

**1) General Test Information**

Client	TFI Inline	FH ID	331	Test #	auto
Code	TFI02	TSS DBID	new	S.O.	CO-TFI080102D-01
Address	5658 E. 58th Ave	Building	5658	Test Date	3/27/2008
Address	Commerce City, CO	Room	Test Room	Retest	N/A
Address	80022	Make	TFI Inline		
Contact	Frank Conner	Model	Exhausted Laminar Flow		
Phone	303-288-6823	Type	CAV		
Email	fconner@tfiinlinedesign.net	Condition	AM		

**2) Criteria (applied to design-height readings)**

Minimum Point Velocity, fpm	70	Minimum Point Velocity, % of Average	NA
Minimum Average Velocity, fpm	100	Maximum Average Velocity, fpm	NA
Maximum Positional Rating, ppm	0.1	Maximum Average Cross draft, % of Average	NA

**3) Airflow Visualization Tests (Small Volume = TiCl4, Large = PEG)**

**Result = Pass**

Small-Volume Result	Pass	Comment	N/A
Large-Volume Result	Pass	Comment	N/A

**4) Face Velocity Tests**

**Result = Pass**

Design Sash Velocity Profile, fpm					50% Design Sash VP (VAV Only), fpm					25% Design Sash VP (VAV Only), fpm				
102	100	106	107	105										
101	106	104	102	110										
Ht. 10in	Avg. 104	Min. 100			Ht. 5in	Avg.	Min.			Ht. 3in	Avg.	Min.		
Wd. 50in	RSD. 3%	Max. 110			Wd. 50in	RSD.	Max.			Wd. 50in	RSD.	Max.		

**5) Cross-current Velocity Tests (60" high, ~12" spacing, 18" in front of FH with sashes closed)**

**Result = FIO**

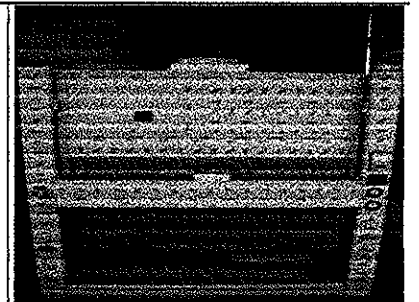
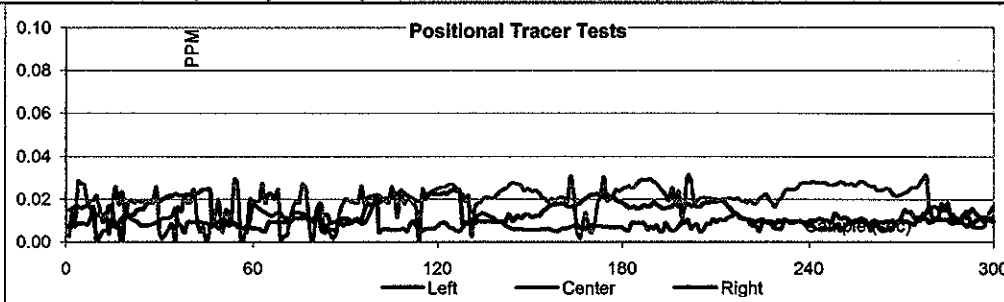
	20 second averages, fpm						Max	Avg.
Vertical	4	2	6	2	8		8	4
Horizontal	11	4	4	7	6		11	6

**6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)**

**Rating: 4.0 AI 0.02 SME 0.03 Pass**

Position	Left	Center	Right
Rating	0.01 ppm	0.02 ppm	0.01 ppm
Sash Effect	Trial #1 0.03 ppm	Trial #2 0.03 ppm	Trial #3 0.01 ppm
Perimeter-scan	0.01 ppm		
Comments	None		

**7) Tracer Plot, VAV response plot and photo of FH as tested (if acquired)**



**8) Equipment Listing (TSS EQ ID Numbers, NIST-traceable records on file)**

Flowmeter	1400	Ane	1372	Ane	NA	DMM	1461	IR	402	Factor	16.5	VVV	
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**9) Comments:** This FH passes the test criteria.

