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Villeurbanne, 30/11/2015

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**Test Report N° 1515072-1**

**Version : 00**

**EROSION, PRESSURE RESISTANCE AND  
AIRTIGHTNESS ACCORDING TO EN 13403**

**URSA AIR ALU ALU – P5858**

EQUIPMENT ID : URSA AIR ALU ALU – P5858

MANUFACTURER : URSA

REFERENCE DOCUMENT(S) : EN 13403

TESTS MADE BY : Jean Hugues SALAZAR

DATE OF TESTS : October 2015

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## **1. INTRODUCTION**

CETIAT has realized some tests in order to characterize a duct, according to the standard EN 13403 July 2003 "*Ventilation for buildings – Non-metallic ducts – Ductwork made from insulation ductboards*".

The report 2514088 of the 14<sup>th</sup> of September, 2005, gives the results for :

- Resistance against pressure (according to §7.3 of EN 13403) ;
- Erosion and Emission of particles (according to §7.2 of EN 13403).

The reference of the tested sample was **URSA AIR ALU ALU P5858**.

This year, CETIAT realized tests on :

- Air leakage factor and airtightness class (according to §4.3 of EN 13403, referred to §5.2 of EN 1507).

The reference of the tested sample is **URSA AIR ALU ALU P5858**.

URSA IBERICA AISLANTES SA certifies that the product URSA AIR ALU ALU P5858 tested in 2005 (2514088) and the product URSA AIR ALU ALU P5858 tested in 2015 (1515072) are identical with the same physical characteristics (see the document in appendix 4).

The CETIAT then considers that the results of the erosion test according to EN 13403 standard, obtained on the URSA AIR ALU ALU P5858 reference in 2005 can be extended to the URSA AIR ALU ALU P5858 reference in 2015, for the same air velocity and the same ducts building method.

The CETIAT then considers that the results of the resistance against pressure test according to EN 13403 standard, obtained on the URSA AIR ALU ALU P5858 reference in 2005 can be extended to the URSA AIR ALU ALU P5858 reference in 2015, for the pressure level and the same ducts building method.

The summary of the results is in part 2.

Detailed results of airtightness test are in Appendix 1.

Detailed results of resistance to pressure test are in Appendix 2.

Detailed results of erosion and emission of particle test are in Appendix 3.

Characteristics of the product are in Appendix 4.

## 2. SUMMARY OF RESULTS

### 2.1. *Airtightness tests*

The following airtightness test results have been obtained during the tests of this year:

For the positive pressure test, the obtained results comply with:

- the **class D** requirements according to EN1507 standard,
- the **class C** requirements according to EN13403 standard.

For the negative pressure test, the obtained results comply with:

- the **class D** requirements according to EN1507 standard,
- the **class C** requirements according to EN13403 standard.

### 2.2. *Resistance against pressure*

The following table gives the results obtained on the product URSA AIR ALU ALU P5858 tested in 2005 (2514088). These results can be extended to the product URSA AIR ALU ALU P5858 tested in 2015.

<b>RESISTANCE AGAINST PRESSURE TEST</b>	
Pressure = 2000 Pa	
URSA AIR ALU ALU P5858	
The fixation staples did not move during the test. On one location, the adhesive tape began to peel off. There is no evidence of damage, which would cause the sample to become unusable.	

### 2.3. *Erosion tests*

The following table gives the results obtained on the product URSA AIR ALU ALU P5858 tested in 2005 (2514088). These results can be extended to the product URSA AIR ALU ALU P5858 tested in 2015.

<b>EROSION AND EMISSION OF PARTICLES TEST</b>		
Air velocity = 18,6 m/s		
	Requirements	URSA AIR ALU ALU P5858
Particles > 0,5 µm	< 60 µg/m <sup>3</sup>	0,015 µg/m <sup>3</sup>
Particles > 5,0 µm	< 4,0 µg/m <sup>3</sup>	0,007 µg/m <sup>3</sup>

The material from the inside surface of the ductwork does not break away, nor flake off and does not show evidence of delamination or erosion.

## APPENDIX 1 - DETAILED RESULTS – AIRTIGHTNESS

### TEST METHOD

The tests are made according to the standard EN 13403:2003.

The standard EN 13403:2003 "*Ventilation for buildings – Non-metallic ducts – Ductwork made from insulation ductboards*" gives the airtightness classification and refers to the standard EN1507 "*Ventilation for buildings – Sheet metal air ducts with rectangular section – Requirements for strength and leakage*" for the test method.

