

PROJET EVALIE

Laboratoire CESA

**TEST REPORT CONCERNING
TWO HUMIDITY SENSITIVE AIR INLET UNITS
EHA2 5-35 and EFA2 35
N° VE 09-26023540
AERO AND HYGRO-DYNAMIC PERFORMANCE**

This test report certifies only the characteristics of the object submitted for testing but does not prejudge the characteristics of similar products. So it does not constitute a product certification in the sense of Article L 115-27 of the Consumer Code and of the Law of June 3, 1994.

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It comprises eighteen pages and an annex.

REQUESTED BY :

**Société Aéréco
9 allée du Clos des Charmes
77615 Marne la Vallée Cedex 03
FRANCE**

SCOPE:

The purpose of the tests reported in this document is to characterise humidity controlled air inlet.

REFERENCE TEXTS:

Tests carried out, for each characteristic concerning air inlets:

- Flow rate vs. humidity rate according to the standard NF EN 13141-9 for pressure = 10 Pa
- Flow rate vs. pressure according to the standard NF EN 13141-1 for two opening position: maximal and minimal forced by screw.

SPECIAL CONDITIONS:

The dimensions required all around the air inlet device by the standard NF EN 13141-9 are reduced in tests. (Required 300 mm, minimal values effective 70 mm, for details see installation dimensions in annex for NF EN 13141-9).

Nevertheless, these differences between dimensions (required/effective) should not have an impact on test results regarding the of diffusion of the inlet device.

NATURE OF THE TESTS:

Layout of the airflow specification flow according to the relative humidity (with the rise and the descent) of air inlets under a pressure of 10 Pa

Layout of the airflow specification flow according to the pressure for minimal and maximal opening of air inlets.

OBJECTS SUBMITTED FOR TESTING

Reception date at the laboratory: November 9th, 2009

Origin: AERECO

Identification: humidity sensitive air inlets unit for different mounting

Tests carried

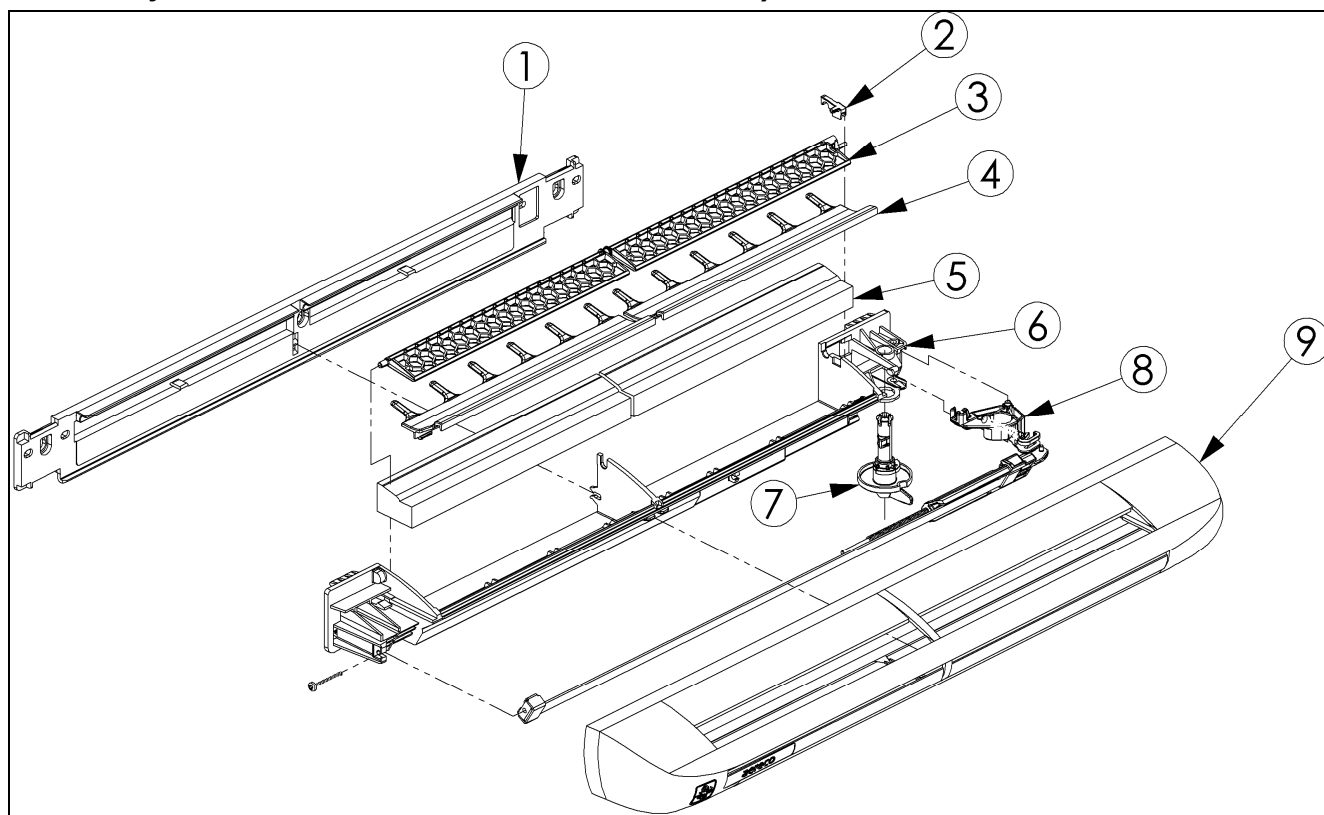
Classification of CESA laboratory	Type of test	Code of products	Used products	Temperature conditions	Test Nr
CES09-071 + CES09-064 + CES 09-067 / BM1055	Flow rate vs. humidity rate	EAR201 + AEA731	EHA2 5-35 + ASAM	Isotherm	1
CES09-071 + CES09-064 + CES 09-067 / BM1057				External = 6°C	2
CES09-071 + CES09-064 + CES 09-067 / BM1056				External = 10°C	3

Tests carried

Classification of CESA laboratory	Type of test	Code of products	Used products	Temperature conditions	Test Nr
CES09-071 + CES 09-064 + CES 09-070	Flow rate vs. pressure for maximal and minimal opening positions	EAR201 + AEA100	EHA2 5-35 + AC	Not applicable	4
CES09-071 + CES 09-064 + CES 09-068		EAR201 + AEA851	EHA2 5-35 + A-EHA AM	Not applicable	5
CES09-071 + CES 09-064 + CES 09-069		EAR201 + AEA833	EHA2 5-35 + A-EMM AM	Not applicable	6
CES 09-066 + CES 09-064 + CES 09-067		EAR206 + AEA731	EHA2 5-35 with acoustic base + ASAM	Not applicable	7
CES 09-066 + CES 09-064 + CES 09-070		EAR206 + AEA100	EHA2 5-35 with acoustic base + AC	Not applicable	8
CES 09-066 + CES 09-064 + CES 09-068		EAR206 + AEA851	EHA2 5-35 with acoustic base + A-EHA AM	Not applicable	9
CES 09-066 + CES 09-064 + CES 09-069		EAR206 + AEA833	EHA2 5-35 with acoustic base + A-EMM AM	Not applicable	10
CES09-071 + CES 09-065 + CES 09-067		EAF313 + AEA731	EFA2 35 + ASAM	Not applicable	11
CES 09-066 + CES 09-065 + CES 09-067		EAF319 + AEA731	EFA2 35 with acoustic base + ASAM	Not applicable	12

