

Technical Bulletin

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Topic: Metal Building Strategies



Putting a Master Wall® on a metal building is a good option for improving the looks or even adding a decorative element to the surface. In many cases it can be an economical application, but some are complicated due to unknown variables that we need to understand to create a successful wall cladding solution. These variables are movement, attachment methods and design potential. This bulletin explores these variables to help the architect or engineer determine the best solution for their project.

Movement Considerations

All buildings move, but sometimes metal buildings move more. In this case the movement we are speaking of is deflection under load. Metal building panels can be highly flexible and still perform well. Excessive deflection movement works against other cladding systems and can cause cracking or additional stress.

In general, older metal buildings seem to have been designed to move more than newer ones. Or at least the deflection is now documented on the architectural drawings which makes for a quick determination of suitability.

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Deflection is the measure of how much building components move under load. Sometimes drawings will list the deflection criteria such as L/180, L/240, L/360 etc. with the lower denominator (lower number) indicating more movement capability. An L/180 wall can move twice as much as an L/360 wall. This calculation is the height of the wall (in inches) divided by the lower number. What you get is the allowable maximum deflection when the wind load is applied. Movement cracks stucco and can overly stress CIFS® Therefore the engineers are involved.

Deflection Limitations

- **L/240:** Master Wall® Rollershield Drainage CIFS®, Aggre-flex Drainage EIFS, Aggre-flex EIFS, QRW1 Drainage EIFS.
- **L/360:** Master Wall® Cemplaster Fiberstucco, Stucco Cement Board Coatings, Traditional and One Coat Stuccos.
- **L/600:** Master Wall® LiMa Systems, Direct applied coatings to masonry or concrete surfaces.

Attachment Methods

CIFS® and EIFS transfer structural loads either to a mechanically attached substrate or through fasteners that hold the insulation in place. For metal buildings, the simplest approach of attaching to the metal siding works best provided there is enough structure in the metal and the structure successfully transfers the load to the girts or other sub-structures.

Sometimes the metal can be too thin to simply attach through it and anything thinner than 25 ga will not be appropriate for standard applications. If investigating mechanically attaching the following properties are needed of the fastener:

Metal Thickness	25 ga	22 ga	20 ga
Pull Out (minimum, lbs.)	178	244	277
Thickness (galvanized, in)	0.0247	0.0336	0.0396
Thickness (plain steel, in)	0.0209	0.0299	0.0359

In addition to needing stiffer substrates, stucco and cement board systems also add weight to the wall. Additional weight may require more fasteners.

Secondary Attachment Options

If the metal or the profile is not appropriate for the direct attachment of a CIFS®/EIFS or other system, there are some other options for the designer:

- Add more fasteners. If the metal is marginal or the wind load requirements are more, additional fasteners may help. Our non-nailable substrate fastening pattern is set on 16" centers but it could be revised to 12" if there is appropriate support in the metal.
- Add a sheathing, increase fasteners spacing from the typical 8" centers to 4". This also helps if the metal profile is not appropriate for a mechanically attached application.
- Add structure to the building. This could be the same as framing the building at 16" centers with the framing attached to the girts, then sheath the wall typical of a standard system

Design Potential

For the easiest CIFS/EIFS application the flatter the metal panel the better the substrate is. Metal panels are often reversed to give more flat surface than void. We recommend a 6" minimum flat area with a 2" maximum void area and 1-1/2" minimum insulation board thickness for EPS insulation (1" minimum for polyisocyanurate).

Wide voids are not appropriate for the system. If deflection and attachment criteria have been met it may be possible to fill the voids with mechanically attached insulation with a layer of additional insulation over the top.

Summary

The addition of a cladding to metal panels adds greatly to the overall building aesthetics but there is no single method that will work for every building. The design professional needs to evaluate the building and if needed adjust the support systems to provide the best solution.

Attached are some common solutions and the reasons they are used based upon how the variables of movement, attachment and design potential affect the structure.

Metal Building System Detail



Attach insulation using approved fasteners and plates following recommended pattern at the minimum rate of one fastener per square foot

Flashing and closure as needed by the design

Design Check



Movement Considerations
Meets deflection requirements.



Attachment Methods
Meets attachment requirements.



Design Potential
Metal deck profile within limits with more flat areas than void.