The test sample is built by URSA IBERICA AISLANTES.

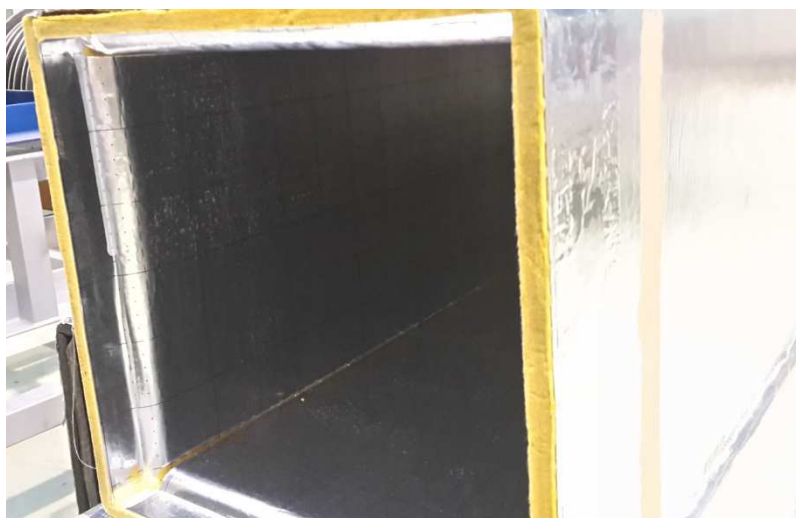
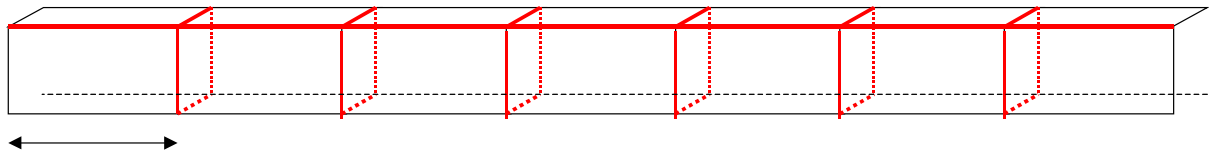
The reference of the tested sample is URSA AIR ALU ALU P5858.

The internal section is 300 mm × 300 mm.

Ductwork surface area (A) =  $7 \times 1,17 \times 4 \times 0,3 = 9,8 \text{ m}^2$

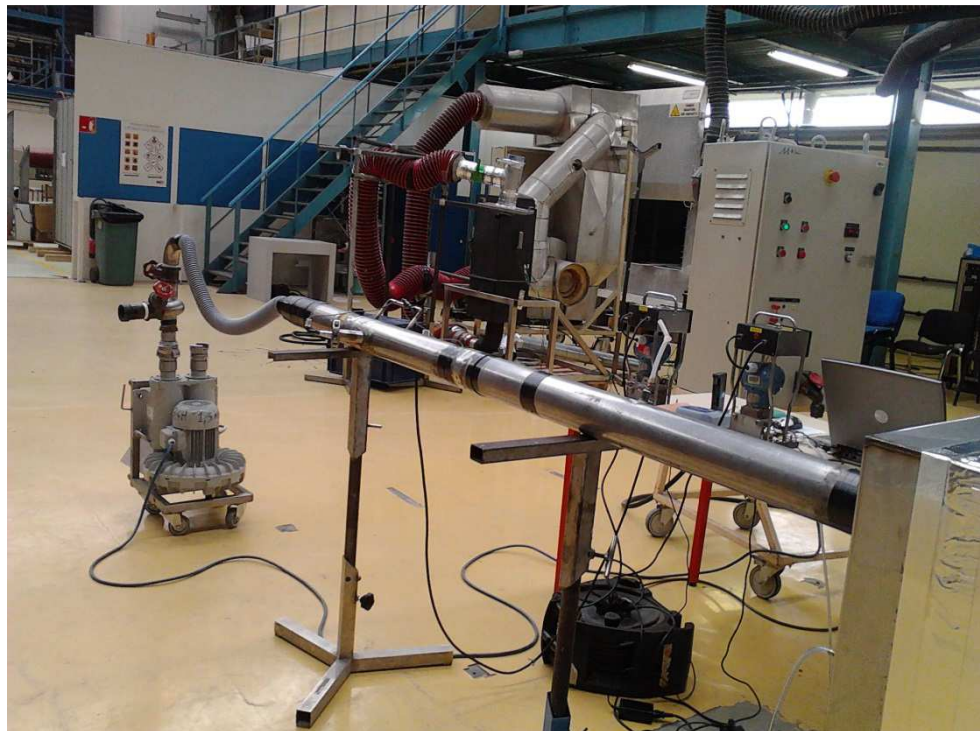
Total joint length (L) =  $6 \times 4 \times 0,3 + 7 \times 1,17 = 15,4 \text{ m}$

