

c|slouvers

Performance Louver Systems

90/60 10



The Water Stops Here



BFM

CS Construction Specialties™

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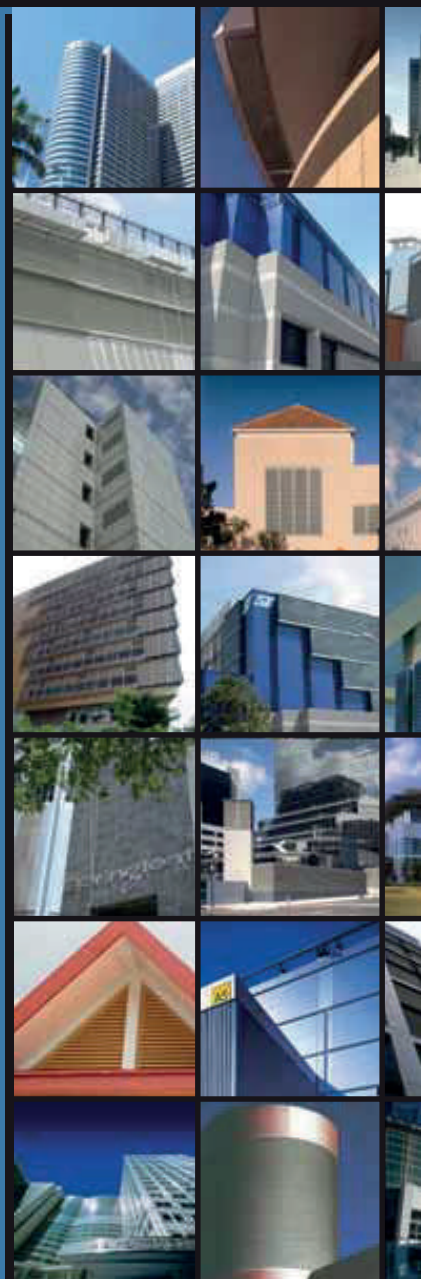
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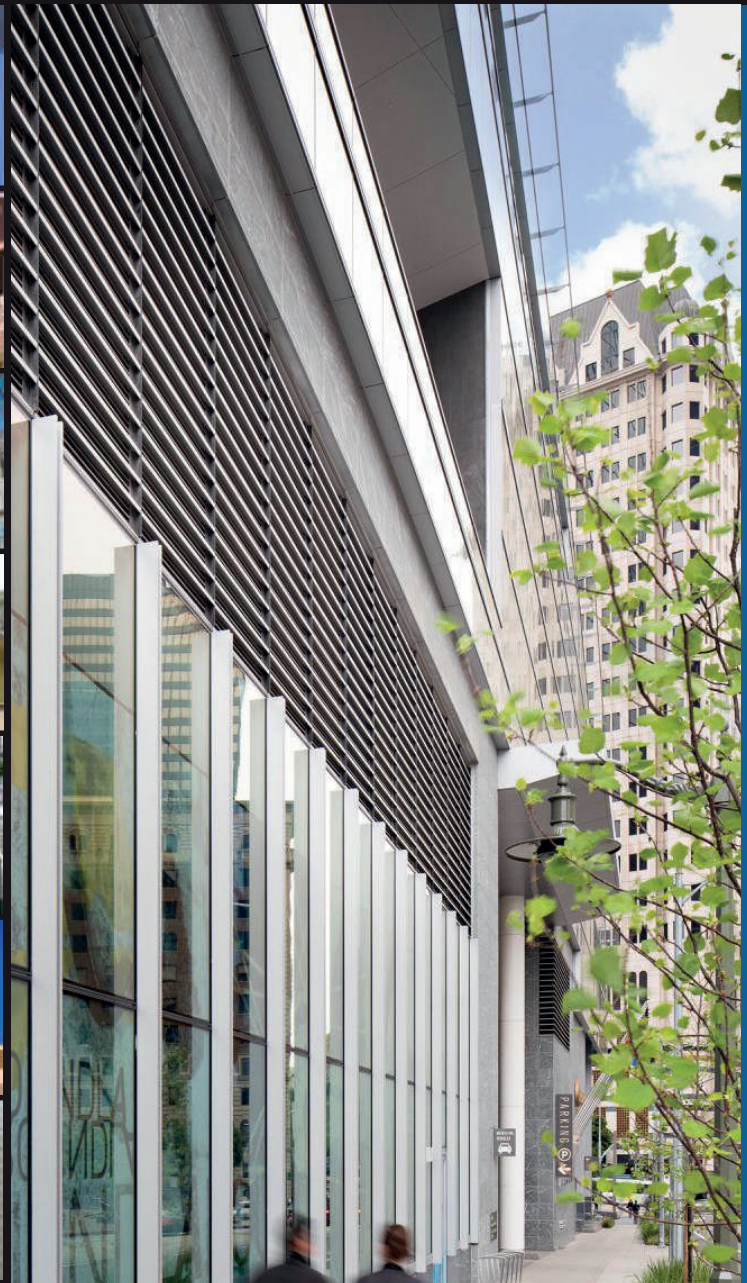
louver systems

