



Colt International Ltd

Design considerations when specifying weather louvres

CPD Technical Seminar 2020





Certification

of CPD course provision

This is to certify that

Colt International Ltd

has been registered as a CPD Course Provider by
The Chartered Institution of Building Services Engineers (CIBSE)

Accredited from 1 June 2019

to 31 May 2021

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Colt have a number of CPD accredited topics including:

- Car park ventilation
- The general principles of smoke control
- Pressurisation
- Smoke shafts
- Overheating common corridors
- Smoke and fire curtains
- Louvre
- Evaporative cooling



A brief history of Colt

Colt International Limited



Founded in

1931

2019 UK turnover

£38.4 million

2019 Group turnover

£180.4 million

Manufacturing facilities in
UK, Holland & Germany



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Accreditations and Memberships

Colt International Limited



Accreditations

- Altius Gateway
- CHAS
- Construction Line
- Safe Contractor
- Worksafe Contractor
- RoSPA



Chas Accredited



PPQ still required by clients



**CERTIFICATED INSTALLER OF
ACTIVE FIRE PROTECTION**



Memberships





Smoke Control



Climate Control



Louvre & Shading

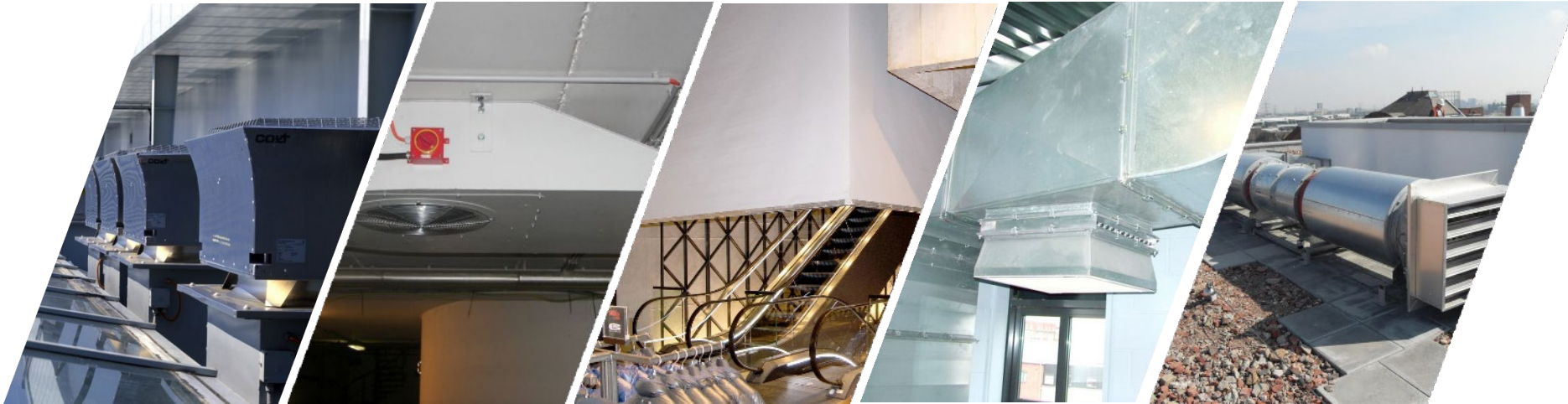


Service





Smoke Control



SHEVS
Smoke and Heat
Exhaust Systems

Car Park
Ventilation

Smoke
Containment

Pressurisation
Systems

Smoke Shaft
Systems





Climate control



Natural
Ventilation

Mechanical
Ventilation /
HVAC

Evaporative
Cooling

Industrial Heating



Performance & Screening Louvre

Colt International Limited



Louvre



Screening

Ventilation &
Rain Defence

Shading

Acoustic



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Service



24 hour call out

Nationwide Coverage

Spare Parts

Surveys



Specifying Weather Louvres

Design considerations when specifying weather louvres 2020



- **What is a louvre?**

- Definition
- Types of louvre

- Function and form

- Testing & classification

- Specification

- Decision making



What is a louvre?

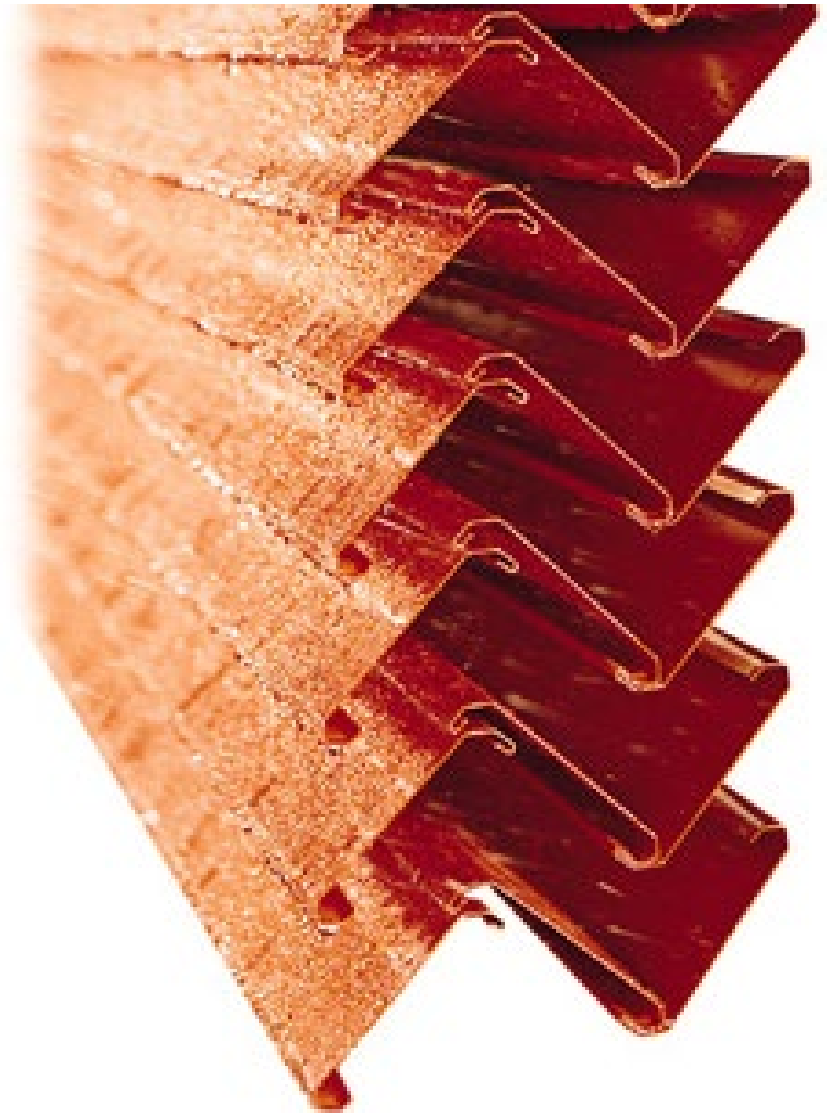
Design considerations when specifying weather louvres 2020



Definition:

“One of a set of boards or slats set parallel & slanted to admit air, but not rain”

- All louvres are not the same
- What do you want to achieve, and under what conditions?
- What is important to the success of your design ?