Ratio  $\frac{L}{A} = 1,6 \text{ m}^{-1}$



*Product*





*Pictures of test facility*

CETIAT closed the ends of the sample with metal sheets. One of the metal sheets is connected to airflow meter and a fan to create the pressure in the duct.

## CLASSES

The standard EN 13403:2003 "Ventilation for buildings – Non-metallic ducts – Ductwork made from insulation ductboards" gives the airtightness classification and refers to the standard EN1507 "Ventilation for buildings – Sheet metal air ducts with rectangular section – Requirements for strength and leakage" for the test method. The standard EN 13403:2003 defines 3 classes.

The results are then compared to the classification given in the both standards: EN 13403 and EN 1507.

### Classification according to the EN 13403:2003:

The airtightness classification defined in the EN 13403:2003 is the following:

Air tightness class	Air leakage limit
	$1.s^{-1}.m^{-2}$
A	$0,027.p_s^{0,65}$
B	$0,009.p_s^{0,65}$
C	$0,003.p_s^{0,65}$

Only 3 classes are defined. There is no classD.

### Classification according to the EN 1507:

The airtightness classification defined in the EN 1507 is the following:

Air tightness class	Air leakage limit
	$f_{max}$
	$1.s^{-1}.m^{-2}$
A	$0,027.p_{test}^{0,65}$
B	$0,009.p_{test}^{0,65}$
C	$0,003.p_{test}^{0,65}$
D	$0,001.p_{test}^{0,65}$

It defines a fourth class: classD.



## DETAILED RESULTS

### Overpressure test

Pressure	Leakage factor	Airtightness class
Pa	l/s/m <sup>2</sup>	-
204	0.004	Class D
405	0.007	Class D
596	0.010	Class D
805	0.013	Class D
1006	0.016	Class D
1204	0.023	Class D

For the positive pressure test, the obtained results comply with:

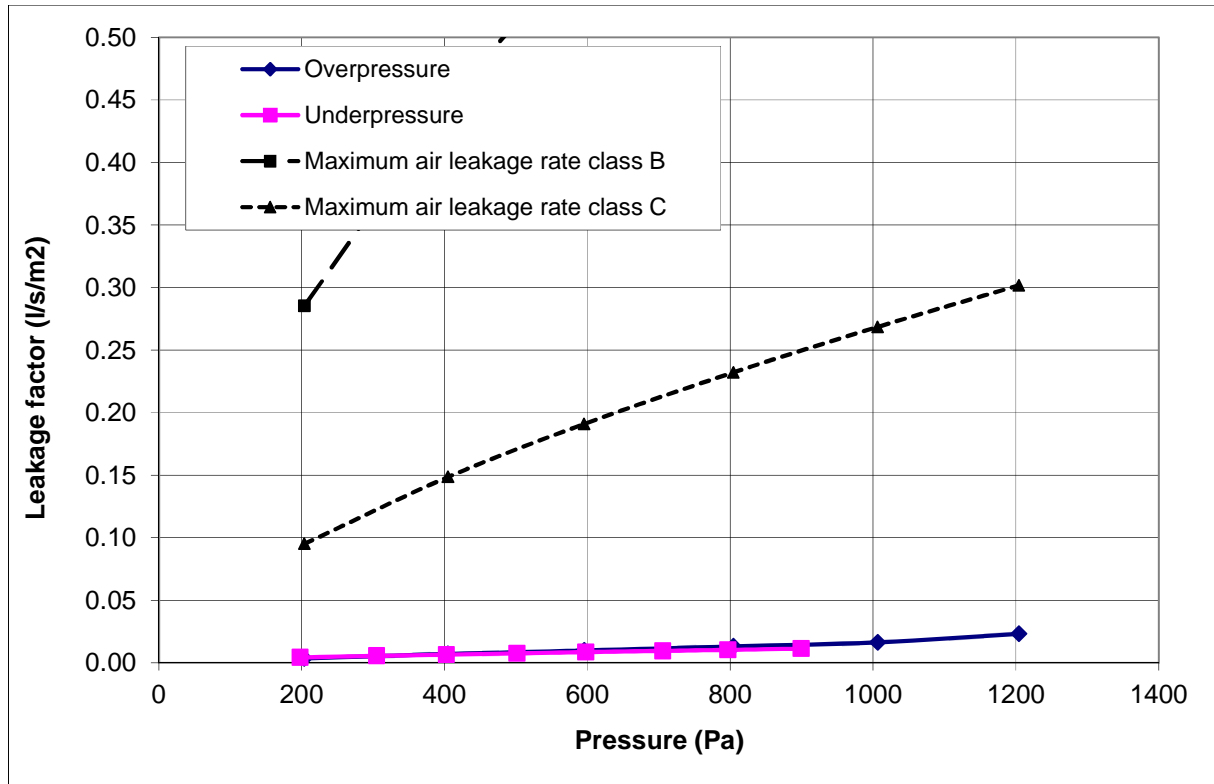
- the **class D** requirements according to EN1507 standard,
- the **class C** requirements according to EN13403 standard.

