**PRIEST & ASSOCIATES CONSULTING, LLC**

# ENGINEERING EVALUATION

Engineering Extensions based on NFPA 285 Test

Project No. 10809B, Revision 5

Prepared for:

Nichiha USA Inc.
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June 21, 2024

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*Abstract*

*An NFPA 285 test report was used to determine Engineering Extensions on wall components of NFPA 285 wall designs for Nichiha USA. These include base wall assemblies, exterior sheathing, water-resistive barrier (WRB), exterior insulation, attachments, and claddings. We have determined that Engineering Extensions on these various components of the tested wall designs can meet the criteria of NFPA 285 with specific limitations.*

*This revision (Revision 5) addresses the allowance of alternative polyiso exterior continuous insulation products. The allowance is based on the approvals given in each insulation product's code compliance report (or design listing).*

The conclusions reached by this evaluation are true and correct, within the bounds of sound engineering practice. All reasoning for our decisions is contained within this document.

Submitted by,

Howard Stacy
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June 21, 2024

Reviewed and approved,

Deg Priest
Chief Executive Officer

June 21, 2024

## INTRODUCTION

An NFPA 285-19 test was conducted on a Nichiha Architectural Wall Panel (AWP) exterior wall design configuration. The design incorporated many components, including base wall assembly, exterior insulation, WRB, and worst-case foam covering. Additionally, cone calorimeter data is referenced for analysis to allow specific WRB materials to replace the tested WRB without negatively affecting expected NFPA 285 test results.

Nichiha Architectural Wall Panels and Siding products are described in Intertek CCRR-0299.

From the wall system tested, an analysis is conducted on the components tested, which will form a base wall system from which replacement components can be interchanged.

This evaluation aims to determine Engineering Extensions for the components that can meet the requirements of NFPA 285.

Approvals for alternate constructions (DrJ Technical Evaluation Reports, ICC-ES ER Reports, Intertek Listings and CCRR reports, UL Listings and ER reports, IAPMO evaluation reports, etc.) are based on worst-case system testing. Using an alternate Ci is dictated by the conditions outlined in the code compliance report or the design listing for each product as listed in the **Table of Substitutions.**

This revision (Revision 4) to Nichiha USA EEV 10809B incorporates significant updates that expand the range of NFPA 285-compliant polyisocyanurate exterior continuous insulation (Ci) products suitable for use in the Nichiha Architectural Wall Panel (AWP) system. This revision recognizes those polyiso Ci products that have been successfully tested in a wall system with either ACM/MCM cladding or, in certain cases, uninsulated min. ¼ in. fiber cement siding for NFPA 285 compliance. The compliance of these products is based on the product's evaluation report or design listing. Testing these foam sheathing products in wall systems with ACM/MCM cladding is considered a worst-case condition. The tested ⅝ in. Nichiha AWP fiber cement siding represents a more robust condition than ACM/MCM or min. ¼ in. fiber cement siding and alternative polyiso Ci's is therefore warranted.

*This document provides an expert opinion on the properties of the materials, products, or assemblies identified in this report related to meeting a specific code or standard. Suitability to use is to be determined by the end-user.*

## TABLE OF SUBSTITUTIONS

The results of this analysis are presented in the following table, which lists the allowable substitutions based on the tests submitted and Engineering Extensions.

| Wall Component | Optional Substitutions |
|---|---|
| **Base Wall**<br>Use any Item 1 - 4 | 1) Cast Concrete Walls<br>2) CMU Concrete Walls<br>3) 20 GA (min.) 3⅝ in. (min.) steel studs spaced 24 in. OC (max.)<br>⅝ in. (min.) type X Special Fire Resistant Gypsum Wallboard Interior<br>4) FRTW (Fire-retardant-treated wood) studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.)<br>a. ⅝ in. type X Gypsum Wallboard Interior<br>b. Bracing as required by code |
| **Cavity Insulation**<br>Use any Item 1 - 4 | 1) None<br>2) Any noncombustible insulation per ASTM E136<br>3) Any Mineral Fiber (Board type Class A ASTM E84 faced or unfaced)<br>4) Any Fiberglass (Batt Type Class A ASTM E84 faced or unfaced) |
| **Exterior Sheathing** | ½ in. or thicker exterior gypsum sheathing |

| Wall Component | Optional Substitutions |
|---|---|
| **WRB over Base Wall Surface**<br>Use Item 1, 2, or 3 | 1) Soprema SOPRASEAL® STICK 1100T<br>2) Any WRB that has been tested per ASTM E1354 (at a minimum of 50 kW/m$^2$ heat flux) and shown by analysis to be less flammable (improved $T_{ign}$, Pk. HRR) than that listed for Item 1)<br>3) WRBs approved for use in the referenced code compliance report or design listing for each type of exterior insulation specified below |
| **Exterior Insulation**<br>Mounted within vertical steel Z-girts spaced 24 in. OC | 1) Hunter (TER 1402-01)<br>• XciFoil (Class A) 4 in. (max.)<br>• Xci-286 4 in. (max.)<br>• Xci-CG (Class A) 4 in. (max.)<br>• Xci Ply (Class A) 4¼ in. ( max.) [3½ in. foam max., ¾ in. FR Plywood (max.)]<br>2) Carlisle CCW (TER 1407-01 & -02)<br>• R2+Sheathe 4 in. (max.)<br>• R2+Silver 4 in. (max.)<br>• R2+Matte 4 in. (max.)<br>• R2+Base 4¼ in. [3½ in. foam (max.) & ¾ in. FR Plywood (max.)]<br>3) Firestone Enverge CI (Intertek Design No. FST/FBI 30-09)<br>• Foil Exterior Wall Insulation 4 in. (max.)<br>4) Firestone Enverge CI (Intertek Design No. FST/FBI 30-08)<br>• Glass Exterior Wall Insulation 1 in. thickness (max.).<br>5) Atlas (TER 1306-03)<br>• EnergyShield Pro 4 in. (max.)<br>• EnergyShield CGF Pro 4 in. (max.)<br>• EnergyShield Ply Pro 4¾ in. (max.) [4 in. EnergyShield CGF Pro with ⅝ or ¾ in. FRT Plywood over the insulation].<br>6) DuPont<br>• Thermax (CCRR-0435) 3 in. (max.)<br>• Thermax NH Sheathing (CCRR-0440) 3 in. (max.)<br>7) Rmax (TER 1309-03)<br>• Thermasheath 4½ in. (max.)<br>• TSX-8500 4½ in. (max.) consisting of a single panel or multiple thinner panels<br>• TSX-8510 4½ in. (max.)<br>• ECOMAXci FR 4½ in. (max.) consisting of a single panel or multiple thinner panels<br>• ECOMAXci FR White, 4½ in. (max) consisting of a single panel or multiple thinner panels<br>8) Johns Manville (CCRR-0444)<br>• AP Foil 3½ in. (max.)<br>• CI Max 3½ in. (max.)<br>9) Siplast (TER 2304-113)<br>• WALLcontrol Foil-faced sheathing 4 in. (max)<br>• Control glass-faced sheathing 4 in. (max)<br>10) Unfaced Mineral Wool 2 in. (min.) 4 pcf density (min.) |
| **Cladding**<br><br>Max. air gap 10 mm with Hunter Insulation.<br><br>Max. air gap unlimited with mineral wool. | ⅝ in. (16 mm) Nichiha Architectural Wall Panels (AWP) mechanically fastened to vertical steel Z-girts using the Nichiha mounting system.<br><br>Other mounting systems include:<br>• Cascadia Clips (Air gap max 10 mm with approved exterior insulation. Mineral wool air gap not limited)<br>• ISOClips (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited) |

| Wall Component | Optional Substitutions |
|---|---|
| | • FERRO Cladding Support (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited)<br>• Knight Wall MFI – S or D Series (Air gap max .10 mm with approved exterior insulation. Mineral wool air gap not limited)<br>• Knight Wall CI (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). May be vertical or horizontal.<br>• Knight Wall HCi (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). May be vertical or horizontal.<br>• Knight Wall ThermaZee (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). vertical or horizontal<br>• CL-TALON (With mineral wool only. Mineral wool air gap not limited)<br>• SMARTci GreenGirts (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). May be vertical or horizontal. |