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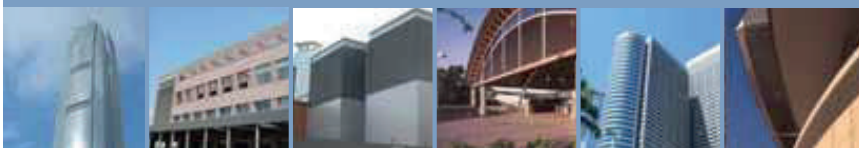


Weathering the Weather

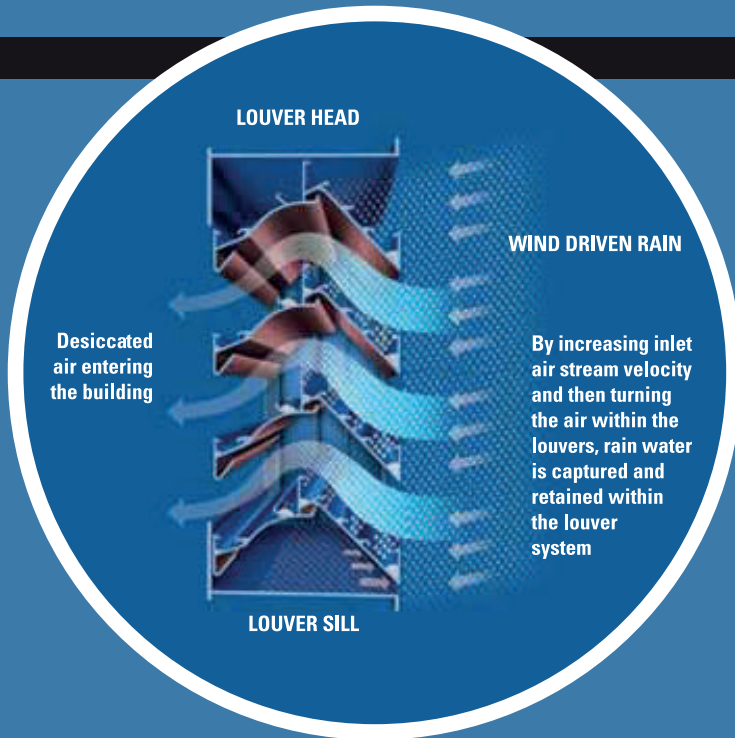


Strong winds, heavy rain, high humidity and the scorching sun all pose a formidable test to building designers in Asia and around the world. These elements prove a challenge not only to good design but also the durability and maintenance of buildings and the systems that support them.

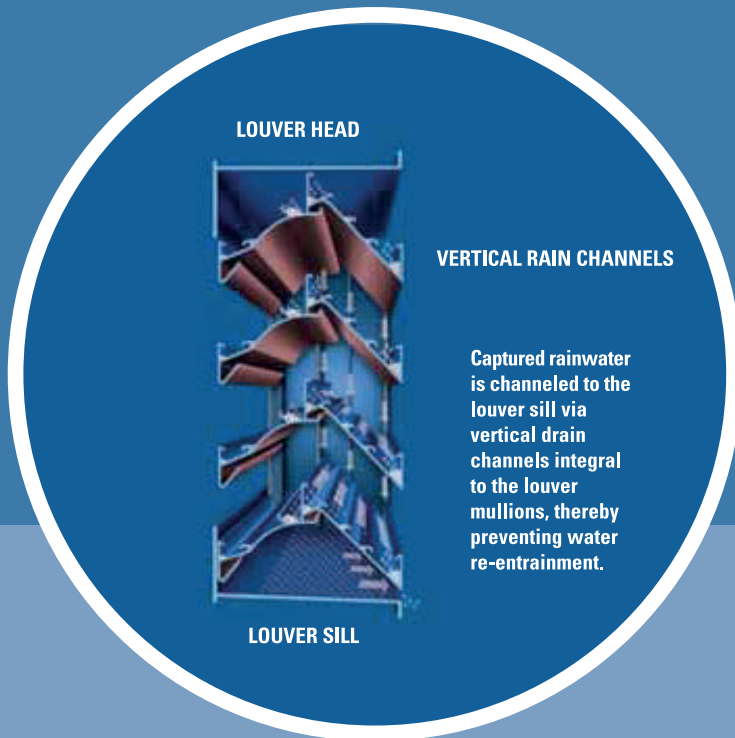
Through extensive research and development, engineering and re-engineering, C/S has specifically developed a wide range of performance louver systems that can withstand harsh weather conditions but at the same time allow efficient air movement both into and out of buildings. For over 50 years, C/S has shared our expertise with designers around the world to achieve the optimum balance of function and form in louver application, whilst recognising the need to operate within project budgets. This unique partnership has allowed C/S to develop performance louver systems capable of being over 20 times more effective than conventional louvers (up to 100% effective) in keeping rainwater out of buildings.



