

**ASHRAE 110 (SEFA 1) Type-Test Report for 220cm  
Wide Bench-Type Fume Hood of Topair Systems INC**

***Ref: ANSI/ASHRAE 110-2016 - SEFA 1-2010***

***Model: FH-220***

***Nominal face velocity: 0.35m/s***

**by**

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***INV/ASHRAE110/1061***

***Date: 28th January 2025***

## 1. INTRODUCTION

ANSI/ASHRAE 110-2016 type tests carried out for 220cm wide bench-type fume hood of Topair Systems INC, as required by SEFA 1-2010, are reported. General information on the test methods, procedures and requirements can be found in references 1 & 2.

## 2. DESCRIPTION OF FUME HOOD

The fume hood tested is a 220cm wide bench-type hood, designed & built by Topair Systems INC, **Model FH-220**.

|                             |   |
|-----------------------------|---|
| <b>External dimensions:</b> | Width = 2200mm<br>Height = 2310mm<br>Depth = 835mm  |
| <b>Internal dimensions:</b> | Width = 2000mm<br>Height = 1170mm<br>Depth (wall to sash) ~ 640mm<br>Depth (baffle to sash) = 585mm   |
| <b>Baffle dimensions:</b>   | Inclined baffle top gap ~ 40mm<br>Back baffle gap from work top = 150mm<br>Back baffle gap from back wall ~ 55mm<br>Baffle side gaps = 15mm   |
| <b>Other dimensions:</b>    | Sash opening width = 2000mm<br>Sash opening height = 500mm from bottom cill<br>Sash internal top gap when sash at 500mm ~ 20mm<br>Sash gap from bottom cill when sash closed ~ 20mm<br>Bottom cill air gap ~ 20mm |

## 3. DESCRIPTION OF TEST ROOM FACILITIES

The tests were carried out in Invent UK's test room which is 9.6m long, 4.7m wide and 2.8m high. The tests facilities include a variable-speed extract air system to adjust the flow rate to the required value. The extract flow rate is measured by a venturimeter with an accuracy of better than 3%. The make-up air was brought in through the perforated ceiling tiles opposite the fume hood so as to allow a test room pressure in the range of -1Pa to -5Pa. The test room differential pressure, temperature, relative humidity and velocity during tests were:

|                             |                        |
|-----------------------------|------------------------|
| Room differential pressure: | -2Pa (+/-10%)          |
| Room air temperature:       | 21°C (+/-10%)          |
| Room air relative humidity: | 50% (+/-10%)           |
| Room air velocity:          | much less than 0.1 m/s |

## 4. VELOCITY TESTS

Velocity tests were performed at 500mm sash opening. The velocity type-test grid for the test opening is shown in Figure 1. The average face velocity for the test opening was 0.36m/s +/-5%. The volume flow rate at this velocity was 1400m<sup>3</sup>/hr +/-3%.

## 5 FLOW VISUALISATION TESTS

The following observations were made:

- on work top = GOOD/FAIR
- along the opening edges = GOOD/FAIR
- near top LHS corner = GOOD/FAIR
- near top RHS corner = GOOD/FAIR
- near bottom LHS corner = GOOD/FAIR
- near bottom RHS corner = GOOD/FAIR

## 6 CONTAINMENT TESTS

### 6.1 Static Sash Tests

The containment tests were performed in accordance with the procedure described in reference 1 and for the same test opening as in the velocity tests. Figure 2 shows the positioning of the containment test system with respect to the test opening. The containment results for the three test positions (P01, P02 & P03) were less than 0.020ppm, indicating that the fume hood containment performance is very good.

### 6.2 Scanning of Static Sash Openings

Traversing of the sampling probe (at a rate of approx 0.05m/s) along the edges of the test opening and under the cill airfoil resulted in SF6 levels much less than 0.100ppm.

### 6.3 Sash Movement Effect Test

These tests were performed at test position P02 only. During this test, the sash is initially at 25% of test opening. After 60sec the sash is opened to the test opening at a speed of approx 0.5m/s. After a further 60sec, the sash is closed back to 25%. This process is repeated for three times. The maximum of 45-sec rolling average over this test period was less than 0.020ppm, indicating that the sash movement effect on containment is insignificant.

## REFERENCES

1. ANSI/ASHRAE 110-2016, *Methods of Testing Performance of Laboratory Fume Hoods*, 2016.
2. SEFA 1-2010, *Laboratory Fume Hoods - Recommended Practices*, 2010.

