# TECHNICAL BULLETIN

METAL CONSTRUCTION ASSOCIATION

# MCM Panel System Definitions

## Overview

Metal Composite Material (MCM) has been used as a means of exterior cladding in North American construction for more than 40 years. In order for this flat sheet material to be used, it must first be fabricated into an assembly that is installable on the structure. These different assemblies are known as installation "systems". In this Technical Bulletin, we will define the basic installation "systems" that were first developed, and continue to be used today. We will also discuss some of the more sophisticated designs that are currently popular and meet the performance requirements of building technology practiced today. When finished with this paper, the reader should have a basic understanding of the different system types and the performance characteristics that make each type of system unique.

## Discussion

### Original Basic Installation Systems

When first introduced, MCM installation in North America were focused on two different styles: the Wet Seal system and the Dry Seal system. These systems were used on many different types of buildings and variations of these systems are still commonly used today.

**Wet Seal System:** This was one of the original installation systems and is still widely used today in a variety of applications. Also known as a "single line barrier wall" or "fully-sealed wall", a Wet Seal system is installed with a joint located between adjacent panels that is fully sealed with **exposed sealant**. This installation type creates a single barrier between the exterior environment and the interior cavity behind the panel. Air and water infiltration is minimized by the flexible exposed sealant located at each panel joint. In this type of system, the sealant installation and adhesion to the panel on each side of the joint is critical for successful performance. This type of installation should be inspected regularly to make sure that the sealant has not lost flexibility or adhesion to the panel as the exterior envelope ages.

The Wet Seal system is intended to stop water infiltration at the exterior panel surface; however any water or condensation that may find its way into the panel cavity gathers at the sill flashing. A well designed Wet Seal system will generally include the use of properly designed sill flashings with weep tubes to allow unwanted water to exit. The use of an air/water barrier is generally recommended to protect the panel cavity from moisture damage; however the wall assembly should be tested without this additional barrier in place so that performance of the exterior cladding assembly may be determined isolated from the air/water barrier performance.

*Tested to AAMA 501 & 501.1 standards*

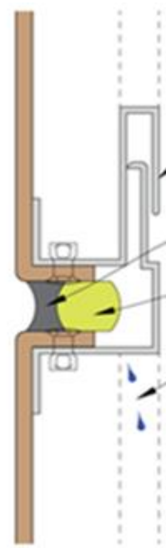


*Figure 1 - Wet System Horizontal Joint (Example)*

**Dry Seal System:** This was also one of the original installation systems used and there are many buildings, from low rise to high rise, which have been clad with this installation system for many years. This system has a few more components than the Wet Seal system, but the installation companies that use this system are expert in the detail required to make this system perform well. This system is also still widely used in today's construction world.

A Dry Seal system is defined as a panel system where the joints between panels provide weather resistance without relying on the application of exposed or concealed sealants within the joints. In one typical method of achieving a Dry Seal system, the perimeter of the MCM panel is affixed with gasketed interlocking perimeter extrusions or formed metal profiles. These extrusions nest together in a gasketed pocket as shown in Figure 2. It should be noted that not all extrusions creating a Dry Seal system utilize gaskets, yet they perform very adequately as an exterior cladding. Water infiltration is primarily controlled by the interlocking extrusions. Any water or condensation that may find its way into the panel cavity is controlled and directed to the exterior through weep holes keeping the interior cavity dry. The Dry Seal system should perform the same with or without an air/water barrier. To properly test a Dry Seal system, the mockup is constructed without any barrier in place and the backside of the panels are exposed directly to the interior chamber pressures. Testing in this fashion shows the effectiveness of the system, designed to perform even if the air/water barrier is compromised.

