Kingfisher Louvre Systems Ltd
Plymouth Avenue
Brookhill Industrial Estate
Pinxton, Nottingham, NG16 6NS
Tel: 01773 814102

Information Update

PMP69 Issue 2 Dec 2024

Louvre Performance Testing Data

Introduction

Weather louvres should be tested and rated to ascertain water rejection and airflow performance when subjected to simulated rain and wind pressure both with and without airflow through the louvre under test. The test method used is BS EN 13030:2001 Ventilation for buildings - Terminals - Performance testing of louvres subjected to simulated rain. Testing with airflow through the blades simulates a louvre used for example as part of a forced ventilation system with an air intake fan attached. Testing without airflow through the blades simulates a naturally ventilated system similar to a plant room louvre without fans.

Classification

Weather louvres are classified by their ability to reject simulated rain and the ease with which they allow air to pass through. The BS EN classification is derived using 2 classifications from the aforementioned traits. The classification is outlined in table 1 and shows the maximum simulated rain penetration per meter squared of louvre. For the classification of pressure drop per meter squared of louvre table 2 is used.
For any given louvre type, the classification may be different for different ventilation velocities across the louvre as rain can be carried in the airstream.

Effectivness (%)	Maximum Rain Penetration ($L/hr/m^2$)	Classification
≥99	0.75	A
95 - 98.9	3.75	B
80 - 94.9	15	C
<80	>15	D

Table 1: Penetration Classification

Coefficient of Discharge (C_D)	Classification
≥0.4	1
0.3 - 0.39	2
0.2 - 0.29	3
<0.2	4

Table 2: Coefficient of Discharge Classification

To get the BS EN classification both the rain and pressure classifications are combined with the rain preceding the Cd and then followed by the core velocity e.g. B2 up to 2m/s.

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Water Penetration Test

In the test the louvre bank is 1,000mm x 1,000mm and uses standard blade pitch. The test is conducted at a minimum of eight different ventilation velocities through the louvres ranging from 0 to 3.5m/s. All tests use a simulated heavy rainfall of 75mm/hr (75 L/hr/m²), with a simulated wind speed of 13m/s and a minimum period of 30 minutes. Throughout the test the following data points are recorded:

- Water supply rate
- Water rejection rate
- Water penetration rate
- Airflow rate through the louvre (except for no airflow test)

Results are plotted on a graph with "E" (% effectiveness) against the ventilation velocity.

The penetration test set is shown in figure 1 and items within the figure will be referenced in the following body of text in relation to the test procedure. The simulating equipment is set to produce a wind speed of 13m/s and rainfall of 75mm/hr.

- The initial test has a ventilation rate of 0m/s this is measured on the other side of the louvre by an airflow measurement device. During the test Drain A will collect any water that is rejected by the louvre whereas Drain B will collect any water that manages to penetrate the louvre.
- The test is repeated with the ventilation rate set at 0.5m/s which was generated by the ventilation fan. Throughout the test the rain collected in both drains is measured again for later analysis.
- The test is repeated multiple times with the ventilation rate increasing to 3.5m/s in 0.5m/s intervals, the same data is collected as in the previous tests.
- Test analysis is done through the calculation of the louvres percentage effectiveness of rain rejection (E), this value is to be calculated at each increment of the ventilation rate.

"E" is normally quoted against ventilation rates of 0m/s and 1.5m/s. Zero ventilation will always give the best "E" value as the rain is not being sucked through the louvres.
"E" is calculated through the following equation with "Simulated Rain" being collected in "Drain A" and "Penetrated Rain" being collected in "Drain B".

$$E = \frac{Simulated\ Rain - Penetrated\ Rain}{Simulated\ Rain} * 100$$

Equation 1: Effectiveness of Rain Rejection

Example:

$$E = \frac{75 - 0.75}{75} * 100$$

$$E = 99\% = 0.75lhr^{-1}\ over\ 1m^2$$

Manufacturers, when talking of good weatherability will be referring to the performance at 0m/s ventilation rate. It is therefore important when talking to clients about performance that the ventilation rate used in making comparisons is established.

