Louvre Airflow Test

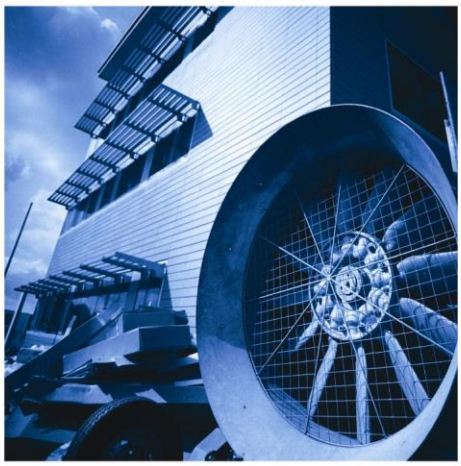
421/L.050.00

Final Report 60554/2

Carried out for
nv RENSON Sunprotection-Projects sa

By Andrew Freeth

27 November 2018



Louvre Airflow Test 421/L.050.00

Carried out for:

nv RENSON Sunprotection-Projects sa
Maalbeekstraat 6
8790 Waregem
Belgium

Contract: **Final Report 60554/2**

Date: **27 November 2018**

Issued by: **BSRIA Limited**
Old Bracknell Lane West,
Bracknell,
Berkshire RG12 7AH UK

Telephone: +44 (0)1344 465600

Fax: +44 (0)1344 465626

E: bsria@bsria.co.uk W: www.bsria.co.uk

Compiled by:	Approved by:
Name: Andrew Freeth	**Name:** Mark Roper
Title: Senior Test Engineer	**Title:** Principal Test Engineer

CONTENTS

APPENDICES

FIGURES

1 INTRODUCTION

This report concerns tests conducted on a louvre to determine the Pressure Drop versus Airflow Curve, with the associated Coefficient of Entry and Discharge using the test methods contained within EN 13030:2001. The work was commissioned by nv RENSON Sunprotection-Projects sa, and was carried out at BSRIA North, Preston on 10 – 13 October 2017.

Items received for test

Test Item	BSRIA ID
421/L.050.00	60554A2

1.1 TEST ITEM INFORMATION

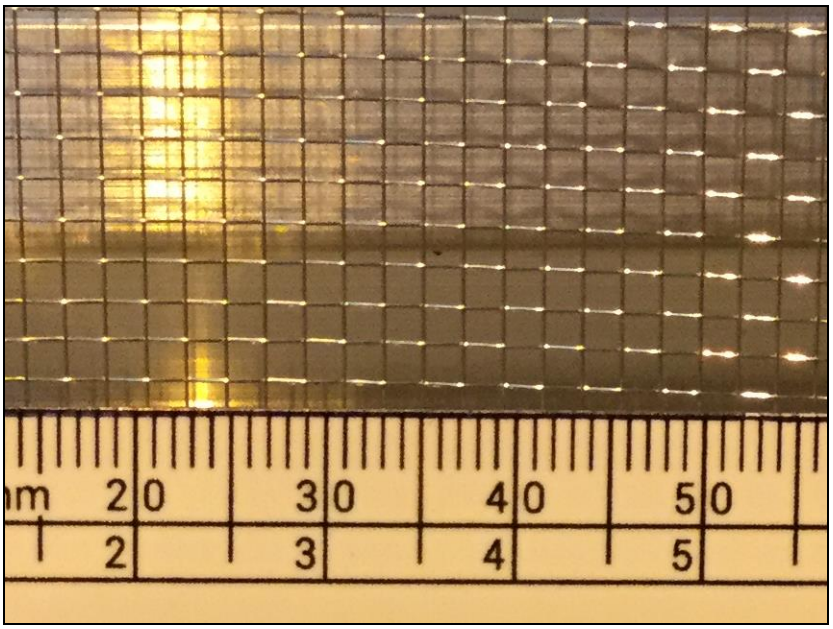
Contract		60554
Date		9-10-17
Manufacturer		nv RENSON Sunprotection-Projects sa
Louvre Model		421/L.050.00
Material		Aluminium
Painted		No
Core Area Height		970 mm
Core Area Width		980 mm
Blade Pack Depth		41 mm
Frame Depth		50 mm
No. of Blades		19
Blade Pitch		50 mm
Blade Angle		45º approx.
No. of Banks		1
Guard Type		Insect
Guard Spacing		10 mm
Side Channels		No
Water Drip Tray		Yes
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 60554A2 (front)