### Underpressure test

Underpressure	Leakage factor	Airtightness class
Pa	l/s/m <sup>2</sup>	-
198	0.004	Class D
305	0.006	Class D
403	0.007	Class D
502	0.008	Class D
598	0.009	Class D
706	0.010	Class D
797	0.010	Class D
900	0.011	Class D

For the negative pressure test, the obtained results comply with:

- the **class D** requirements according to EN1507 standard,
- the **class C** requirements according to EN13403 standard.



### INSTRUMENTATION

The instrumentation used is the following :

	n°	Gamme
Débitmètre	11869	0-20 m <sup>3</sup> /h
Manomètre	11562	0-2000 Pa
Thermomètre	14781	15-45°C

## **APPENDIX 2 - DETAILED RESULTS – RESISTANCE AGAINST PRESSURE**

The following results were obtained on the product URSA AIR ALU ALU P5858 tested in 2005 (2514088). These results can be extended to the product URSA AIR ALU ALU P5858 tested in 2015.

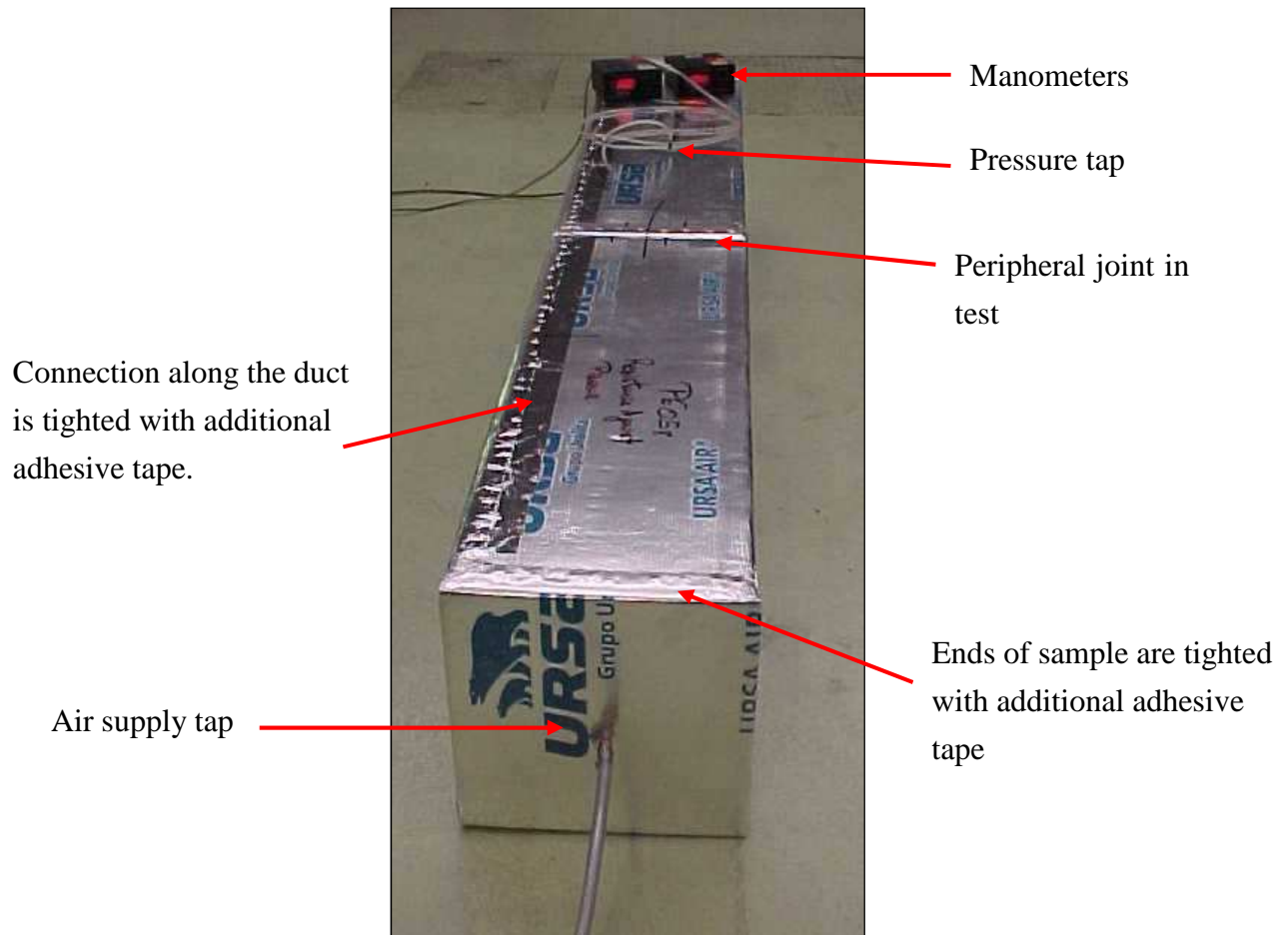
### **TEST METHOD**

The pressure test determines the fitness for purpose of the ductboard assembly.

The duct was constructed by the URSA IBERICA AISLANTES SA Company and assembled with a peripheral joint. The used internal section is 300 mm \* 300 mm. The connections along the duct have been made airtight with additional adhesive tape by CETIAT, to keep only the median peripheral joint.

A pressure tap is sealed on the test sample and connected to a manometer. The manometer is checked for zero reading at the beginning and end of each test.

An air supply tape is sealed on the test sample to supply specified air pressure.



*View of the test facility*

The manufacturer's rated pressure is 800 Pa.

This pressure is gradually reached in a time between 45 and 60 s, and is maintained during 1 min. It is then increased to 2000 Pa (2,5 times 800 Pa), and maintained during 1 h.

## **DETAILED RESULTS**

As it can be seen on the picture, fixation staples of the peripheral joint did not move during the pressure test.



*View of the peripheral joint after the test (P5858 sample)*

On the sample, it can only be noted that adhesive tape began to peel off on one location.



