

**ASHRAE 110 (SEFA 1) Type-Test Report for 150cm
Wide Bench-Type Fume Hood of Topair Systems INC**

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

Model: FH-150

Nominal face velocity: 0.35m/s

by

Dr A F Bicen

**Invent UK Ltd
85 Southdown Road
Harpenden AL5 1PR**

Tel: +44 (0) 1582 461666

Fax: +44 (0) 1582 460077

INV/ASHRAE110/1055

Date: 25th January 2025

1. INTRODUCTION

ANSI/ASHRAE 110-2016 type tests carried out for 150cm 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 150cm wide bench-type hood, designed & built by Topair Systems INC, **Model FH-150**.

External dimensions:	Width = 1500mm Height = 2310mm Depth = 835mm
Internal dimensions:	Width = 1300mm Height = 1170mm Depth (wall to sash) ~ 640mm Depth (baffle to sash) = 585mm
Baffle dimensions:	Inclined baffle top gap ~ 40mm Back baffle gap from work top = 150mm Back baffle gap from back wall ~ 55mm Baffle side gaps = 15mm
Other dimensions:	Sash opening width = 1300mm Sash opening height = 500mm from bottom cill Sash internal top gap when sash at 500mm ~ 20mm Sash gap from bottom cill when sash closed ~ 20mm 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:	-1Pa (+/-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 0.35m/s +/-5%. The volume flow rate at this velocity was 890m³/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*)

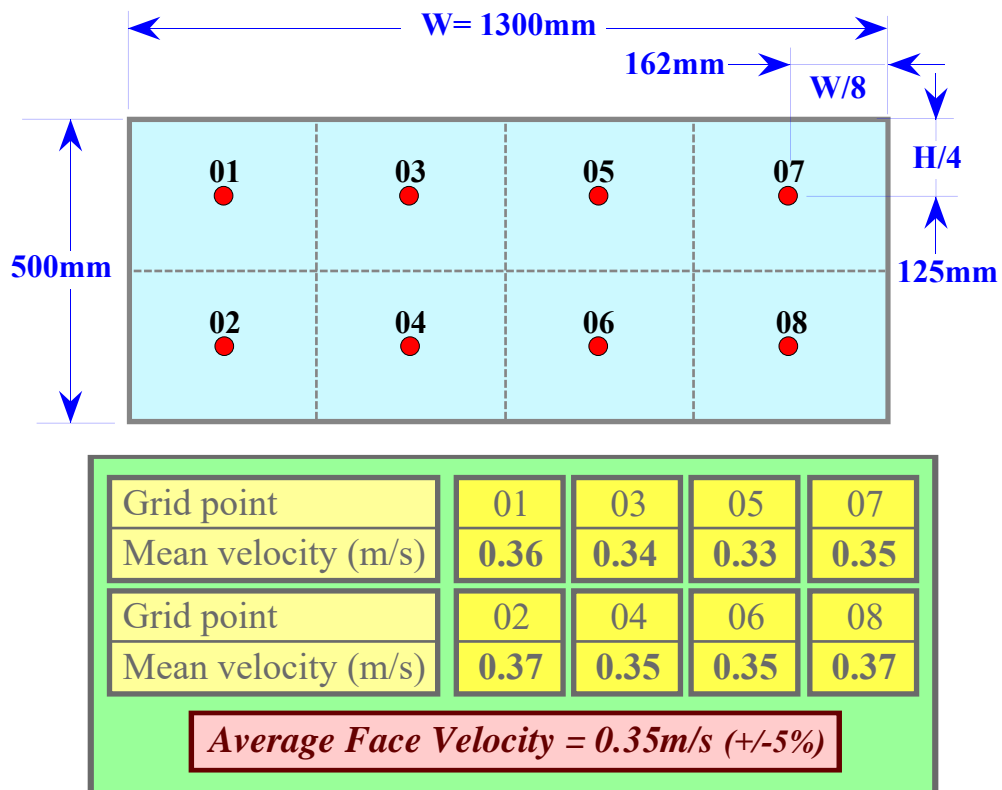


Figure 1 ASHRAE 110-2016 velocity test results.

- 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 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.

