# Weather Louvre Test

## 449/150

Carried out for

Renson Ventilation NV


Report 105079/3


Compiled by Thomas Costello


5 June 2023

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# Weather Louvre Test

## 449/150

| | |
|---|---|
| Carried out for: | Renson Ventilation NV |
| | Industriezone 2, Vijerdam |
| | Maalbeekstraat 6 |
| | Waregem |
| | 8790 |
| | Belgium |
| | |
| Contract: | Report 105079/3 |
| | |
| Issued by: | BSRIA Limited |
| | Old Bracknell Lane West |
| | Bracknell |
| | Berkshire |
| | RG12 7AH |
| | UK |
| | |
| Telephone: | +44 (0)1344 465600 |
| | |
| Fax: | +44 (0)1344 465626 |

Email: bsria@bsria.co.uk
Website: www.bsria.co.uk

## QUALITY ASSURANCE

| Issue | Date | Compiled by: | Approved by: | Signature |
|---|---|---|---|---|
| *FINAL* | *05-Jun-2023* | *Thomas Costello* | *Anthony Collier* | |
| | | *Senior Technician* | *Technical Operations Manager* | |

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# 1  INTRODUCTION

This report concerns tests conducted on a louvre to determine the Rainwater Penetration and the Pressure Drop versus Airflow Curves, with the associated Coefficient of Entry and Coefficient of Discharge, using the test methods contained within BS EN 13030:2001. It should be noted that BS EN 13030:2001 simply provides a method for testing and rating louvre samples, there are no minimum permitted values or recommendations for louvre performance.

The work was commissioned by Renson Ventilation NV and was carried out at BSRIA North from 4th May to 18th May 2023, by Thomas Costello and Samuel Twibill of BSRIA Ltd.

## Items received for test

| Test Item | BSRIA ID |
|---|---|
| 449/150 | 105079A3 |

## 1.1  TEST ITEM INFORMATION

| | |
|---|---|
| **Contract** | 105079 |
| **Date** | 1/5/23 |
| **Manufacturer** | Renson Ventilation NV |
| **Louvre Model** | 449/150 |
| **Material** | Aluminium |
| **Painted** | No |
| **Core Area Height** | 973 mm |
| **Core Area Width** | 973 mm |
| **Blade Pack Depth** | 145 mm |
| **Frame Depth** | 155 mm |
| **No. of Blades** | 5 |
| **Blade Pitch** | 170 mm |
| **Blade Angle** | 45° approx. |
| **No. of Banks** | 1 |
| **Guard Type** | Insect |
| **Guard Spacing** | 10 mm |
| **Side Channels** | No |
| **Water Drip Tray** | No |
| **Blade Orientation** | Horizontal |

**Note**: Weather louvre core area - product of the minimum height H and minimum width W of the front opening in the weather louvre assembly with the louvre blades removed.
Blade Pack Depth refers to the distance from front of first bank to rear of last bank.