Master Wall® Systems

- Aggre-flex/Aggre-flex Drainage EIFS (1-1/2" insulation minimum)
- QRW1 Drainage EIFS (1" insulation minimum)
- Stucco Cement Board Coatings (L/360 deflection required)

MB-01 Metal Building Attachment Profile

These drawings relay the conceptual conditions of Master Wall® Systems and are not the construction drawings. Ultimately the design and detailing of an entire wall system is the responsibility of a professional. These details will guide the design professional in the use of Master Wall® Products. Master Wall disclaims design, warranty or construction intent or responsibility. Bold or Brand Name = Master Wall® Product.

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Metal Building System Detail



Attach substrate to the panel ridges every 8" vertically by 16" horizontally. Additional fasteners will provide more wind resistance

Design Check



Movement Considerations
Meets deflection requirements.



Attachment Methods
Meets attachment requirements with enough support for the substrate.



Design Potential
Wide spaced panels make spanning the voids impossible, substrate provides an acceptable surface for the system attachment.

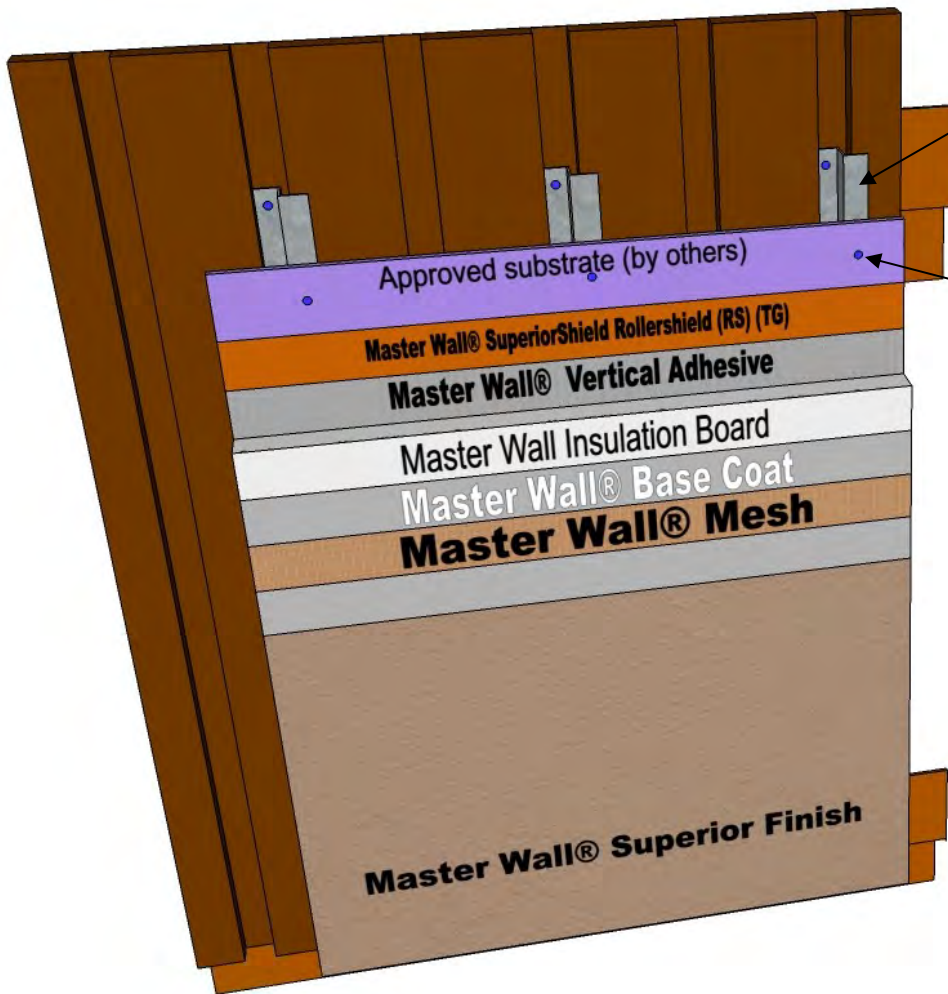
Master Wall® Systems

- Rollershield Drainage CIFS® (shown)
- Aggre-flex EIFS
- Aggre-flex Drainage EIFS

MB-02 Metal Building Attachment Profile Using an Approved Substrate

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Metal Building System Detail



Structural members attached to girts to meet attachment and deflection considerations.

Attach substrate to structural members every 8" vertically by 16" horizontally. Additional fasteners will provide more wind resistance

Design Check



Movement Considerations

Panels that do not meet deflection criteria require metal structure to transfer load onto girts.



Attachment Methods

Thin metal does not provide enough strength to hold fasteners



Design Potential

More flat than void areas but structure and an approved substrate are added for a successful application.