Experience the performance and effectiveness of C/S Louvers



The 'complete' design of an effective performance louver system relies on achieving the optimum balance of function and form. In the case of performance louvers, the functional components are airflow capability, the ability to restrict the entry or egress of contaminants e.g. rain water or noise, together with the structural stability of the system. Key form aspects include the ability to shape the louvers to blend harmoniously with the building design and the capacity of the materials employed to accept the types of finishes required. Only when these criteria are expertly matched with the design requirements and project budget, is the best solution achieved.



Very often, the key design requirement is rain defense or the ability to permit airflow but restrict or eliminate rainwater from entering the building. Where the highest level of protection from rainwater entry is a prerequisite of building design, testing to internationally recognised standards, with third party accreditation, has shown the range offered by C/S to be in a class of its own. The fundamental parameters to achieve this level of performance exist not only in the louver blade profile and configuration but also in the controlled nature by which rainwater is retained and drained from the louver system. Capturing water within the louver blade is not enough. Vertical drain channels within the louver mullions are essential to ensure that rainwater is not reintroduced to airflow but drained effectively away from the louver panels.

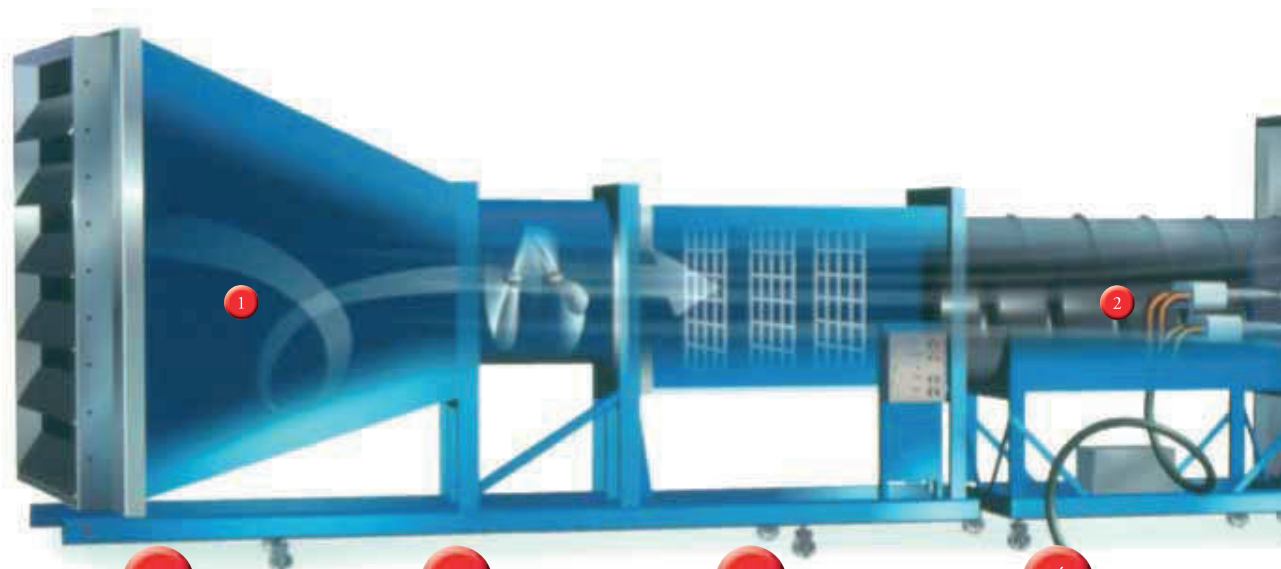
Beauty in Innovation - C/S Louvers

Tried, Tested and Proven - 100% Waterproof Louvers in Asia!