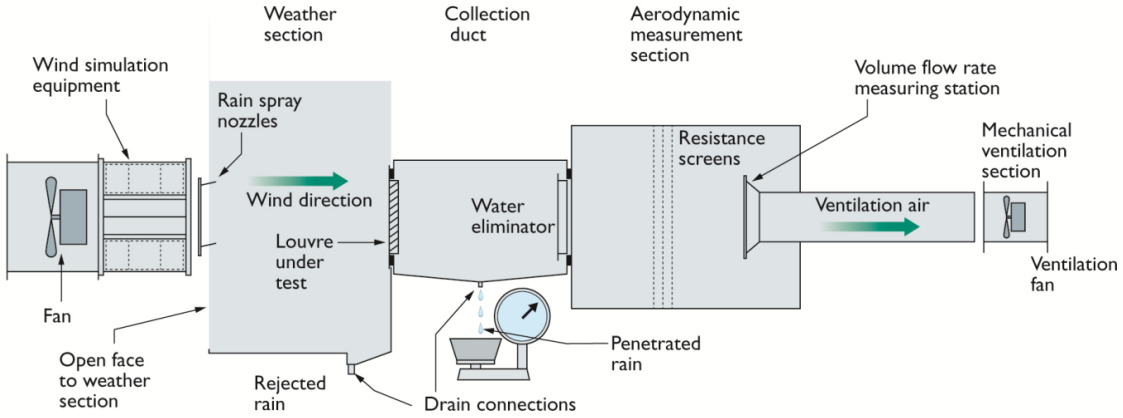
Figure 2 Test item 60554A2 (rear)

Figure 3 Close-up of guard



2 TEST METHOD

A schematic representation of the rig used during testing



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. In addition to 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
Water supply measurement	352	24-4-18
Rain measuring system	353	24-4-18
Airflow cones	364	7-1-19
Micromanometer	1600	24-6-18
Micromanometer	1601	24-6-18
Scales (water)	1599	20-6-18
Flow meter	1533	9-6-18

3 RESULTS

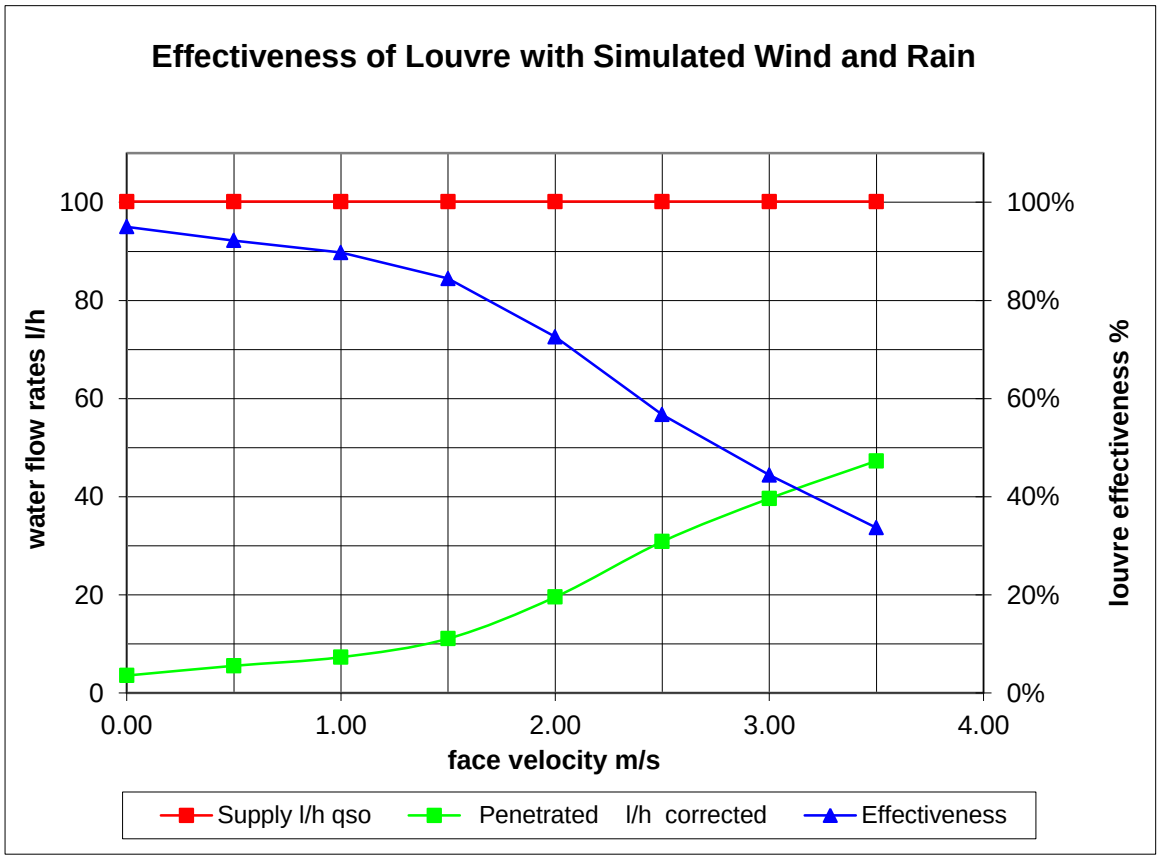
3.1 RAINWATER PENETRATION

MANUFACTURER nv RENSON Sunprotection-Projects sa Date 10/10/2017
MODEL 421/L.050.00 Contract 60554