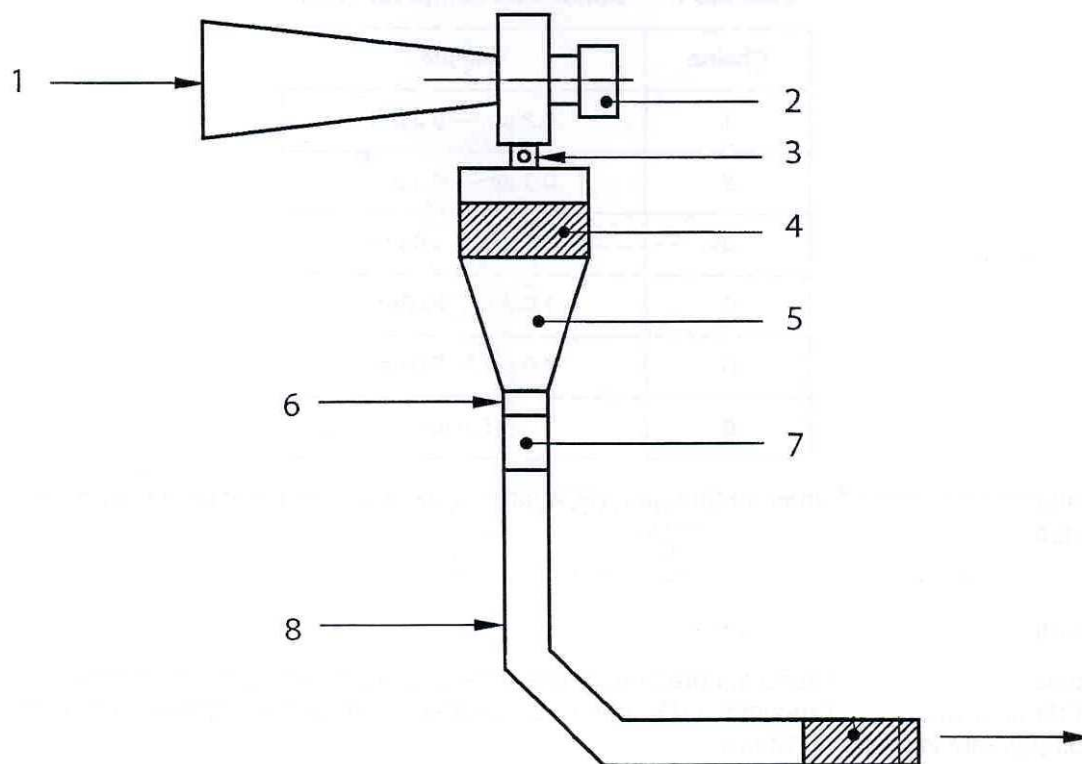
*Adhesive tape begins to peel off – P5858 sample*

### APPENDIX 3 - DETAILED RESULTS – EROSION

The following results were obtained on the product URSA AIR ALU ALU P5858 tested in 2005 (2514088). These results can be extended to the product URSA AIR ALU ALU P5858 tested in 2015.

#### TEST METHOD

The sample is arranged in an L-shaped assembly. The entire assembly has similar cross-section (300 mm \* 300 mm).



- |                      |                       |
|----------------------|-----------------------|
| 1 : Sucking box      | 5 : Blowing plenum    |
| 2 : Sucking fan      | 7 : Connexion duct    |
| 3 : Control valve    | 8 : Duct to be tested |
| 4 : Absolute filters |                       |

*Construction for particle emission*

Tests consisted in :

- Purge during 1 h, air velocity = 12 m/s,
- Stop during 15 min,
- Erosion test during 5 h, air velocity = 18,6 m/s.



The particle accounting is made with an optical laser counter with different channels given in the following table. The counting is not done during the purge.

Channel	Range
1	0,2 – 0,3 µm
2	0,3 – 0,5 µm
3	0,5 – 0,7 µm
4	0,7 – 1,0 µm
5	1,0 – 2,0 µm
6	2,0 – 3,0 µm
7	3,0 – 5,0 µm
8	> 5 µm

*Laser counter range*

The extracted flow rate is of 28,3 l/min.

The average particle concentration is calculated from the extracted air volume and the measurement of the particle's mass using the following formula:

$$C = \frac{M}{Q_v t}$$

Where:

C is the particle concentration in µg/m<sup>3</sup>,

M is the particles' mass in µg,

Q<sub>v</sub> is the extraction flow rate in m<sup>3</sup>/s.