**Figure 1   Test item 105079A3 (front)**



**Figure 2   Test item 105079A3 (rear)**

**Figure 3  Test item 105079A3 (close-up of guard)**
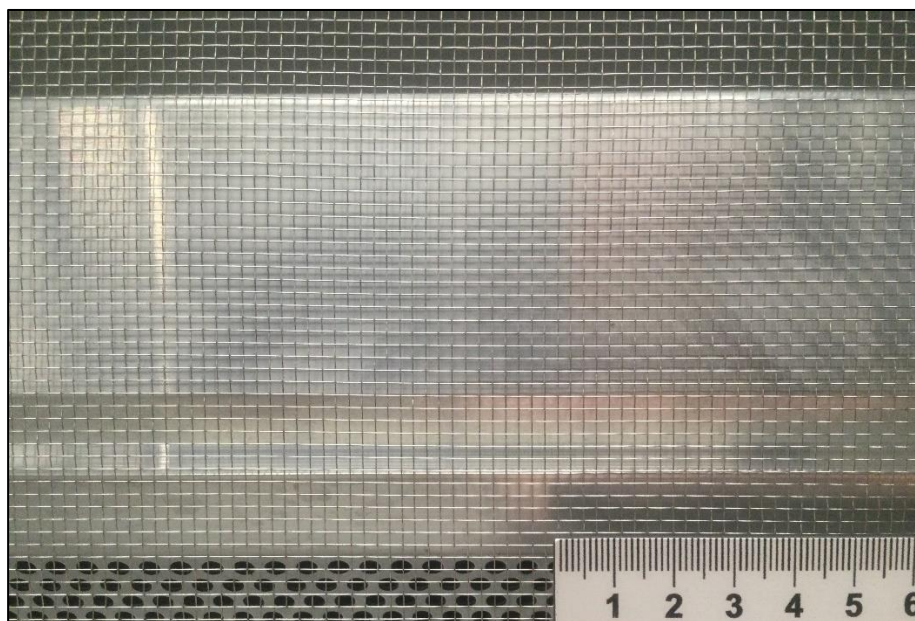
# 2  TEST METHOD

A schematic representation of the rig used during testing



The test comprises of two parts:

## 2.1  WATER PENETRATION

The weather louvre is subjected to fan driven wind at a speed of 13 m/s and water sprayed as rainfall at a rate of 75 l/h (+10% / -0%).  In addition t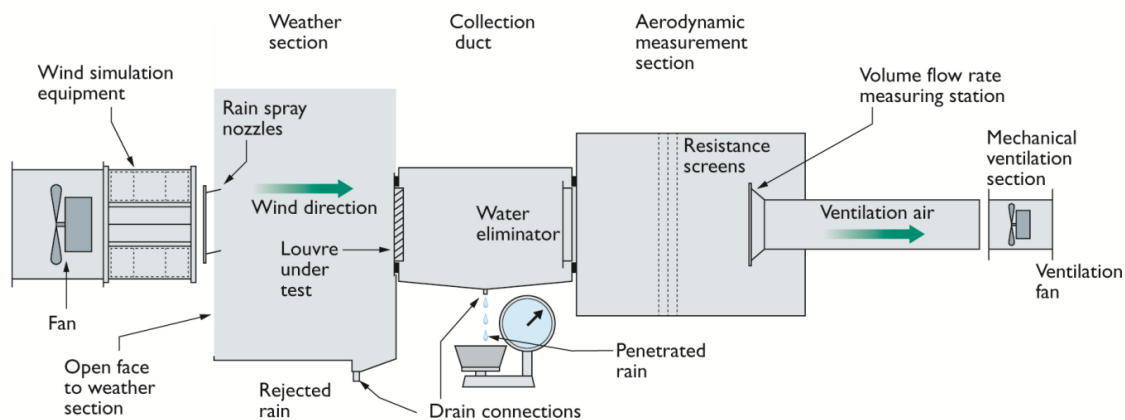o the simulated wind and rain, air is drawn through the louvre at various set velocities (0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 and 3.5 m/s).
Each test is preceded by a suitable 'pre-test' soak which is typically around 30 minutes. Each test is run until the results become stable, and in any case, for a minimum of 30 minutes.
The penetrated water is collected in the collection duct and is measured and recorded against time elapsed. A range of measurements are taken to give the characteristic curve for the test louvre.

## 2.2  PRESSURE DROP

For this test, the Aerodynamic Measuring Section (AMS) is separated from the main rig. The louvre is then mounted in the upstream opening of the AMS.
Pressure tappings in the plenum walls of the AMS allow measurement of the static pressure within the plenum during testing. The airflow volume is calculated from the differential pressure at the measuring cones. The plenum has a set of settling screens within to produce even flow through the cones and therefore gives an accurate reading of the total volume.
By adjusting the fan speed, the total airflow through the system varies and therefore changes the pressure on the louvre under test. A range of measurements are taken to give the characteristic curve for the test louvre.