DESCRIPTION

Acoustic humidity controlled air inlet with closing / opening device ref EHA2 5-35 (ref laboratory Base CES 09-071 + inlet device 09-064)

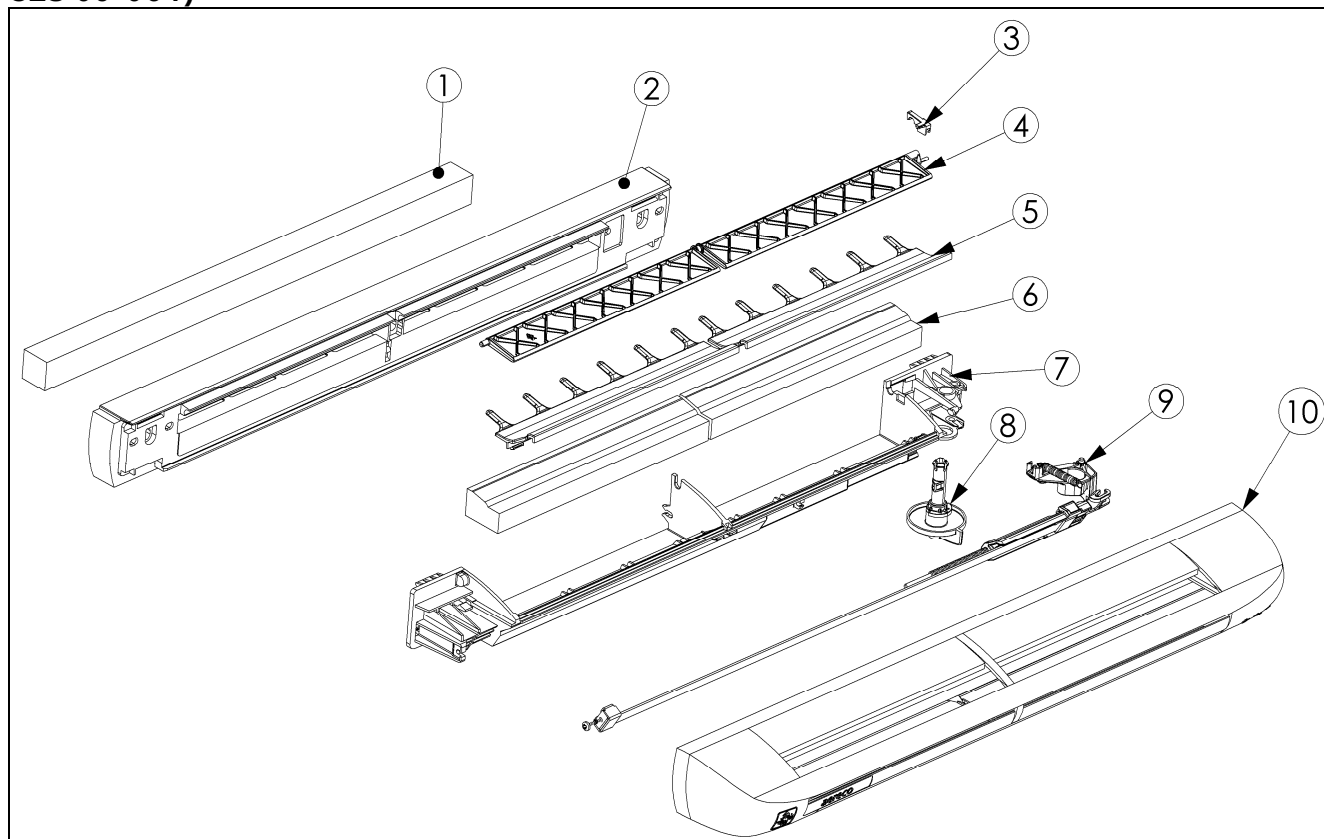


num	description	material	Ref laboratory
1	Base	PS	CES 09-071
2	End stop	POM	CES 09-064
3	Shutter	ABS	
4	Jet deflector	PS	
5	Acoustic foam	Mélangine	
6	Body	PS	
7	Closing / opening device	PS	
8	Humidity sensor		
9	Front cover	ABS	

The humidity sensor (8), fixed to the body (6), is translated according the humidity rate in ambiance. The increasing of humidity rate push the shutter (3) so it's open gradually the inlet device. The closing of the inlet device when the humidity rate is decreasing is obtained by a spring fixed to the body.

The inlet device can be closed manually by the rotation of the closing/opening device (7).

Acoustic humidity controlled air inlet with closing / opening device (reinforced acoustic), ref EHA2 5-35 with acoustic base (ref laboratory Acoustic Base CES 09-066 + inlet device CES 09-064)