Note: *Window Headers/jambs for all constructions shall incorporate 25 GA. L flashing*

**REFERENCED DOCUMENTS**


1) *Priest & Assoc. Test Plan 10809A for Nichiha*
2) *ITS Test Report 104152993SAT-001 NFPA 285 Nichiha 16mm Thick Fiber Cement Cladding System*
3) *NFPA 285-2019 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-loadbearing Wall Assemblies Containing Combustible Components*
4) *White, R.H., and Dietenberger, M.A., Wood Handbook Chapter 18 "Fire Safety of Wood Construction."*
5) *Benichou, N., Sultan, M.A., Kodur, V.R., Fire resistance performance of light weight framed wall assemblies: effects of various parameters, key design considerations and numerical modelling. NRCC-45688, Institute of Research in Construction, National Research Council, Ottawa, Canada.*


**EVALUATION METHOD**

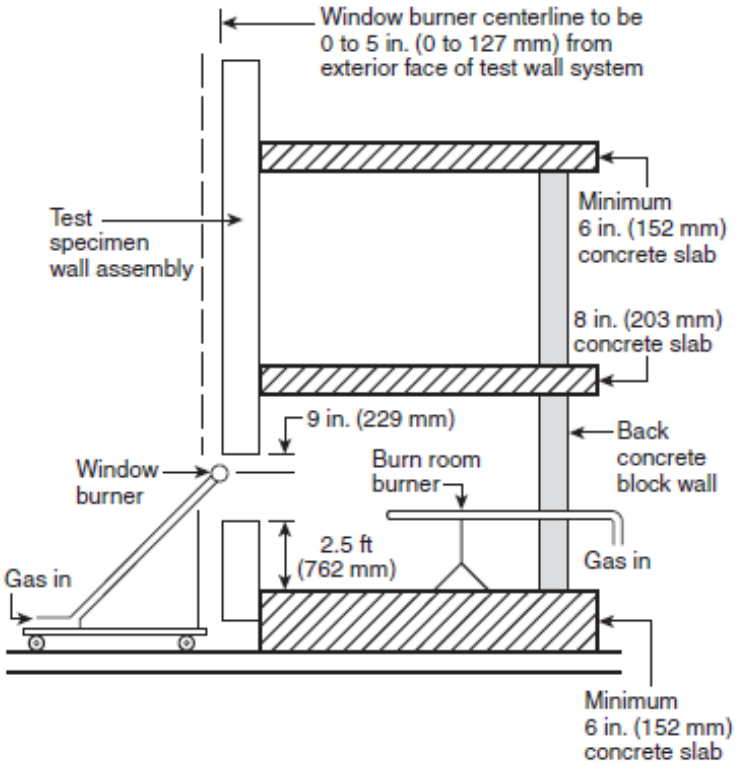
**NFPA 285 Criteria**

The NFPA 285 fire test (Ref. 3) tests the flame spread properties of exterior walls containing combustible components. Two noncombustible rooms are stacked to simulate two stories of a multi-story building. The wall assembly is then attached to the exterior face of the rooms. A typical test wall measures 14 ft x 18 ft with a 30 in. x 78 in. window opening placed on the bottom floor.

Two burners are ignited to produce a specific time-temperature profile in the room and on the wall's exterior face.

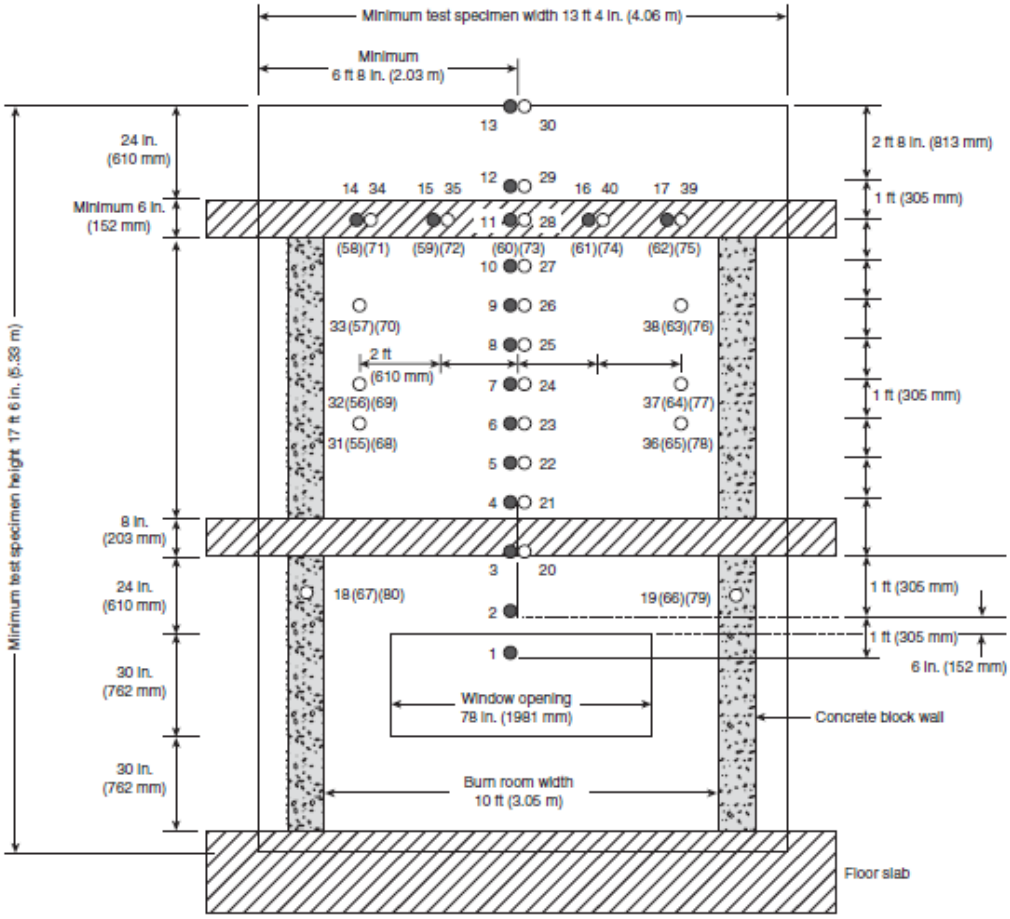
Thermocouples are placed strategically to monitor temperature as an indicator of flame spread.

In the depictions below, Thermocouples 1 - 10 and 20 - 27 are not used for compliance. The remainders are used to monitor flame spread.