Architects and building designers in Asia have found the perfect solution in battling challenging weather conditions - C/S Performance Louver Systems. Traditional 'Z' section louvers offer very limited protection against the onslaught of wind driven rain. The choice to cater for effect rather than restrict the cause can often lead to wasted plant room space, costly plenum chambers and additional drainage systems that all add up to extra expense. Although these measures may indeed reduce the risk of rain entering sensitive areas of a building, fact is, they often cost more to include than a properly designed performance louver system. Let's face it; louvers are required anyway so why not ensure you choose maximum protection at the building facade?

From Concept to Actual Performance

The development of an effective system relies on years of experience that is then put to the test. The C/S investment, in what is one of the world's only test chambers capable of testing to current international standards, facilitates the continuous development of systems to meet any designer's needs. By simulating wind driven rain in extremely harsh weather conditions, the C/S test chamber puts performance louvers to the test - with tremendous success.



1 External Wind Generator

Severe wind conditions are simulated using powerful fans that can generate wind speeds of up to 45 m/s (100mph).

2 Rain Simulator

Specific quantities of water are delivered via calibrated nozzles and injected into the air stream replicating rainfall rates up to 150mm (6") per hour.

3 Louver Test Panel

The louver panel under test is secured in place and subject to a continuous bombardment of strong wind and rain.

4 Flow and Pressure Monitors

Flow and pressure monitors are positioned about the louver panel under test, to determine airflow efficiency and pressure drop values.

Our exceptional louver system is unmatched and unrivalled in its field - a world-class solution for a global problem. That's exactly what we want to share with you in this comprehensive guide.



C/S Louver Test Chamber

Built in accordance with the strict requirements of the globally recognised design employed by the Building Services and Research Information Association (BSRIA), C/S has a registered chamber capable of testing to both the current Heating, Ventilation and Air Conditioning Manufacturers Association (HEVAC) standard from Europe and the Air Movement and Control Association (AMCA) standard from the US. In addition to these rigorous test standards, other severe wind and rain conditions can be created in our test facility to develop customised solutions to meet specific requirements. Whilst test standards provide a benchmark of performance, only by testing is actual performance proven. This proof provides confidence in application to manufacturers, designers and building owners alike.

Imitation Products Do Not Perform

With over 50 years of experience in the design of Louver systems, we believe that expertise is impossible to imitate. The outcome of our extensive study, research and development on louvers, was the introduction of the industry's first truly revolutionary Storm Resistant Louvers in the early 1990s. Since then, these systems and their successors have set the industry standard. It is only by truly understanding the system requirements through consultation with building designers and then expertly matching this by calculation and verified test results, can the correct system selection be proposed.

Meeting Our Customers' Needs

With the critical knowledge and cutting-edge facilities available to us along with invaluable feedback from our customers, we have been able to develop a range of performance louver models specifically suited to the needs of building designers in Asia. These nine models are represented in this catalog. Information on other C/S louver models can be found in our general catalog which provides details on the wide range of non-drainable, air conditioning, acoustic and operating louvers available.



Collection Chambers

Any water that passes through the louver is collected and measured to determine the effectiveness of the louver system in preventing rainwater ingress.

Intake Fan

The intake fan replicates air demand from handling equipment. The effectiveness of a louver at resisting rain entry may be determined at various air intake rates.

World-Class Testing Standards

AMCA Testing

An AMCA Standard 500 water penetration test facility can be created by removing Sections 1 and 2 of this test chamber, although the latest AMCA test standard (AMCA 500 - L - 99) requires the total rig setup.

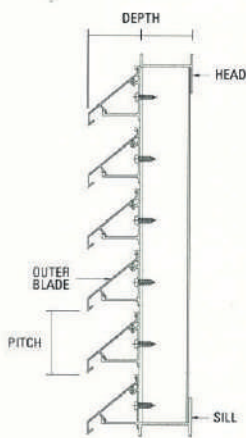
BSRIA Testing

The rig conforms in full to the latest HEVAC testing standards. C/S has a weather louver test facility accreditation license agreement direct with BSRIA.

c|slouvers Architectural Line (hidden mullion) Range

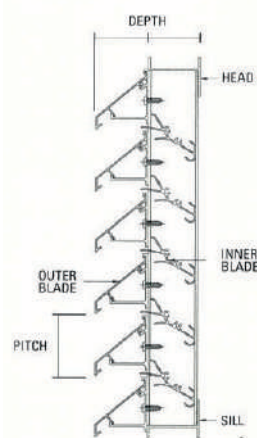
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model RS-1605



