A photograph of a modern building facade featuring large glass panels and white horizontal louvers. The building is set against a clear blue sky. A red rectangular overlay is positioned on the left side of the image, containing white text.

A guide to specifying weather or performance Louvres.



Construction Specialties™

About the Author

Founded in the United States, C/S has been a global manufacturer and supplier of a range of specialist building products for over 60 years.

Operating through 22 offices worldwide, with key manufacturing locations or sales offices in most European countries and employing more than 2,000 people around the world, C/S have the skills and the knowledge to help you with your building.



We have more than 60 years experience in the design, manufacture, specification and installation of Louvres and have worked on some of the most prestigious projects in the world.

With years of experience under our collective belts, we've distilled our knowledge and experience into this compact guide to specifying, installing and using Louvres, including extracts from the BSRIA Guide to Weather Louvre Specification.

So lets get started...

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What is a Louvre?



- BSRIA defines a weather louvre as: “...a passive device, intended to allow the passage of air into or out of a building or ventilation system, while restricting the entry of rain.”

Others define louvre as:

- “A framed opening, as in a wall, door or window, fitted with fixed or moveable horizontal slats for allowing air and light through whilst stopping rain.”
- “A way of providing necessary airflow, both intake and exhaust to HVAC and heavy plant machinery.”

Why are they used?

Louvres are used on most building's in some form or another. Louvre systems usually provide airflow, both intake and exhaust, to HVAC and other building systems, while protecting these openings against rain.

As well as providing natural ventilation, an efficient louvre system can improve airflow to building systems, which means less power is needed to move the volumes of air required. In the cases of HVAC systems, this improvement in energy efficiency can sometimes mean a smaller and less powerful system is required for space heating and cooling.



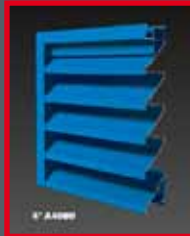
What types of louvre are there?

There are 3 main types of louvre:



Performance (or Weather) Louvre

The main objective of Performance Louvre is to allow the passage of air, whilst providing the room beyond the louvre with protection from rain penetration.



Standard Louvre

A standard louvre will provide the maximum airflow required with some degree of rain defence. These louvres tend to be preferred for projects where economy is the primary consideration, high free area is important and occasional water penetration will not cause significant problems.



Screening Louvre

Screening louvre is often used on the top of buildings to conceal HVAC systems. Their primary objective is to hide unsightly equipment.

Free Area

Did you know that specifying building louvres on free area alone can cause problems?

The principle reason for using louvres is to move air. But how do you know if the louvre you specify will actually deliver the air volume the engineer has asked for?

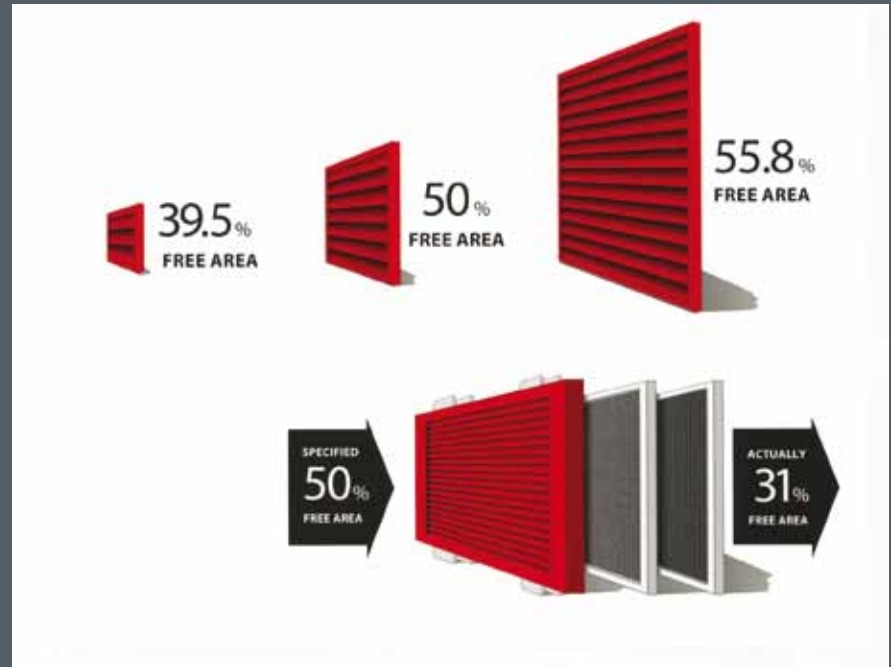
In our experience we have found that sizing and specifying louvres on free area alone can cause problems for both architects and owners.