During a test, a calibrated fire starts in the bottom room. After 5 minutes, the exterior burner is ignited to produce a specific heat flux/temperature pattern on the exterior of the wall. Both burners remain ignited during the 30-minute test. Personnel monitor flame spread visually during the test. A computer data acquisition system monitors and records the thermocouples' temperatures. The criteria for passing (Ref. 3) are as follows (reworded in simpler terms for this analysis):

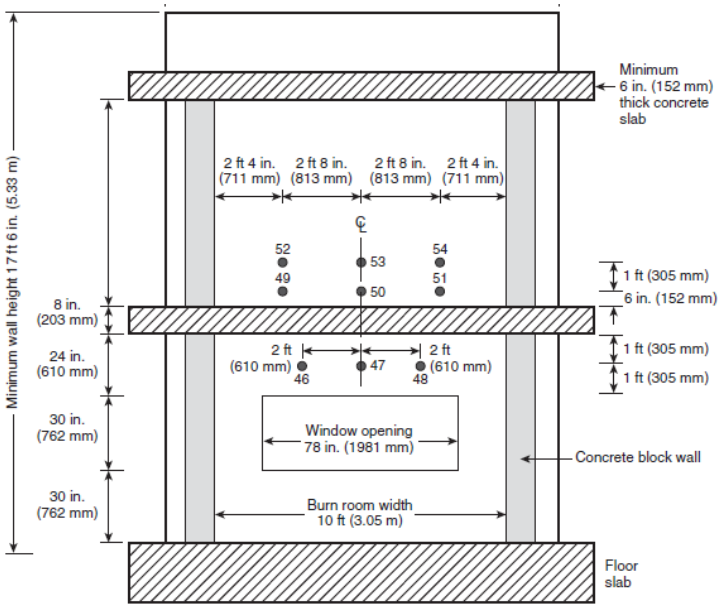
1) Flames shall not spread vertically 10 ft above the window opening as determined visually or by thermocouples at the 10 ft level. Failure occurs when Thermocouples 11 or 14 - 17 exceed 1000 °F.
2) Flames shall not spread (visually) horizontally 5 ft on either side of the centerline of the window opening.
3) Flames shall not spread inside the wall cavity as determined by thermocouples placed within the wall cavity insulation and air gaps if present. Failure occurs when Thermocouples 28 or 31 - 40, 55 - 65, and 68 - 79 exceed 750 °F above ambient.
4) Flames shall not spread horizontally within the wall cavity past the interior room dimension as determined by wall cavity thermocouples. Failure occurs when Thermocouples 18 - 19 or 66 - 67, or 79 - 80 exceed 750 °F above ambient.
5) Flames shall not spread to the second story room as determined by interior wall surface thermocouples. Failure occurs when Thermocouples 49 - 54 exceed 500 °F above ambient.
6) Flames shall not occur in the second story (visually).
7) Flames shall not escape (visually) from the interior to the exterior at the bottom story room wall/wall intersection.




● Thermocouples — 1 in. (25 mm) from exterior wall surface

○ Thermocouples — in the wall cavity air space or the insulation, or both, as shown in Figure 6.1(b) Details A through I.

( ) Thermocouples — Additional thermocouples in the insulation or the stud cavity, or both, where required for the test specimen construction being tested, as shown in Figure 6.1(b) Details C through I.




● Thermocouples — 1 in. (25 mm) from interior wall surface

**Construction Tested**

The table below outlines the report submitted for analysis (Ref. 2). For the tested system, critical components are listed. These include interior sheathing, steel studs, exterior insulation, air gaps, claddings, and window details. Some details, such as fastener patterns, application rates, etc., are not included. For those details, the descriptions in the referenced reports should be used.

**Report Submitted**

| Interior sheathing | Stud | Cavity Insulation | Exterior Sheathing | WRB | Exterior Insulation | Air Gap | Exterior Covering |
|---|---|---|---|---|---|---|---|
| ⅝ in. type X gypsum wallboard | 20 GA. 3⅝ in. steel studs spaced 24 in. OC | None | ½ in. DensGlass | Sopraseal | Hunter Panels 4 in. Xci CG (Class A) | ⅜ in. (10 mm) | ⅝ in. Nichiha AWP shiplap panels, mounted with Nichiha starter track and Ultimate Clips |

*Note: Window Header/Jambs used 25 GA. L flashing*

**Analysis of Components**

When making flammability comparisons of NFPA 285 wall systems, the elements that could potentially cause increased flame spread should be considered.

1) **Interior Gypsum Wallboard**
The test incorporated ⅝ in. type X gypsum wallboard. Experience has shown that using ½ in. regular gypsum wallboard causes failures of Thermocouples 18 and 19. Therefore, the use of ½ in. regular gypsum board is not permitted as the interior sheathing.

*2)* **Steel Studs**
The test incorporated 3⅝ in. steel studs 20 GA. spaced 24 in. OC. Field applications typically use 16 or 24 in. OC spacing and these are allowed. Wider spacing is the worst case since the wall is potentially more flexible and prone to warping. Heavier or deeper studs are allowed.

3) **Cavity Insulation**
The test did not incorporate cavity insulation. However, any noncombustible insulation or listed fiberglass (faced or unfaced) may be used since this does not increase flammability.

4) **Exterior Sheathing**
The test used ½ inch Densglass exterior sheathing. Any exterior gypsum sheathing (min. ½ in.) may be used.

5) **WRB over Exterior Sheathing**
The construction tested used Sopraseal Stick 1100T applied to exterior gypsum sheathing.

*6)* **Exterior Insulation**
The test used 4 4-inch Hunter Xci CG (Class A), representing a maximum thickness for the Hunter panel product. That allows the use of Hunter Xci Foil (Class A) or Xci 286 at a thickness of 4 inches or less based on fuel load. The exterior insulation panels were friction-fit within vertically oriented steel Z-girts spaced 24 in. OC and extending the height of the wall structure. This vertical orientation allowed for unprotected gaps between the foam panel and the edges on one side of the opposing girts and is considered a more onerous condition than horizontally mounted girts (which can serve as potential fire blocks to the vertical spread of flame). Nichiha has indicated that the vertical Z-girts are necessary for current methods of AWP Panel attachment.

*7)* **Air Gap**
The construction utilized a nominal ⅜ in. (10 mm) air gap between the Nichiha cladding and the surface of the exterior insulation. The air gap is allowed to be reduced since smaller air gaps typically tend to spread flame less than larger air gaps.

*8)* **Exterior Cladding**
Nichiha Architectural Wall Panels (AWP), VintageWood Panel, ⅝ in. thick

**Engineering Extensions**

Base Walls

Since the test submitted (Ref. 2) utilized steel studs (minimum 20 GA., other base wall types that tend to perform the same or better are allowed. These include:

1) Cast Concrete Walls
2) CMU Concrete Walls
3) 20 GA. (min.) 3⅝" (min.) steel studs spaced 24 in. OC (max.)
   a. ⅝ in. type X Gypsum Wallboard Interior
   b. ½ in. Exterior Gypsum Sheathing
   c. Lateral Bracing every 4 ft
   d. Any approved mineral fiber-based safing insulation in each stud cavity at the floor line. Safing thickness must match stud cavity depth.
4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24" OC (max.)
   a. ⅝ in. type X Gypsum Wallboard Interior
   b. Braced as required by code
   c. Fire blocking at floor line per code.

The use of Fire-retardant-treated wood (FRTW) framing covered under IBC Section 2303.2 is allowed in Type III construction within bearing and nonbearing exterior walls with required fire ratings of two hours or less. Type II construction also allows FRT framing in nonbearing exterior walls where a fire rating is not required. The use of FRT framing in the exterior wall with specific limitations as described in this EEV is not expected to detract from the NFPA 285 performance of the allowed Nichiha wall systems for the following reasons:

1) In ASTM E1354 Cone calorimeter testing, the initial Peak Heat Release Rate (Pk. HRR) for FRT plywood is comparable to gypsum sheathing (Ref. 4).
2) From the literature (Ref. 5), it has been established that steel stud walls exhibit fire resistance behavior similar to wood stud walls.
3) The building code allowance for the use of FRT framing instead of noncombustible materials is predicated on its Class A flame spread rating. FRTW does not support progressive combustion during the ASTM E84 30-minute fire test and will not support combustion once the flame source is removed.

Cavity Insulation

The test submitted (Ref. 2) did not utilize stud cavity insulation. In the referenced designs, any non-combustible cavity insulation may be used. Additionally, any listed faced or unfaced fiberglass insulation may be used.