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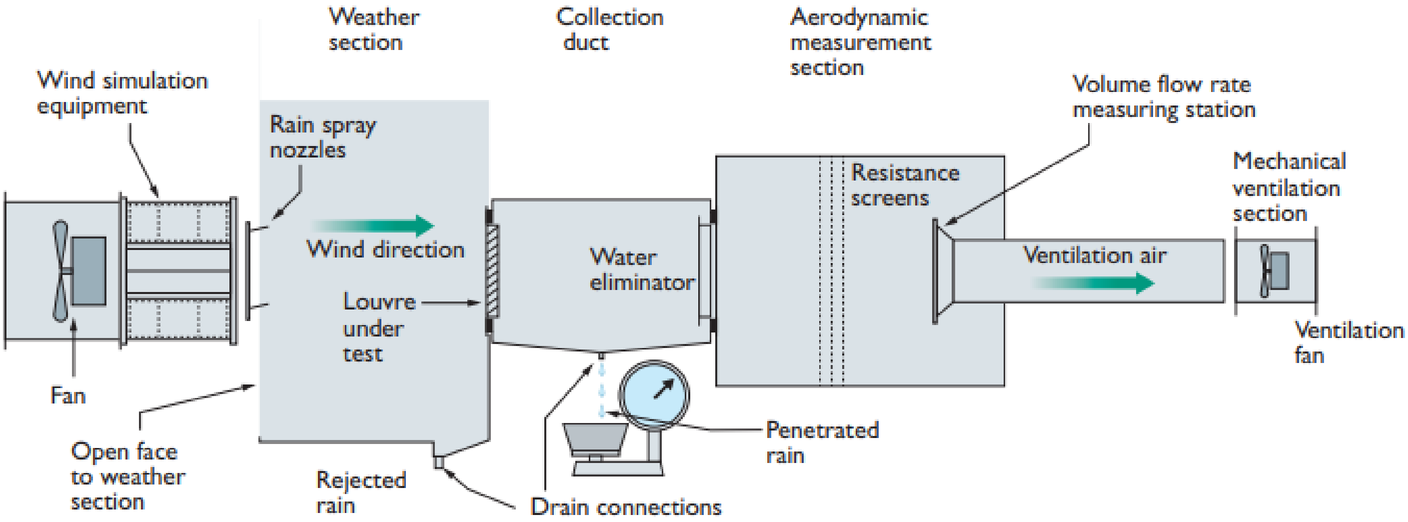

Figure 1: Diagram of Rain Penetration Test Set Up

Airflow Resistance

Airflow performance of a louvre panel is measured by its discharge loss coefficient (Cd). The Cd is a measure of the ease with which air will flow across and through a louvre, a higher Cd value means low resistance to flow and a low-pressure drop. The method of testing is to pass air through a louvre at various volume flow rates up to a maximum of 3.5m³/s noting the pressure drop across the louvre at each rate top provide a Cd value. It should be noted that whilst the Cd will remain constant irrespective ofthe volume flow rate, the pressure drop will increase as the volume flow rate increases.