What is a louvre?

Design considerations when specifying weather louvres 2020



- Allow air in or out
- Louvre Screening
- Exclude wind driven rain
- Provide cosmetic screening



What is a louvre?

Design considerations when specifying weather louvres 2020



One London Wall: Cosmetic Screening



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What is a louvre?

Design considerations when specifying weather louvres 2020



BMW Plant, Hams Hall: Plant Room Air Intake / Exhaust



What is a louvre?

Design considerations when specifying weather louvres 2020



Natural ventilation



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What is a louvre?

Design considerations when specifying weather louvres 2020



Rain screen



What is a louvre?

Design considerations when specifying weather louvres 2020



What is a louvre?

Design considerations when specifying weather louvres 2020



Schoenefeld Airport, Berlin Solar shading



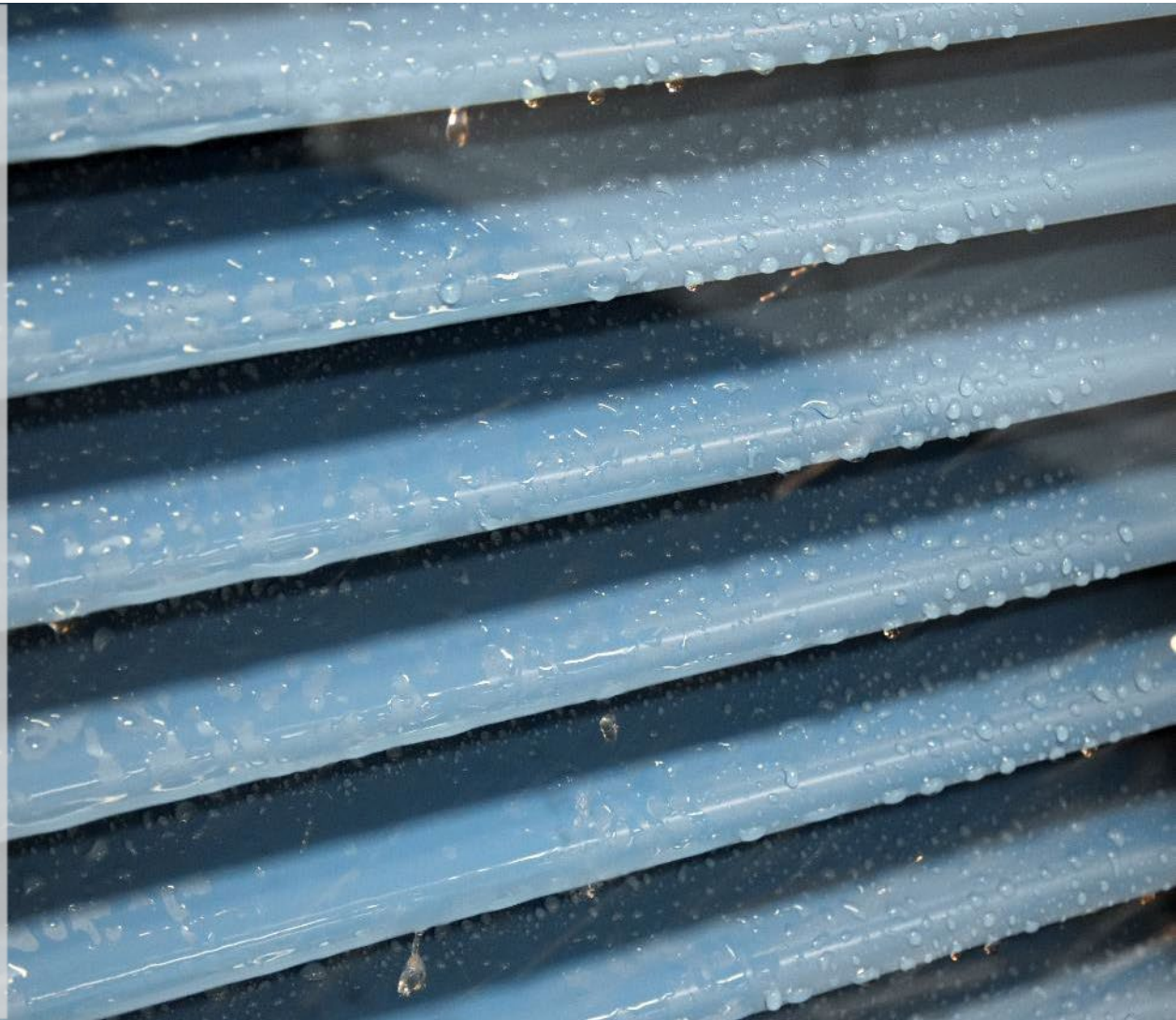
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Specifying Weather Louvres

Design considerations when specifying weather louvres 2020



- What is a louvre?
- **Function and form**
 - Purpose / application
 - Airflow / sizing
 - Rain defence
 - Louvre appearance
 - Other considerations
- Testing & classification
- Specification
- Decision making



Purpose / application of the louvre?

Design considerations when specifying weather louvres 2020



Performance

- Air flow performance
- Rain defence
- Relationship between air flow and rain defence
- Wind load resistance

Aesthetics

- Dimensions
- Decorative finishes
- Continuous appearance

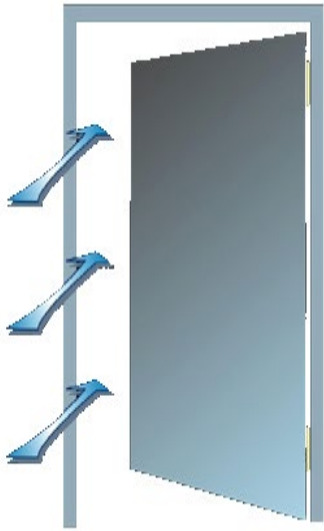
Durability

- Fixing method
- Manufacturer guarantee



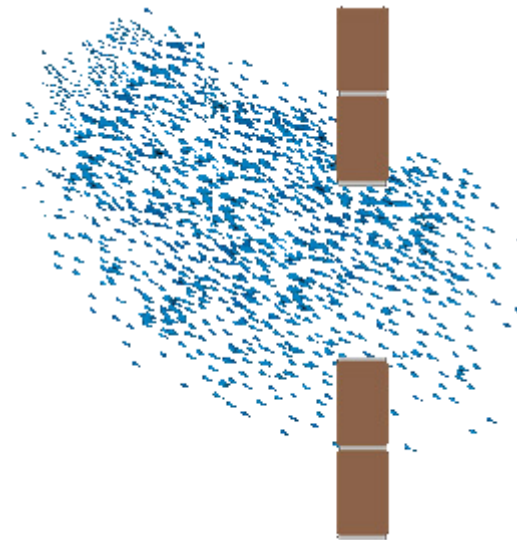
Ideal design solution:

- 100% airflow is never possible
- Even a fully opened door is only 60% efficient ($C_v=0.6$)

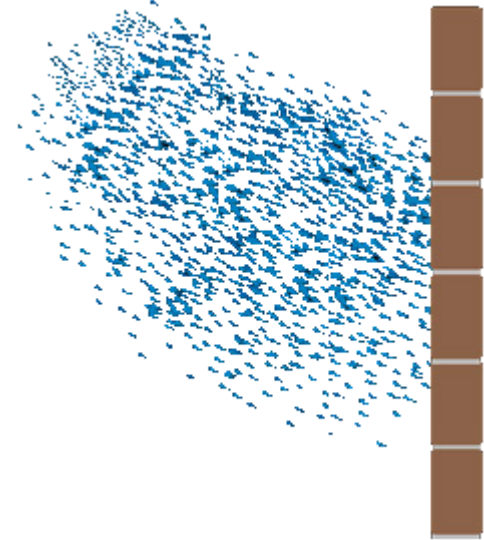


100% rain defence and 100% air flow

- Maximum Air Flow
- But rain gets in!