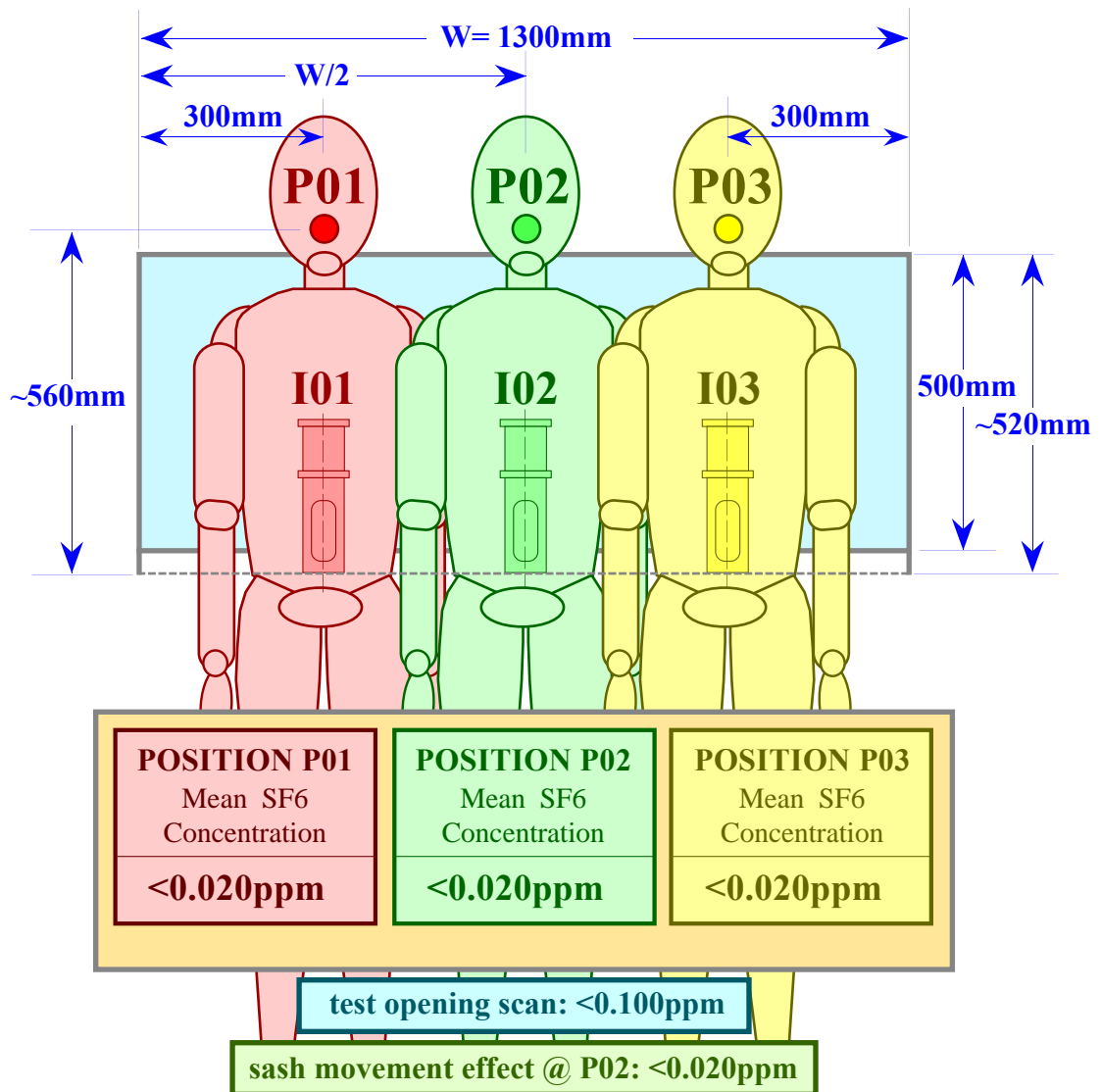


Figure 2 ASHRAE 110-2016 containment test results.

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

CERTIFICATE & REPORT NO: INV/ASHRAE110/1055

DATE: 25th January 2025

Fume Hood Manufacturer:

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



Fume Hood Model-Type:

FH-150

150cm wide bench-type

External Dimensions:

Width = 1500mm

Height = 2310mm

Depth = 835mm

Internal Dimensions:

Width = 1300mm

Height = 1170mm (max)

Depth = 585mm (baffle-sash)

640mm (wall-sash)

Test Opening:

Width: 1300mm

Height: 500mm

Fume Hood Flow:

Face velocity: 0.35m/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'.



Invent UK Ltd, 85 Southdown Road, Harpenden, Herts AL5 1PR

T: +44 (0) 1582 461666 F: +44 (0) 1582 460077 E: info@invent-uk.com