High performance Walls

CLADDING ATTACHMENT SYSTEMS AND THEIR IMPACT ON CONTINUOUS EXTERIOR INSULATION EFFICIENCY

Document Summary: This document is meant to serve as a guide for designers and builders to compare the thermal performance of different cladding attachment systems. The first section is a catalogue of products, split into brick veneer and cladding finish systems. The second section presents thermal modeling results of these systems from a study conducted by Steven Winter Associates (SWA).

Thermal Efficiency: percentage of continuous insulation R-value that is effective.

- 100% thermal efficiency = continuous insulation without thermal bridging
- 20% thermal efficiency = continuous insulation derated to 20% of installed R-value
For Cladding Finish Systems: Girts

**Galvanized Girts**

**Description**

Typical z-girts are usually galvanized steel. Most projects use these to support their cladding systems.

**Thermal efficiency per SWA:** 43%-53%

- 53% for Steel backup
- 43% for CMU backup

**Example Products:**

- Green Girt- Simple Z

**Fiberglass Girts**

**Description**

Fiberglass girts are installed and used the same way as typical metal z-girt. The fiberglass material reduces thermal bridging.

**Thermal efficiency per SWA:** 91%-95%

- 91% for Steel backup
- 95% for CMU backup

**Example Products:**

- Armatherm Z Girt

**Thermoset Resin Girts**

**Description**

These girts have a low thermal conductivity. Made of fire resistant resin material. Can be spaced 16” or 24” o.c. and is very strong.

**Thermal efficiency per SWA:** 96%

- 96% for Steel backup
- 96% for CMU backup

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For Cladding Finish Systems: Clips

**Galvanized Metal Clips**

**Description**
These clips are usually galvanized steel and are used to support rainscreen and panel cladding systems.

**Thermal efficiency per SWA:** 46-59%

46% for Steel backup
59% for CMU backup

**Example Products:**
- A-Clip. MFSSCHAN

**Stainless Steel Clips**

**Description**
Replacing galvanized steel clips with stainless steel ones can greatly reduce the thermal conductivity.

**Thermal efficiency per SWA:** 63-74%

63% for Steel backup
74% for CMU backup

**Example Products:**
- Alpha Brackets

**Aluminum Clips**

**Description**
Aluminum clips are light weight and strong. They are a more elastic and non corrosive alternative to traditional metal clips.

**Thermal efficiency per SWA:** 38-52%

38% for Steel backup
52% for CMU backup

**Example Products:**
- Alpha Brackets

**Fiberglass Clips**

**Description**
Fiberglass clips have a much lower thermal transmittance coefficient than any metal equivalent.

**Thermal efficiency per SWA:** 64-79%

64% for Steel backup
79% for CMU backup

**Example Products:**
- Cascada Clip

**Thermal Stop Clips**

**Description**
This clip has a plastic thermal stop at the base and head to help mitigate thermal bridging.

**Thermal efficiency per SWA:** 67-80%

67% for Steel backup
80% for CMU backup

**Example Products:**
- Pos-I-Tie Thermal Clip,
- Nvelope NV1 Thermal Clip

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For Brick Veneer Systems: Ties

Galvanized Steel Brick Ties

Description
Typical brick ties are galvanized steel. Most brick veneer projects use this type of product.

Thermal efficiency per SWA: 75-84%

75% for Steel backup
84% for CMU backup

Example Products:
2 Seal Tie Thermal, Original Pos-I-Tie

Stainless Steel Brick Ties

Description
Stainless steel ties are less conductive than galvanized steel ties.

Thermal efficiency per SWA: 87-93%

87% for Steel backup
93% for CMU backup

Example Products:
2 Seal Tie Thermal Wing Nut Anchor

Thermal Break Brick Ties

Description
This stainless steel brick tie has a plastic coating, which reduces thermal bridging.

Thermal efficiency per SWA: 88-94%

88% for Steel backup
94% for CMU backup

Example Products:
Teplo Ties, Galen Wall Ties

Basalt Fiber Wall Ties

Description
Basalt fiber is a material made from fine fibers of basalt. They tend to be stronger and lighter than stainless steel wall ties and much less thermally conductive.

Example Products:
Block Shear Connector

Connectors

Description
These are used in place of brick ties. The combination of horizontal and vertical elements increases strength despite its small size.

These can be applied prior to liquid applied air barrier installation, so air tightness is improved.

Example Products:
Block Shear Connector

Stainless Steel Brick Ties

Description
Stainless steel ties are less conductive than galvanized steel ties.

Thermal efficiency per SWA:
87% for Steel backup
93% for CMU backup

Example Products:
2 Seal Tie Thermal

Galvanized Steel Brick Ties

Description
Typical brick ties are galvanized steel. Most brick veneer projects use this type of product.

Thermal efficiency per SWA: 75-84%

75% for Steel backup
84% for CMU backup

Example Products:
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Example Products:
Block Shear Connector
For Brick Veneer Systems: Angles

**Typical Shelf Angle**

*Description*

Typically, shelf-angles are made of galvanized steel.

*Thermal efficiency per SWA: 58-69%*

- 58% for Steel backup
- 69% for CMU backup

*Example Products:*

- FAST (Fero Angle Support Technology)

**Stand-off Shelf Angle**

*Description*

This stand-off shelf angle allows insulation to be installed behind it. The bracket can be used with readily available shelf angles.

*Thermal efficiency per SWA: 73-81%*

- 73% for Steel backup
- 81% for CMU backup

*Example Products:*

- Armatherm Shelf Angle

**Shelf Angle with Thermal Break**

*Description*

The thermal break plate is installed between the shelf angle and bracket to reduce the thermal bridge at those points.

*Thermal efficiency per SWA: 63-74%*

- 63% for Steel backup
- 74% for CMU backup

*Example Products:*

- Armatherm Shelf Angle
Results: Brick Veneer

Brick Ties

- Thermal Ties: 94% CMU, 88% Steel
- Stainless Brick Ties: 93% CMU, 87% Steel
- Galvanized Brick Ties: 84% CMU, 75% Steel

Shelf Angles

- Standoff Shelf Angle: 81% CMU, 73% Steel
- Thermally Broken Shelf Angle: 74% CMU, 63% Steel
- Standard Shelf Angle: 69% CMU, 58% Steel

Have to be combined
Results: Panel Cladding

- **Clip and Rail**
  - Thermal Stop Clip and Rail: 80% CMU Backup, 67% Steel Backup
  - Fiberglass Clip and Rail: 79% CMU Backup, 64% Steel Backup
  - Stainless Clip and Rail: 74% CMU Backup, 63% Steel Backup
  - Galvanized Clip and Rail: 59% CMU Backup, 46% Steel Backup
  - Aluminum Clip and Rail: 52% CMU Backup, 38% Steel Backup

- **Girts**
  - Thermoset Resin Girt: 96% CMU Backup, 96% Steel Backup
  - Fiberglass Girt: 95% CMU Backup, 91% Steel Backup
  - Galvanized Girt: 53% CMU Backup, 43% Steel Backup