- 100% rain defence
- But no airflow



Air flow

- Volume flow rate (m^3/s)
 - Depends on the ventilation and plant design requirements
 - Normally decided by the Mechanical Services Design Consultant

Resistance to Air Flow

- Maximum acceptable pressure drop
 - Resistance to airflow the fan needs to overcome
 - There is no direct correlation between percentage free area and pressure drop!



- Design Criteria:
 - Air flow rate through the louvre (m^3/s)
 - Limiting air velocity (m/s) or Pressure loss (Pa)



- Air flow performance:
 - Characterised by the Coefficient (C_v) which is determined by testing
 - Percentage free area is not a good guide to performance



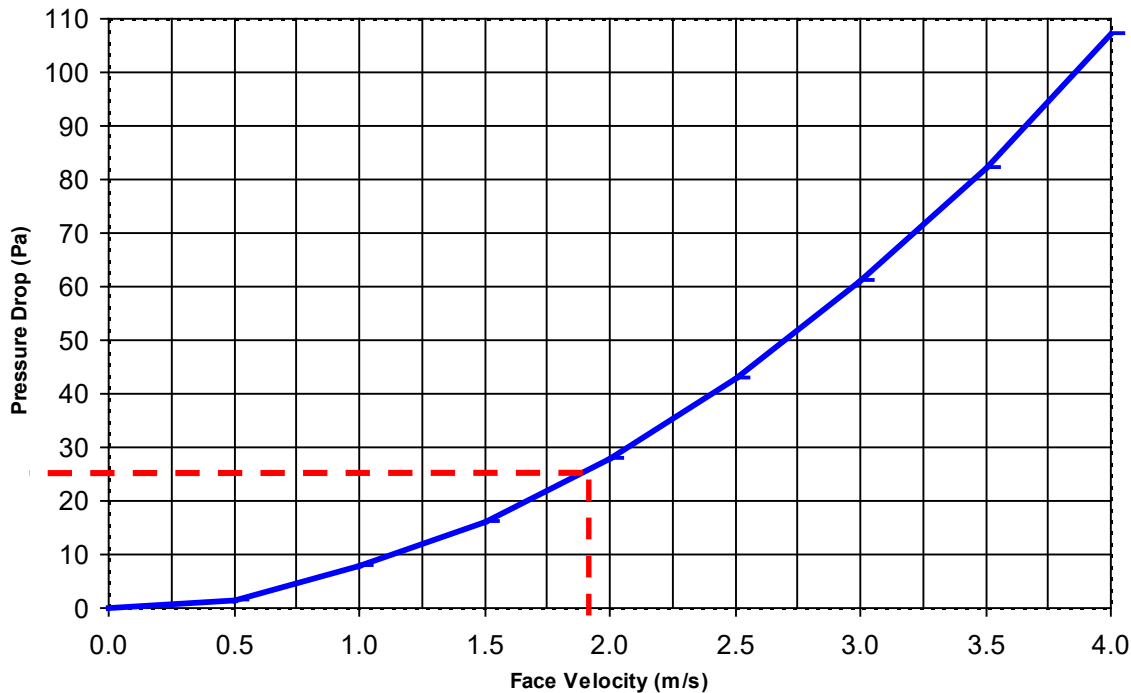
Louvre sizing - example

Design considerations when specifying weather louvres 2020



Size a louvre with a C_v of 0.308 to give a maximum pressure drop of 25Pa (P_s) at a flow rate of $2.5\text{m}^3/\text{s}$

$$V = C_v \sqrt{\frac{P_s}{0.5\rho}} = 0.308 \times \sqrt{\frac{25}{0.5 \times 1.2}} = 1.99\text{m/s}$$



ρ = Density of dry air @
 $20^\circ\text{C} = 1.2\text{kg}/\text{m}^3$

Core area = $2.5 / 1.99$
 $= 1.26\text{m}^2$



Louvre sizing - example

Design considerations when specifying weather louvres 2020



Size a louvre with a Cv of 0.308 to give a maximum pressure drop of 25Pa (Ps) at a flow rate of 2.5m³/s

Of course, a spread sheet is easier.

Colt Louvre selection program →

INPUT DATA:

Louvre type	<input type="text" value="2UL/S"/>	Material	<input type="text"/>
Not in use	<input type="text"/>		
Not in use	<input type="text"/>	Mullion spacing	<input type="text" value=""/> m
Accessories	<input type="text" value="None"/>	Steelwork spacing	1UL <input type="text" value=""/> m 2UL <input type="text" value=""/> m 3UL <input type="text" value=""/> m
Direction of air flow	<input type="text" value="Inlet"/>	Steelwork thickness	<input type="text" value=""/> m
Connections	<input type="text"/>	Ambient air density	<input type="text" value=""/> kg
Air flow rate	<input type="text" value="2.5"/> m ³ /s	Not in use	<input type="text"/>
Other equipment in series	<input type="text"/>		
Not in use	<input type="text"/>		
Maximum air pressure drop	<input type="text" value="25"/> Pa		
Maximum louvre height	<input type="text" value=""/> m		
Maximum louvre width	<input type="text" value="1"/> m		

Fill in 2 out of 3
Leave 3rd blank

RESULTS

	Option 1 (Louvre selected)	Option 2
Selected louvre type	<input type="text" value="2UL/S"/> Double bank 50mm pitch	<input type="text" value="N/A"/>
HEVAC classification	<input type="text" value="B2"/>	<input type="text" value="N/A"/>
Pressure drop	<input type="text" value="25"/> Pa	<input type="text" value="N/A"/> Pa
Core velocity	<input type="text" value="2.17"/> m/s	<input type="text" value="N/A"/> m/s
Panel height	<input type="text" value="1.583"/> m	<input type="text" value="N/A"/> m
Panel width	<input type="text" value="1.000"/> m	<input type="text" value="N/A"/> m
Panel weight	<input type="text" value="73"/> kg	<input type="text" value="N/A"/> kg