When you specify a 50% free area louvre, what are you actually getting?

The percentage free area of a louvre is affected by size. Typically Percentage Free Area of a louvre is given for a specific size; say 1m x 1m, however changing the size of the louvre can significantly affect the Percentage Free Area available.

The reality is that other factors also impact airflow. For example, louvre frames add resistance to airflow and mullions, structural supports, bird screens and insect screens will also reduce airflow.

We've found that a more efficient specification solution is based on the needs of the building.



On the next page we show you what should be taken into account when specifying louvre



How do you decide what you need?

Specifying louvre is a compromise between airflow and water ingress. Each project should be considered independently, to take into account the particular needs of each application.

For example a car park may require maximum ventilation, but little protection from rain penetration, so a standard louvre or perhaps a screening louvre would be appropriate. Alternatively, a plant room containing special machinery or electrical equipment may still need high levels of ventilation, but with maximum protection from water entry, in which case performance louvre would be the best option.

It is therefore important to consider the following when specifying louvres:



AIRFLOW



**SEVERITY OF
SITE WEATHER
CONDITIONS**



**SITE
LOCATION**



**BUILDING
USE**



**WATER
PENETRATION**



**MAXIMUM
PRESSURE
DROP**



**BUILDING
AESTHETICS**

Weather Louvres

A weather louvre does not have any moving parts, and is designed to work as efficiently as possible at letting air through whilst keeping water out. A louvres suitability for a particular project or application should be determined by how effectively it performs this function.

The 2 key requirements of a weather louvre are:

1. Airflow - based on the volume flow rate of air required and the size of the louvre face
2. Water penetration - based on how important it is to prevent water getting beyond the louvre.

As mentioned previously, when choosing a louvre, each element should be given a weighting of importance dependent upon the site and site conditions.



AIRFLOW



**WATER
PENETRATION**

Airflow

When selecting weather louvres, one of the most important aspects is the air velocity at the louver face.

This can be calculated using the following formula:

Face Velocity (m/s) = Volume Flow Rate (m³/s) / Face Area (m²)

For example: If the volume flow rate is 2m³/s and the face area is 1m² the face velocity will be 2m/s.

A weather louver will perform differently depending on the face velocity, in testing a weather louver, the louver is tested at intervals from 0.0m/s to 3.5m/s face velocities to determine its range.

NOTE: It is critical to ensure that the louver you choose will perform as required with your site's expected Airflow Face Velocity.

Energy Efficiency:

It is important to recognise that the ultimate efficiency of design is a combination of the louver size (the larger area the better) and how freely it allows air and water to pass through it.

Energy usage and louvres comes down to the fan power required to deliver a specified volume flow rate through the louver. The greater the resistance to the air moving through the louver, the greater the difference in pressure between the outside and inside of the louver (pressure drop). The greater the pressure drop, the more fan power is required to pull the same volume flow rate of air, which is why it is important to minimise this pressure drop early on.

NOTE: Improved efficiency of louver design not only saves money but can also contribute to an improved energy rating for the building. Increasing the size of the louver at the design stage means that the same volume flow rate requirement can be achieved, but at a lower velocity.



AIRFLOW



Water Penetration

As well as allowing air to flow through the louvre, a weather louvre must also keep rain out. The acceptable level of water penetration is dependent upon the application and how important it is for the area beyond the louvre to stay dry.

Key considerations for working out your water penetration requirements are:

- The degree of allowable water penetration (0% - 100%)
- The severity of local/site weather conditions
- The position of the louvre on the building (sheltered from the weather or exposed?)

Working out the allowable water penetration can be tricky, so we find the best way is to look at the BS EN 13030:2001 water penetration banding.