## 2.3  TEST EQUIPMENT USED

| Test equipment | BSRIA ID | Calibration Expiry Date |
|---|---|---|
| Rain measuring system | 353 | 19-12-23 |
| Airflow cones | 364 | 18-12-23 |
| Fan | 484 | 19-12-23 |
| Scales (water) | 1599 | 26-05-23 |
| Micromanometer | 1600 | 24-11-23 |
| Micromanometer | 1601 | 24-11-23 |
| Temperature and Pressure Gauge | 1605 | 10-10-23 |
| Flow meter | 1533 | 05-05-23 |
| Water supply measurement | 1749 | 20-12-23 |

# 3  RESULTS

## 3.1  RAINWATER PENETRATION

Manufacturer  Renson Ventilation NV                                      Date 04/05/2023
       Model  449/150                                               Contract 105079

| | | | |
|---|---|---|---|
| Core Area Height | 973 | mm |
| Simulated Rainfall  75 (+10% / -0%)  mm/hr | Core Area Width | 973 | mm |
| Wind Speed  13 (+/-10%)  m/s | Core Area Area | 0.947 | m² |

Core Area Height  973  mm
Core Area Width  973  mm
Core Area Area  0.947  m²

Simulated Rainfall  75 (+10% / -0%)  mm/hr
Wind Speed  13 (+/-10%)  m/s

| Ventilation Rate | | Water Flow Rates | | Effectiveness | Class |
|---|---|---|---|---|---|
| Volume<br>m³/s | Velocity<br>m/s | Supply<br>l/h | Penetrated<br>l/h | % | |
| 0.00 | 0.00 | 97.2 | 9.3 | 88.0 | C |
| 0.47 | 0.50 | 97.2 | 16.7 | 78.5 | D |
| 0.95 | 1.00 | 97.2 | 22.5 | 71.1 | D |
| 1.42 | 1.50 | 97.2 | 29.2 | 62.4 | D |
| 1.89 | 2.00 | 97.2 | 36.2 | 53.6 | D |
| 2.37 | 2.50 | 97.2 | 46.5 | 40.4 | D |
| 2.84 | 3.00 | 97.2 | 55.0 | 29.9 | D |
| 3.31 | 3.50 | 97.2 | 63.8 | 18.2 | D |