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v1.1pub May 2013

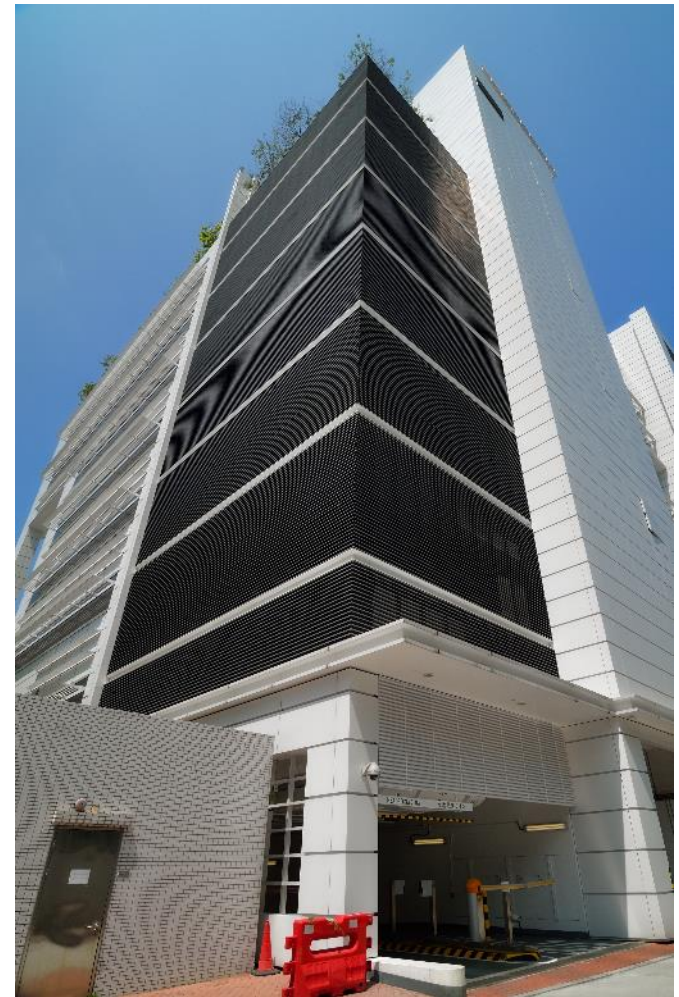


Rain defence

Design considerations when specifying weather louvres 2020



- Common Terms
 - Rain Defence
 - Weatherproof
 - Storm Proof
- What do they mean?
- What performance is actually required?
- What is the maximum acceptable water penetration?



TKO hospital, Hong Kong



St David's Hotel, Cardiff



Rain defence

Design considerations when specifying weather louvres 2020



Plant Room
Louvre



Rain defence

Design considerations when specifying weather louvres 2020

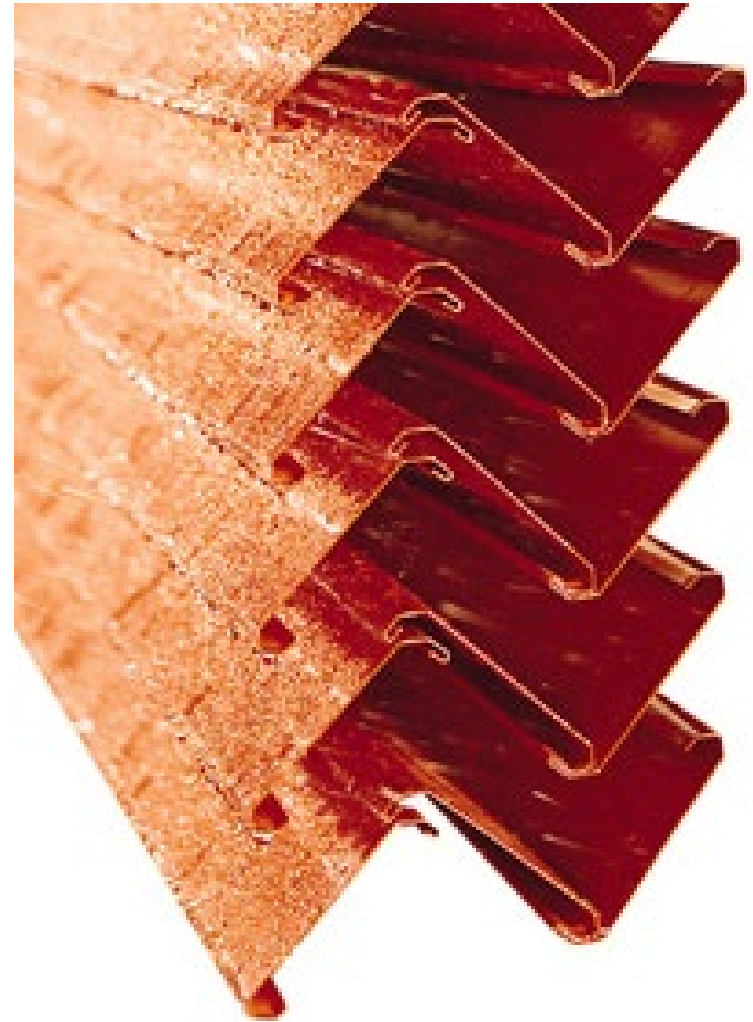


Internal
view



How a multi bank louvre works

- Air and Rain enter between louvre blades
- Air passes efficiently through, but water is collected into second louvre blade (and third if fitted) by “tangential separation”
- Water is drained into hollow section mullions where it can be drained directly to outside over the cill

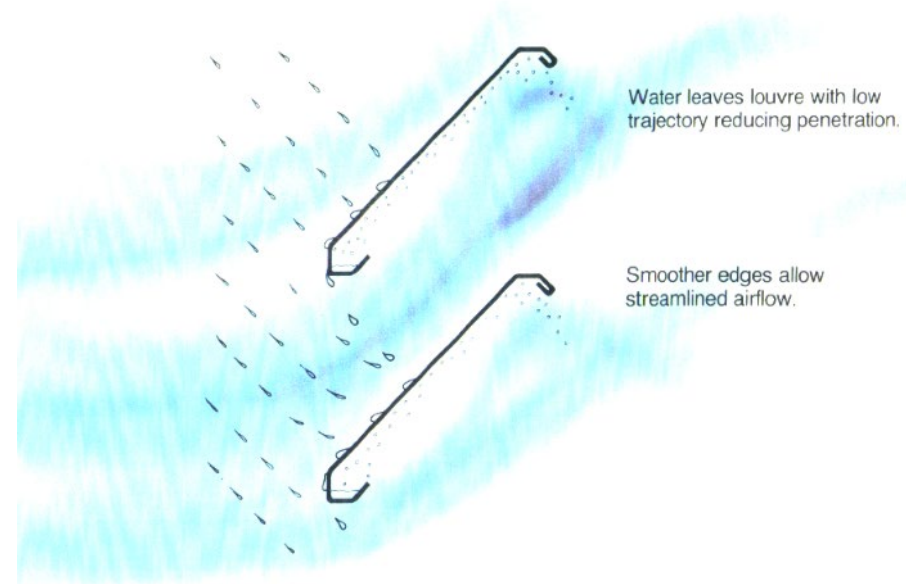
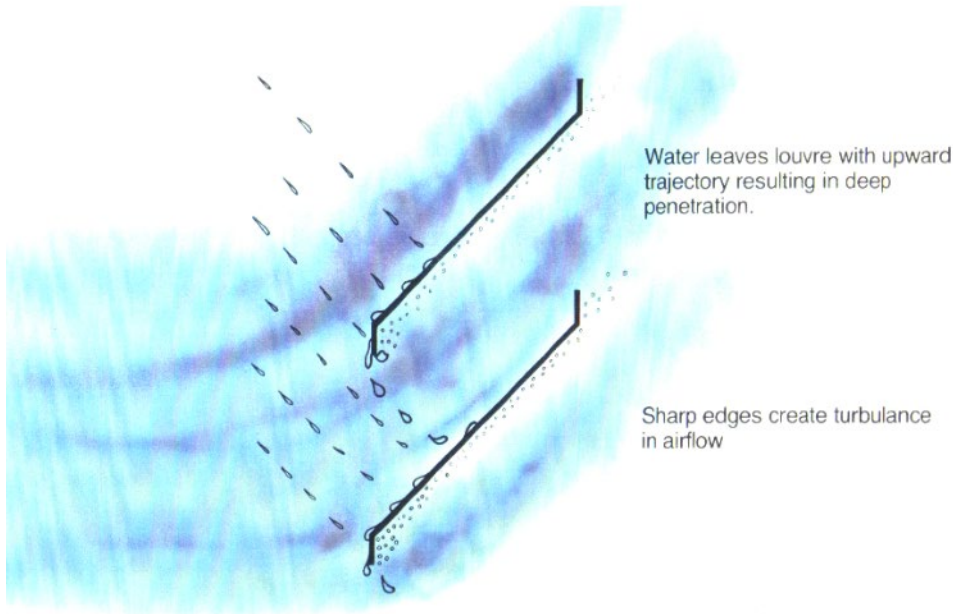


