Kingfisher Louvre Systems Ltd
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Information Update

PMP71 Issue 2 Dec 2023

Free Area vs Airflow

Free Area

Free Area is not indicative of airflow, it does not measure the movement or air. It is calculated using (equation 1) the smallest dimension between any two blades at given centres.

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

Equation 1: Free Area

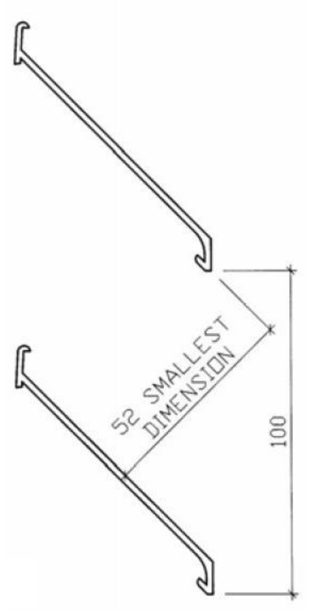

Figure 1: Free Area

Increasing the free area is not necessarily a method of improving the airflow. This is shown by KW75HPG having a 47% free area but class 2 airflow and KW100Z having a 61% free area but class 3 airflow. This leads to the conclusion that the blade profile influences how the air is manipulated across the blade and consequently its airflow classification.

The free area can easily be manipulated by manufactures showing a “visual” and “actual” free area on their websites. Generally the “visual” free area will yield a higher value however, this is not used in the free area equation the “actual” would be used as this is the smallest dimension shown in figure 1.

If a customer calls and claims they want a louvre with a high free area, determine what type of air flow they require. Using the above information inform them on lack of evidence for the correlation of free area vs airflow performance.

Discharge Loss Coefficient

Discharge Loss Coefficient (Cd) is required when calculating air flow and is a measure of the resistance to air passing through the louvre.

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

Equation 2: Coefficient of Discharge

Using equation 2 as reference “actual airflow” denotes the flow of air through the louvres whereas, “theoretical airflow” is the flow of air through an open area (without anything installed) equal to the test louvre. Table 1 highlights the correlation between the ventilation and Cd value.

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Increased Cd	Reduced Air Resistance	Good Ventilation
Reduced Cd	Increased Air Resistance	Poor Ventilation

Table 1: Cd and Ventilation Performance

Pressure is measured in Pascals (Pa), air flow is the pressure difference experienced between entry and exit of the louvre. This is shown through a combination of figure 2 and equation 3 with the variables in the equation being pulled from figure 2.

$$\text{Pressure Drop} = \text{Intake} - \text{Exhaust}$$

Equation 3: Pressure Drop

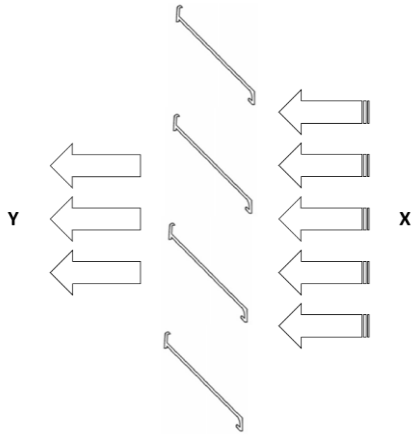

Figure 2: Pressure Drop Example

By substituting the variables into equation 3 intake becomes "X" and exhaust becomes "Y" this is due to the direction of airflow through the louvre if the flow was inverted the variables would also invert. If you have an entry pressure of 25Pa and an exit pressure of 15Pa this would produce a pressure drop of 10Pa. The lower the calculated pressure drop the more effective the system is at ventilation. A drop in pressure indicates that air is prevented from passing through the louvre, this is likely due to the blade profile.

It's common for customers to ask us for a louvre which cannot exceed a maximum specified pressure drop. We can perform a pressure drop calculation to confirm this. Within the Kingfisher Bible there is a sheet talking you through this process and on the Technical Server there is a calculator folder with a pressure drop excel document in. Customers must provide us with some information before we can complete the calc for them, ensure that any calcs done are saved within the project folder.

BSRIA Classifications

Another indicator of the airflow performance of a louvre is the BSRIA performance classifications. These are generated through the BS 13030 2001 testing and classifications are as follows:

Classification	Coefficient of Discharge
1	≥0.4
2	$0.3 - 0.3\dot{9}$
3	$0.2 - 0.2\dot{9}$
4	≤0.2

Table 2: Cd Value Brackets for BSRIA Classificions