The list of approved cavity insulations is below:

1) None
2) Any noncombustible insulation per ASTM E136
3) Any Mineral Fiber (Board type Class A, ASTM E84 faced or unfaced)
4) Any Fiberglass (Batt Type Class A, ASTM E84 faced or unfaced)

Exterior Sheathing

The test used ½ inch Densglass exterior sheathing. Exterior sheathing (min. ⅝ in.) may be used. Approved sheathings are listed below:

½ in. or thicker exterior gypsum sheathing

WRB over Base Wall

The test included Soprema SOPRASEAL® STICK 1100T applied to the exterior gypsum sheathing. Any WRB tested per ASTM E1354 (at a minimum of 50 kW/m$^2$ heat flux) and shown by analysis to be less flammable (improved $T_{ign}$, Pk. HRR) may also be used. Comparisons based on NFPA potential heat calculations may also be used.

Alternative WRBs are as allowed by the specific code compliance report or design listing referenced for the various polyiso CIs.

Exterior Insulation

The allowable alternative polyiso Ci products presented in the Table of Substitutions and below were mostly tested for wall systems clad with an ACM/MCM. In certain cases, the code report lists "min. ¼ in. fiber cement board" as the weakest cladding, which allows the Ci to be included in the approved components for the Nichiha USA AWP system. The allowance of alternate exterior insulations in NFPA 285 approvals is almost always based on test results with a cladding of Aluminum Composite Panels (ACM/MCM/ACP, etc.). These products melt, ignite, and spread flames in NFPA 285 fire tests if the core is exposed. For this reason, this cladding is considered the worst case when tested with combustible underlying components. See NFPA 285-23 Annex section below.

> ***N* B.18.1.6** Successful NFPA 285 testing with an ACM can potentially allow for claddings that have better fire performance or that have facers with higher melting points than MCM/ACM (with open joints), such as uninsulated metal panels (e.g., aluminum or copper), noncombustible fiber cement, porcelain, mortared thin brick, other masonry, and materials of similar noncombustibility.
>
> NFPA 285 testing with MCM/ACMs does not allow for other combustible claddings.

The following provides links to the alternative polyiso Ci code compliance reports or listings included in the Table of Substitutions.

**Hunter Panels** – **TER 1402-01**
The test was performed with a 4 in. thickness of Hunter Panels Xci CG (Class A). Based on the flammability characteristics and allowances described for Hunter Panels Xci products in TER 1402-01, the testing with 4 in. thick Xci CG (Class A) allows the substitution of Xci Foil (Class A), Xci 286 and Xci-Ply (Class A).
Xci CG (Class A), Xci Ply (Class A), Xci Foil (Class A), Xci Foil (Class A) PLUS, and Xci 286 Air Barrier, Water-Resistive Barrier, and Fire Performance in Exterior & Interior Walls of Buildings of Type I-V Construction (drjcertification.org)

**Carlisle CCW** – **TER 1407-01 & -02**
R2+SHEATHE (TER 1407-02)
R2+ SHEATHE Air Barrier, Water-Resistive Barrier & Fire Performance in Exterior & Interior Walls of Buildings of Type I-IV Construction (drjcertification.org)
R2+SILVER, R2+MATTE, R2+BASE (TER 1407-01)
R2+ SILVER, R2+ MATTE & R2+ BASE Fire Performance in Exterior Walls of Buildings of Type I-IV Construction (drjcertification.org)

**Firestone Enverge CI**
Foil Exterior Wall Insulation
FST/FBI 30-09 (2) (intertek.com)
Glass Exterior Wall Insulation
FST/FBI 30-08 (R2) (intertek.com)

**Atlas Roofing Corporation – TER 1306-03**
EnergyShield Pro, EnergyShield CGF Pro, EnergyShield Ply Pro
Fire Performance of EnergyShield® Products in Buildings of Type I-V Construction (drjcertification.org)

**DuPont de Nemours - CCRR-0435 & -0440**
Thermax
CCRR-0435 (intertek.com)
Thermax NH
CCRR-0440 (intertek.com)

**Rmax – TER 1309-03**
Thermasheath, TSX-8500, TSX-8510, ECOMAXci & ECOMAXci FR White
Rmax® Thermasheath®, Rmax® TSX-8500, Rmax® TSX-8510, Rmax® ECOMAXci® FR, and Rmax® ECOMAXci® FR WHITE (drjcertification.org)

**Siplast** - **TER 2304-113**
WALLcontrol Foil faced and Glass faced sheathing 4 in. thickness (max) Fire Performance of WALLcontrol™ Products in Buildings of Type I-V Construction (drjcertification.org)

**Johns Manville** - **CCRR-0444**
AP Foil or CI Max
CCRR-0444 (intertek.com)

Air Gap
For combustible insulation, the air gap may be up to 10 mm.

Any reasonable air gap may be used for mineral wool since both sides of the air gap have noncombustible components.

Claddings

Based on the analysis of components, the following are allowed:

⅝ in. (16 mm) Nichiha Architectural Wall Panels (AWP) mechanically fastened to vertical steel Z-girts using the Nichiha mounting system.

Other mounting systems include:

- Cascadia Clips (Air gap max 10 mm with approved exterior insulation. Mineral wool air gap not limited)
- ISOClips (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited)
- FERRO Cladding Support (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited)
- Knight Wall MFI – S or D Series (Air gap max .10 mm with approved exterior insulation. Mineral wool air gap not limited)
- Knight Wall CI (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). May be vertical or horizontal.
- Knight Wall HCi (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). May be vertical or horizontal.

- Knight Wall ThermaZee (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). vertical or horizontal
- CL-TALON (With mineral wool only. Mineral wool air gap not limited)
- SMARTci GreenGirts (Air gap max. 10 mm with approved exterior insulation. Mineral wool air gap not limited). May be vertical or horizontal.

**CONCLUSIONS**

An NFPA 285 test was conducted on a Nichiha exterior wall design with a 4-inch thickness of Hunter Panels' polyisocyanurate sheathing.

The purpose of this evaluation was to determine Engineering Extensions for those components that can meet the requirements of NFPA 285. An analysis was conducted on the components tested from the wall system submitted, which allowed us to form a base wall system from which replacement components can be interchanged.

In conclusion, we have determined that Engineering Extensions on various components of the tested wall designs, as shown herein, can meet the criteria of NFPA 285 with specific limitations.

**APPENDIX A**
**Alternate Mounting Systems**

## Cascadia Clips®

IAPMO ER 0363 for HPL lists Cascadia for use with mineral wool only. This system may be used with mineral wool (any reasonable air gap) with Nichiha since Nichiha is a non-combustible cement board type.

BASF ESR 2642 shows Cascadia with SPF (with a coating) with ACM. It can be used with approved exterior insulation since it was tested with combustible insulation. The air gap may not exceed 10 mm.

## ISOClips

IsoClip comes in many variations.

Home - ISO Clip: Thermal Isolation Clip (isoclips.com)

Brock White Canada | ISO Clip Thermal Isolation Clip

These clips are made of steel with a plastic thermal separator.

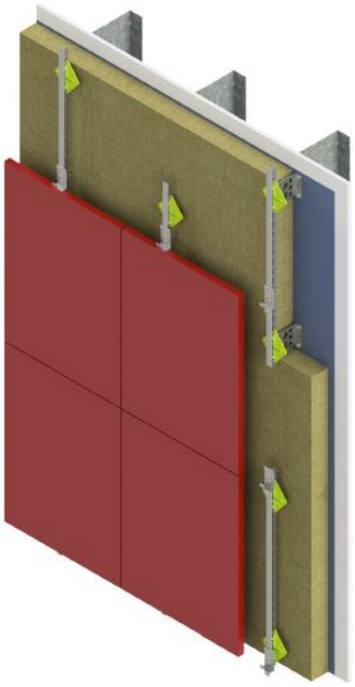
**Material Composition:**

14ga ASTM A792 [Galvalume]™ or ASTM 653 [Galvanized] steel clip with new integral glass fibre reinforced polyamide thermal isolator pad. Also available fully nylon coated for use in SalmonSafe specified projects.