Rain defence – how it works

Design considerations when specifying weather louvres 2020



Single bank louvre

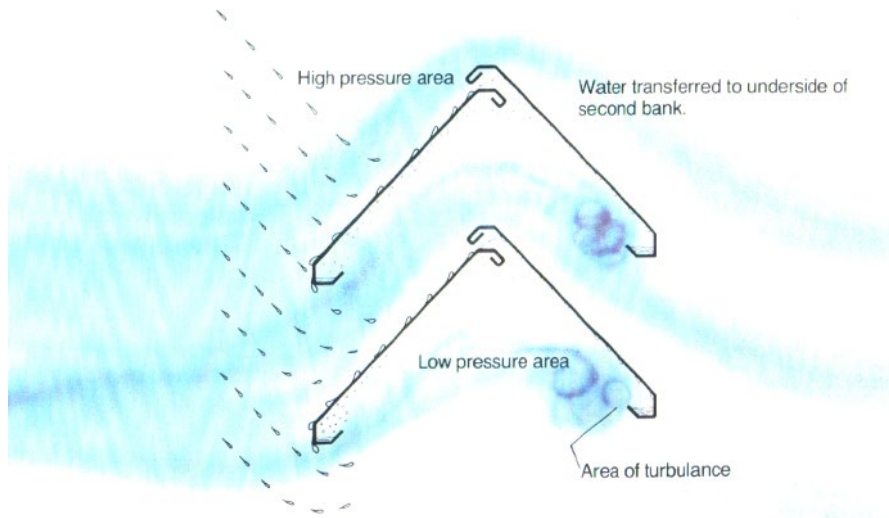


Rain defence – how it works

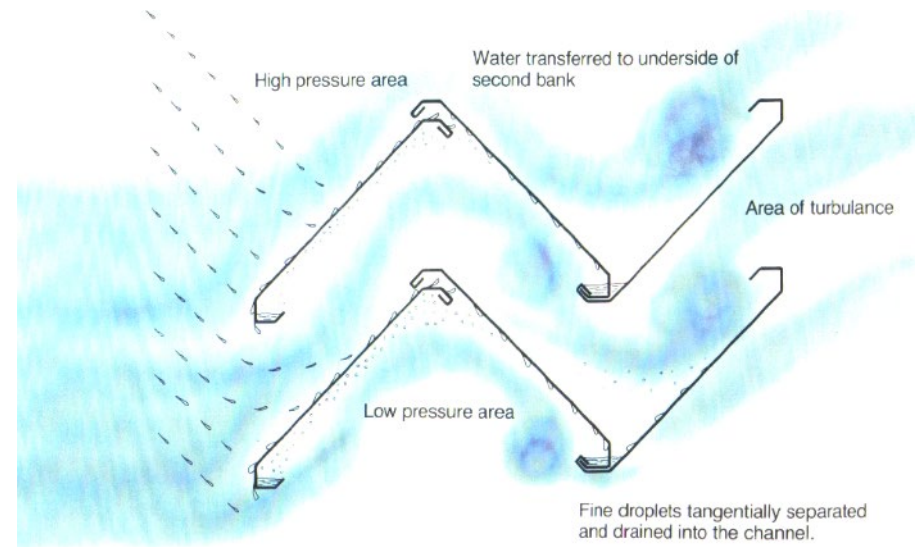
Design considerations when specifying weather louvres 2020