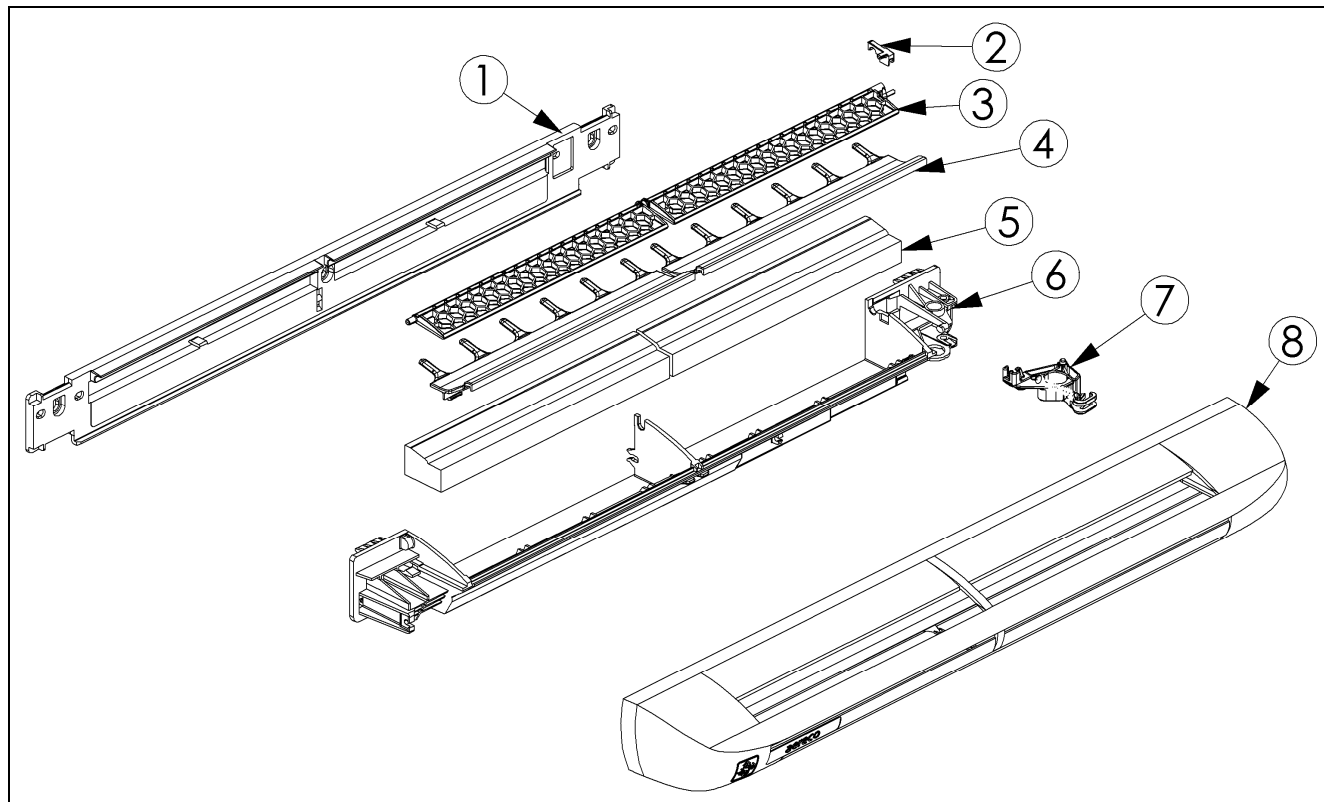


num	description	material	Ref laboratory
1	Acoustic foam base	Mélamine	CES 09-066
2	Acoustic base	PS	
3	End stop	POM	CES 09-064
4	Shutter	ABS	
5	Jet deflector	PS	
6	Acoustic foam	Mélamine	
7	Body	PS	
8	Closing / opening device	PS	
9	Humidity sensor		
10	Front cover	ABS	

The humidity sensor (9), fixed to the body (7), is translated according the humidity rate in ambience. The increasing of humidity rate push the shutter (4) so it's open gradually the inlet device. The closing of the inlet device when the humidity rate is decreasing is obtained by a spring fixed to the body.

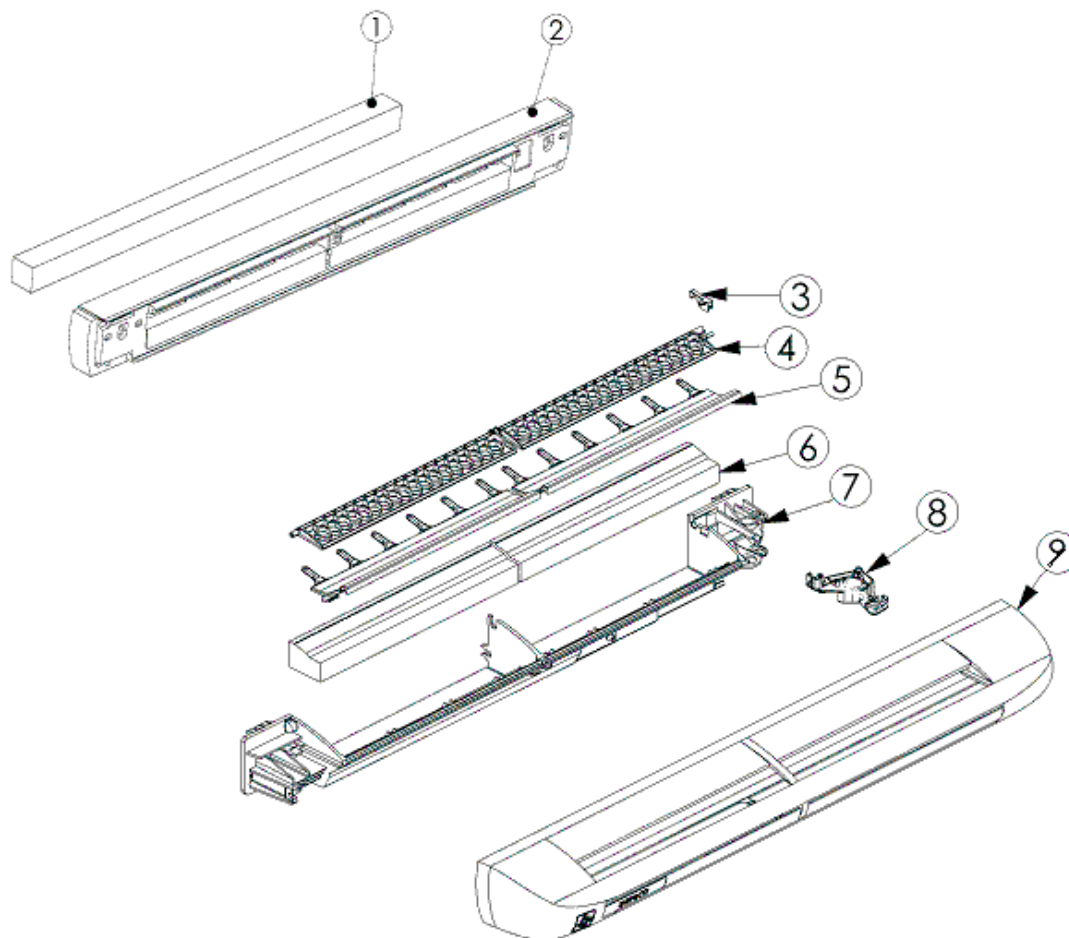
The inlet device can be closed manually by the rotation of the closing/opening device (8).

Fix acoustic air inlet ref EFA2 35 (ref laboratory Inlet device CES 09-065 + Base CES 09-071)