ISOClip-325-TDS-2019.pdf (northernfacades.com)

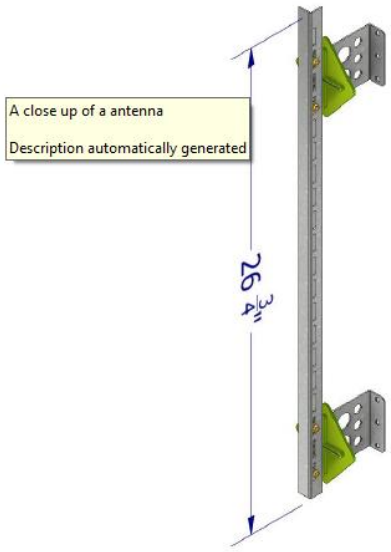
Nichiha EEV 10809C lists the ISOClips for use with mineral wool. They may be used with mineral wool (any reasonable air gap). These may be used with approved exterior insulation since they are mostly steel and the plastic is not directly exposed. The air gap may not exceed 10 mm.

## FERO Cladding Support



### FERO THERMAL EXTERIOR PANEL SUPPORT:

1. FERO Thermal Exterior Panel Support
   - Provides a flat universal interface for securing most panel connectors from other manufactures
2. FERO Thermal Holed Tie or Connector (order form)
   FERO Thermal Plate
   - Incorporation of thermal holes through the body of the plate reduces thermal bridging
3. Diamond Insulation Support
   - Restrains the insulation from separating from the structural backing/air barrier




| ORDER FERO THERMAL PANEL EXTERIOR SUPPORTS | |
|---|---|
| # of ties required: | |

https://ferocorp.com/wp-content/uploads/2020/12/Submittal-Sheet-Thermal-Exterior-Panel-Support.pdf

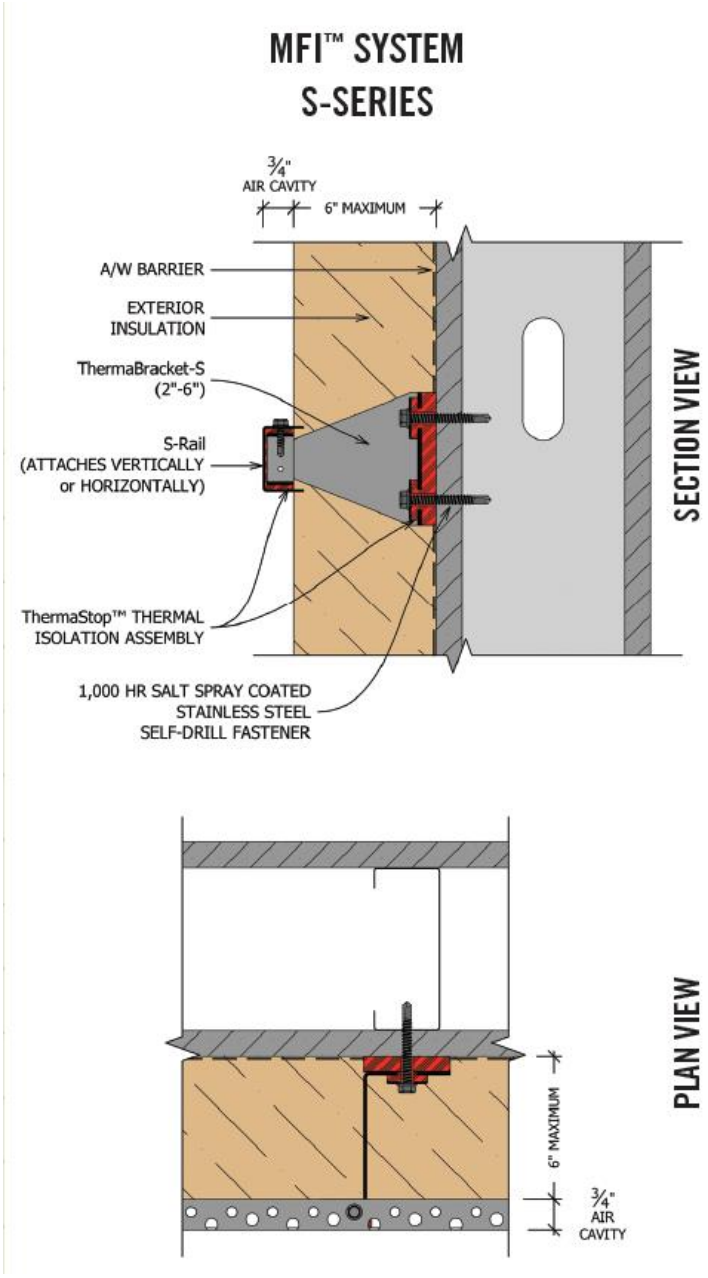
The exterior panel support spec sheet shows steel construction with minimal plastic thermal break.

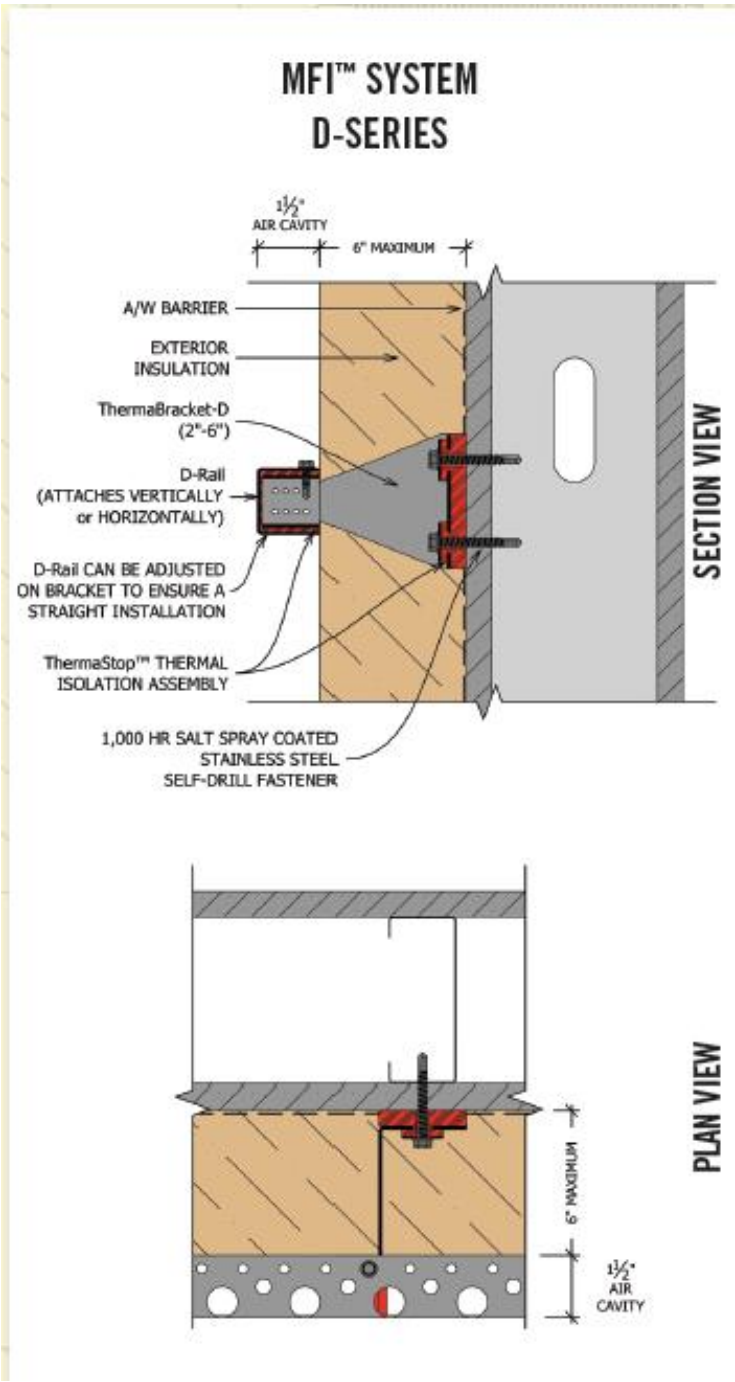
These may be used with mineral wool (any reasonable air gap).

