

**EN 14175, Part 3 Type Test Report for 220cm Wide
Bench Type Fume Hood of Topair Systems INC**

Ref: EN 14175, Part 3

Model: FH-220

by

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INV/EN14175/1011

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1. INTRODUCTION

EN 14175, Part 3 type tests carried out to 220cm wide bench type fume hood of Topair Systems INC are reported. General information on the test methods and procedures can be found in reference 1.

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:	-3Pa (+/-10%)
Room air temperature:	21°C (+/-10%)
Room air relative humidity:	55% (+/-10%)
Room air velocity:	much less than 0.1 m/s

3. DESCRIPTION OF FUME HOOD

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

External dimensions:	Width = 2200mm Height = 2310mm Depth = 835mm
Internal dimensions:	Width = 2000mm 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 = 2000mm 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

4. EN 14175 PART 3 TYPE TESTS

4.1 VELOCITY TESTS

Velocity tests were carried out in accordance with the procedure described in reference 1. Tests were performed for a sash opening of 500mm from the bottom cill airfoil. The velocity type-test grid for this opening is shown in Figure 1. Figure 1 also summarises the test results.

4.2 CONTAINMENT TESTS

Containment tests were performed using the procedures described in reference 1.

4.2.1 Inner Measurement Plane Tests

Figure 2 shows the positionings of the test system with respect to the test opening. Figure 2 also summarises the test results, C_1 and protection factor PF_1 .

4.2.2 Outer Measurement Plane Tests

Figure 3 shows the positioning of the test system with respect to the test opening and summarises the test results, C_2 , C_3 , C_4 & C_5 and protection factors PF_2 , PF_3 , PF_4 & PF_5 .

4.2.3 Robustness of Containment Test

Figure 4 shows the positioning of the test system with respect to the test opening and summarises the test results, C_R and protection factor PF_R .

4.3 AIR EXCHANGE RATE TEST

Air exchange rate test was performed us 1980m³/hr (+/-3%). The measured purge time was 6 (+/-1sec) which results in an air exchange rate of approx 600.

4.4 SASH SUSPENSION TEST

The sash suspension test was carried out as required by 6.1 of EN 14175, Part 2, see reference 2. The sash remains in its test position when one of the suspension devices is disconnected.

4.5 SASH DISPLACEMENT TEST

The sash displacement force was measured as required by reference 2. The maximum force for sash closing and opening was approx 30N (+/-10%).

4.6 PROTECTION AGAINST SPLASHES

Good protection. The sash closes with a minimum gap of 20mm from the bottom cill airfoil.

4.7 OTHER OBSERVATIONS

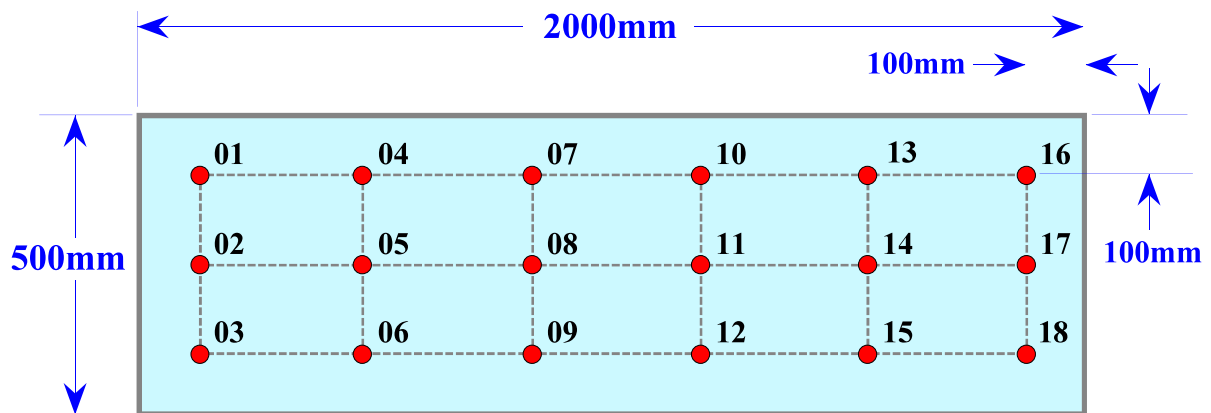
1. Low volume flow visualisation tests indicated that smoke moves inward at boundaries with no apparent flow reversals.
2. Work surface has a raised edge for spillage retention.
3. There is no "keep sash closed when not in use" marking.
4. Hood is not fitted with a pressure relief device.