**Effectiveness of Louvre with Simulated Wind and Rain**
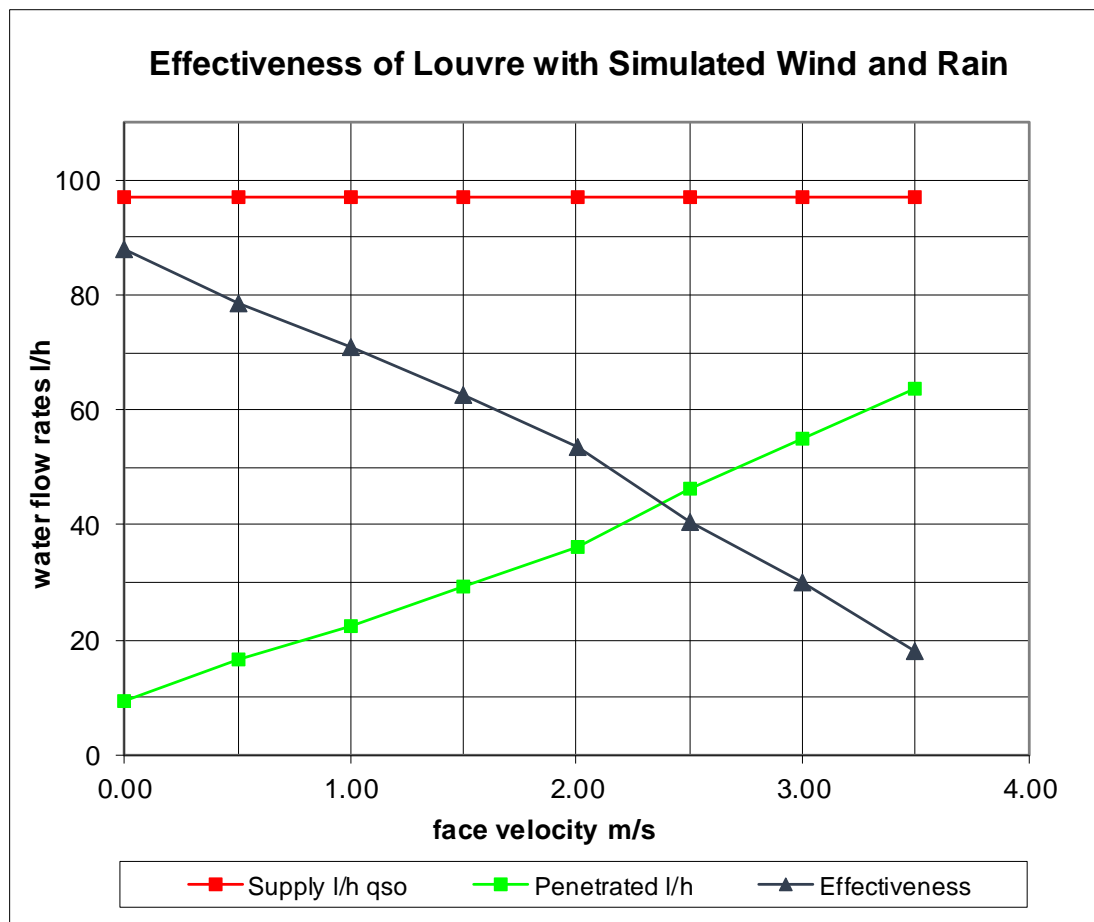
## 3.2  COEFFICIENT OF ENTRY

Manufacturer  Renson Ventilation NV                    Date 18/05/2023
    Model  449/150                                        Contract 105079

Air Temperature    18.3    °C          Core Area Height        973        mm
    Barometer  1022.5  mbar          Core Area Width        973        mm
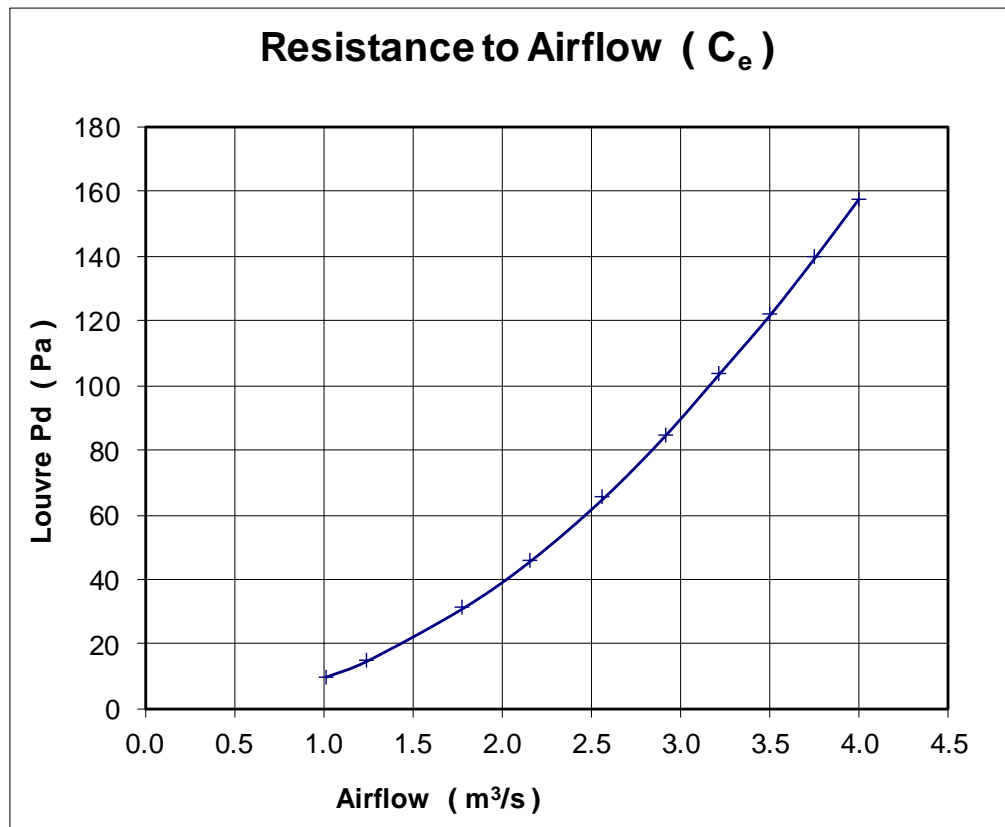    Air Density   1.217   kg/m$^3$          Core Area Area        0.947      m$^2$