Double bank louvre

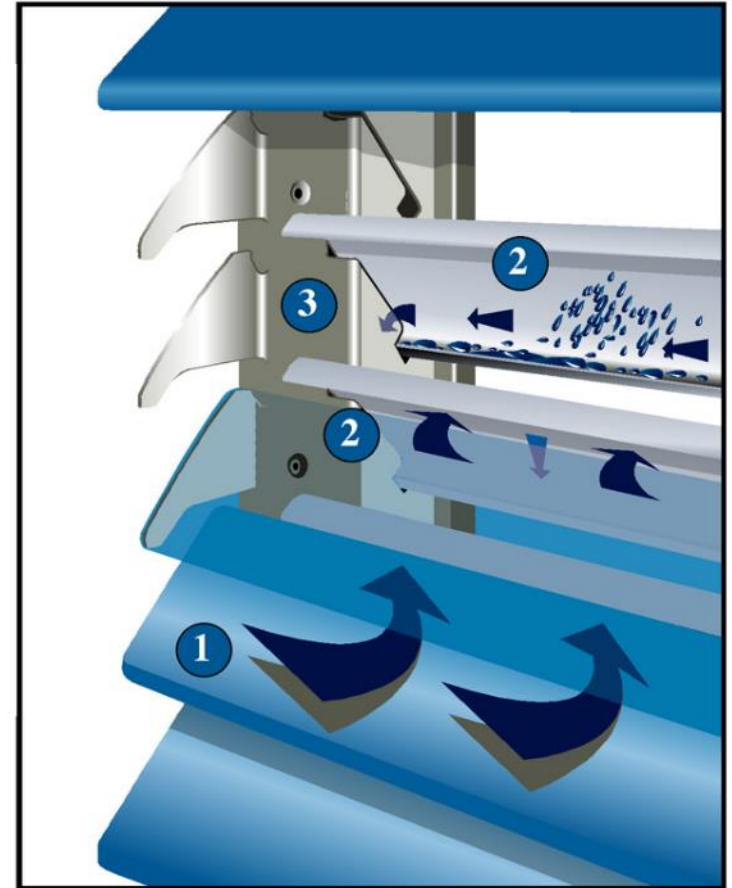


Triple bank louvre



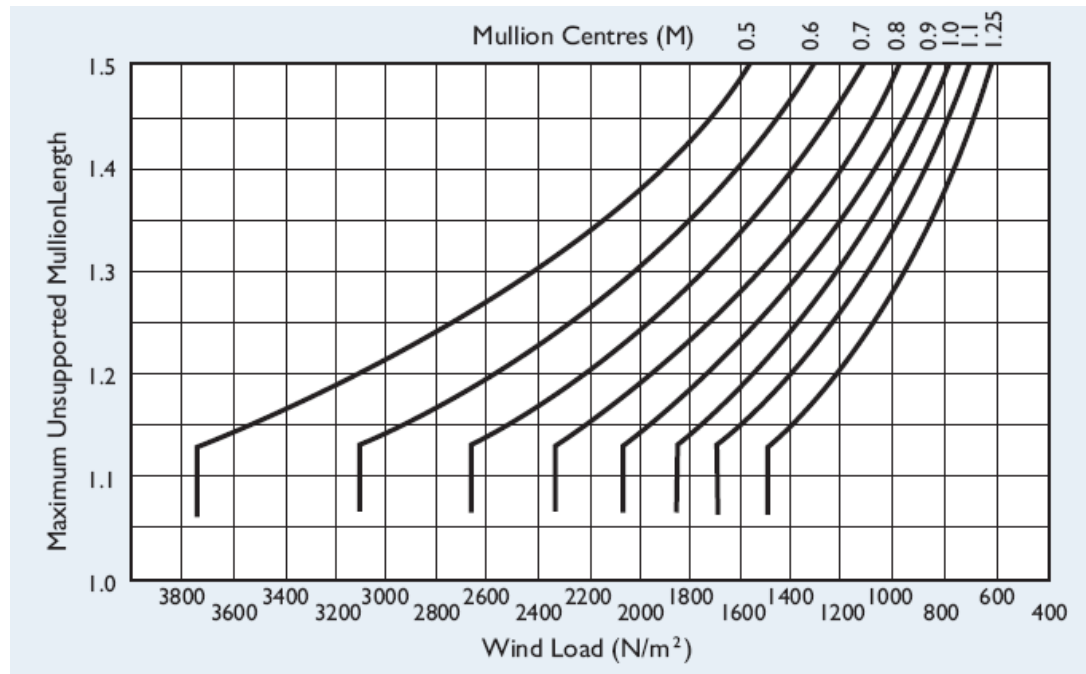
How a multi bank louvre works

- Air and Rain enter between louvre blades
- Air passes efficiently through, but water is collected into second louvre blade (and third if fitted) by “tangential separation”
- Water is drained into hollow section mullions where it can be drained directly to outside over the cill



Wind load resistance

Design considerations when specifying weather louvres 2020



Under local maximum design wind loads the louvre panel should:

- Retain its structural integrity
- Not deflect excessively
- Not suffer visible permanent deflection



Louvre appearance

Design considerations when specifying weather louvres 2020



Many materials and finishes available

Consider:

- Louvre material
- Operating environment
- Durability



Xscape, Milton Keynes

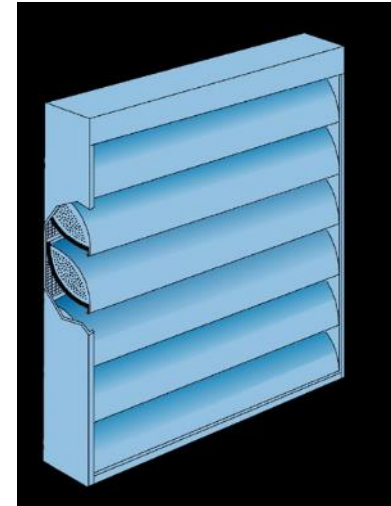


Ancillaries

Design considerations when specifying weather louvres 2020



- Bird guard and/or insect mesh
- Doors & access panels
- Mitred / faceted / curved corners
- Thermal insulation / blanking panels
- Acoustic louvre



Specifying Weather Louvres

Design considerations when specifying weather louvres 2020



- What is a louvre?
- Function and form
- **Testing & classification**
- Specification
- Decision making



Testing & classification

Design considerations when specifying weather louvres 2020

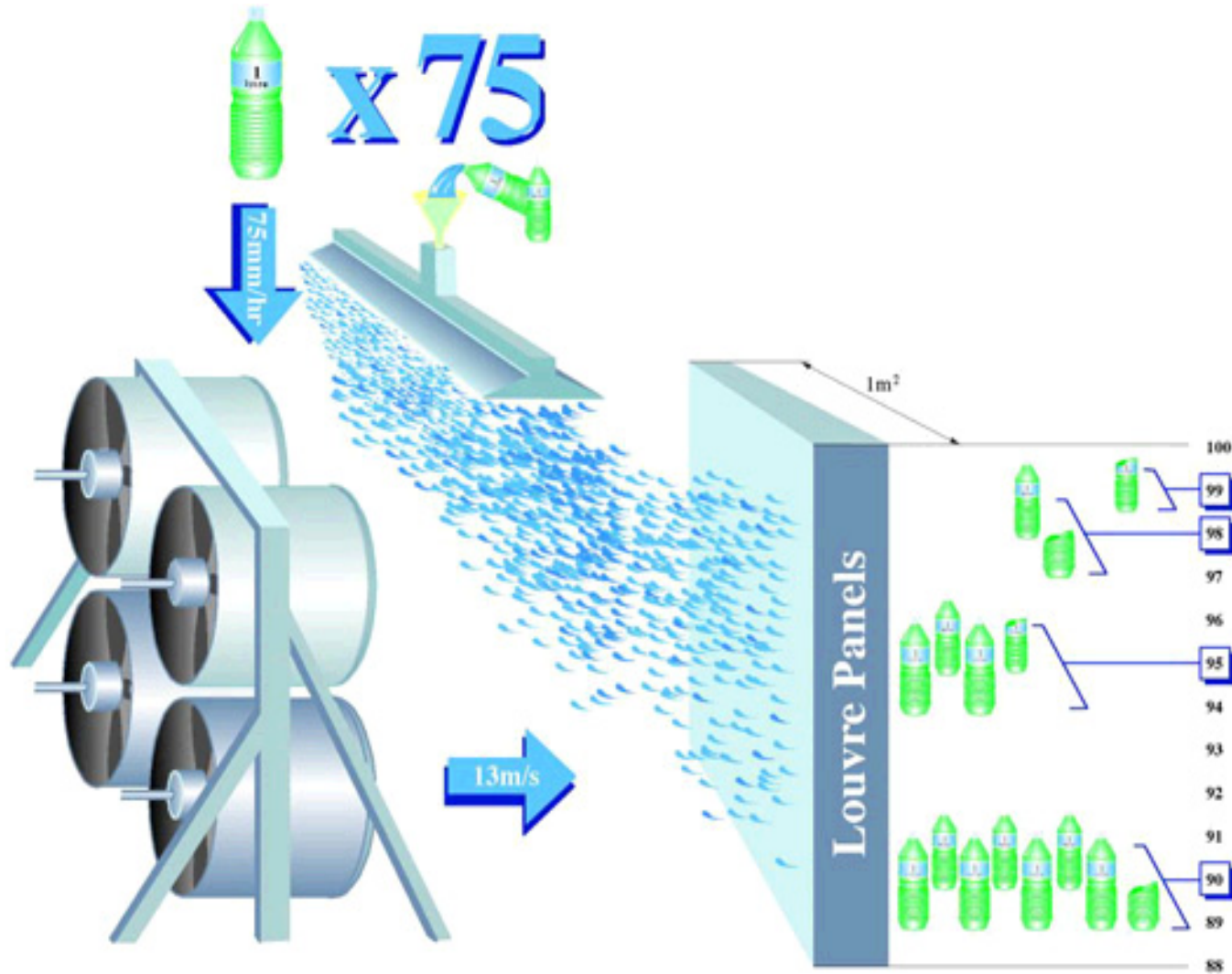


- Louvre performance can be specified by reference to BS EN 13030:2001
 - Technically equivalent to the HEVAC test method on which it was based
 - Now also incorporated as an option within AMCA 500
- Quantifies both air flow and rain defence performance