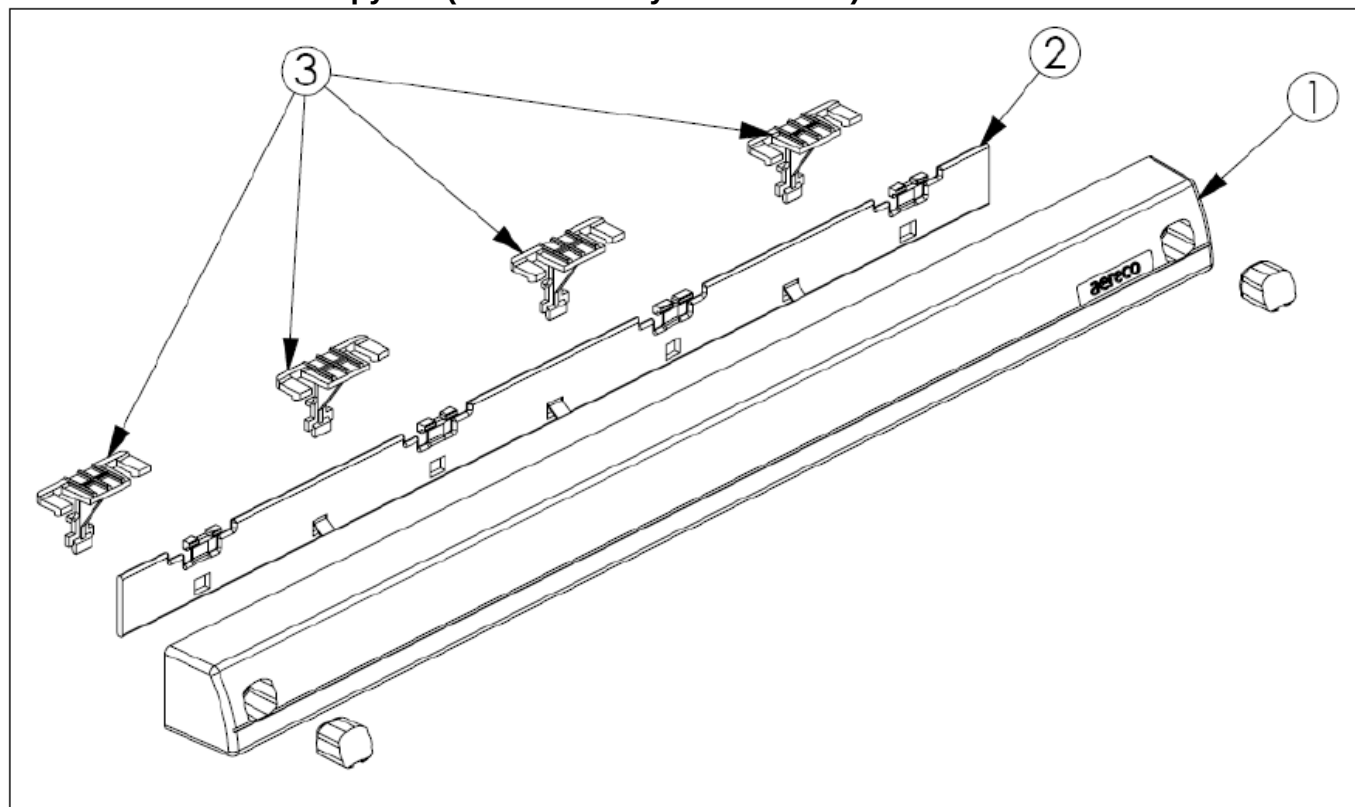
num	description	material	Ref laboratory
1	Base	PS	CES 09-071
2	End stop	POM	CES 09-065
3	Shutter	ABS	
4	Jet deflector	PS	
5	Acoustic foam	Mélamine	
6	Body	PS	
7	Lever	POM	
8	Front cover	ABS	

Fix acoustic air inlet with acoustic base ref EFA2 35 with acoustic base (Inlet Device ref laboratory CES 09-065 + Acoustic Base CES 09-066)



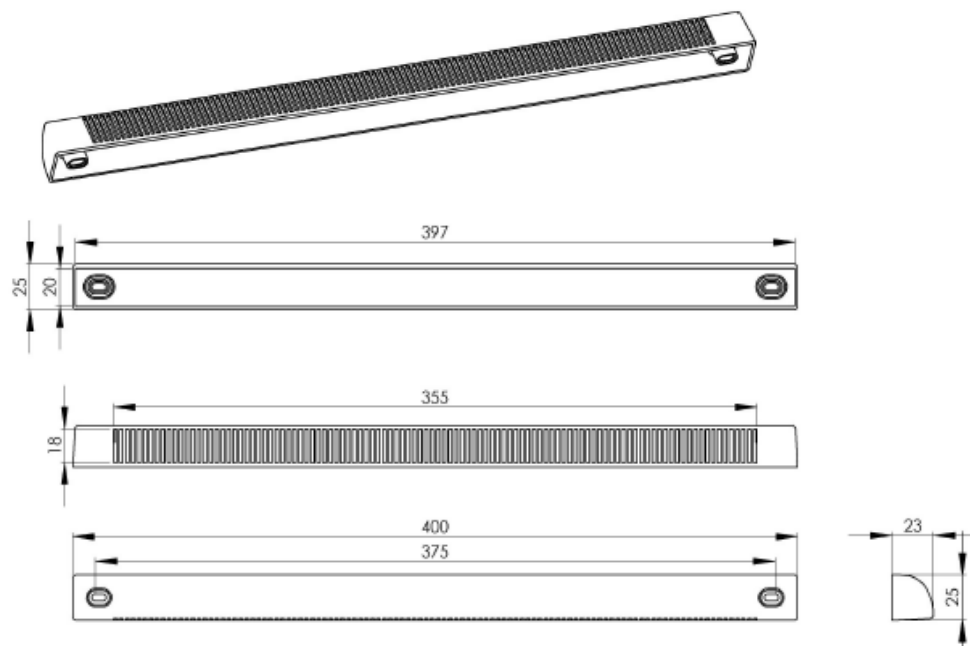
num	description	material	Ref laboratory
1	Acoustic foam base	Mélamine	CES 09-066
2	Base	PS	
3	End stop	POM	CES 09-065
4	Shutter	ABS	
5	Jet deflector	PS	
6	Acoustic foam	Mélamine	
7	Body	PS	
8	Lever	POM	
9	Front cover	ABS	

Airflow controller canopy AC (ref laboratory CES 09-070)



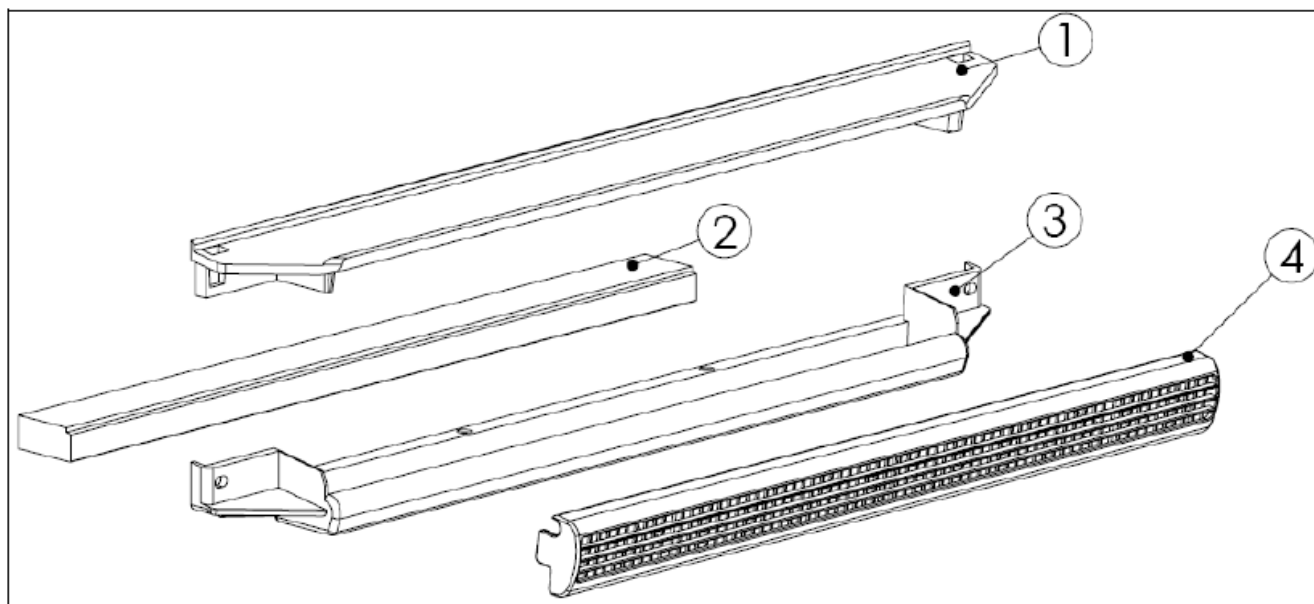
num	description	material
1	Body	ABS
2	Self adjusting shutter	silicon
3	Shutter fixations	PVC