| Louvre p.d. Pa | Louvre Face Velocity m/s | Air Flow Rate | | Coefficient $C_e$ |
| --- | --- | --- | --- | --- |
| | | Test m$^3$/s | Theoretical m$^3$/s | |
| 10.0 | 1.07 | 1.012 | 3.837 | 0.264 |
| 15.1 | 1.32 | 1.247 | 4.716 | 0.264 |
| 31.2 | 1.88 | 1.777 | 6.778 | 0.262 |
| 46.0 | 2.28 | 2.160 | 8.230 | 0.262 |
| 65.3 | 2.71 | 2.567 | 9.806 | 0.262 |
| 84.6 | 3.08 | 2.912 | 11.162 | 0.261 |
| 104.0 | 3.40 | 3.219 | 12.375 | 0.260 |
| 122.0 | 3.70 | 3.500 | 13.404 | 0.261 |
| 140.0 | 3.97 | 3.755 | 14.358 | 0.262 |
| 158.0 | 4.22 | 3.998 | 15.253 | 0.262 |
| | | | Mean $C_e$ | 0.262 |
| | | | Class | 3 |

### Resistance to Airflow ( $C_e$ )



A 'trendline' for the above graph would follow $y = 9.7506x^{2.0164}$

## 3.3 COEFFICIENT OF DISCHARGE

Manufacturer  Renson Ventilation NV                    Date 18/05/2023
    Model  449/150                            Contract 105079

| | | |
|---|---|---|
| Air Temperature | 18.5 | °C |
| Barometer | 1022.6 | mbar |
| Air Density | 1.217 | kg/m$^3$ |

| | | |
|---|---|---|
| Core Area Height | 973 | mm |
| Core Area Width | 973 | mm |
| Core Area Area | 0.947 | m$^2$ |

| Louvre p.d. Pa | Louvre Face Velocity m/s | Air Flow Rate Test m$^3$/s | Theoretical m$^3$/s | Coefficient $C_d$ |
|---|---|---|---|---|
| 10.0 | 0.91 | 0.862 | 3.839 | 0.225 |
| 20.7 | 1.32 | 1.250 | 5.523 | 0.226 |
| 40.0 | 1.87 | 1.768 | 7.677 | 0.230 |
| 61.7 | 2.29 | 2.168 | 9.535 | 0.227 |
| 81.5 | 2.65 | 2.505 | 10.958 | 0.229 |
| 105.0 | 3.02 | 2.858 | 12.438 | 0.230 |
| 129.0 | 3.34 | 3.166 | 13.787 | 0.230 |
| 153.0 | 3.65 | 3.456 | 15.015 | 0.230 |
| 179.0 | 3.93 | 3.719 | 16.240 | 0.229 |
| 200.0 | 4.18 | 3.956 | 17.167 | 0.230 |
| | | | Mean $C_d$ | 0.229 |
| | | | Class | 3 |