Testing & classification

Design considerations when specifying weather louvres 2020



Testing & classification

Design considerations when specifying weather louvres 2020



In-house performance testing



Rain penetration



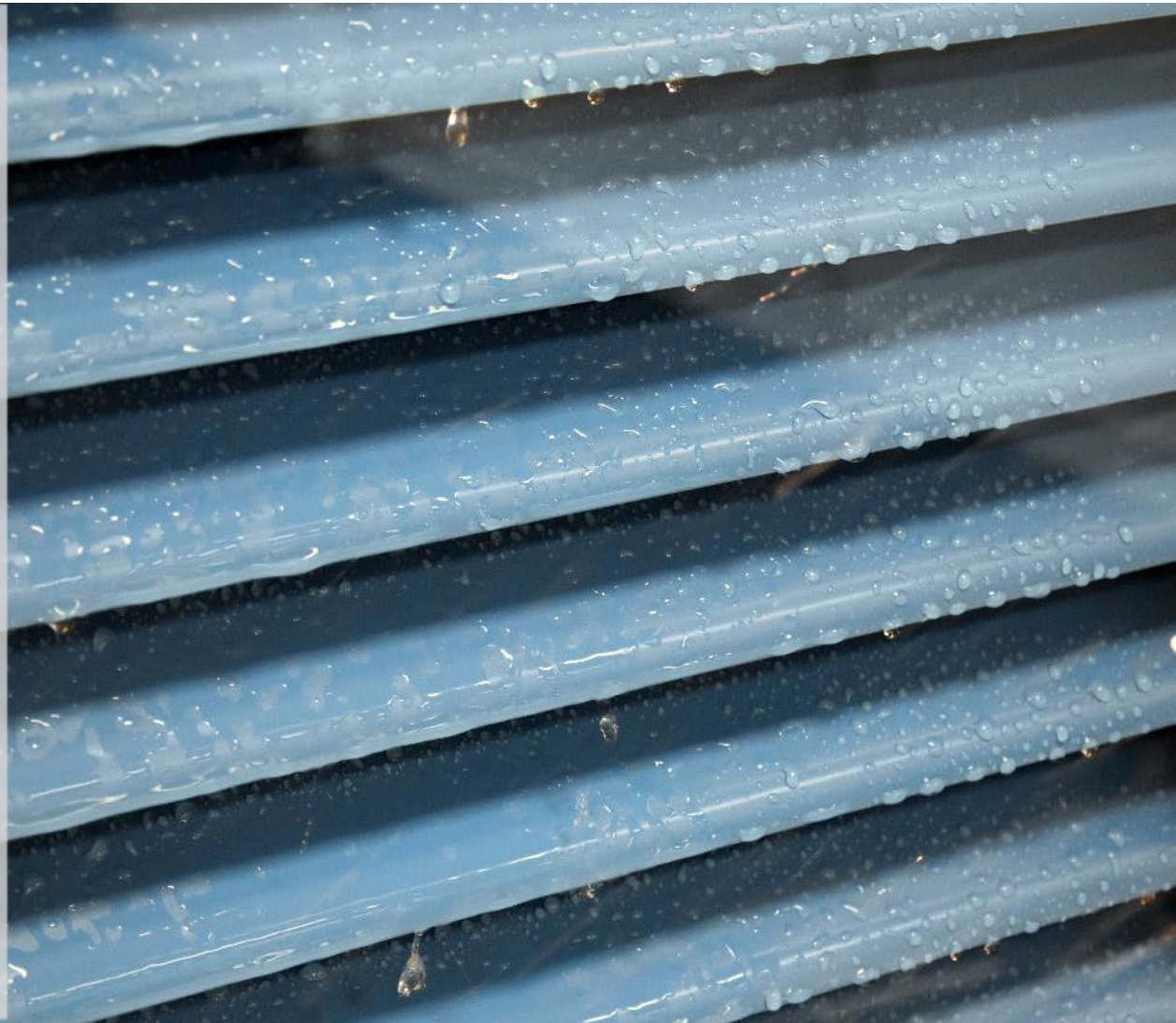
Airflow test



Deflection under load



- What is a louvre?
- Function and form
- Testing & classification
- **Specification**
- Decision making