Standard anti-insect canopy ASAM (ref laboratory CES 09-067)



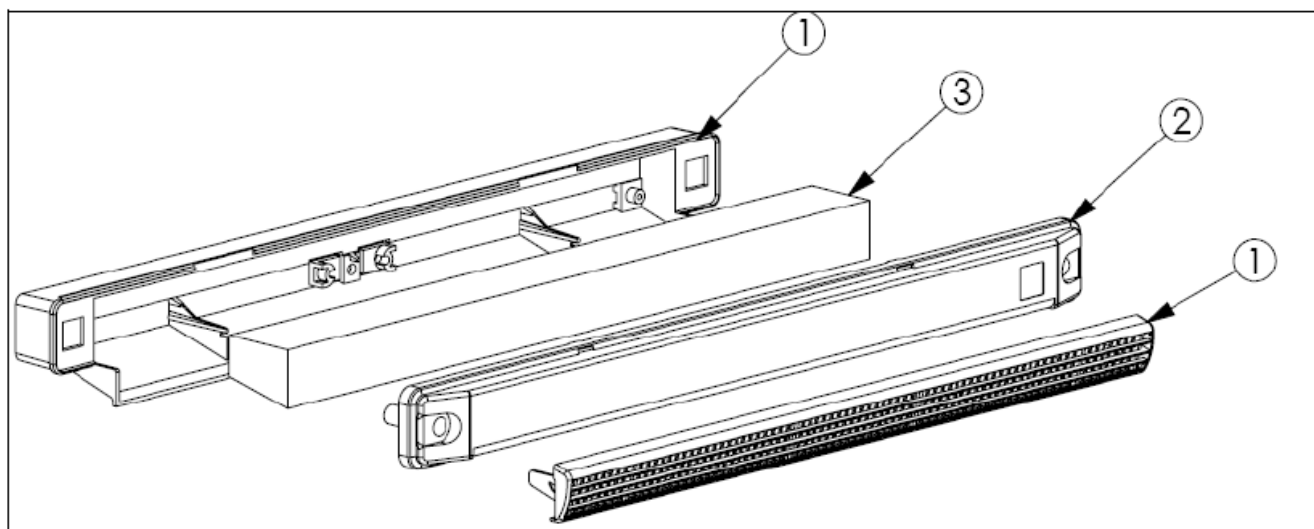
num	description	material
	Standard canopy	ABS

Acoustic canopy for EMM air inlet with insect grille A-EMM AM (ref laboratory CES 09-069)



num	description	material
1	Base	PVC
2	Acoustic foam	PU
3	Front cover	PVC
4	Anti-insect grille	PVC

Acoustic canopy for EHA air inlet with insect grille A-EHA AM (ref laboratory CES 09-068)

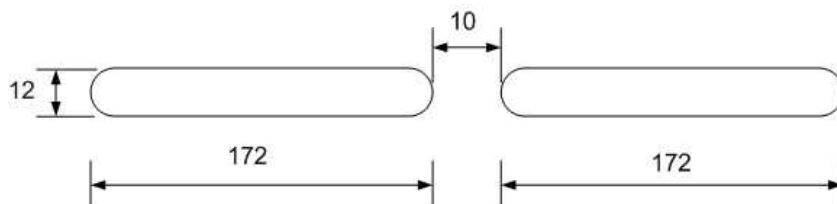


num	description	material
1	Anti-insect grille	PVC
2	Front cover	PVC
3	Acoustic foam	PU
4	Base	PVC

Mounting specifications:

Air inlets were installed on a wooden support of thickness 60mm.

Dimensions of the used slot are as follows:



Prepared at Marne-la-Vallée, November 31st, 2009

In charge of test	For approval
Eric PILCH	Patrick O'KELLY

RESULTS
Inlet EHA2 5-35 + ASAM – Isotherm Conditions
CES 09-071+CES 09-064 + CES 09-067 – BM1055
Test 1
Date November 10th, 2009

Humidity rising			Humidity decreasing		
Humidity (HR%)	Flow rate (m ³ /h) at 10 Pa	Flow rate (l/s) at 10 Pa	Humidity (HR%)	Flow rate (m ³ /h) at 10 Pa	Flow rate (l/s) at 10 Pa
29.4	4.4	1.22	78.6	31.5	8.75
32.5	4.5	1.25	71.4	31.4	8.72
37.6	6.7	1.86	66.6	30.4	8.44
42.6	9	2.50	62	27.9	7.75
47.7	12.1	3.36	57.2	25.1	6.97
52.4	15.9	4.42	52.7	21.3	5.92
57.2	21.1	5.86	47.8	17.4	4.83
61.8	25.7	7.14	43.3	12.2	3.39
66.6	29.5	8.19	38	9.1	2.53
71.3	31.7	8.81	32.5	5.8	1.61
78.6	31.5	8.75	29.7	4.5	1.25
			28.2	4.6	1.28

RESULTS
Inlet EHA2 5-35 + ASAM – External Temperature = 6°C
CES 09-071+CES 09-064 + CES 09-067 – BM1056
Test 2
Date November 12th, 2009

Humidity rising			Humidity decreasing		
Humidity (HR%)	Flow rate (m ³ /h) at 10 Pa	Flow rate (l/s) at 10 Pa	Humidity (HR%)	Flow rate (m ³ /h) at 10 Pa	Flow rate (l/s) at 10 Pa
28.9	9.6	2.67	61.5	31.4	8.72
33.5	12.7	3.53	55.8	31.2	8.67
40	19.1	5.31	50.9	31	8.61
45.3	24.7	6.86	46.1	27.4	7.61
51	29.1	8.08	40.5	23.9	6.64
55.8	31	8.61	34.1	19.3	5.36
61.5	31.4	8.72	30.3	15.4	4.28