### List of instrumentation used during tests:

1. Miran 205-B infrared gas analyser - SN: 76185-382 (*for containment tests*)
2. Critical orifice - 0.64mm - SN: ASHRAE-02 (*for test gas flow rate metering*)
3. VelociCalc 9545-A - SN: 0713014 (*for velocity tests*)

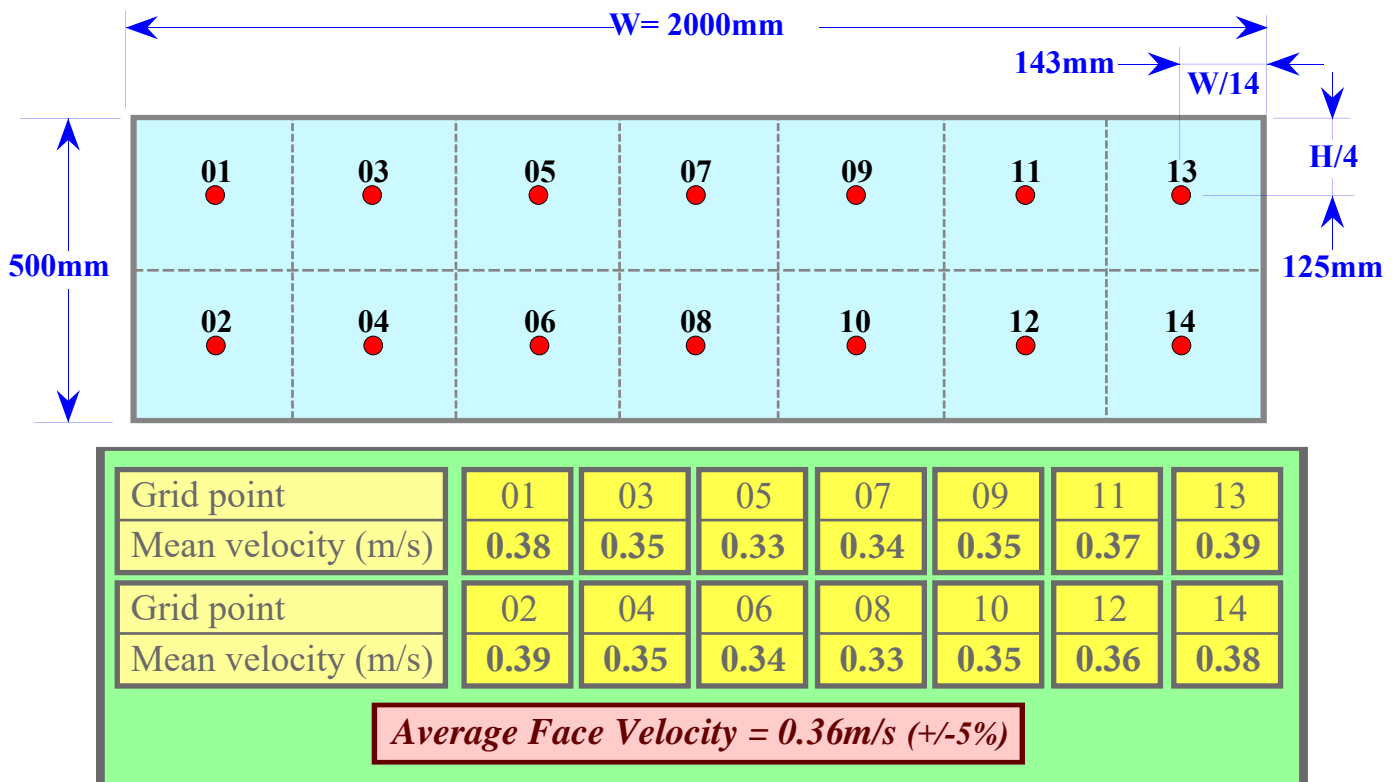


Figure 1 ASHRAE 110-2016 velocity test results.

- Mannequin is positioned at locations shown below.
- Sampling probe is at breathing zone of mannequin which is 560mm up from work top and 75mm out from sash plane.
- Test gas injector is positioned on work top at locations shown below. Front edge of injector barrel is at 150mm in from sash plane. Centreline of injector is at 300mm from left and right inside walls of fume hood.
- Test gas is 100% SF6.
- Test gas flow rate is 4.0lt/min.