**Resistance to Airflow ( $C_d$ )**
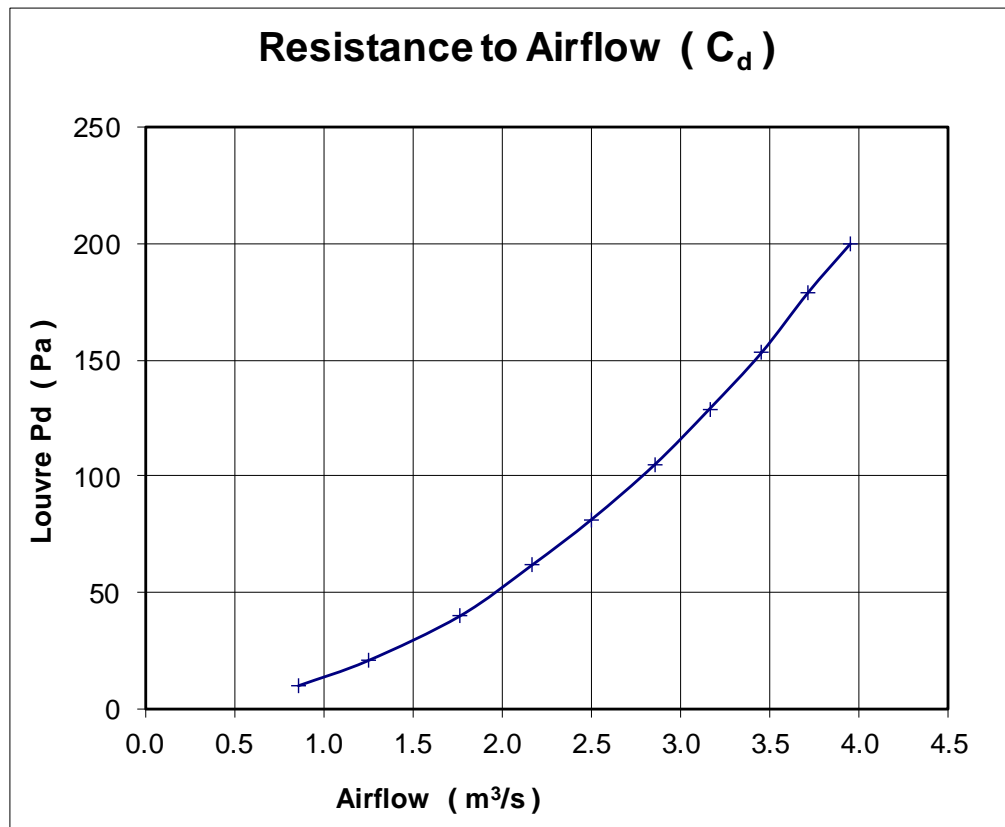
A 'trendline' for the above graph would follow $y = 13.311x^{1.9709}$

# APPENDIX A:  MANUFACTURER'S DRAWING



A-A ( 1 : 5 )

Insect mesh 2,3 x 2,3mm

1097
973

1097
973
988
170
64
40°
142
156

| Mat. : | | Finish : | | Weight :6,907 kg | Area : | | Volume :10581,374 cm | Base part : | | Tol. : | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Description : | | 449/150 with Insect Mesh 2,3 x 2,3mm | | | | | Sheet : 1 /1 | |
| | RENSON® Creating healthy spaces | | Use. : | | Akoustische Rooster | | | | | Scale : 1 : 5 | |
| | www.renson.eu - 8790 Waregem (Belgium) | | Part. nr. : | | | | | | | Drawn : nvlie | |
| | This drawing is owned by RENSON and may not be copied or shown to third parties without written permission. | | | r0250965 | | Revision | State :Work in Progress | Date Saved : 03/02/2023 | | Size : | |
| | | | | | | ~ | Doc. nr.:r0250965 - 449-150 with Insect Mesh 2,3 | | A3 | units in mm | |