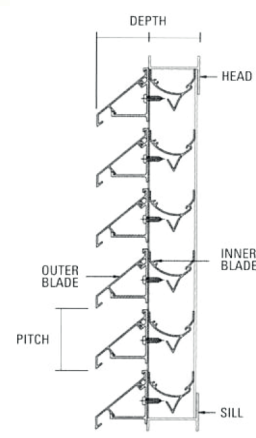
Cross Section on Elevation

model RS-2605



Cross Section on Elevation

model RS-3605



Cross Section on Elevation

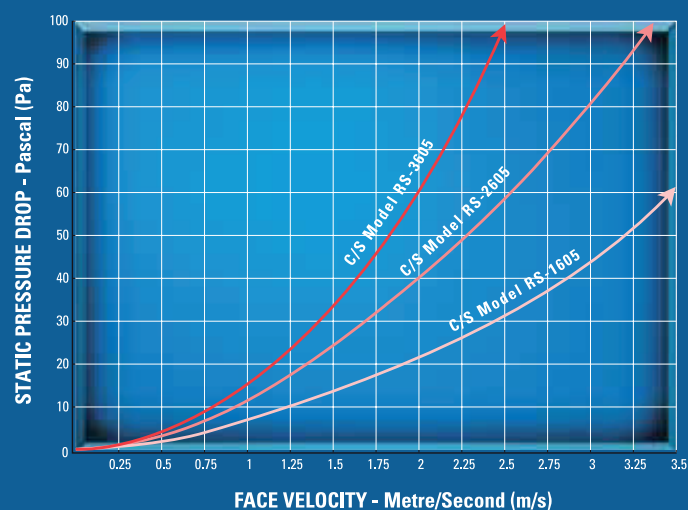
Airflow Performance

Class	Maximum Airflow Coefficient	Rating
1	0.4 and above	Excellent
2	0.3 to 0.399	Very Good
3	0.2 to 0.299	Good
4	0.199 and below	Fair

Performance Comparison Table

C/S Model	Depth (mm)	Pitch (mm)	Blade Configuration	Visual Blade Orientation	Visual Impact of Mullions/Jambs	Airflow Rate in m³/s									
						Rain Defence Classification*									
RS-1605	100	60	Single Blade	Horizontal	Hidden Mullion	C	C	C	C	C	C	D	D		
RS-2605	100	60	Dual Blade	Horizontal	Hidden Mullion	A	A	A	B	C	C	D	D		
RS-3605	100	60	Triple Blade	Horizontal	Hidden Mullion	A	A	A	A	A	B	C	C		

Typical Pressure Drop Curve



* Classified in accordance with the 5th Edition of the HEVAC Technical Specification "Laboratory testing and rating of weather louvers when subject to simulated rain."
 + Construction Specialties, Inc. certifies that the louver models shown herein are licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA publication 511 and comply with requirements of the AMCA certified ratings program.

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Louvers
Applied
**RS-7305a
LSM**



Airflow Coefficient _{max}	Airflow Class	Rain Defence Rating _{average}	Airflow Rating
0.390	2	Fair	Very Good
0.287	3	Good	Good
0.215	3	Excellent	Good

Rain Defence Performance*

Class	Effectiveness (%)	Max. allowed Penetration of Simulated Rain (l/hr/m2)	Rating
A	99 to 100%	0.75	Excellent
B	95 - 98.9%	3.75	Good
C	80 - 94.9%	15	Fair
D	Below 80%	More than 15	not applicable

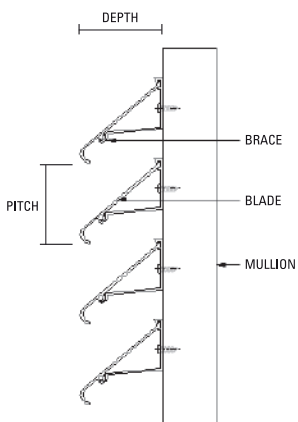
c|slouvers Architectural Line (hidden mullion) Range

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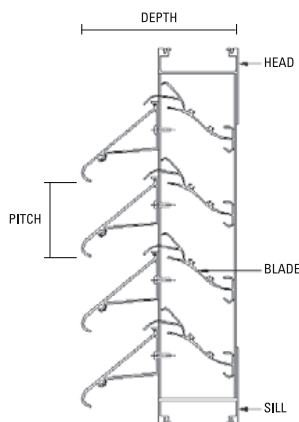
model RS-3105