Class	Maximum allowable penetration of rain l/h. m ²
A	0.75
B	3.75
C	15
D	Greater than 15

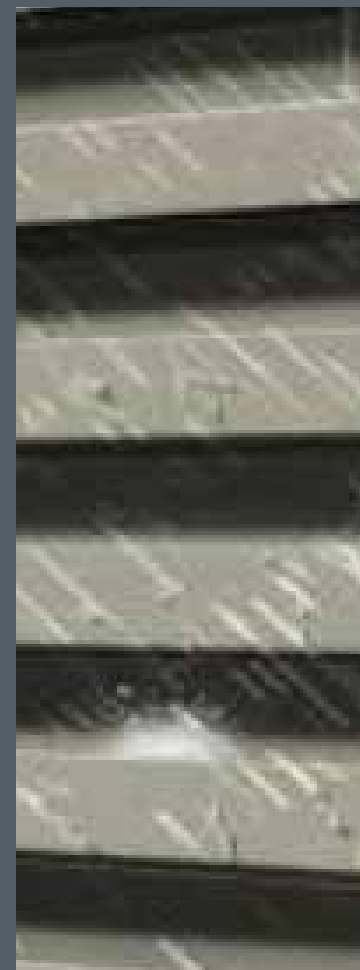
Whilst these bands have quite a large range, it should help you narrow your selection down to a specific class.

Local weather conditions naturally vary from place to place so it is important to check your expected site conditions against the standard test conditions.

The positioning of louvre is also key, not just for rain penetration but for airflow too. Naturally a rural hilltop will expect a higher rain penetration than a sheltered urban position. And the same can be said for the expected airflow. A sheltered louvre will likely have a larger fan requirement than an exposed louvre.



**WATER
PENETRATION**



Achieving Balance

Often the better a louvre is at letting air through, the worse it is likely to be at keeping water out. Which is why a balance or weighting has to be applied to each element (airflow and rain penetration) when deciding which louvre is right for your building.



According to BSRIA the typical effect of the variables affecting louvre performance are as follows:

Action	Effect on energy performance	Effect on water rejection
Install more water resistant louvre	Worse	Better
Install lower pressure drop louvre	Better	Worse
Increase air velocity	Worse	Worse
Increase louvre face area (thus lowering required air velocity)	Better	Better

The degree to which these variables affect performance depends largely on the design of the louvre. These effects can be reduced to some extent through more efficient design.

To help overcome the trade-off between efficient airflow and water penetration the following may help, depending on the site application:

- Increase the size of the louvre face to achieve the same air volume but at a lower velocity, reducing pressure drop and water penetration at the same time
- Make provisions for water penetration such as drains behind the louvre in the ductwork.
- Opt for a more highly engineered product, as this reduces the amount of trade-off



Testing

BS EN 13030:2001 sets out the guidelines for the testing and classification of all weather or performance louvres. During testing, the resistance to airflow is assessed and the louvres are subjected to 75mm/hr of water, blown against a 1m x 1m louvre at a velocity of 13m/s. The louvre is then given a 3 part classification:

1. Effectiveness
2. Discharge Loss Coefficient (DLC)
3. Overall Performance

Part 1: Louvre Effectiveness (or Penetration Class)

This classification rated A-D designates the “effectiveness” Class of the weather louvre against water (rain) penetration. Each class covers a specific range and it can be seen from the table below that a Class A is significantly more effective than the Class B below it:

Class	Effectiveness	Maximum allowable penetration of rain l/hr
A	1 to 0.99	0.75
B	0.989 to 0.95	3.75
C	0.949 to 0.80	15
D	Below 0.8	Greater than 15

Louvre performance is dependant on the intake velocity. i.e. a Louvre may be class A at 0m/s but at 3.5m/s it might be a D. It's therefore important to look at historical weather conditions at the site to establish what the maximum and minimum expected face velocity will be.



Testing Continued

Part 2: Airflow Class

This classification, rated 1-4 designates the louvres ability to allow air to pass through it and is determined by establishing the Discharge Loss Coefficient (DLC) at various airflow velocities. Each class covers a specific range, as can be seen in the table below. The higher the DLC the less resistant to air the louvre is. In simple terms, a hole in the wall with no louvre would have a DLC of 0.6 or above depending on the size of the hole. The Airflow Class gives a guide to M&E consultants of how the louvre performs at various ventilation rates and the actual DLC figure is used to establish the actual area of louvre required.