$$C_d = \frac{Actual\ Airflow}{Theoretical\ Airflow}$$

Equation 2: Coefficient of Discharge

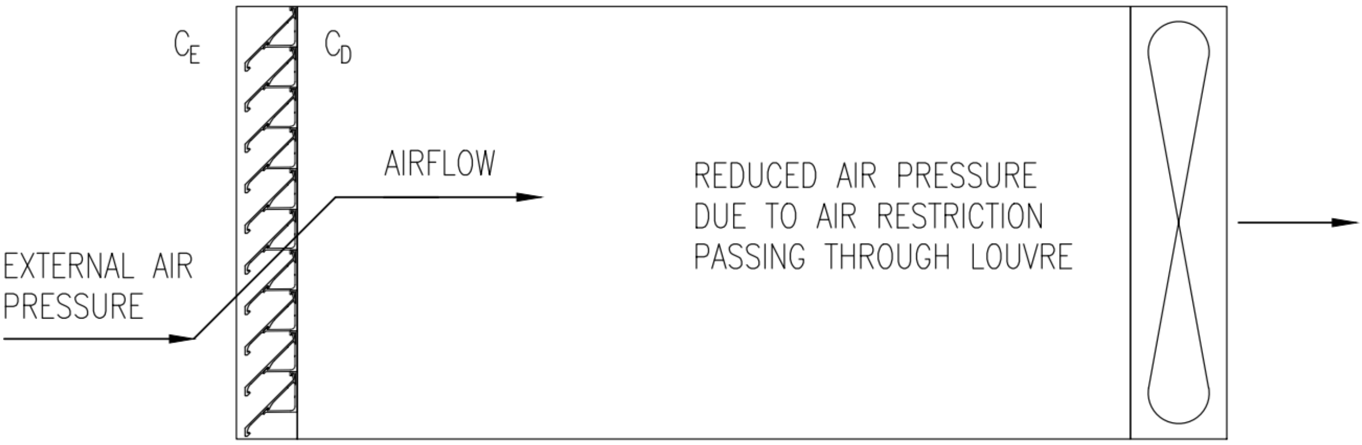

Figure 2: Diagram of Pressure Drop Test Set Up

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Appendix

Actual airflow – Flow of air through the louvres

Theoretical airflow – Flow with a loss coefficient of 1 or the flow through an opening the same size as the test louvre but without the louvres in place.

Core Area – Product of the minimum height 'H' and minimum width 'W' of the smallest opening in the louvre panel assembly with the blades removed. (To avoid misinterpretation of the definition and subsequent misleading weather louvre performance figures,the core area should be the smallest 'hole' in the louvre panel within 40mm to the front or rear of the leading edge.)

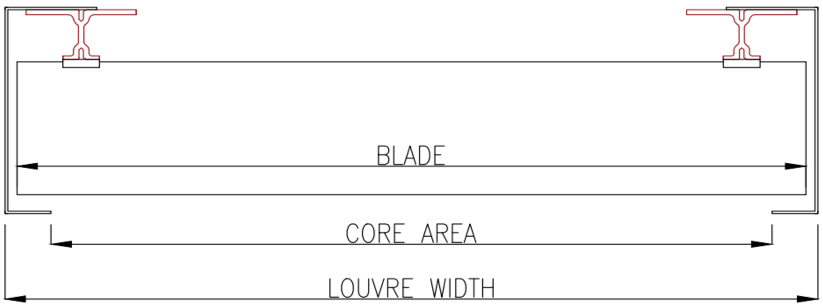

Figure 3: Core Area

Free Area

The free area is calculated using the smallest dimension between any two blades at given centres.

$$Free\ Area = \frac{Smallest\ Dim}{100} * 100$$

Equation 3: Free Area

Example equation uses data from figure 4.

$$Free\ Area = \frac{52}{100} - 100$$
$$Free\ Area = 52\%$$

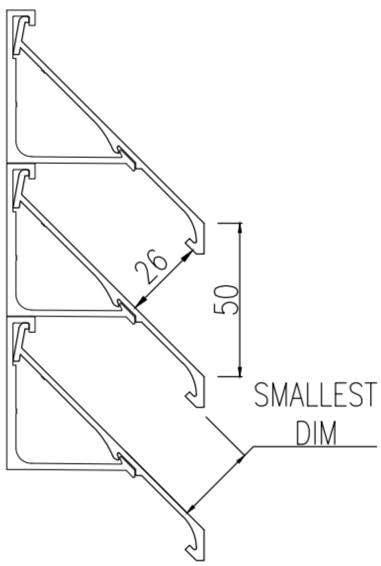

Figure 4: Free Area

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Whilst a high free area has the potential to give good airflow it does not necessarily follow that a louvre with a high free area will have the best airflow. The shape of the blade, particularly with surface protrusions will affect smooth airflow and it is therefore important in a sales situation that Cd values and not free area is used for performance comparisons.