model RS-7305a⁺

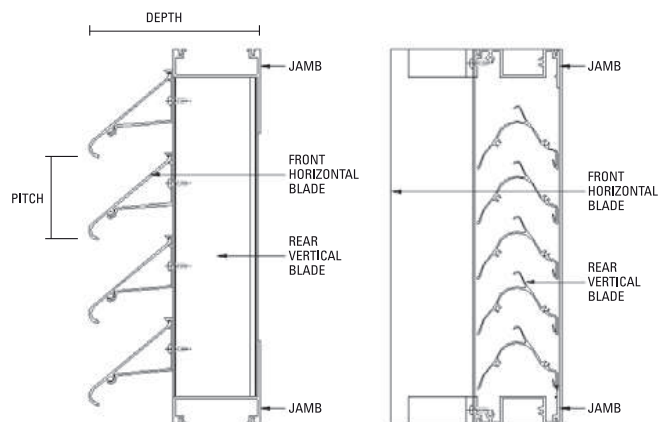
model LSM⁺



Cross Section on Elevation



Cross Section on Elevation

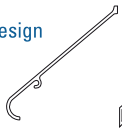


Cross Section on Elevation

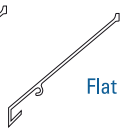
Cross Section on Plan

Alternative front blade profiles

Bull Nose Design



Flat Nose Design



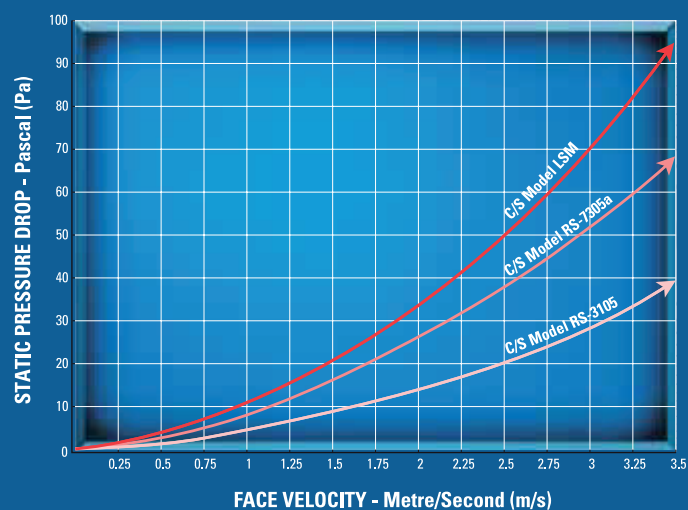
Airflow Performance

Class	Maximum Airflow Coefficient	Rating
1	0.4 and above	Excellent
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3	0.2 to 0.299	Good
4	0.199 and below	Fair

Performance Comparison Table

C/S Model	Depth (mm)	Pitch (mm)	Blade Configuration	Visual Blade Orientation	Visual Impact of Mullions/Jambs	Airflow Rate in m ³ /s									
						0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	Rain Defence Classification*	
RS-3105	76	75	Single Blade	Horizontal	Hidden Mullion	C	C	C	C	C	C	C	C	D	
RS-7305a ⁺	152	75	Dual Blade	Horizontal	Hidden Mullion	A	A	A	B	C	C	C	C	D	
LSM ⁺	155	75	Triple Blade	Horizontal	Hidden Mullion	A	A	A	A	A	A	A	A	A	

Typical Pressure Drop Curve



performance louver systems / performance louver systems / performance louver systems / performance louver systems / performance louver systems

Louvers
Applied
RS-3105
RS-7305a



“ From our experience with C/S Louver products supplied and installed, these louver products have proven to be effective in areas where we needed both weather protection and ventilation. We are pleased with the performance of C/S from installation to commissioning on our Ang Mo Kio Market project. ”

Surbana Consultants - Singapore

Rain Defence Performance*

Airflow Coefficient ^{max}	Airflow Class	Rain Defence Rating ^{average}	Airflow Rating
0.434	1	Fair	Excellent
0.320	2	Good	Very Good
0.282	3	Excellent	Good

Class	Effectiveness (%)	Max. allowed Penetration of Simulated Rain (l/hr/m2)	Rating
A	99 to 100%	0.75	Excellent
B	95 - 98.9%	3.75	Good
C	80 - 94.9%	15	Fair
D	Below 80%	More than 15	not applicable

