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Solutions

A Guide to Louvre Selection and Specification

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What is a Louvre ?

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There are many ways in which to describe a Louvre, but in general it is a building element that is used to allow the passage of air into or out of a building whilst reducing or restricting the entry of rain.

Types of Louvre Available

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There are 4 main type of louvre available on the commercial market:

High Performance Weather Louvres

High performance louvres are used to allow the passage of air into / out of a building whilst providing the highest degree of protection against rain ingress

Standard Weather Louvres

Standard louvres are used to allow the passage of air into / out of a building or enclosure where rain ingress is of less importance

Screening Louvres

Screening louvres are generally found on roof tops or plant compounds and are used to hide plant or machinery and give a more architecturally pleasing view.

Acoustic Louvres

Acoustic louvres can be used in the above 3 applications but in addition to the mechanical functions outlined above these louvres also provide attenuation to reduce noise pollution from the associated mechanical systems behind the louvres.

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Dispelling the Myth Around Free Area

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Many of todays specifications that are driven by architects and mechanical building services engineers incorrectly define the requirements of a louvre. These are the ones that specify the selection of the louvre in terms of requiring a given free area.

Unless the louvre is being used to ventilate a boiler room or similar application it is most likely the incorrect benchmark.

The free area of a louvre may be stated as being able to provide 50% free area. This means that the smallest air gap between each louvre blade should be added together and then divided by the structural opening size. The area between each blade also needs to account from changes in size due to framing of the louvre, structural supports required for the louvre and any type of mesh applied to the louvre (bird or insect). In practice 50% is very rarely achievable. In addition to this any louvre that is supplied as being 50% or close to it would provide very little defence against rain rejection which is a very important consideration when selecting louvres!

Dispelling The Myth Around Free Area

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A further consideration for louvre selection is whether the unit is a single or multiple bank louvre.

Double or triple bank louvres are often used to increase the protection against rain penetration.

If we take a single bank louvre at say 43% then a double bank version – which is generally the same louvre profile fitted back to back to product a chevron type louvre – the free area would be very similar if not the same. However, the resistance to airflow would increase dramatically from a single bank to a double bank. This could end up with the fan system being under selected and not providing the required design flowrates.

So in general Do Not Use FREE AREA to specify louvre performance unless its in a boiler room or similar application

Testing and Performance

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Louvres should be tested to provide correct and consistent data. The data should be relevant to the application and where required should provide the following:

Aerodynamic Performance

Rain Defence Requirements

Acoustic Requirements

Testing and Performance

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Aerodynamic Performance

Louvres should be tested at an independent certified Test House to provide data in terms of the louvres aerodynamic performance. BSRIA is the only UK Test House to provide this service.

The tests are undertaken on a 1m wide x 1m high test sample. The louvre is configured within the test rig to either supply air or exhaust air. In both cases a known volume if air is passed through the louvre and a reading of the units pressure drop is recorded.

This is done for numerous data points so that a characteristic curve for the louvre can be generated. The data is then used to calculate the louvres Coefficient of Entry (for intake applications) and Coefficient of Discharge (for exhaust applications).

Testing and Performance

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Aerodynamic Performance

Once the tests have been conducted the results are then used to categorize the louvres in terms of its aerodynamic performance:

Class	Coefficient of Entry / Discharge
1	>= 0.4
2	0.3 – 0.399
3	0.2 – 0.299
4	<0.2

Testing and Performance

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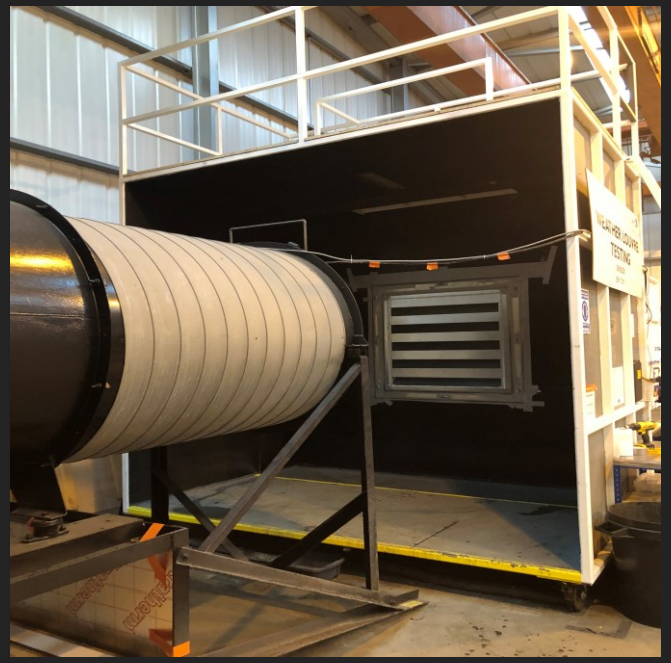
Rain Defence Requirements



BSRIA are again the only UK test facility to provide independent data in terms of rain penetration.
The test standard EN13030 describes the current test method used in Europe. In essence a sample louvre 1m wide x 1m high is fixed into a calibrated test rig and simulated rainfall is applied to the louvre. The rainfall in the standard is intended to represent bad Northern European weather conditions, in essence a 13m/s (30mph) wind is applied to the louvre, normal to its face whilst rainfall at the rate of 75mm/hr (3 inches of rain per hour) is simulated.