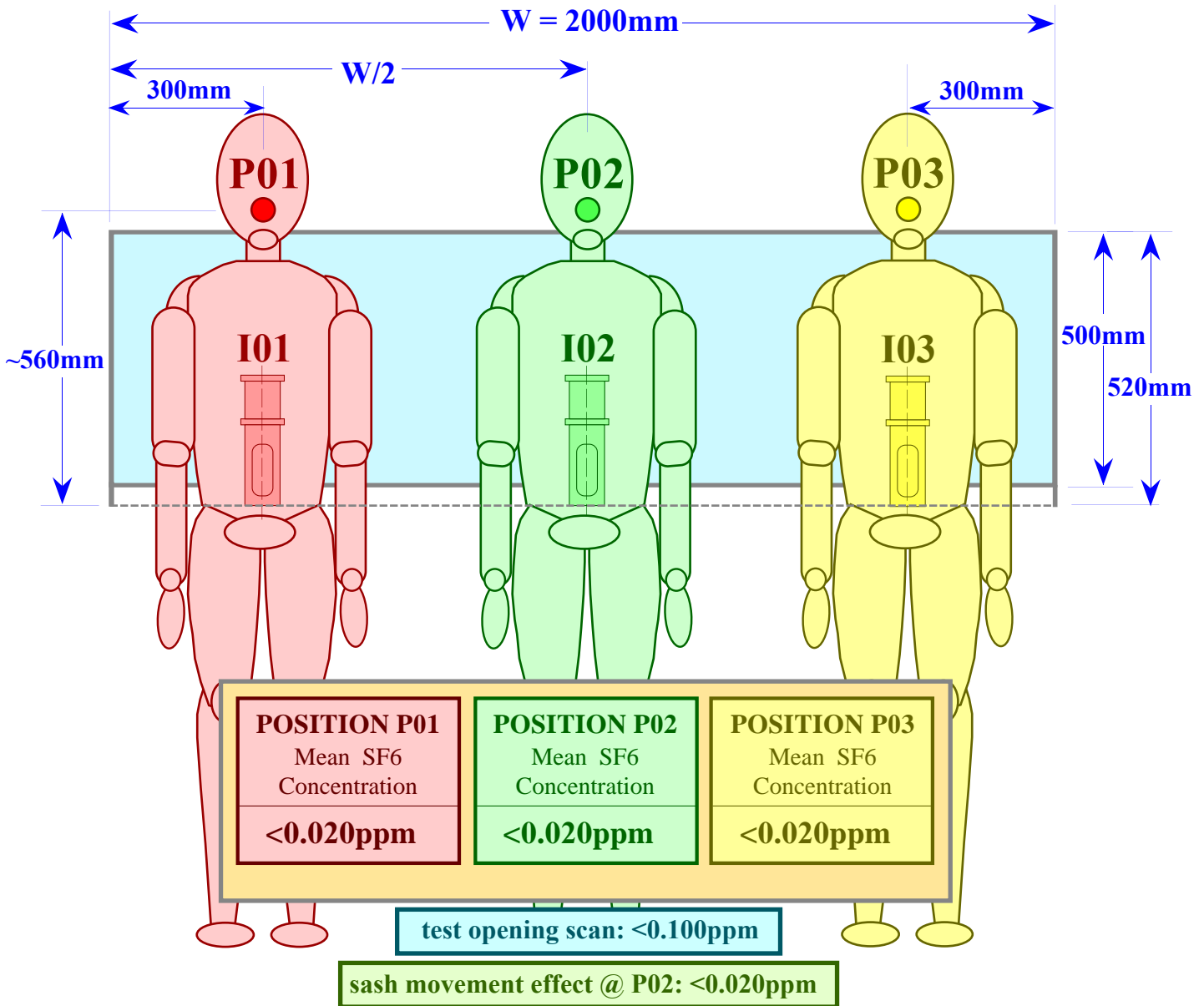


Figure 2 ASHRAE 110-2016 containment test results.

## CERTIFICATE OF TYPE TESTING IN ACCORDANCE WITH ASHRAE 110 & SEFA 1

CERTIFICATE & REPORT NO: INV/ASHRAE110/1061

DATE: 28th January 2025

**Fume Hood Manufacturer:**

**Topair Systems INC**  
**300 First Avenue, Suite 102**  
**Needham**  
**MA 02494**  
**USA**



**Fume Hood Model-Type:**

**FH-220**

**220cm wide bench-type**

*External Dimensions:*

Width = 2200mm

Height = 2310mm

Depth = 835mm

*Internal Dimensions:*

Width = 2000mm

Height = 1170mm (max)

Depth = 585mm (baffle-sash)

640mm (wall-sash)

**Test Opening:**

**Width: 2000mm**

**Height: 500mm**

**Fume Hood Flow:**

**Face velocity: 0.36m/s**

**Fume Hood Containment:**

**At all test positions: <0.020ppm**

**Test opening scans: <0.100ppm**

**Sash movement effect: <0.020ppm**

This is to certify that the fume hood described above has been type tested in accordance with ASHRAE 110-2016, as required by SEFA 1-2010, and resulted in performance characteristics given in test report INV/ASHRAE110/1012.

**Tested and Certified by: Dr A F Bicen**

A handwritten signature in blue ink that reads 'A.F. Bicen'.



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