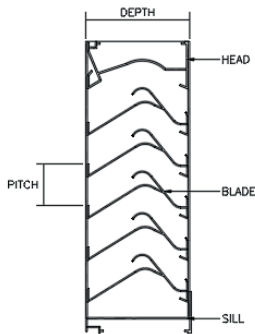
c|slouvers Storm Resistant Range

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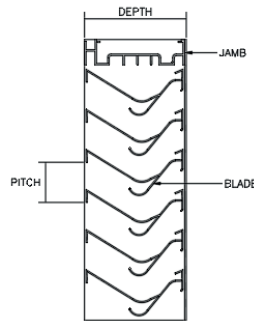
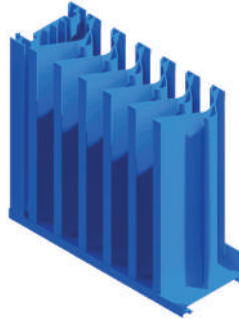
model RSH-5700⁺

model RSV-5700⁺

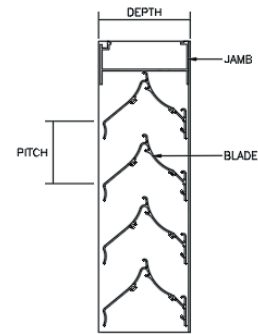
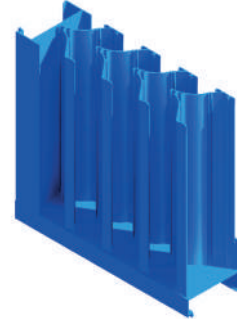
model RS-4600



Cross Section on Elevation

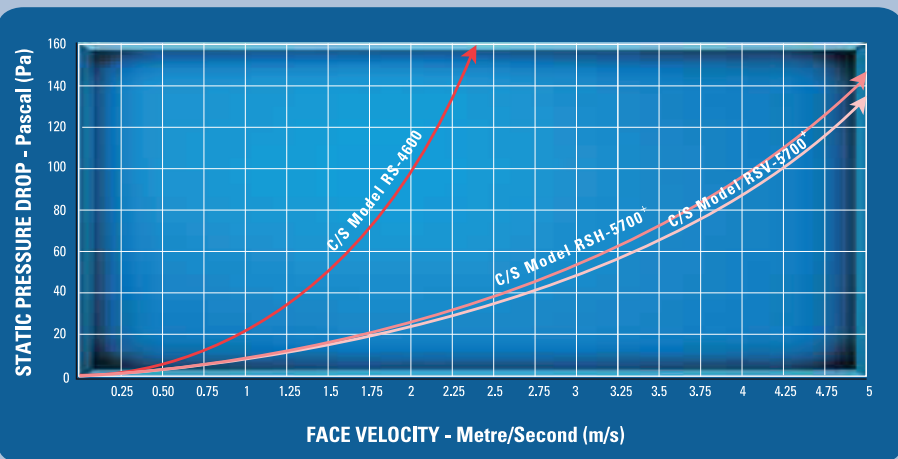


Cross Section on Plan



Cross Section on Plan

Typical Pressure Drop Curve



Airflow Performance

Class	Coefficient Maximum Airflow	Rating
1	0.4 and above	Excellent
2	0.3 to 0.399	Very Good
3	0.2 to 0.299	Good
4	0.199 and below	Fair

Performance Comparison Table

C/S Model	Depth (mm)	Pitch (mm)	Blade Configuration	Visual Blade Orientation	Visual Impact of Mullions/Jambs	Airflow Rate in m³/s													
						Rain Defence Classification*													
RSH-5700 ⁺	127	50	Dual Blade	Horizontal	Visible Mullion	A	A	A	A	A	A	A	A	A	A	A	B	C	
RSV-5700 ⁺	127	50	Dual Blade	Vertical	Visible Mullion	A	A	A	A	A	A	A	A	A	A	A	A	A	A
RS-4600	102	75	Dual Blade	Vertical	Hidden or Visible	A	A	A	A	A	A	A	A	A	B	-	-	-	

* Classified in accordance with the 5th Edition of the HEVAC Technical Specification "Laboratory testing and rating of weather louvers when subject to simulated rain."

⁺ Construction Specialties, Inc. certifies that the louver models shown herein are licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA publication 511 and comply with requirements of the AMCA certified ratings program.



LANE MARK
HONG KONG

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Louvers
Applied
RSH-5700⁺

Rain Defence Performance*

Airflow Coefficient ^{max}	Airflow Class	Rain Defence Rating ^{average}	Airflow Rating
0.32	2	Excellent	Very Good
0.33	2	Excellent	Very Good
0.162	4	Excellent	Fair

Class	Effectiveness (%)	Max. allowed Penetration of Simulated Rain (l/hr/m2)	Rating
A	99 to 100%	0.75	Excellent
B	95 - 98.9%	3.75	Good
C	80 - 94.9%	15	Fair
D	Below 80%	More than 15	not applicable

C/S Louvers - Form, Accessories & Glossary

Customised Elegance

To meet the aesthetic (form) needs of the building designer, louver systems are matched to provide a consistent external appearance whatever the functional requirements.