Rain Defence

Class Effectiveness

A 1.0 to 0.99

B 0.989 to 0.95

C 0.949 to 0.8

D below 0.8

Air Flow

Class Coefficient

1 0.4 and above

2 0.3 to 0.399

3 0.2 to 0.299

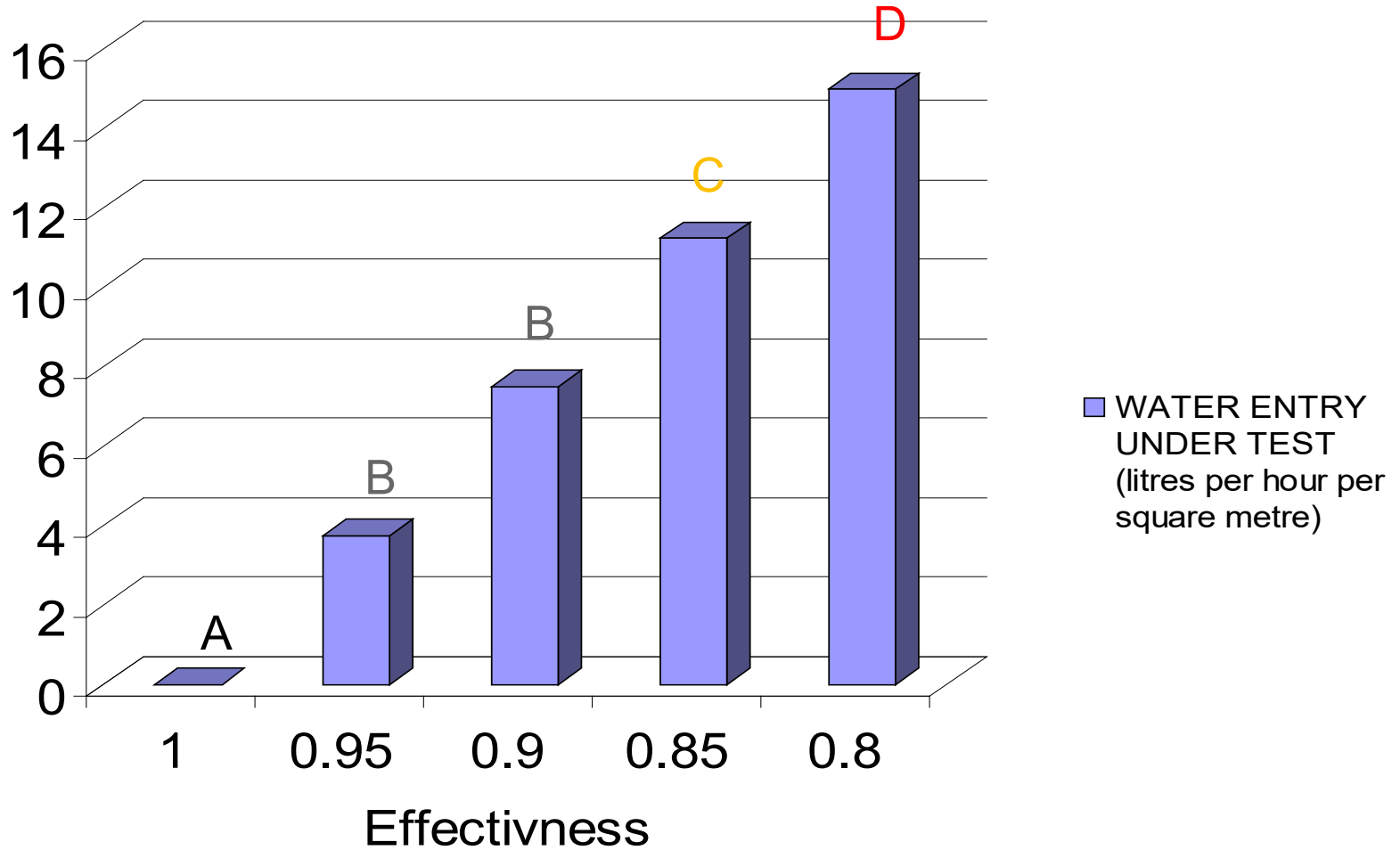
4 below 0.2

Rain defence classifications should always be linked to a suction velocity – it's much easier to achieve class A at 0m/s than at 3.5m/s



What the classifications mean

Design considerations when specifying weather louvres 2020



Classification of Colt louvre systems

Design considerations when specifying weather louvres 2020



Louvre type	Coefficient	Rain Defence Effectiveness at core velocity (m/s)							
		0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5
1UL/SH	0.44	0.73	0.66	0.60	0.62	0.60	0.59	0.51	0.50
	Class 1	D1	D1	D1	D1	D1	D1	D1	D1
2UL/SH	0.31	0.997	0.996	0.992	0.986	0.96	0.90	0.81	0.74
	Class 2	A2	A2	A2	B2	B2	C2	C2	D2
3UL/SH	0.28	1.00	0.999	0.998	0.998	0.997	0.996	0.996	0.995
	Class 3	A3	A3	A3	A3	A3	A3	A3	A3
ERD	0.3	0.993	0.985	0.968	0.95	0.89	0.69	0.42	0.35
	Class 2	A2	B2	B2	B2	C2	D2	D2	D2
EWL	0.268	0.995	0.993	0.997	0.998	0.996	0.909	0.681	0.443
	Class 3	A3	A2	A2	A2	A2	C2	D2	D2

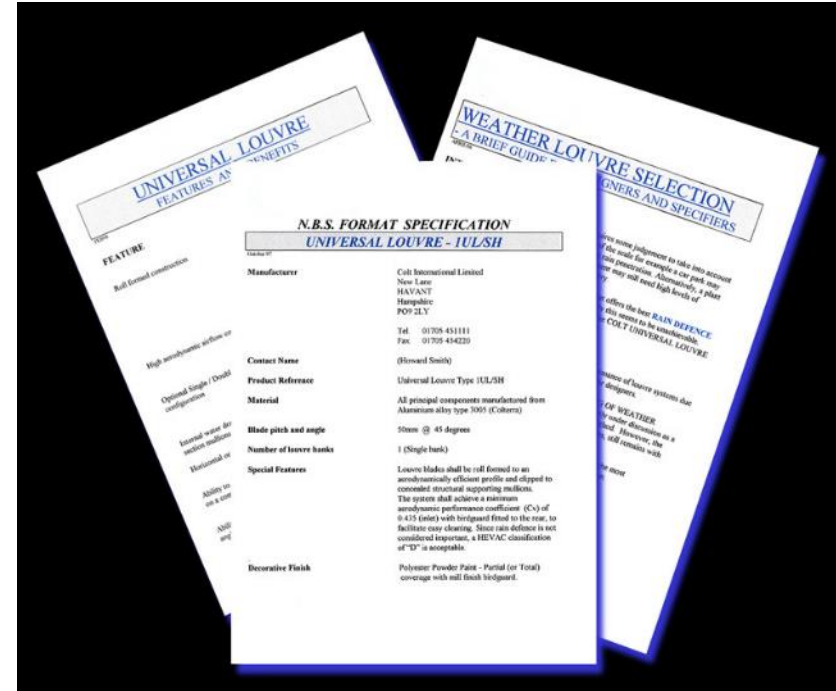


Specification – National Building Specification (NBS)

Design considerations when specifying weather louvres 2020



- Manufacturer
- Product Reference
- Material
- Decorative / Protective Finish
- Performance (Airflow and Rain Defence)
- Ancillary Items
 - Bird guard / Insect Mesh / Blanking Panels etc.



The louvre shall have an aerodynamic coefficient of at least **[insert value or class here]** when tested in accordance with BS EN 13030.

The louvre shall have a rain defence effectiveness of at least **[insert value or class here]** at the design air velocity for the installed louvre when tested in accordance with BS EN 13030.

NOT

The louvre shall have a free area of at least 50%.

The louvre shall be storm proof.



Specifying Weather Louvres

- What is a louvre?
- Function and form
- Testing & classification
- Specification
- **Decision making**



- What is the system going to look like?
- What is it's purpose?
- Who is responsible within the design team to actually specify this?
- Ensure that all relevant information is obtained
- Ensure that the performance specification is very specific and that the final product verifiably meets the specification



Before and after

Design considerations when specifying weather louvres 2020

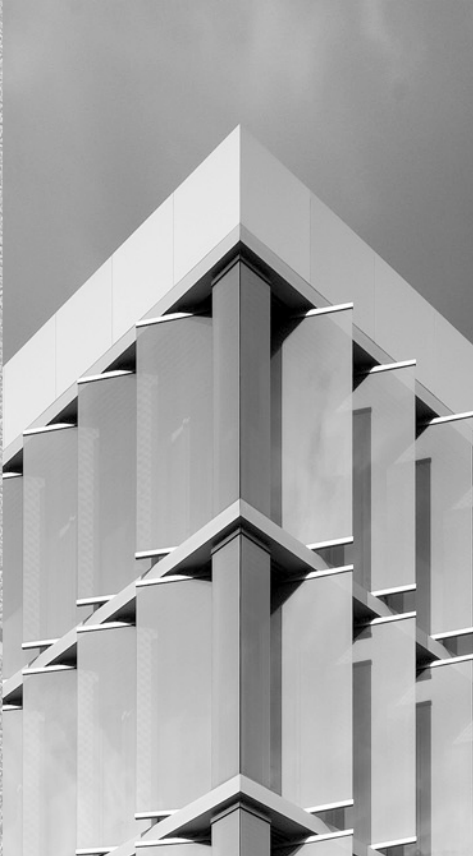


Dun & Bradstreet, High Wycombe



Perforated single
bank louvre





Q&A Session...

COLT

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