUNT @ 2.832 LITERS= 0.1CUBIC FEET/MINUTE

LOCATION #	COUNT 1	PARTICLES/M3	COUNT 2	PARTICLES/M3	MEAN
ECA2					
1.0 MICRON	1	378	419	147,953	140,714
	2	278	252	88,984	93,574
	3	388	317	111,936	124,471
	4	626	754	266,245	243,646
	5	732	646	228,109	243,293
	6	605	595	210,100	211,866
	7	650	638	225,284	227,403
	8	553	568	200,566	197,918
	9	596	640	225,990	218,222
	10	769	725	256,005	263,773
	11	758	779	275,073	271,365
	12	763	768	271,188	270,306
	13	737	750	264,833	262,537
	14	941	910	321,330	326,803
	15	996	852	300,850	326,274
	16	854	816	288,138	294,847
MEAN=					232,313
5.0 MICRON	1	14	25	8,828	6,886
	2	19	4	1,412	4,061
	3	13	11	3,884	4,237
	4	28	13	4,590	7,239
	5	18	20	7,062	6,709
	6	23	15	5,297	6,709
	7	15	25	8,828	7,062
	8	20	21	7,415	7,239
	9	19	31	10,946	8,828
	10	28	34	12,006	10,946
	11	46	55	19,421	17,832
	12	58	45	15,890	18,185
	13	34	38	13,418	12,712
	14	46	46	16,243	16,243
	15	28	33	11,653	10,770
	16	39	25	8,828	11,300
MEAN=					9,810

COMMENT: All areas are below the maximum allowable 1.0u and 5.0u particles/m³ for a Class 8 cleanroom.

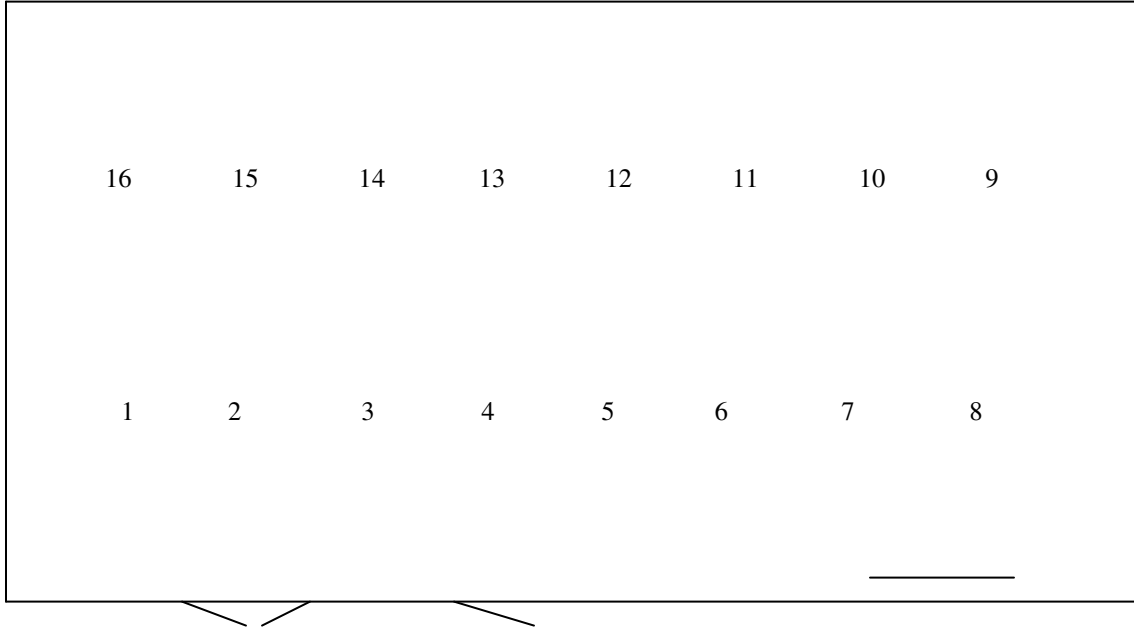
ROOM DIAGRAMS AND MEASUREMENT LOCATIONS

ECA-1



ROOM DIAGRAMS AND MEASUREMENT LOCATIONS

ECA-2



ECA-1 Particle Count – Statistical Summary

Statistical Analysis

ECA-1 ISO Class 8		Measured Particle Size (µm)	
		1.0µm # / M ³	5.0 # / M ³
ISO Standard 14644-1		832,000 MAX	29,300 MAX
[7-3-08]	Maximum Reading	211,160	19,656
	Mean of the Averages	163,686	12,045
	UCL	N/A	N/A
[Date]	Maximum Reading		
	Mean of the Averages		
	UCL		
[Date]	Maximum Reading		
	Mean of the Averages		
	UCL		
[Date]	Maximum Reading		
	Mean of the Averages		
	UCL		

ECA-2 Particle Count – Statistical Summary

Statistical Analysis

ECA-2 ISO Class 8		Measured Particle Size (µm)	
		1.0µm # / M ³	5.0 # / M ³
ISO Standard 14644-1		832,000 MAX	29,300 MAX
[7-3-08]	Maximum Reading	326,803	18,185
	Mean of the Averages	232,313	9,810
	UCL	N/A	N/A
[Date]	Maximum Reading		
	Mean of the Averages		
	UCL		
[Date]	Maximum Reading		
	Mean of the Averages		
	UCL		
[Date]	Maximum Reading		
	Mean of the Averages		
	UCL		

**ECA-1 AND 2 Temperature and Humidity –
NOT REQUIRED FOR CERTIFICATON**

Test Data

CONTOUR FABRICATORS								
Test Point	ECA-1		ECA-2					
	°F	%RH	°F	%RH	°F	%RH	°F	%RH
1	68	70	71	57				
2	68	70	71	57				
3	67	70	72	55				
4	68	70	72	55				
5	68	69	72	55				
6	67	69	73	53				
7	67	68	72	51				
8	67	70	73	51				
9	67	70	73	52				
10	67	70	73	52				
11	67	70	73	49				
12	67	70	73	49				
13	67	70	73	50				
14	67	68	73	49				
15	67	70	73	48				
16	67	70	73	49				
17	67	70						
18	67	70						