Airflow Class	Discharge Loss Coefficient (DLC)	Rating
1	0.4 & Above	Excellent
2	0.3 to 0.399	Very Good
3	0.2 to 0.299	Good
4	0.199 & below	Fair

Part 3: Overall Performance

This is calculated by multiplying the effectiveness by the coefficient, giving you an “Overall Performance” rating.

NOTE: Overall performance should not be used as the sole determining factor when choosing louvres, as it can mask poor weather performance on a louvre with good airflow.



Things to remember

- Compare the simulated weather conditions, both on site and within the standard test, as the site conditions will never be exactly the same as the test.
- A louvre rating of “A” at 0m/s is not guaranteed to perform at even 0.5m/s or any other face velocity other than 0m/s.
- Check the full range of face velocities the louvre is tested to, to ensure the louvre will operate as it should in your specific site location. Not all Class A Louvres are the same.
- There are other factors that will affect a louvres performance that are not accounted for in the standard test:
 - Bird/rodent/insect guards
 - Size of louvre - standard test is on a 1m x 1m louvre
 - Structural elements such as mullions, joints and drains
 - Orientation - a weather louvre will perform differently when the blades are orientated vertically rather than horizontally
 - Application - for example a structure that is openly exposed to multi-directional winds compared to a traditional installation which is flush with a wall is likely to see differences in airflow and rain penetration.
 - Site conditions - for example prevailing winds, level of exposure, rainfall and degree of shelter from surrounding buildings and geographical features.
- When specifying a louvre you need to be specific about exactly what you need, mistakes could be costly. A good specific example would be: “I need a weather louvre which is Class A at 1.0m/s with a DLC class 3.”



Full example specification on the next page, highlighting exactly what you need to specify.



L10 Windows / Rooflights / Screens / Louvres

To be read with Preliminaries / General Conditions

GENERAL

- 110 Evidence of Performance
Certification: Provide independently certified evidence that all incorporated components comply with specified performance requirements
- 120 Site Dimensions
Procedure: before starting work on designated items, take site dimensions, record on shop drawings and use to ensure accurate fabrication

PRODUCTS

650 Metal Louvres

- Manufacturer: Construction Specialties (UK) Limited, 1010 Westcott Venture Park, Westcott, Aylesbury, Bucks, HP18 0XB
 - Tel: +44 1296 652800
 - Fax: +44 1296 652888
 - Web: www.c-sgroup.co.uk
 - Email: info@c-sgroup.co.uk

- ➔ - Product Reference: C/S 127mm Deep Storm Resistant Fixed Performance Louvre Model RSH 5700
- Materials: Heads, Sills, Jambs and mullions to be one-piece structural aluminium members with integral caulking slot and retaining beads. Mullions shall be sliding interlock type. Blades to be one-piece aluminium extrusions with front lip gutter and multiple secondary gutters designed to catch and direct water to sill. Louvres to be supplied with 102mm high by full depth sill flashings formed from minimum 1.27mm thick aluminium. Sill flashings to have welded side panels. Louvres and sill flashings to be as follows: Heads, Sills, Jambs and Mullions: Minimum of 1.91mm. Fixed blades: 1.52mm
- ➔ - Fabrication: Louvres to be mechanically assembled using stainless steel or aluminium fasteners
- ➔ - Finish: Finished in accordance with project requirements from manufacturers standard options:
 - Anodised
 - Polyester Powder Coating
 - C/S 20 Year Non Toxic, VOC Fluoropolymer Powder Coat
 - Colour: RAL 9003
- Size: As per elevation drawings and louvre schedule
- Number of louvre banks: Integrated slim-line double bank to give tangential separation
- Louvre blade pitch and angle: 50mm at Zero Degrees
- ➔ - Performance Requirements: Louvres to be extruded to give an aerodynamically efficient profile to create tangential separation of water in airflow. Louvre to be mechanically fastened within extruded framing sections complete with integral channels to achieve maximum drainage. The system shall achieve a minimum Discharge Loss Coefficient of 0.320 and when tested in accordance with the principles of BS EN 13030:2001 (at 13m/s wind speed) will achieve the following Penetration Classes:

A	1m/s
A	3m/s
C	5m/s
- Blanking Panels: As per drawings, schedules and M&E requirements
- Installation: Louvre to be installed by competent installer, strictly in accordance with manufacturer's instructions back to primary steel structure