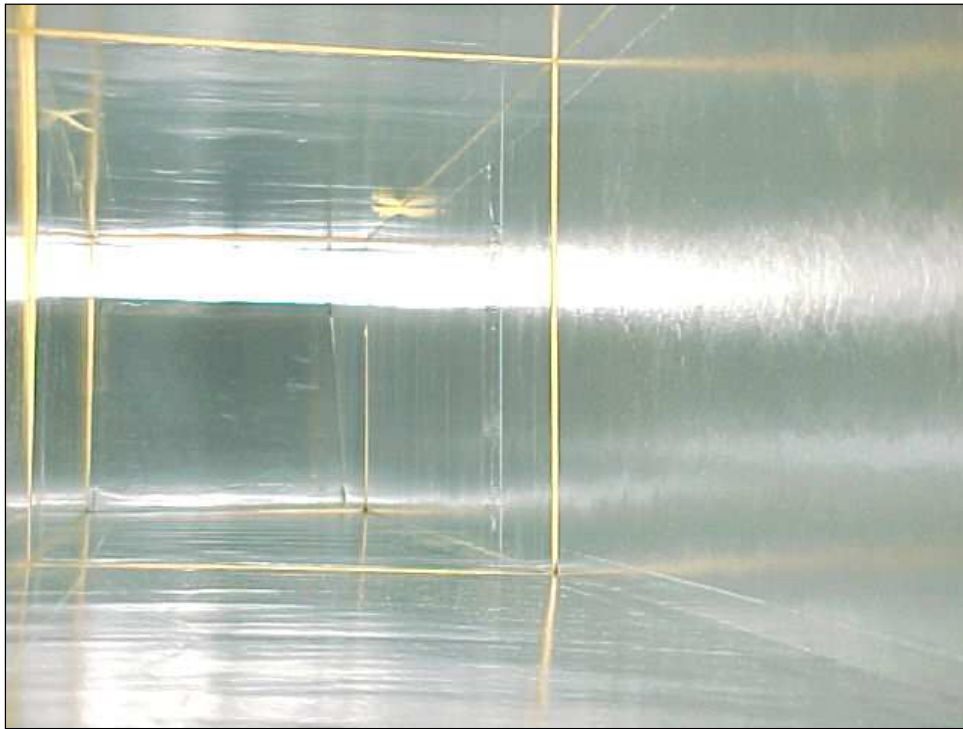
The mass of particles is determined from the number of counted particles and the relative density of the glass (2500 kg/m<sup>3</sup>).



*View of the test facility before the installation of the tested ducts*



*Views of the installation with the tested ducts*



*View of the inside of the P5858 sample*

**DETAILED RESULTS**

Duration of extraction for the optical laser counter : 315 minutes

Extracted flow rate for the optical laser counter : 28,3 l/min = 0,0283 m<sup>3</sup>/min

Extracted flow : 315 × 0,0283 = 8,91 m<sup>3</sup>

Volume of a particle (diameter d) =  $\frac{4}{3} \times \pi \times \left(\frac{d}{2}\right)^3$

Air velocity in the duct : 18,6 m/s

Air temperature : 21.8°C < T < 25.8°C

Range of particles diameter (µm)	Nb of counted particles	Nb of particles/m <sup>3</sup>	Particles mass in µg/m <sup>3</sup>
0,2 - 0,3	37344	4189.1	8.57E-05
0,3 - 0,5	26614	2985.5	2.50E-04
0,5 - 0,7	4165	467.2	1.32E-04
0,7 - 1,0	1504	168.7	1.36E-04
1,0 - 2,0	1285	144.1	6.37E-04
2,0 - 3,0	557	62.5	1.28E-03
3,0 - 5,0	331	37.1	3.11E-03
> 5,0	326	36.6	5.98E-03

*Detailed results of the erosion test – P5858 sample*

	Requirements	Test results
Particles > 0,5 µm	< 60 µg/m <sup>3</sup>	0,015
Particles > 5,0 µm	< 4,0 µg/m <sup>3</sup>	0,007

*Comparison with the requirements – P5858*

The material from the inside surface of the ductwork does not break away, flake off and does not show evidence of delamination or erosion.

The requirements concerning the maximum particle concentration are fulfilled for the P5858 sample.

## APPENDIX 4 - URSA AIR ALU ALU P5858 CHARACTERISTICS

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### Statement of range of products tested according EN 13.403 in CETIAT

Dear Mrs. LEFEBVRE,

URSA AIR range of products is composed by high density mineral wool boards used for making AC duct installations, and mineral wool rolls used for wrapping and insulating metallic duct installations.

In the case of boards, they are always faced by both sides with different types of tissues or fabrics.

The range of URSA AIR boards, at date of 10/11/2015, is composed by:

**1) URSA AIR Alu – Alu – P5858**

Thickness: 25 mm  
Outer facing: Reinforced (with a glass mesh) kraft – aluminum facing  
Actually this facing has URSA and URSA AIR logos printed over its surface.  
Inner facing: Kraft – aluminum facing.  
Actually this facing has the IN Marking printed over its surface. This in marking is a grill of marks that the installers use as reference when they construct ducts.  
Reaction to fire: B s1 d0  
EN 13.403 tested on CETIAT. Technical rapport 2514088 of 02/09/2005.

