

ASHRAE 110 (SEFA 1) Type-Test Report for 150cm (5ft) Wide Bench-Type Fume Hood of Topair Systems INC

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

Model: CF-150-PP

by

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INV/ASHRAE110/1032

Date: 17th October 2023

1. INTRODUCTION

EN 14175, Part 3 type tests carried out to 150cm wide bench type ductless fume hood of Topair Systems INC are reported. General information on the test methods and procedures can be found in reference 1. The ASHRAE 110 test methods and procedures were used to determine frontal flow and containment characteristic of the fume hood. The fume hood was connected to the test room extract system. In this way the test gas was exhausted to outside rather than back into the room.

2. DESCRIPTION OF TEST ROOM FACILITIES

The test room was approx 10.0m long, 5.0m wide and 4.0m 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

3. DESCRIPTION OF FUME HOOD

The fume hood tested is a 150cm wide bench-type ductless fume hood, designed and built by Topair Systems INC, Model CF-150-PP.

External dimensions:	Width = 1500mm Height = 2060mm Depth = 700mm (max)
Internal dimensions:	Width = 1425mm Height = 700mm (max) Depth = approx 620mm
Baffle slots/dimensions:	Top baffle slots = approx 40nos of 75mm x 8mm Bottom baffle slots = approx 150nos of 75mm x 8mm
Other dimensions:	Sash opening width = 1425mm Sash opening height = 500mm from bottom cill Air assisted sash airfoil with approx 15mm air gap Sash internal top gap when sash at 500mm = approx 20mm Sash gap from bottom cill when sash closed = approx 20mm Bottom cill air gap = approx 25mm

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 100fpm +/-5%, ie 0.51m/s +/-5%.

5 FLOW VISUALISATION TESTS

The following observations were made:

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

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 0.010ppm, 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 10fpm, ie 0.05m/s) along the edges of the test opening and under the cill airfoil resulted in SF6 levels much less than 0.050ppm.

6.3 Sash Movement Effect Test

These tests were performed at test position P01 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 0.010ppm, 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)





Grid point	01	03	05	07	09	
Mean velocity (fpm)	104	97	96	97	102	
Mean velocity (m/s)	0.53	0.49	0.49	0.49	0.52	
Grid point	02	04	06	08	10	
Mean velocity (fpm)	102	98	96	98	102	
Mean velocity (m/s)	0.52	0.50	0.49	0.50	0.52	
Face Velocity = 100fpm ±5% (0.51m/s ±5%)						

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.



ASHRAE 110-2016 : SEFA 1-2010

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

CERTIFICATE & REPORT NO: INV/ASHRAE110/1032 DATE: 17th October 2023

Fume Hood Manufacturer: Topair Systems INC 300 First Avenue, Suite 102 Needham MA 02494 USA

Fume Hood Model-Type: CF-150-PP 150cm wide bench-type ductless *External Dimensions:*

Width =1500mmHeight2060mmDepth =700mm (max)Internal Dimensions:Width =1425mmHeight =700mm (max)Depth =620mm (max)



Test Opening: Width: 1425mm Height: 500mm

Fume Hood Flow: Face velocity: 100fpm (0.51m/s)

Fume Hood Containment:At all test positions:<0.010ppm</td>Test opening scans:<0.050ppm</td>Sash movement effect:<0.010ppm</td>

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/ASHRAE110/1014.

Tested and Certified by: Dr A F Bicen



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