REFERENCES

1. *BS EN 14175, Fume Cupboards-Part 3: Type Test Methods*, 2019.
2. *BS EN 14175, Fume Cupboards-Part 2: Safety and Performance Requirements*, 2003.
3. *BS EN 14175, Fume Cupboards-Part 1: Vocabulary*, 2003.

List of instrumentation used during tests:

1. Miran 205-B infrared gas analyser - SN: 76185-382
2. Critical orifice for inner-plane test gas metering: SN: 053
3. Critical orifice for outer-plane and robustness test gas metering: SN: 065
4. VelociCalc 9545-A: SN: 0713014
5. Smoke pen



Grid point	01	04	07	10	13	16
Mean velocity (m/s)	0.52	0.51	0.49	0.50	0.51	0.54
Grid point	02	05	08	11	14	17
Mean velocity (m/s)	0.50	0.49	0.48	0.49	0.50	0.52
Grid point	03	06	09	12	15	18
Mean velocity (m/s)	0.53	0.50	0.49	0.49	0.50	0.54
Average Face Velocity = 0.51m/s (+/-5%)						

Figure 1 Velocity type-test results
(see 5.2 of EN 14175, Part 3).

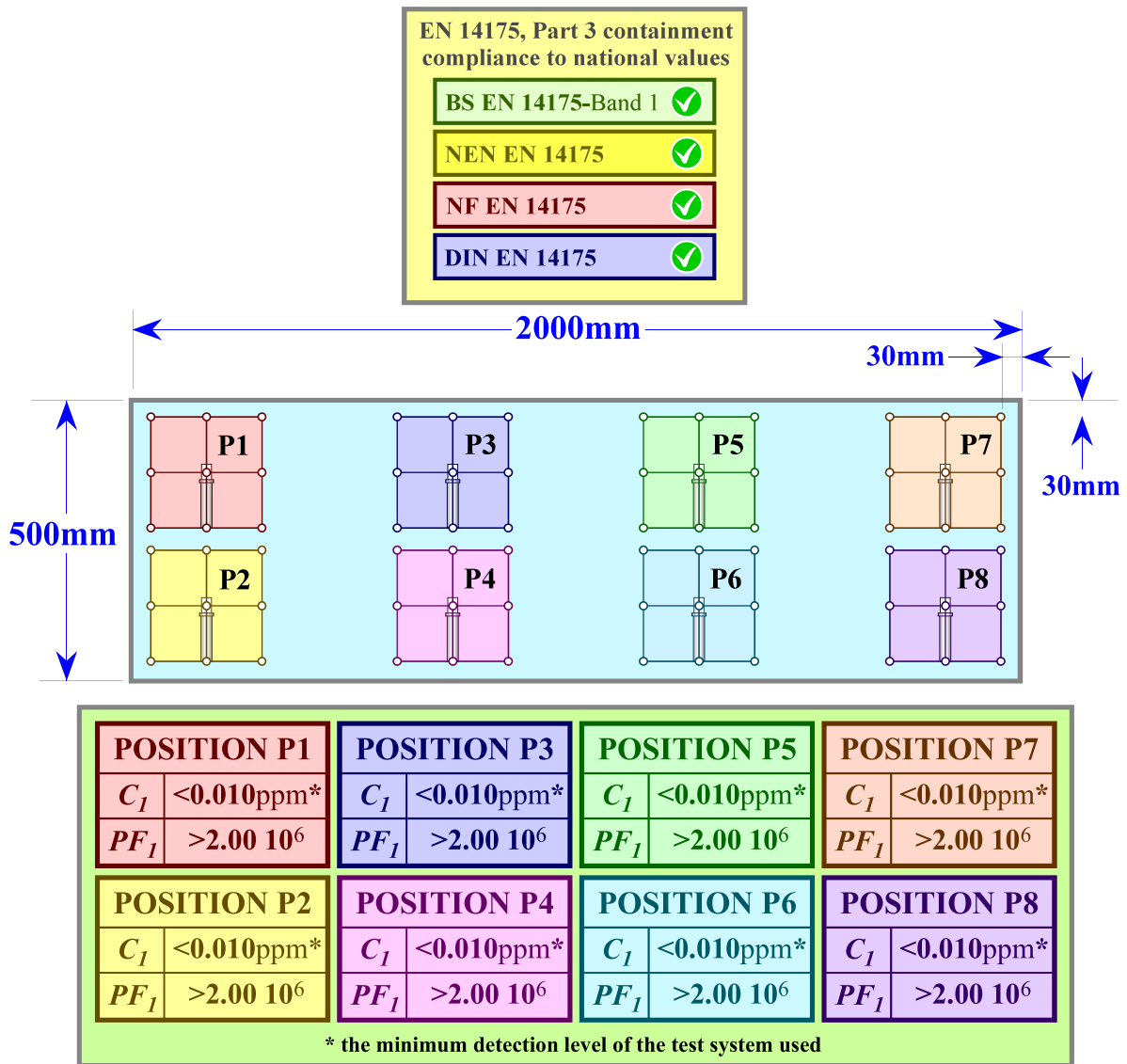


Figure 2 Inner plane containment test results
(see 5.3 of EN 14175, Part 3).