These may also be used with approved exterior insulation since they are mostly steel. The plastic thermal break is intermittent (not full wall coverage) and will not spread flames more than the plastic foot's size (a few inches). The air gap may not exceed 10 mm.

## Knight Wall MFI®

### S or D Series





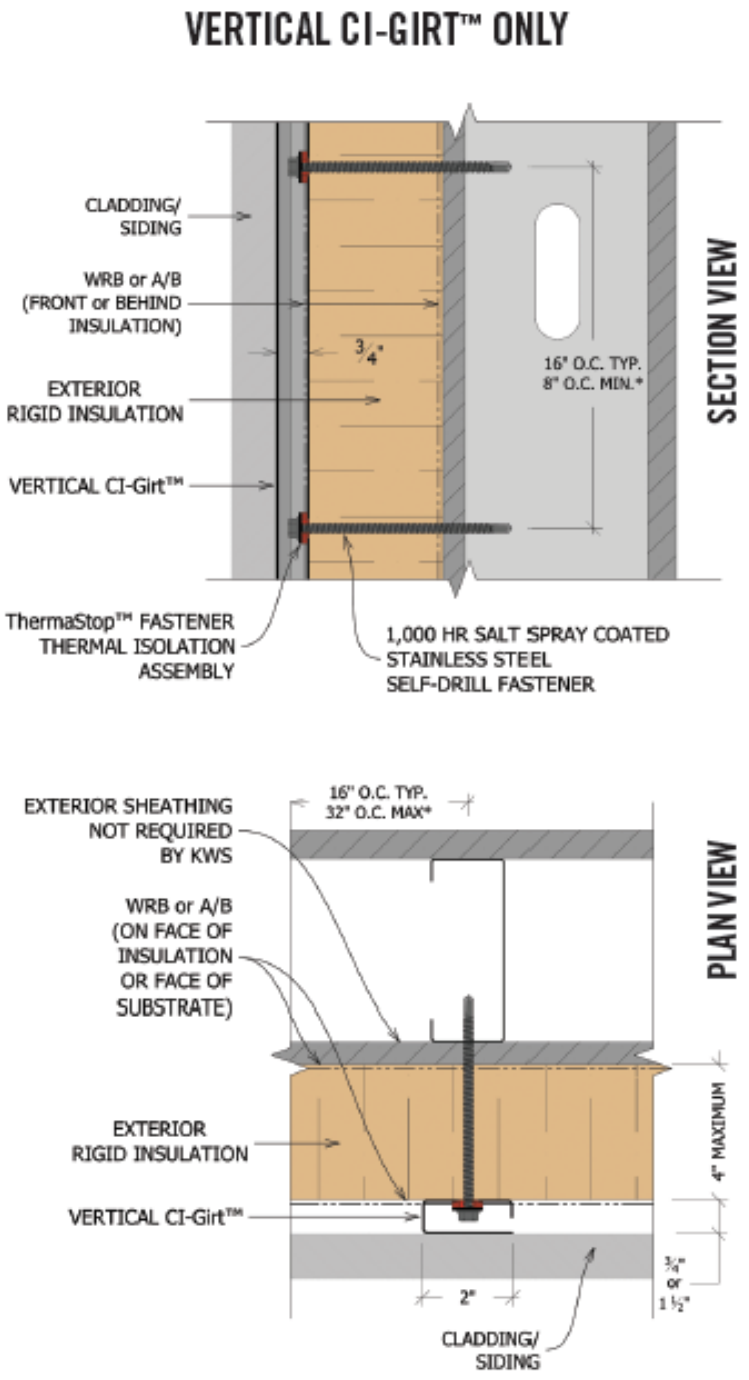

https://knightwallsystems.com/wp-content/uploads/2016/03/mfi_sell_sheet_2016-1.pdf

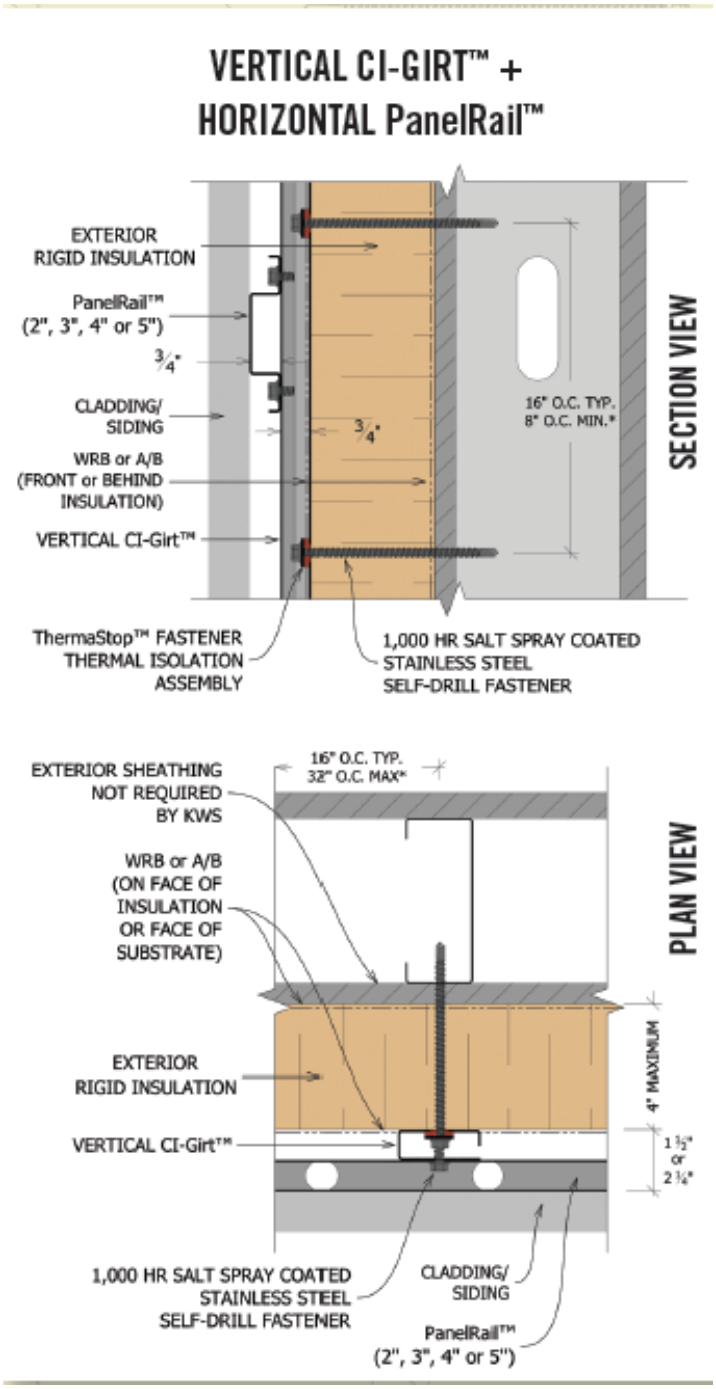
MFI sell sheet shows mostly steel with minimal plastic.