Master Wall® Systems

- Rollershield Drainage CIFS® (shown)
- Aggre-flex EIFS
- Aggre-flex Drainage EIFS

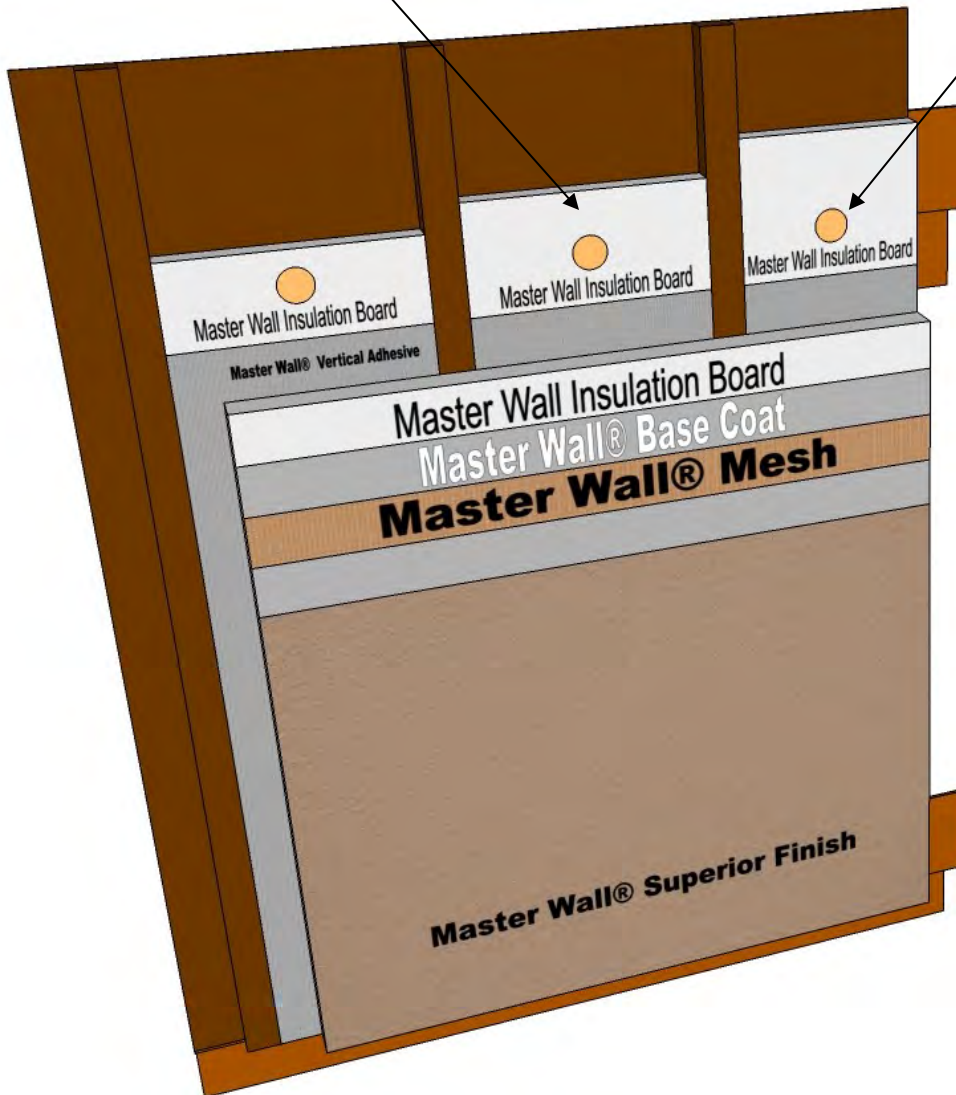
MB-03 Metal Building Attachment Profile Using an Approved Substrate and Structural Support

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Metal Building System Detail

Insulation board flush with metal panel ribs

Attach insulation using approved fasteners and plates at the minimum rate of one fastener per square foot



Design Check



Movement Considerations

Meets deflection requirements.



Attachment Methods

Meets attachment requirements.



Design Potential

More flat than void areas but insulation provides support for the application.

Master Wall® Systems

- Aggre-flex EIFS (shown, minimum 1-1/2" insulation thickness)
- Aggre-flex Drainage EIFS (minimum 1-1/2" insulation thickness, mechanically attached to ridges of metal panel)
- QRW1 Drainage EIFS (minimum 1" insulation thickness, mechanically attached to ridges of metal panel)

MB-04 Metal Building Attachment Profile with Infill Insulation

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