*Tested to AAMA 501 & 501.1 standards*

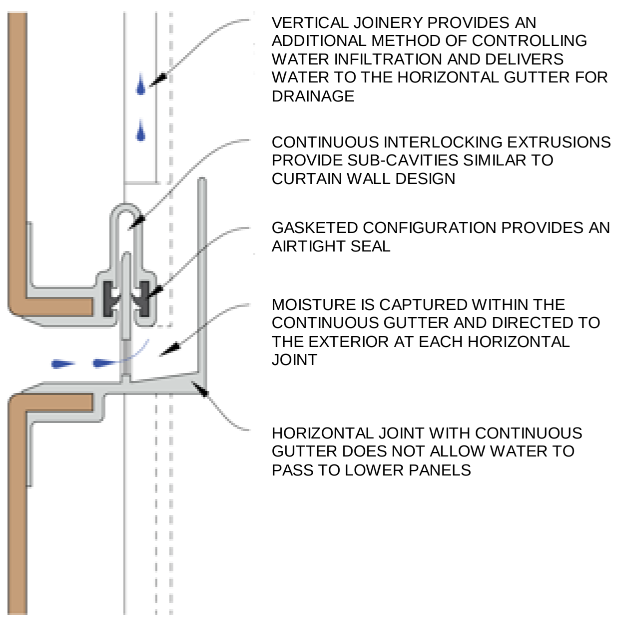


*Figure 2 - Dry System Horizontal Joint (Example)*

Both the Wet Seal and Dry Seal systems have been used successfully for many years and continue to be used in the construction market. Material changes over the years and a better understanding of how the exterior cladding actually performs under load have led to many new developments that have been incorporated into cladding design.

## Today's Installation Systems

Today's installation systems appear far more varied because each fabricator/installer has developed their own unique installation method. That being said, one can still find many instances of both the Wet Seal system and the Dry Seal system. In addition, technology and product development has brought on several new and very popular systems.

**Drained and Back Ventilated Rainscreen System (AAMA 509):** A drained and back ventilated (DBVR) system allows water to enter the interior air space through the cladding system joinery. The minimal amount of water that does enter the interior air space, is quickly drained to the exterior while the interior panel cavity is designed to quickly dry through ventilation. A solid backing such as gypsum board must be correctly installed to withstand any temporary increase in pressure. A properly designed drained and back ventilated system will minimize the amount of water passing through the exterior cladding joinery, while the air/water barrier provides a "final" layer to inhibit water infiltration. All of these components must be properly designed and installed to control any water that enters the air cavity and contacts the air/water barrier. Since the system allows air pressure to pass though the joints, the air/water barrier and gypsum board backing most likely will experience a load increase due to the wind load impacting the building and should be designed to accommodate these loads, as defined for air-permeable cladding in the ASCE 7 "Standard for Minimum Loads for Buildings and Other Structures".

*Tested to AAMA 509 standards*

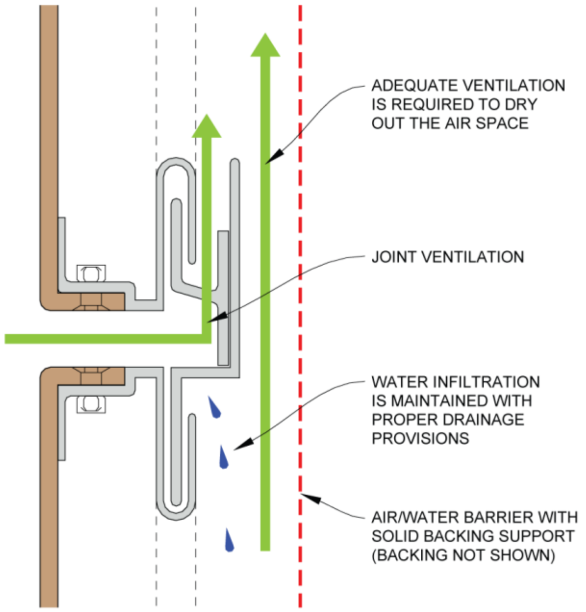


*Figure 3 - Drained and Back Ventilated Rainscreen System Horizontal Joint (Example)*