**10) Tested by:** Mike Tester

**Date:** 3/27/2008

**11) Reviewed by:** Martin Burke

**Date:** 3/31/2008



Colorado  
6732 W Coal Mine Ave., Unit 408  
Littleton CO, 80123  
Phone: (720)981-4965  
Fax: (720)981-4988

**Airborne Nonviable Particle Count Test**

**Service Order:** CO-TFI20080102D-01  
**Cert. No.:** MAT832911155  
**Facility:** TFI02 - TFI Inline Design Corp.  
**Clean Zone ID:** Exhausted LFU 331

**Test Specification:** ISO 14644  
**Locations:** 3 **Sample Vol.:** 1.0 ft<sup>3</sup>/28.3 L  
**Area Status:** At Rest/Static **Class:** ISO5/100  
**Zone Area:** 8.33 ft<sup>2</sup>; 0.77 m<sup>2</sup>

Loc.	PPCF >= 0.50 um				PPCF >= 5.00 um				Environmental	
	Count 1	Count 2	Count 3	Average	Count 1	Count 2	Count 3	Average	% rH	Temp, C
1.)	0	0	0	0	0	0	0	0	30.40	14.00
2.)	0	0	0	0	0	0	0	0	30.00	14.60
3.)	0	0	0	0	0	0	0	0	29.80	14.60

Mean of Averages: 0  
Standard Deviation: 0  
Standard Error: 0  
95% UCL Factor: 2.9  
95% UCL Result: 0  
Class Limit, PPCF: 100  
Convert to PPCM: 0  
Class Limit, PPCM: 3,520

Mean of Averages: 0  
Standard Deviation: 0  
Standard Error: 0  
95% UCL Factor: 2.9  
95% UCL Result: 0  
Class Limit, PPCF: 0.7  
Convert to PPCM: 0  
Class Limit, PPCM: 29

Avg. %rH: 30.1  
Avg. Temp: 14.4

**Class Limit Test: Pass**  
**Sample Volume Test: Pass**  
**Class Limit Location: Pass**

**Class Limit Test: FIO**  
**Sample Volume Test: FIO**  
**Class Limit Location: FIO**

Testing is performed in accordance with ISO 14644-2:2000:  
**Pass**

The following NIST-traceable equipment were used to perform this test:

Equipment ID	Equipment Type	Serial Number	Calibration Date
000816	Particle Counter	011348	August 2008

Comments:

Test Date: 03/29/2008  
Retest Date: 03/29/2009  
Last TSS Test Date:

Signature:   
Test By: Mike Tester

Initials MAT <sup>29 mar 08</sup>  
eData Ver.: 1.3.0.3 <sup>29 mar 08</sup>  
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**Service Order:** CO-TFI20080102D-01