Simulated rainfall 75 mm/hr
Wind speed 13.0 m/s

louvre height 970 mm
louvre width 980 mm
louvre area 0.951 m^2

VENTILATION RATE		WATER FLOW RATES		Effectiveness	Class
Volume m^3/s	Velocity m/s	Supply l/h	Penetrated l/h		
0.00	0.00	100.2	3.6	95.0%	B
0.48	0.50	100.2	5.5	92.2%	C
0.95	1.00	100.2	7.3	89.8%	C
1.43	1.50	100.2	11.1	84.5%	C
1.90	2.00	100.2	19.6	72.6%	D
2.38	2.50	100.2	30.9	56.7%	D
2.85	3.00	100.2	39.6	44.4%	D
3.33	3.50	100.2	47.3	33.7%	D

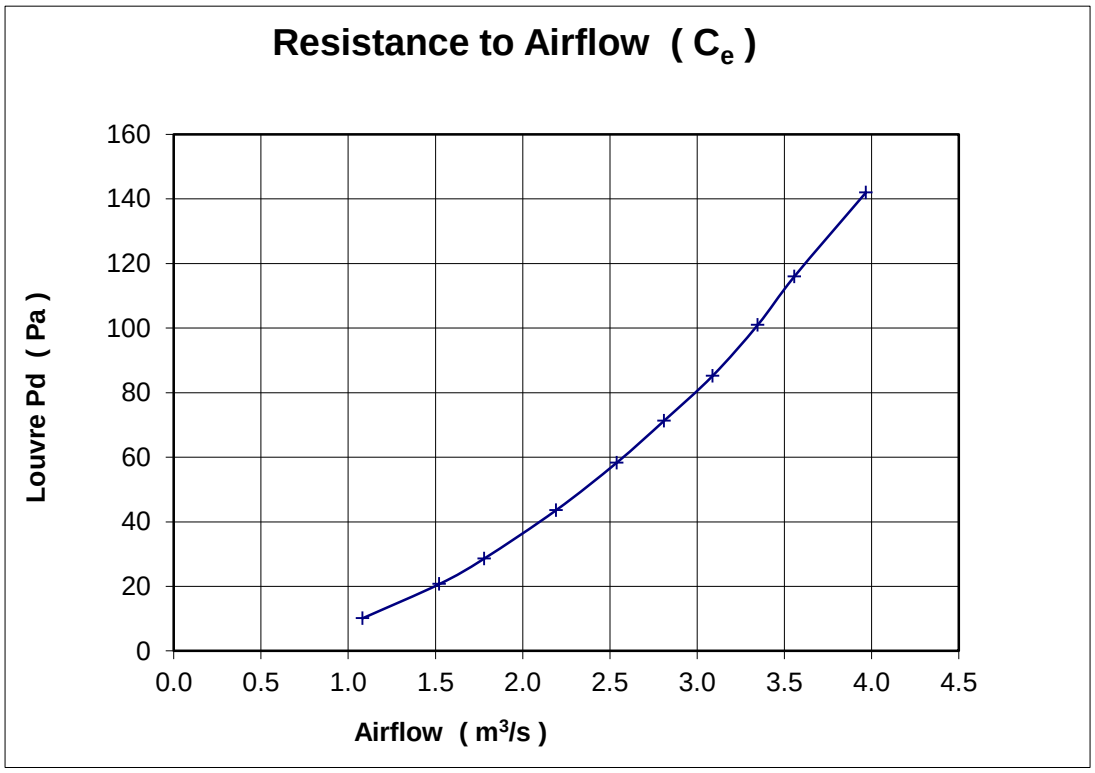


3.2 COEFFICIENT OF ENTRY

MANUFACTURER nv RENSON Sunprotection-Projects sa Date 13/10/2017
MODEL 421/L.050.00 Contract 60554

air temperature	15.9	°C	louvre height	970	mm
barometer	1008	mbar	louvre width	980	mm
air density	1.210	kg/m^3	louvre area	0.951	m^2

	louvre face velocity	air flow rate		
louvre pd Pascals	m/s	test m^3/s	theoretical m^3/s	coefficient C_e
10.1	1.14	1.082	3.883	0.279
20.7	1.60	1.522	5.559	0.274
28.6	1.87	1.779	6.535	0.272
43.6	2.31	2.192	8.068	0.272
58.3	2.67	2.539	9.330	0.272
71.3	2.96	2.811	10.318	0.272
85.2	3.25	3.089	11.278	0.274
101.0	3.52	3.348	12.280	0.273
116.0	3.74	3.558	13.160	0.270
142.0	4.17	3.968	14.560	0.273
			mean C_e	0.273
			Class	3