*Tested to AAMA 508 or 509 standards*

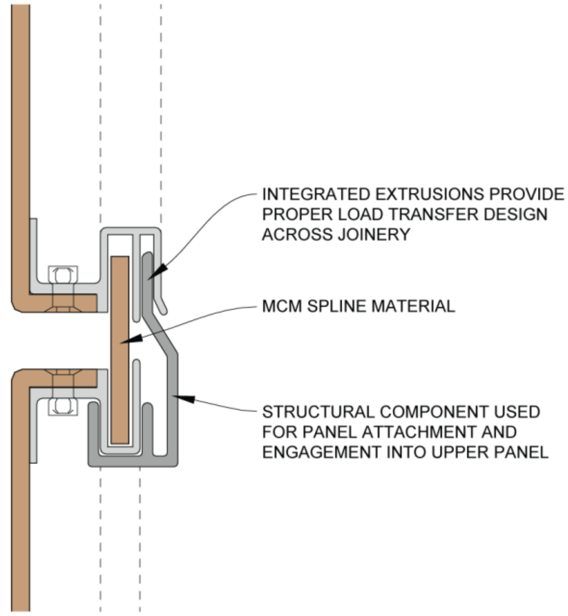


*Figure 4- Spline System Horizontal Joint (Example)*

Drained and Back Ventilated systems have been developed using many different connection details. Some of the more common DBVR systems include:

**Spline System:** The spline system is really a description of one method used to construct and finish the joinery in either a PER or a DBVR system. The spline element, used to close off the panel joinery and provide a significant deterrent to water infiltration, is a solid material such as a strip of metal or metal composite material inserted into the panel perimeter extrusions as the panels are installed. It should be noted that spline element should not be designed to transfer loads across the panel joint. It is primarily provided to control the panel water infiltration and venting. This cover also serves to conceal any exposed fasteners used in the attachment of the panels.

**Hook and Pin:** The hook and pin is another DBVR method used to affixed panels to the building's substructure. It is not intended to describe the weathering performance of a system. The term "hook and pin" references the "hook" engagement which is engineered into the panel to engage over a corresponding horizontal "pin" element that is pre-attached to the building substructure. The panels engage (hook) onto the pin and hang in place. The element containing the pins is commonly a clip or rail which is installed onto the building prior the panel installation. A hook and pin system can also be designed as a PER system that can comply with AAMA 508.



METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 I mca@metalconstruction.org I www.metalconstruction.org

*Tested to AAMA 501, 508 or 509 standards*

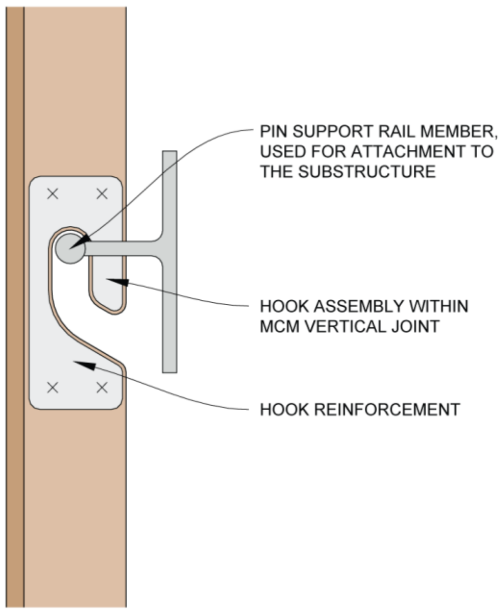


*Figure 5 - Hook and Pin Attachment (Example)*

**Pressure Equalized Rainscreen System (AAMA 508):** A pressure equalized rainscreen (PER) system design is based on the concept of having equal pressure on the exterior of the cladding and the interior air cavity. With no pressure gain/loss there is no method for the rain to enter into the system. The concept of pressure equalization has been proven in many applications and is widely used throughout the industry.

Equalization is achieved by venting the interior airspace in precisely the correct locations and amounts. This venting allows air to quickly pass through the cladding joinery allowing the interior air space to quickly equalize with the exterior pressure while controlling water infiltration. However, this pressure equalization also means that the solid backing (such as gypsum board) must be properly designed and constructed behind the panel system. The air/water barrier becomes the primary air barrier for the building. In addition to the air/water barrier, the interior air space behind the panel system is typically divided into sealed and separate compartments. This prevents the air within the air space from migrating between higher and lower pressure zones. One method to create movement of air in differing pressure zones is the use of vertical and/or horizontal sealant as shown in Figure 6, however the design of adequate compartmentalization is beyond the scope of AAMA 508. When properly designed and installed, acceptable levels of pressure equalization can be proven in laboratory test results to nationally recognized standards.