Architectural line (hidden mullion) systems provide an uninterrupted louver appearance irrespective of where support mullions and performance modules are placed behind the front louvers.

Mullion line (visible mullion) systems provide a regular vertical mullion appearance, where this is required to match the building facade.

Although generally supplied in square or rectangular panels, variations in the shape of louver panels are available.

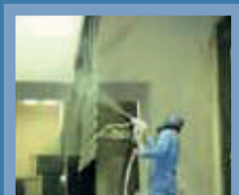
Quality and Performance Beyond Expectations

The principal material used in the manufacture of C/S Louvers is architectural standard high grade aluminium, designed to cater to both the structural and finishing requirements of the louver system itself. Unlike other commercially available louvers, the complete system is manufactured from extruded sections to ensure consistent size, shape and quality and facilitate concealed stainless steel fasteners. The louver panels are assembled using purpose-designed gaskets and seals to ensure waterproofing and eliminate the uncertainties associated with gunned sealant.

Both mullion line and performance panels are factory assembled to minimise site handling and ensure quality control. Front louvers for Architectural line systems are provided cut to size for clipping to purpose designed louver clips pre-fixed to the louver mullions, for quick and easy site assembly.

Aluminium also provides an ideal substrate for commercially available architectural finishes, from anodizing to polyester powder and polyvinylidene fluoride (PVDF) coatings. Alternatively, C/S Louvers can be provided in a range of alternative materials upon request.

C/S is accredited to ISO 9001:2000 in Asia to reinforce our commitment to provide quality systems that meet customer expectations.



Stringent production process in spray-painting and detailed touch-ups to ensure high quality standards.

Integrated Accessories

Optional accessories include birdguard, insect mesh and blanking panels which are un-insulated or insulated to meet project requirements. Louver doors and access panels can be easily integrated within the louver panel design.



Typical Architectural Line
(Hidden Mullion) Louver



Typical Mullion Line
(Visible Mullion) Louver

Glossary

This section provides a glossary and explanation of terms commonly applied to performance louver systems and their design:

Aerodynamic Coefficient - determined by actual airflow testing, this unitless value represents the effectiveness of the louver system to pass air from one side to the other. Unlike free area %, it takes due account of depth and profile shape when subjected to various air velocities, to provide an accurate value that can be used for airflow performance analysis. Values are recorded for both inlet and exhaust. Typical values for performance louvers range from 0.1 to 0.5, the higher number being more effective at air passage.

A.M.C.A. - Based in the United States the Air Movement Control Association provides a methodology, test standard and test facilities for the performance testing of louvers subjected to wind and rain. They also operate a certificated ratings system for finished products.

Blade Pitch - Blade pitch is the dimension, usually in millimetres (mm), at which the individual blades are spaced within the louver panel.

B.S.R.I.A. - Based in the UK, Building Services Research and Information Association is one of Europe's leading independent laboratories for the testing and certification of building services products.

Core Area - The area of the louver panel minus the louver framing and fixing flanges is referred to as the core area, and is generally expressed in square metres (m²).

Core Velocity - Once core area is determined, the speed at which air passes through this area is known as core velocity and is generally expressed in metres per second (m/s).

Face Area - The complete area of the louver panel including louver framing and fixing flanges is referred to as the face area, and is generally expressed in square metres (m²).

Face Velocity - Based on the louvers face area, the speed at which air approaches this area is known as face velocity and is generally expressed in metres per second (m/s).

Framing Factor - Where total louver area is known but specific panel sizes are not, a framing factor is applied to make allowance for the effect of louver framing in the airflow calculations.

Free Area - The minimum area through which air can pass is referred to as the free area and usually expressed as a percentage of the total louver size. Although generally used as a 'rule of thumb' for louver sizing, it does not provide an accurate assessment of louver performance, as it takes no account for the effects of panel depth, configuration and blade profile on airflow performance.

H.E.V.A.C. - Based in the UK, the Heating, Ventilation and Air Conditioning Manufacturers Association provides a methodology and test standard for the performance testing of louvers subject to wind and rain.

Pressure Drop - Based on flow, aerodynamic coefficient and specific density of air, the pressure drop is resistance to flow incurred when air moves from one side of the louver to the other. Generally expressed in pascals (Pa).

Volumetric Flow Rate - The specific flow rate required to pass through the louver system (inlet or exhaust) to provide the correct supply and exhaust air requirements to the buildings mechanical plant, is referred to as the volumetric air flow and generally expressed in cubic metres per second (m³/s).



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