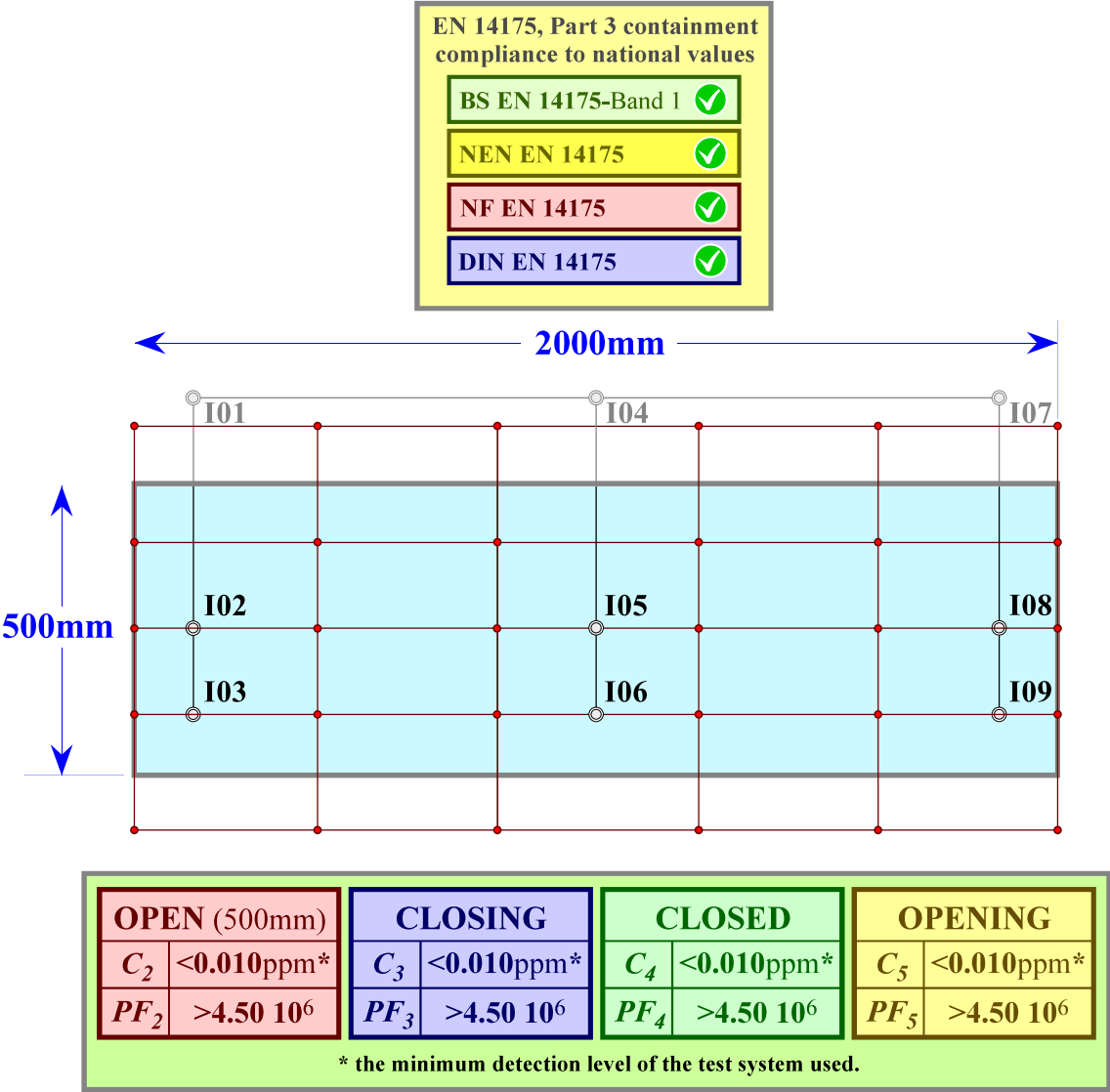


Figure 3 Outer plane containment test results
(see 5.3 of EN 14175, Part 3).