RESULTS

Inlet EHA2 5-35 + ASAM – External Temperature = 10°C

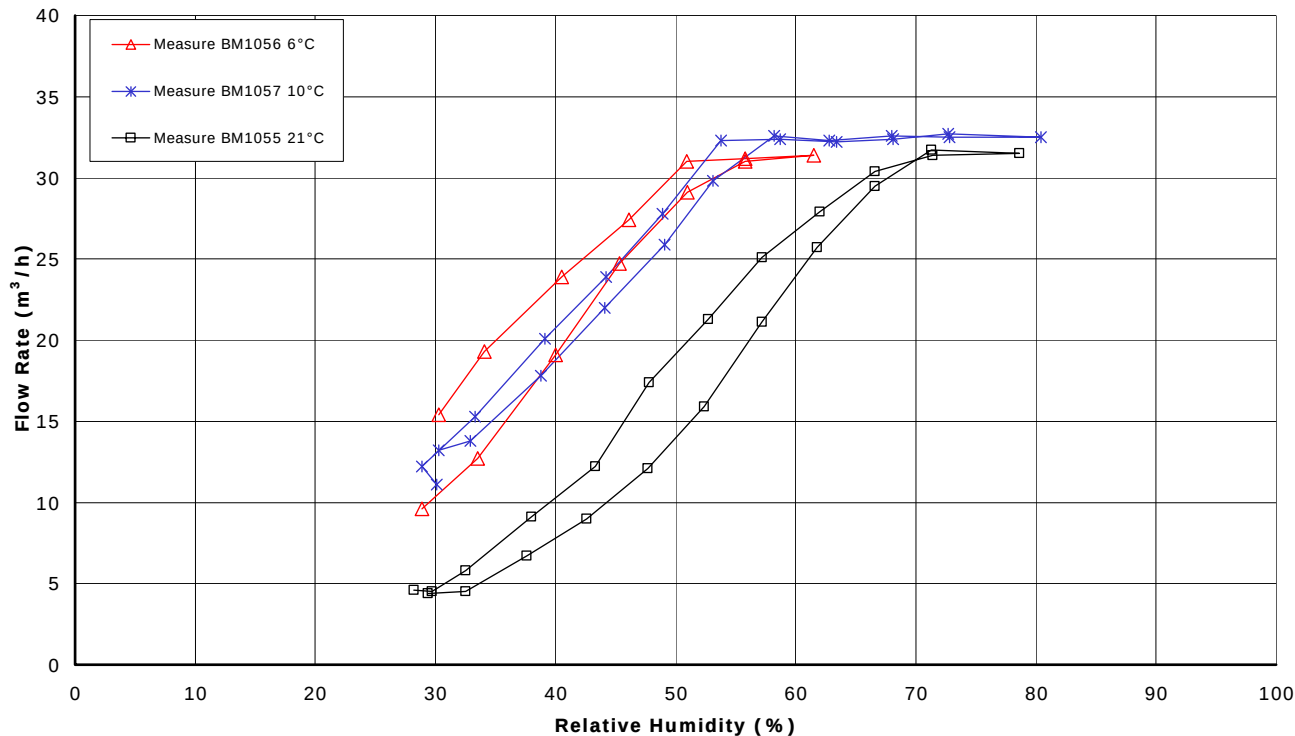
CES 09-071 + CES 09-064 + CES 09-067 – BM1057

Test 3

Date November 13th, 2009

Humidity rising			Humidity decreasing		
Humidity (HR%)	Flow rate (m ³ /h) at 10 Pa	Flow rate (l/s) at 10 Pa	Humidity (HR%)	Flow rate (m ³ /h) at 10 Pa	Flow rate (l/s) at 10 Pa
30.3	13.2	3.67	80.4	32.5	9.03
32.9	13.8	3.83	72.7	32.7	9.08
38.8	17.8	4.94	68.1	32.4	9.00
44.1	22	6.11	63.4	32.2	8.94
49.1	25.9	7.19	58.7	32.4	9.00
53.1	29.8	8.28	53.8	32.3	8.97
58.2	32.6	9.06	48.9	27.8	7.72
62.8	32.3	8.97	44.2	23.9	6.64
68	32.6	9.06	39.1	20.1	5.58
72.8	32.5	9.03	33.3	15.3	4.25
80.4	32.5	9.03	28.9	12.2	3.39
			30.1	11.1	3.08

**Temperature influence on hygro-aéraulic response curves
EHA2 5-35 + ASAM - Tests 1 To 3 -**

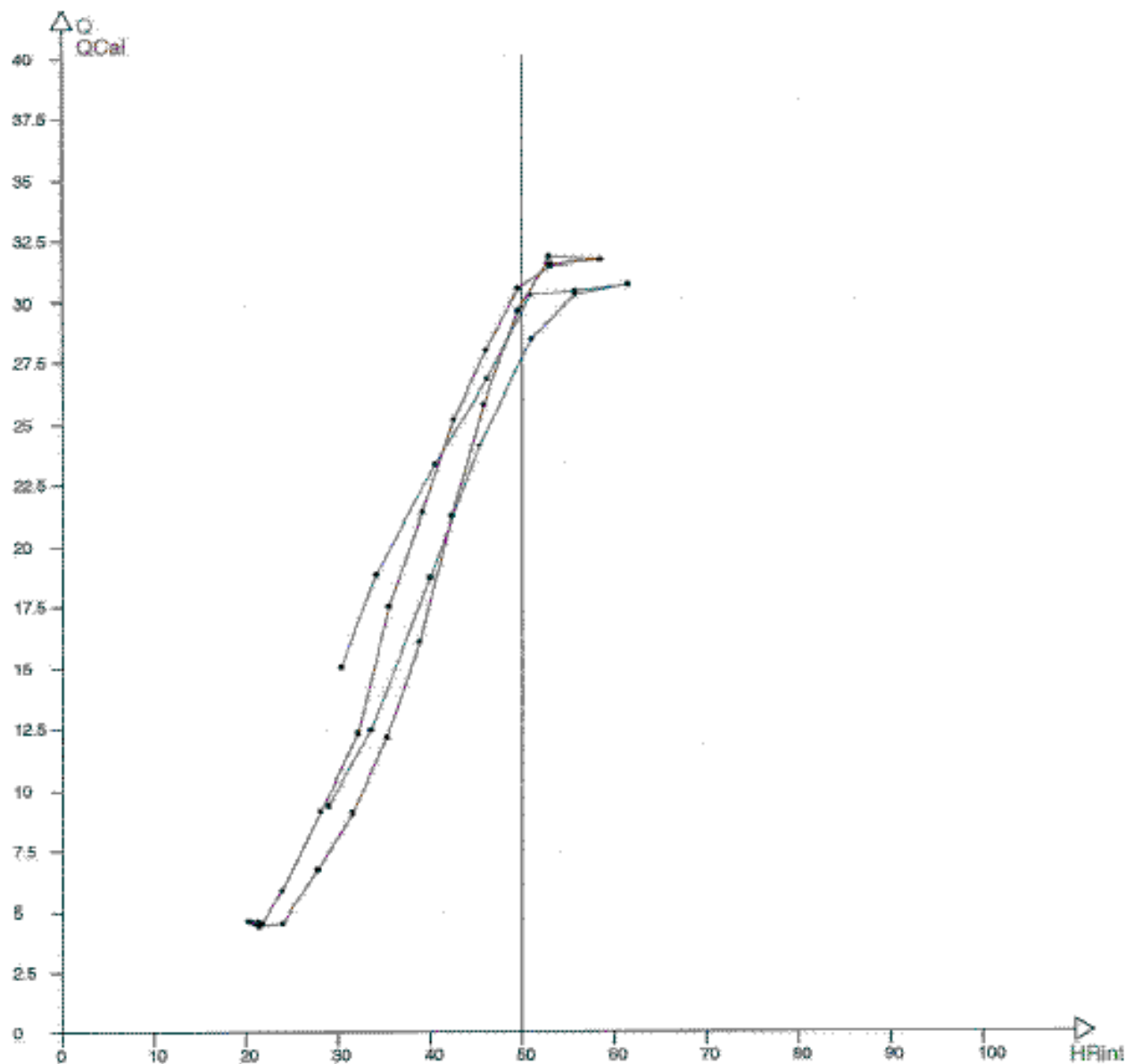


Inlet EHA2 5-35 + ASAM – All conditions

Date November 10th to 13th, 2009

CES 09-071 + CES 09-064 + CES 09-067 – BM1055 and BM 1056

Temperature coefficient determination at 6 °C



Temperature coefficient: 0,31

RESULTS

Tests 4 to 12
Date Nov 9th and 10th, 2009

TEST RESULTS:

Test Conditions:

Temperature : 16 °C
 Atmospheric Pressure : 1009 hPa
 Humidity : 53 % HR
 Air flow density : 1.21 kg/m³

Test Nr	Designation of products	Minimal opening			Maximal Opening		
		Pressure difference on inlet device (Pa)	Flow rate (m3/h)	Flow rate (l/s)	Pressure difference on inlet device (Pa)	Flow rate (m3/h)	Flow rate (l/s)
4	EHA2 5-35 Standard base + AC	10.0	3.3	0.92	10.0	28.2	7.83
5	EHA2 5-35 Standard base + A-EHA AM	10.0	3.0	0.83	10.0	28.6	7.94
6	EHA2 5-35 Standard base + A-EMM AM	10.0	2.9	0.81	10.0	27.7	7.69
7	EHA2 5-35 with acoustic base + ASAM	10.0	3.9	1.08	10.0	29.3	8.14
8	EHA2 5-35 with acoustic base + AC	10.1	3.9	1.08	10.1	27.3	7.58
9	EHA2 5-35 with acoustic base + A-EHA AM	10.0	3.9	1.08	10.0	28.9	8.03
10	EHA2 5-35 with acoustic base + A-EMM AM	10.0	3.9	1.08	10.0	27.8	7.72
11	EFA2 35 Standard base + ASAM	10.0	3.1	0.86	10.0	29.2	8.11
12	EFA2 35 with acoustic base + ASAM	10.0	3.5	0.97	10.0	29.1	8.08

ANNEX

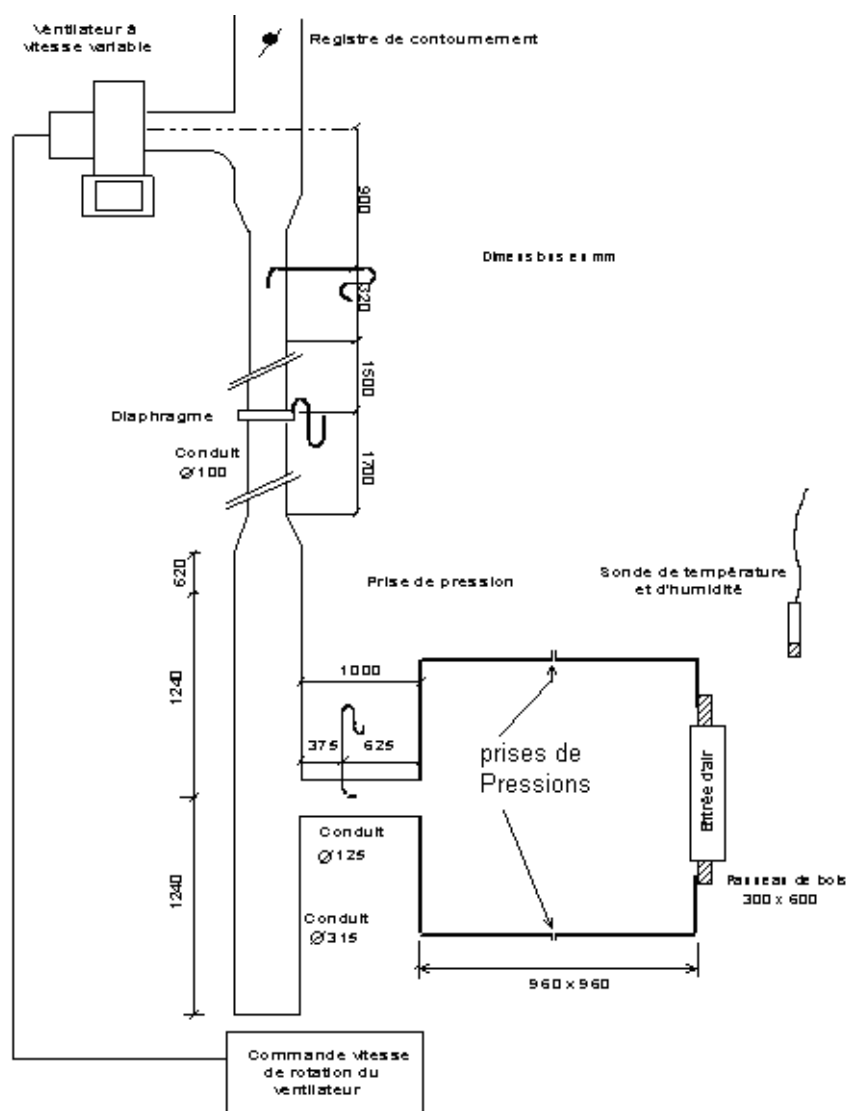
MEASUREMENT USED FOR TEST ACCORDING TO NF EN 13141-1:

MEASURE	MANUFACTURER	TYPE	REF
Pressure transducer for air flow rate measurement	Furness Control	FC 014	CSTB 89-0014
Pressure transducer for inlet device pressure	Furness Control	FC 012	CSTB 07-0632
Diaphragm (air flow rate)	-	Quarter of circle	CSTB 90-0039
Temperature and humidity sensor	Rotronic	MP 100	CSTB 06-0021
Atmospheric pressure Barometer	SKYE	SKPS 810	CSTB 06-0288
Data acquisition system	National Instrument	Field Point FP 1001	CSTB 98-0086
	National Instrument	Field Point AI 110	CSTB 98-0087