**Test Specification:** ISO 14644

**Cert. No.:** MAT832911155

**Locations:** 3

**Sample Vol.:** 1.0 ft<sup>3</sup>/28.3 L

**Facility:** TFI02 - TFI Inline Design Corp.

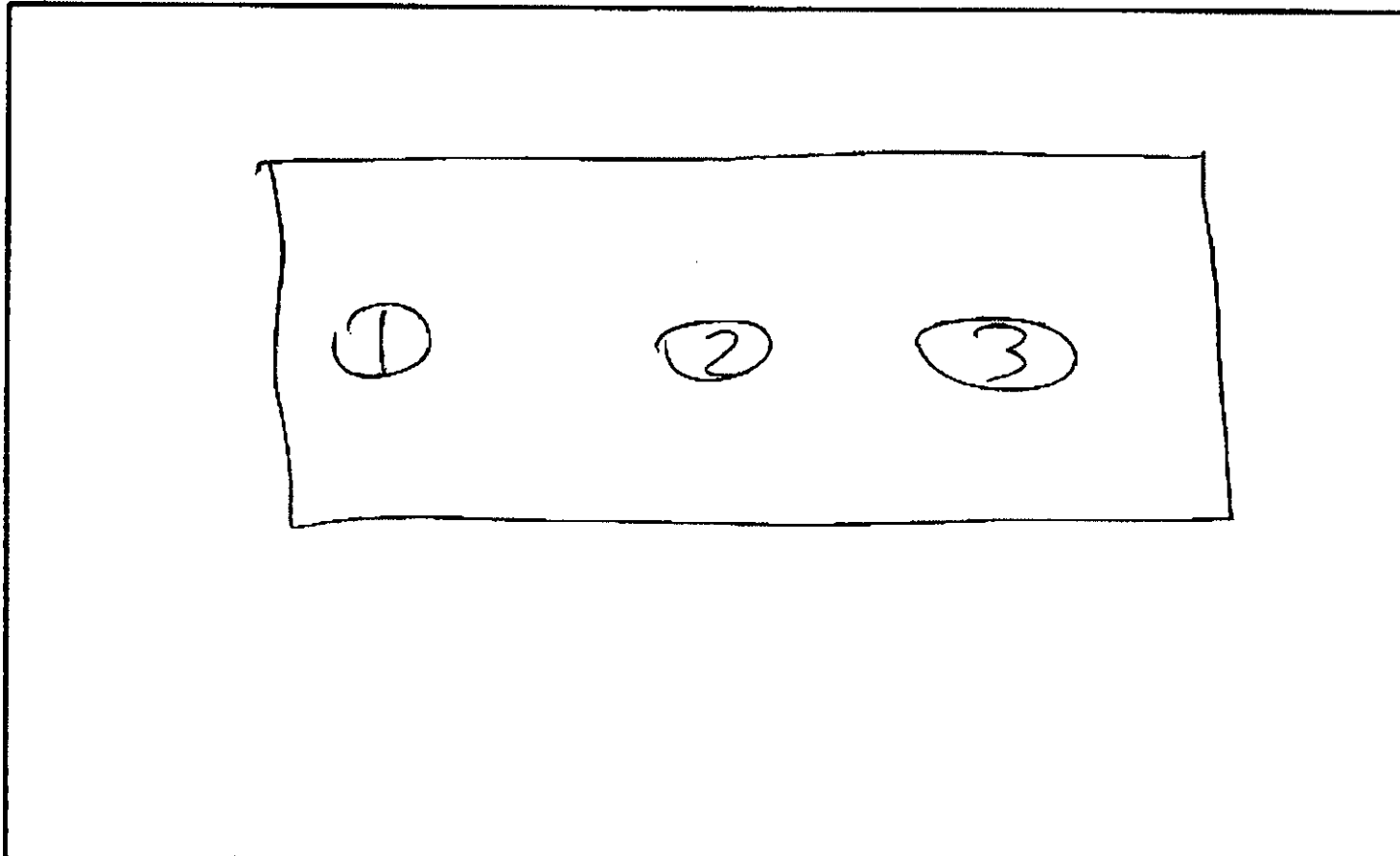
**Area Status:** At Rest/Static

**Class:** ISO5/100

**Clean Zone ID:** Exhausted LFU 331

**Zone Area:** 8.33 ft<sup>2</sup>; 0.77 m<sup>2</sup>

**Diagram:**



Test Date: 03/29/2008

Retest Date: 03/29/2009

Last TSS Test Date:

Signature:   
Test By: Mike Tester

Initials MAT 29 mar-08

eData Ver.: 1.3.0.3

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Code	TFI02	TSS DBID	new	S.O.	CO-TFI080102D-01
Address	5658 E. 58th Ave	Building	5658	Test Date	3/27/2008
Address	Commerce City, CO	Room	Test Room	Retest	N/A
Address	80022	Make	TFI Inline		
Contact	Frank Conner	Model	Exhausted Laminar Flow		
Phone	303-288-6823	Type	CAV		
Email	fconner@tfiinlinedesign.net	Condition	AM		

**2) Criteria (applied to design-height readings)**

Minimum Point Velocity, fpm	70	Minimum Point Velocity, % of Average	NA
Minimum Average Velocity, fpm	100	Maximum Average Velocity, fpm	NA
Maximum Positional Rating, ppm	0.1	Maximum Average Cross draft, % of Average	NA

**3) Airflow Visualization Tests (Small Volume = TiCl4, Large' = PEG)**

Result = Pass

Small-Volume Result	Pass	Comment	N/A
Large-Volume Result	Pass	Comment	N/A

**4) Face Velocity Tests**

Result = Pass

Design Sash Velocity Profile, fpm						50% Design Sash VP (VAV Only), fpm						25% Design Sash VP (VAV Only), fpm					
103	106	104	103	107	105												
110	111	107	109	105	112												
Ht. 10in	Avg. 107	Min. 103				Ht. 5in	Avg.	Min.				Ht. 3in	Avg.	Min.			
Wd. 62in	RSD. 3%	Max. 112				Wd. 62in	RSD.	Max.				Wd. 62in	RSD.	Max.			