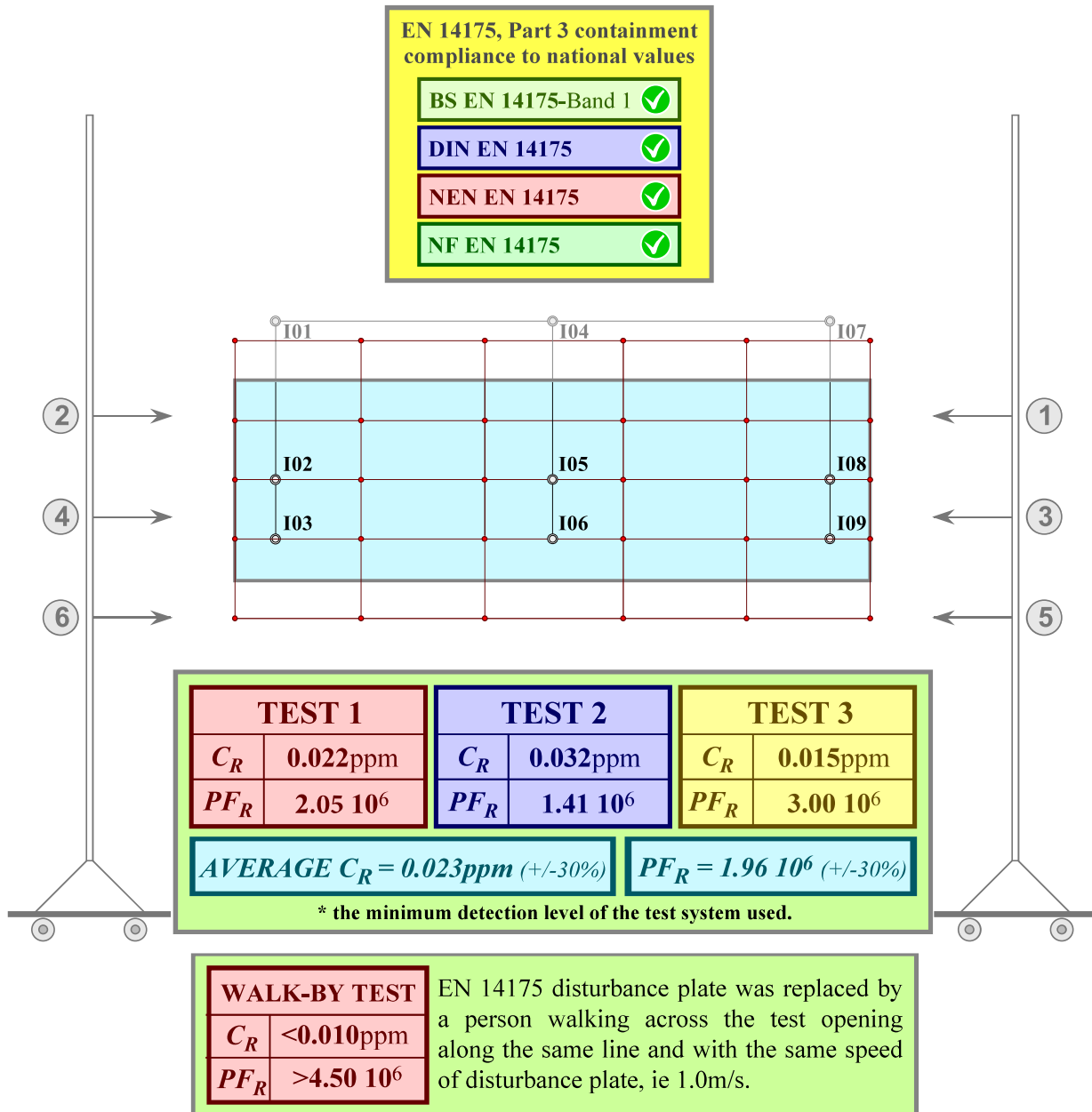


Figure 4 Robustness of containment test results.
(see 5.4 of EN 14175, Part 3).

CERTIFICATE OF TYPE TESTING IN ACCORDANCE WITH EN 14175, PART 3

CERTIFICATE & REPORT NO: INV/EN14175/1011

DATE: 8th June 2023

Fume Hood Manufacturer:

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



Fume Hood Model:

FH-220

Fume Hood Type:

220cm wide bench-type

External Dimensions:

Height = 2310mm

Width = 2200mm

Depth = 835mm

Internal Dimensions:

Height = 1170mm

Width = 2000mm

Depth = 640mm (wall-sash)

Depth = 585mm (baffle-sash)

Test Opening:

Width: 2000mm

Height: 500mm

Fume Hood Flow:

Volume flow rate: 1980m³/hr (+/-3%)

Face velocity: 0.51m/s (+/-5%)

Fume Hood Containment:

Inner-plane containment:

C1: <0.010ppm at all locations

Outer-plane containment:

C2, C3, C4, C5: <0.010ppm

Robustness of containment:

CR: 0.023ppm (+/-30%)

This is to certify that the fume hood described above has been type tested in accordance with Part 3 of EN 14175, in compliance with the requirements of Part 2 and with reference to Part 1, and resulted in performance characteristics given in test report, INV/EN14175/1011.

Tested and Certified by:

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Appendix A

EN 14175, PART 3: FUME HOOD CONTAINMENT BORDER VALUES IN EUROPE

	Border Value (SF6 concentration)	Protection Factor
GERMANY outer plane & robustness of containment	0.650ppm	0.07 10 ⁶
FRANCE inner plane	0.100ppm	0.20 10 ⁶
NETHERLANDS outer plane - <i>open & closing</i>	0.020ppm	2.25 10 ⁶
NETHERLANDS robustness of containment	0.650ppm	0.07 10 ⁶

BS EN 14175, PART 3: FUME HOOD CONTAINMENT BORDER VALUES IN THE UK (*draft*)

		Border Value (SF6 concentration)	Protection Factor
RESEARCH LABS	UK - BAND 1 inner plane	0.010ppm	2.00 10 ⁶
	UK - BAND 1 outer plane - open, closed, closing	0.010ppm	4.50 10 ⁶
	UK - BAND 1 outer plane - opening	0.020ppm	2.25 10 ⁶
	UK - BAND 1 robustness of containment	0.100ppm	0.45 10 ⁶
TEACHING LABS	UK - BAND 2 inner plane	0.020ppm	1.00 10 ⁶
	UK - BAND 2 outer plane - open, closed, closing	0.020ppm	2.25 10 ⁶
	UK - BAND 2 outer plane - opening	0.040ppm	1.13 10 ⁶
	UK - BAND 2 robustness of containment	0.200ppm	0.23 10 ⁶
SCHOOL LABS	UK - BAND 3 inner plane	0.040ppm	0.50 10 ⁶
	UK - BAND 3 outer plane - open, closed, closing	0.040ppm	1.13 10 ⁶
	UK - BAND 3 outer plane - opening	0.080ppm	0.56 10 ⁶
	UK - BAND 3 robustness of containment	0.400ppm	0.11 10 ⁶