These may be used with mineral wool (any reasonable air gap).

These may also be used with approved exterior insulation since they are mostly steel. The plastic thermal break is intermittent (not full wall coverage) and will not spread flames more than the plastic foot's size (a few inches). The air gap may not exceed 10 mm.

## Knight Wall CI®






ci_sell_sheet_2016 (knightwallsystems.com)

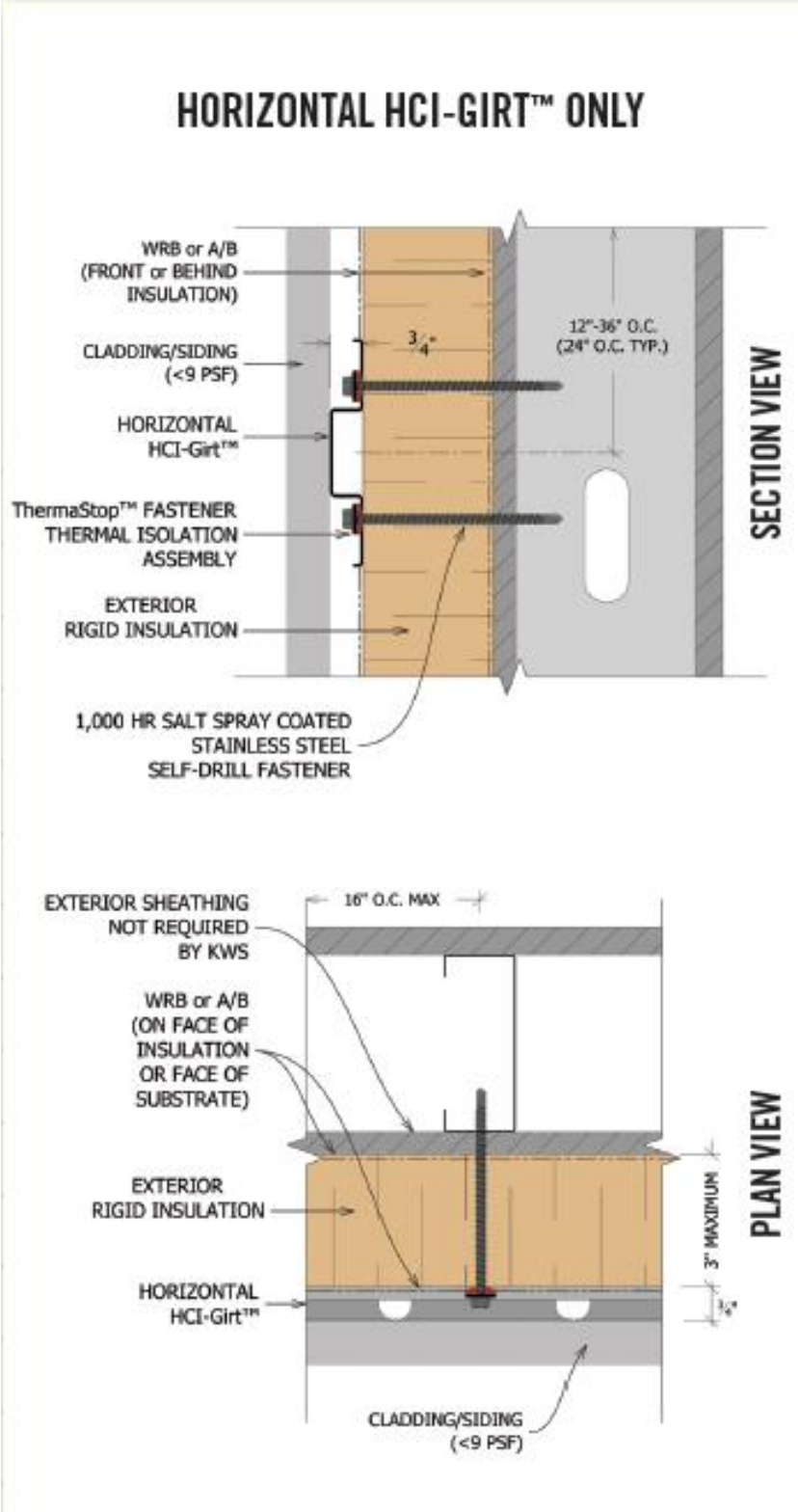
CI sell sheet shows all steel.

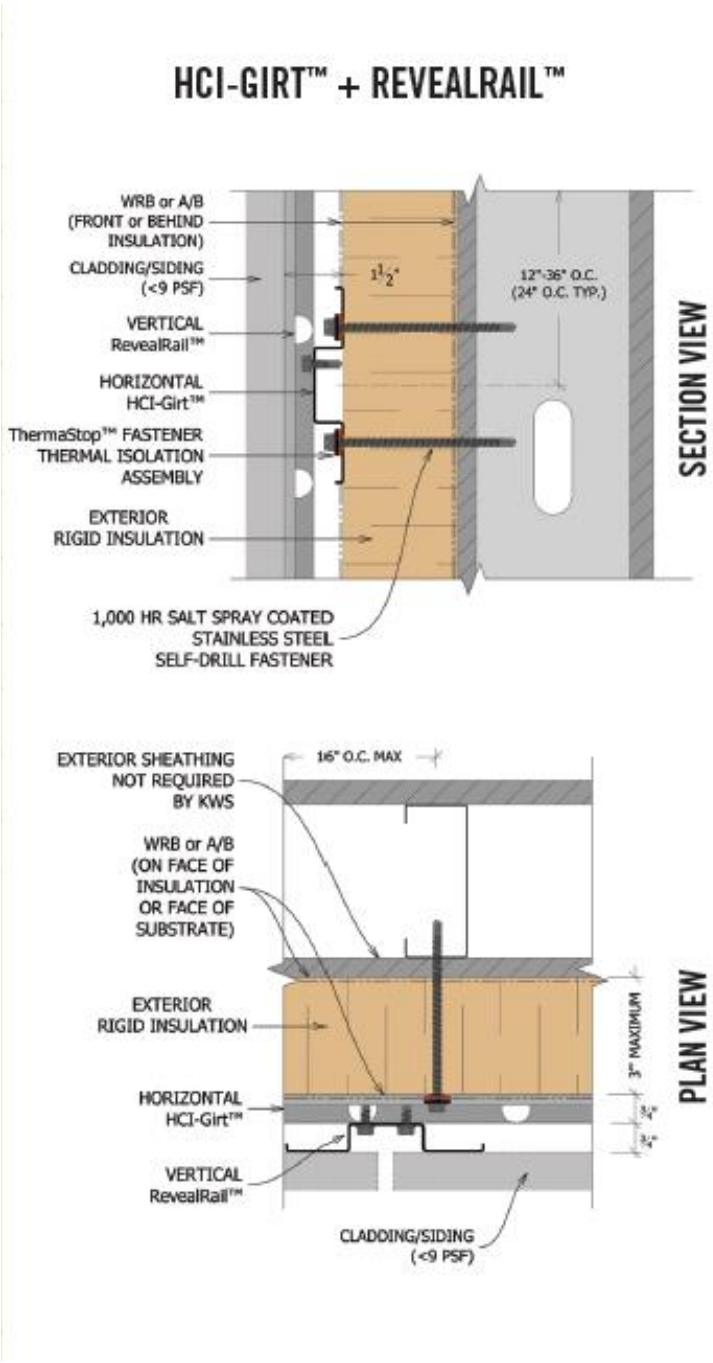
These may be used with mineral wool (any reasonable air gap).