**5) Cross-current Velocity Tests (60" high, ~12" spacing, 18" in front of FH with sashes closed)**

Result = FIO

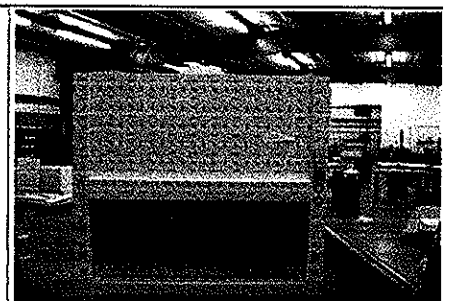
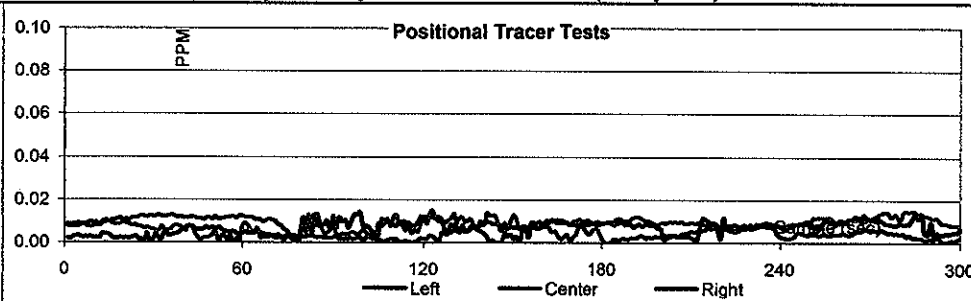
	20 second averages, fpm						Max	Avg.
Vertical	6	5	8	8	5	3	8	6
Horizontal	7	10	4	3	6	9	10	7

**6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)**

Rating: 4.0 AI 0.01 SME 0.01 Pass

	Left	Center	Right
Position			
Rating	0.01 ppm	0.01 ppm	0.01 ppm
Sash Effect	Trial #1 0.01 ppm	Trial #2 0.01 ppm	Trial #3 0.00 ppm
Perimeter-scan	0.03 ppm		
Comments			

**7) Tracer Plot, VAV response plot and photo of FH as tested (if acquired)**



**8) Equipment Listing (TSS EQ ID Numbers, NIST-traceable records on file)**

Flowmeter	1400	Ane	1372	Ane	NA	DMM	1461	IR	402	Factor	15.3	vvv
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9) Comments: This FH passes the test criteria.

10) Tested by: Mike Tester  
X3

Date: 3/27/2008

11) Reviewed by: Martin Burke

Date: 3/31/2008



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**Airborne Nonviable Particle Count Test**

**Service Order:** CO-TFI20080102D-01  
**Cert. No.:** MAT8329111757  
**Facility:** TFI02 - TFI Inline Design Corp.  
**Clean Zone ID:** Exhausted LFU 332

**Test Specification:** ISO 14644  
**Locations:** 3 **Sample Vol.:** 1.0 ft<sup>3</sup>/28.3 L  
**Area Status:** At Rest/Static **Class:** ISO5/100  
**Zone Area:** 11.19 ft<sup>2</sup>; 1.04 m<sup>2</sup>

Loc.	PPCF >= 0.50 um				PPCF >= 5.00 um				Environmental	
	Count 1	Count 2	Count 3	Average	Count 1	Count 2	Count 3	Average	% rH	Temp, C
1.)	0	0	0	0	0	0	0	0	25.40	19.70
2.)	0	0	0	0	0	0	0	0	25.80	19.30
3.)	0	0	0	0	0	0	0	0	26.00	19.70

Mean of Averages: 0  
 Standard Deviation: 0  
 Standard Error: 0  
 95% UCL Factor: 2.9  
 95% UCL Result: 0  
 Class Limit, PPCF: 100  
 Convert to PPCM: 0  
 Class Limit, PPCM: 3,520

Mean of Averages: 0  
 Standard Deviation: 0  
 Standard Error: 0  
 95% UCL Factor: 2.9  
 95% UCL Result: 0  
 Class Limit, PPCF: 0.7  
 Convert to PPCM: 0  
 Class Limit, PPCM: 29

Avg. %rH: 25.7  
 Avg. Temp.: 19.6

**Class Limit Test: Pass**  
**Sample Volume Test: Pass**  
**Class Limit Location: Pass**

**Class Limit Test: FIO**  
**Sample Volume Test: FIO**  
**Class Limit Location: FIO**

Testing is performed in accordance with ISO 14644-2:2000:  
**Pass**

The following NIST-traceable equipment were used to perform this test:

Equipment ID	Equipment Type	Serial Number	Calibration Date
000816	Particle Counter	011348	August 2008

Comments:

Test Date: 03/29/2008  
 Retest Date: 03/29/2009  
 Last TSS Test Date:

Signature:   
 Test By: Mike Tester

Initials MAT 29 MAR 08  
 eData Ver.: 1.3.0.3  
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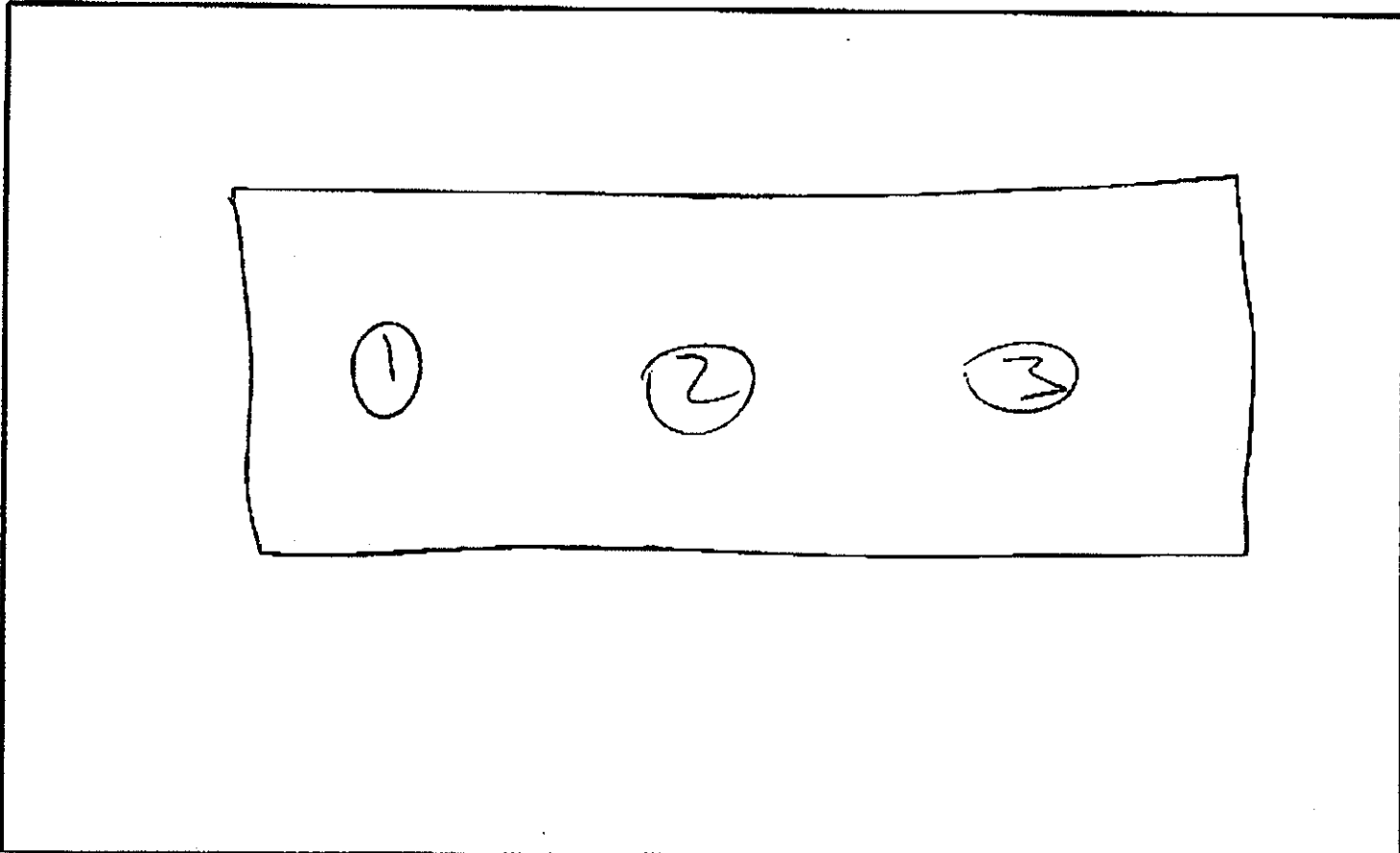
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**Cert. No.:** MAT8329111757  
**Facility:** TFI02 - TFI Inline Design Corp.  
**Clean Zone ID:** Exhausted LFU 332

**Test Specification:** ISO 14644  
**Locations:** 3      **Sample Vol.:** 1.0 ft<sup>3</sup>/28.3 L  
**Area Status:** At Rest/Static      **Class:** ISO5/100  
**Zone Area:** 11.19 ft<sup>2</sup>; 1.04 m<sup>2</sup>

Diagram:



Test Date: 03/29/2008  
Retest Date: 03/29/2009  
Last TSS Test Date:

Signature: *[Handwritten Signature]*  
Test By: Mike Tester

Initials MAT 29 MAR 08  
eData Ver.: 1.3.0.3  
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