The louvre is tested at these conditions for a period between 30 and 60minutes at various intake velocities between 0m/s and 3.5m/s.
The test data derives how much air is collected either side of the louvre so that the amount of rain penetration can be determined.

Testing and Performance

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Rain Defence Requirements

The results of the rain penetration tests are reported in terms of how much rain the louvre rejects and are classified into 4 bands with a being the best and d the worst performing.

Class	Coefficient of Entry / Discharge
A	>= 99%
B	95 – 98.99%
C	80 – 94.99%
D	<80%

Testing and Performance

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Acoustic Requirements

In respect of the performance of acoustic louvres, tests to determine the transmission loss or sound reduction index should be undertaken at an accredited independent acoustic laboratory.

The tests involve fixing a acoustic louvre between to calibrated test rooms. A noise source is then used to generate noise in the source room and then measuring the noise levels on the other side of the louvre in the receiving room. The difference between the two rooms is the level difference.

This information along with a knowledge of the rooms sizes, area and volume and absorption allow the sound reduction indices to be calculated. The standard which describes these tests is BS EN ISO 10140-2 : 2010.

Louvre Specification

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Louvres should be specified using the following criteria:

Aerodynamic Performance

Rain Defence Requirements

Acoustic Requirements

Material

Finish

Louvre Specification

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Aerodynamic Performance

The Aerodynamic Performance of a louvre system can be considered to be the resistance of the louvre at a given design air flowrate. The louvre needs to be sized to deliver the required amount of airflow without the pressure drop of the louvre being too great. The pressure drop can accommodated for by altering the area of the louvre through which the air will pass.
A small area louvre will have an higher pressure drop or resistance than a larger louvre of the same design for the same design flowrate.

The pressure drop is generally measured and stated as a function of the face velocity of the louvre. Once the relationship between the face velocity and pressure drop is known the size (area) of the required louvre can be calculated.

Louvre Specification

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Aerodynamic Performance

The relationship between pressure drop and face velocity is determined by test and normally shown in graphical format or by stating the coefficient of entry / discharge, which allows the pressure drop to be calculated from a formula.

Louvre Specification

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Rain Defence Requirements

The effectiveness of a louvre against rain penetration can only be determined from test.
When specifying a louvre it is essential that the location, exposure and application are considered. It is no good to merely say I want the best in class, as these louvres are more expensive than normal louvres and may need to be much larger than required if the performance is over specified.

In general the effectiveness of a louvre against rain penetration is designated as a classification in the range 1 to 4, with 1 being the best in class and 4 being the worst. It is also very important to realise that the classification of the louvre for rain defence will differ and different face velocities.

Louvre Specification

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Acoustic Requirements

The acoustic requirements of the louvre is a very important design consideration and in many applications and designs not taken into account. The performance requirements of the louvre should be specified in line with he project acousticians requirements or the acoustic specification.

Where an acoustic louvre is specified this should give the required Rw dB value or the required transmission loss / sound reduction index. Where the Rw is specified this will normally be a single figure descriptor such as Rw 17dB. Where transmission loss or sound reduction index are used these should be shown across the audible spectrum from 63Hz through to 8kHz

Louvre Specification

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The acoustic performance of some single and double bank acoustic louvres are listed below:

Model	63	125	250	500	1k	2k	4k	8k	Rw
BASL100	4	4	5	6	9	12	12	11	8
BASL150SP	4	4	6	8	11	13	12	12	10
BASL150HP	6	6	8	10	14	18	15	15	14
BASL300	6	7	9	12	19	22	17	15	18
BA2SL100	5	5	6	10	13	20	18	21	13
BA2SL150SP	5	6	8	12	19	22	20	21	16
BA2SL150HP	7	7	13	15	22	29	26	27	21
BA2SL300	7	9	12	23	33	41	32	28	25

Louvre Specification

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Acoustic Requirements

It is also important to consider to self noise generated by the louvre at the design condition.
In many applications the louvre will be required to meet a given level, lets say 65dBa @1m from the face of the louvre. This criteria will be decided by the acoustician in conjunction with the local planning department.

Many louvre manufacturers simply build louvres and do not have test data to back up their products. If a louvre is selected based on pressure drop or even worse free area – then the requirement for the louvre to be within acceptable noise limits will most probably be exceeded.

It is very important that the louvre manufacturer can provide this data to ensure the design specification is met.

Louvre Specification

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Material

Most specifications and NBS schedules state that the louvre shall be manufactured from Aluminium. This requirement is somewhat out of date and dare I say it occurs from specification's put together on a cut and paste basis from previous specifications. Most louvres are today still made from aluminium extrusion but equally there are also many louvres manufactured from rolled steel sections, stainless steel, other metals and even plastic! It all depends upon the application, location and exposure levels.

Equally 99% of all acoustic louvres will be manufactured from pre-galvanised sheet steel – so the next time your comparing a louvre offer with a specification its worth considering a derivation as great cost savings can be made without compromising the specification.

Louvre Specification

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Finish

Louvre's all of types can be supplied with various finishes.

Mill Finish – Base metal untreated – self colour
Painted – to give an aesthetic appearance in line with the building it is being installed into
Anodising – Only applies to aluminium, the metal is electrocoated to give an architectural finish that is hard wearing.

Anodising in the UK is extremely expensive with long lead times, there are only a few recognised applicators and cost is a key consideration when specifying this finish.

With the increase of powder coating systems and the varied finishes available most colours and even metallic finishes that look just like anodising can be achieved at greatly reduced costs.