*Tested to AAMA 508 standards*

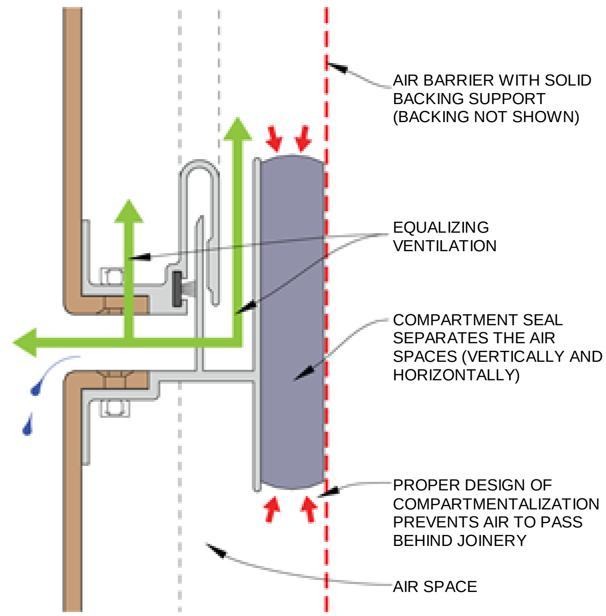


*Figure 6 – Pressure Equalized Rainscreen System Horizontal Joint (Example)*

<u>**Summary**</u>

There are a wide variety of installation systems used in the marketplace. The choice of installation system often depends on the performance requirements of the project and the overall appearance that the designer is trying to achieve. The important aspect in each system is that air and water infiltration is controlled to the exterior side of the WRB or gypsum sheathing. Properly designed for the anticipated loading, the correctly selected installation system type can be used meet the performance requirements of the project.

***References:***

Anderson, J.M. and Gill, J.R. 1988 Rainscreen Cladding a guide to design principles and practice.

Canada Mortgage and Housing Corporation. 1999 Rainscreen Penetration Control: Applying Current Knowledge



METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

BUILD LEGACIES METAL

Canada Mortgage and Housing Corporation. 2004 The Rainscreen Wall System

American Society of Civil Engineers. 2013 Minimum Design Loads for Buildings and Other Structures - ASCE7-10

---

Founded in 1983, the Metal Construction Association brings together the diverse metal construction industry for the purpose of expanding the use of all metals used in construction. MCA promotes the benefits of metal in construction through:

- Technical guidance
- Product certification
- Educational and awareness programs
- Advocating for the interests of our industry
- Recognition of industry-achievement awards
- Monitoring of industry issues, such as codes and standards
- Research to develop improved metal construction products
- Promotional and marketing support for the metal construction industry
- Publications to promote use of metal wall and roof products in construction

For more information, please visit the MCA Web site at www.metalconstruction.org



This document is for general information only. The document is designed to delineate areas requiring consideration. Information contained in the document should not be used without first securing competent advice with respect to its suitability for any given application. MCA does not assume responsibility and disclaims any representation or warranty, express or implied, that such information is suitable for any general or particular use. Anyone making use of the document assumes all liability resulting from such use.

The existence of the document does not in any respect preclude a member or nonmember of MCA from manufacturing, selling, or specifying products not conforming to the document, nor does the existence of an MCA document preclude its voluntary use by persons other than MCA members. The document does not purport to address all safety problems associated with its use or all applicable regulatory requirements. It is the responsibility of the user of the guideline to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before use of the document.

The Metal Construction Association reserves the right to change, revise, add to, or delete any data contained in the document without prior notice.

It is the responsibility of the end user to verify the applicability of this information with the local building and fire officials.



METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 I mca@metalconstruction.org I www.metalconstruction.org

BUILD LEGACIES METAL