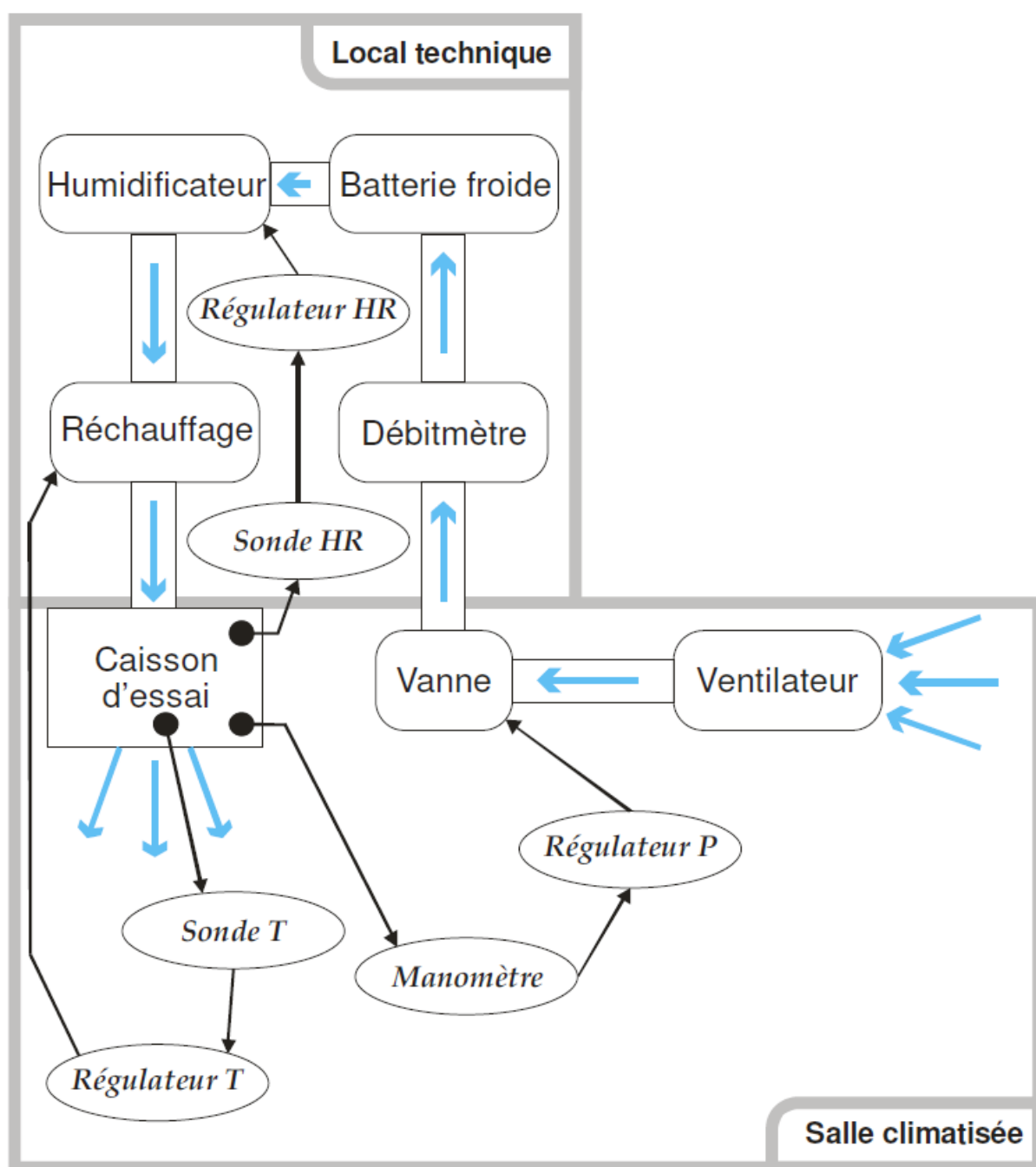
MEASUREMENT USED FOR TEST ACCORDING NF EN 13141-9:

MEASURE	MANUFACTURER	TYPE	REF
Flow Rate	SAM	SAM	SAM
Pressure transducer for inlet device pressure	MPS44	CERGA MPS	MPS44
Temperature and humidity sensor inside	Rotronic	Rotronic HP102A-C602D4-W1W	SHT 07 – 14343 001
Temperature and humidity sensor outside	Rotronic	Rotronic HP102A-C602D4-W1W	SHT 09 – 11391 001

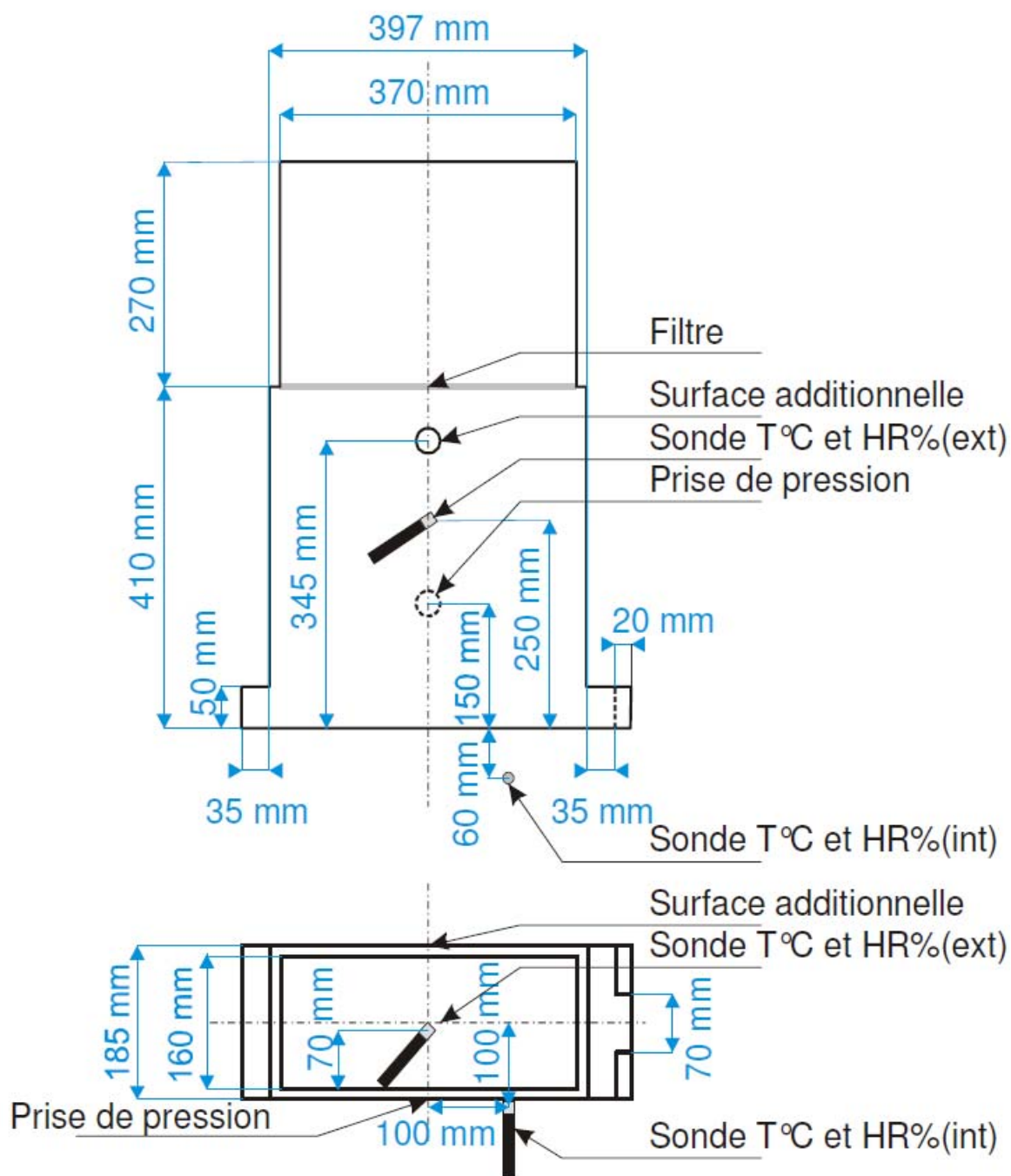
Installation for test according to NF EN 13141-1



Installation for test according to NF EN 13141-9



Test chamber dimensions (mm)



END OF TEST REPORT