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Product Selection

Here are a few suggestions on ways to minimise the risk of procuring an under-performing weather louvre:

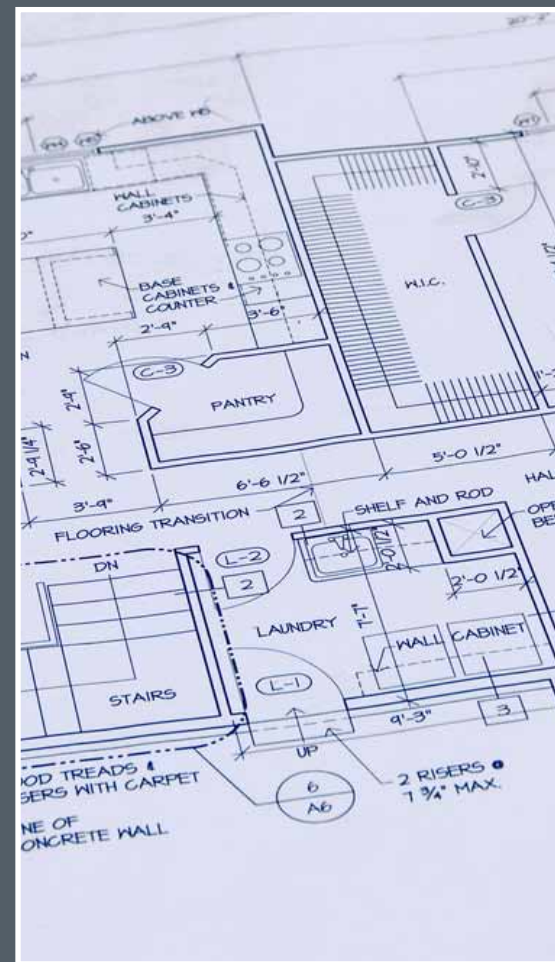
- Ensure the product description is accompanied by reliable performance test data, preferably from tests carried out by an independent third party
- Ensure that any claimed water penetration class is accompanied by the corresponding face velocity in all cases, and focus on the face velocity that matches your application.
- Where does the water go? If you are specifying a weather louvre, it is important to find out about the drainage system within the louvre, if water isn't diverted away effectively enough, the louvre won't perform as well.
- Be aware that test data usually only relates to a one-off test sample (1m x 1m) and does not necessarily reflect what it will actually achieve in real world conditions.
- Ensure that installation instructions are provided with the product. Incorrect installation can adversely affect weather louvre performance.



Checklist

Having been through our guide, hopefully you have a better understanding of what a louvre is, how it works and what information you need in order to specify a louvre. Below is a short checklist of the information you will need to make your product selection.

- ☐ Face Velocity value (see page 8 for calculation)
- ☐ Energy Efficiency - Large or small louvre face area
- ☐ Volume Flow rate requirement
- ☐ Maximum allowable water penetration l/h. m² (or Class A-D)
- ☐ Severity of local weather conditions
- ☐ Position of the louvres
- ☐ Relevant performance data (site requirements)
- ☐ Product suitable for application? (Bird guards etc.)



Now you just need to choose your supplier...



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Choosing your supplier

After you have been through the process of working out the right louvre for your application, it is important to choose the right supplier. Here are a few tips for finding the right supplier:

- **Questions** - It's important to ask your supplier the right questions, hopefully this guide will help you with that.
- **Relevance** - You need to make sure your supplier understands exactly what your application is going to involve, so that they can provide relevant technical data to your application. It's no good showing you a Class A rating at 0m/s face velocity if your application is going to involve 1.5m/s.
- **Experience** - Your supplier should be experienced, whether it's in your country or worldwide. Their project portfolio should be an indication of whether they are a good supplier or not.
- **Installation** - A dedicated installation team isn't essential, but it helps. Having an installation division ensures the louvres are installed exactly to the manufacturers specification, meaning less risk on your part when it comes to the installation.

At C/S we are proud to offer:

- 22 offices worldwide
- 60+ years of experience with louvres
- prestigious global portfolio
- support at every stage of the selection process right through to the technicalities of installation
- an in-house installation team who can install any of our louvres



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