**2) URSA AIR Zero – P8858**

Thickness: 25 mm  
Outer facing: Reinforced (with a glass mesh) kraft – aluminum facing  
Actually this facing has URSA and URSA AIR logos printed over its surface.  
Inner facing: Black glass fabric.  
This is an acoustical absorption surface.  
Reaction to fire: B s1 d0  
EN 13.403 tested on CETIAT. Technical rapport 2914197/1 of 11/2009, updated on 27/10/2014.

**3) URSA AIR Zero A2 – P8880**

Thickness: 25 mm  
Outer facing: Aluminum glass fabric.  
Actually without printing of URSA logos.  
Inner facing: Black glass fabric.  
This is an acoustical absorption surface.  
Reaction to fire: A2 s1 d0  
EN 13.403 tested on CETIAT. Technical rapport 1214029/1 of 07/2012, updated on 27/10/2014.


**4) URSA AIR Zero Q4 – P8856**

Thickness: 40 mm  
Outer facing: Reinforced (with a glass mesh) kraft – aluminum facing  
Actually this facing has URSA and URSA AIR logos printed over its surface.  
Inner facing: Black glass fabric.  
This is an acoustical absorption surface.  
Reaction to fire: B s1 d0  
EN 13.403 tested on CETIAT. Technical rapport 1314086/3 of 04/11/2013.



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**5) URSA AIR Alu – dB – P6058**

Thickness: 25 mm  
Outer facing: Reinforced (with a glass mesh) kraft – aluminum facing  
Actually this facing has URSA and URSA AIR logos printed over its surface.  
Inner facing: Micro drilled, reinforced (with a glass mesh) pure aluminum  
Actually this facing is not printed.  
Reaction to fire: B s1 d0  
EN 13.403 tested on CETIAT. Technical rapport 2514088 of 02/09/2005.

**6) URSA AIR Alu – TECH2 – P8058**

Thickness: 25 mm  
Outer facing: Aluminum glass fabric.  
Actually without printing of URSA logos.  
Inner facing: Reinforced (with a glass mesh) pure aluminum  
Actually this facing is not printed.  
Reaction to fire: A2 s1 d0  
EN 13.403 tested on CETIAT. Technical rapport 2814200 of 25/09/2008.

**7) URSA AIR Aluvel A2**

Thickness: 25 mm  
Outer facing: Aluminum glass fabric.  
Actually without printing of URSA logos.  
Inner facing: Black glass vell.  
Reaction to fire: A2 s1 d0  
EN 13.403 tested on CETIAT. Technical rapport 1314086/4 of 04/11/2013.

As requested by CETIAT, I can confirm that:

**1) URSA AIR Alu-Alu**

The duct sampling constructed on October 2015 with URSA AIR Alu-Alu, for updating airtightness result, improving sealing of junctions, was done with same product URSA AIR Alu-Alu that were done tests of 2005.

Differences on the current product compared with the 2005 one, are the printing of IN marks over the inner kraft - aluminum surface.  
Since this year 2015 we have printed over the aluminum a grill of points and lines, that are a reference for the installers of 1 cm, 5 cm and 10 cm. This reference is used by the installers for working fast without meters.

Those printed marks are not supposed to affect air tightness results.

**2) URSA AIR Alu-TECH2**

The duct sampling constructed on October 2015 with URSA AIR Alu-TECH2, for updating airtightness result, improving sealing of junctions, was done with same product URSA AIR Alu-TECH2 that were done tests of 2008.

Differences on the current product compared with the 2008 one, is the URSA logo that was printed on the aluminum inner surface in the 2008 product, and now it is not.

Those printed logos are not supposed to affect air tightness results.

**3) URSA AIR Zero Q4**

The duct sampling constructed on October 2015 with URSA AIR Zero Q4, for updating airtightness result, improving sealing of junctions, was done with same product URSA AIR Zero Q4 that were done tests of 2013.



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In conclusion,

URSA certifies that URSA AIR Alu - Alu - P5858 tested in 2005 (2514088) and URSA AIR Alu - Alu - P5858 tested this month in 2015 (tests 1515072) are identical with the same physical characteristics.

URSA certifies that URSA AIR Alu - TECH2 - P8058 tested in 2008 (2814200) and URSA AIR Alu - TECH2 - P8058 tested this month in 2015 (tests 1515072) are identical with the same physical characteristics.

URSA certifies that URSA AIR Zero Q4 - P8856 tested in 2013 (1314086/3) and URSA AIR Zero Q4 - P8856 tested this month in 2015 (tests 1515072) are identical with the same physical characteristics.



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