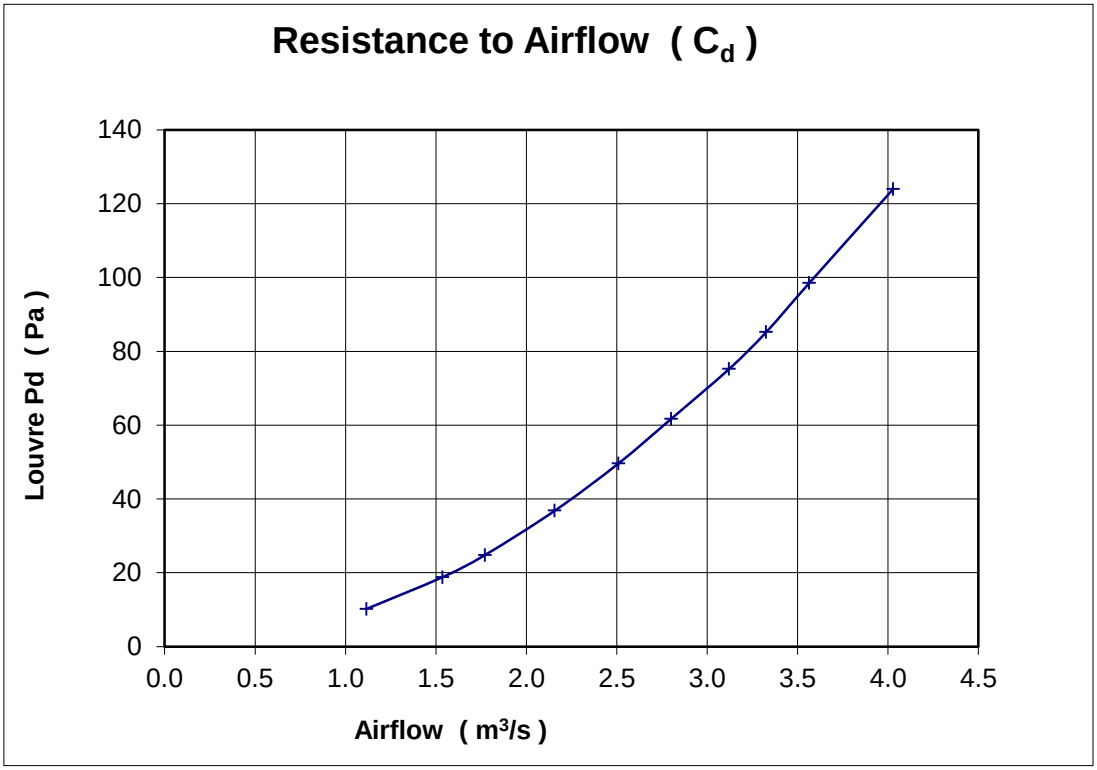
A 'trendline' for the above graph would follow $y = 8.773x^{2.027}$

3.3 COEFFICIENT OF DISCHARGE

MANUFACTURER nv RENSON Sunprotection-Projects sa Date 13/10/2017
MODEL 421/L.050.00 Contract 60554

air temperature	16.2	°C	louvre height	970	mm
barometer	1008	mbar	louvre width	980	mm
air density	1.209	kg/m^3	louvre area	0.951	m^2

	louvre face velocity	air flow rate		
louvre pd Pascals	m/s	test m^3/s	theoretical m^3/s	coefficient C_d
10.2	1.17	1.117	3.904	0.286
18.8	1.62	1.536	5.301	0.290
24.8	1.86	1.771	6.088	0.291
36.8	2.27	2.157	7.416	0.291
49.6	2.64	2.509	8.610	0.291
61.7	2.95	2.801	9.603	0.292
75.2	3.28	3.121	10.601	0.294
85.2	3.50	3.327	11.284	0.295
98.5	3.75	3.565	12.133	0.294
124.0	4.24	4.030	13.613	0.296
			mean C_d	0.292
			Class	3



A 'trendline' for the above graph would follow $y = 8.1794x^{1.9534}$

APPENDIX: A MANUFACTURER'S DRAWING