These may also be used with approved exterior insulation since they are all steel. Any air gap may not exceed 10 mm.

May be vertical or horizontal since Nichiha 285 test was with a vertical Z.

Knight HCI™ Systems






hci_sell_sheet_2016 (knightwallsystems.com)

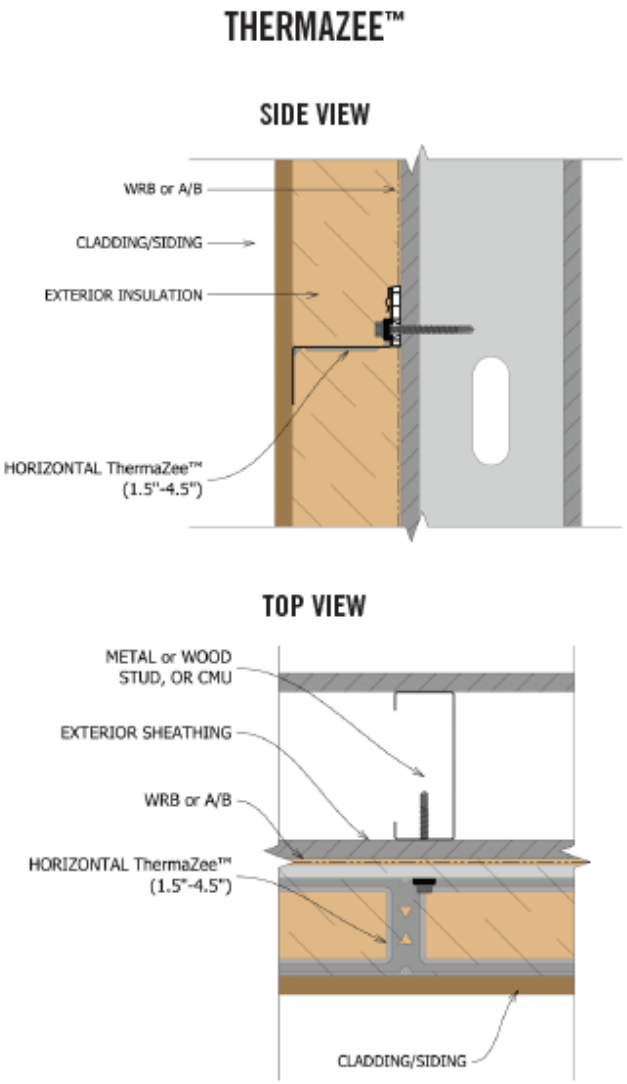
HCI sell sheet shows all steel.

These may be used with mineral wool (any reasonable air gap).

These may also be used with approved exterior insulation since they are all steel. The air gap may not exceed 10 mm.

May be vertical or horizontal since Nichiha NFPA 285 test was vertical Z.

# Knight Thermazee




thermazee_sell_sheet_10072020 (knightwallsystems.com)

All metal Z girt.

These may be used with mineral wool (any reasonable air gap).

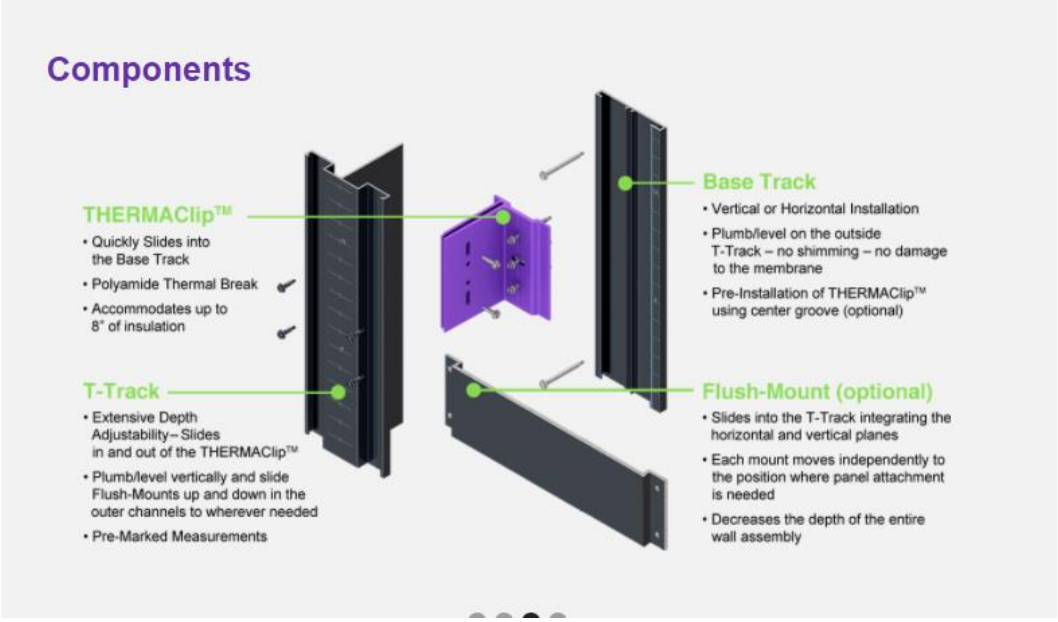
These may also be used with approved exterior insulation since they are all steel. Any air gap may not exceed 10 mm.

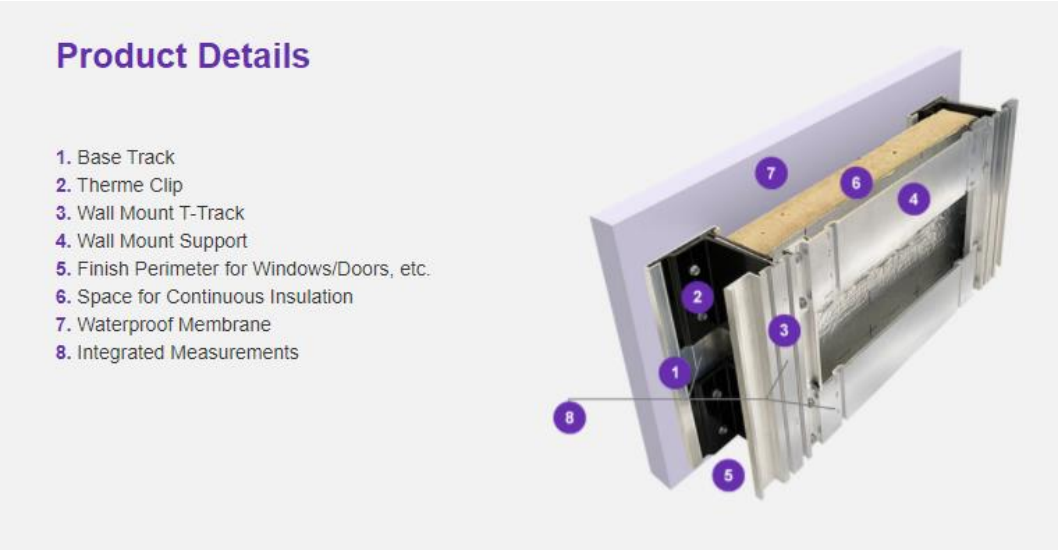
May be vertical or horizontal since Nichiha 285 test was vertical Z.

## CL-TALON®

The website shows a CL 300 sliding attachment system (adjustable) with a plastic thermal break.

Product (cltalon.com)




System details pdf.

5ff8c4f4ce5ce3e685409f58_CL-TALON 300 - Details JAN8-2021.pdf (webflow.com)

Since this system uses a major plastic component and the NFPA 285 data are not available, only mineral wool will be allowed.

May be used with mineral wool (any reasonable air gap).

## SMARTci GreenGirts

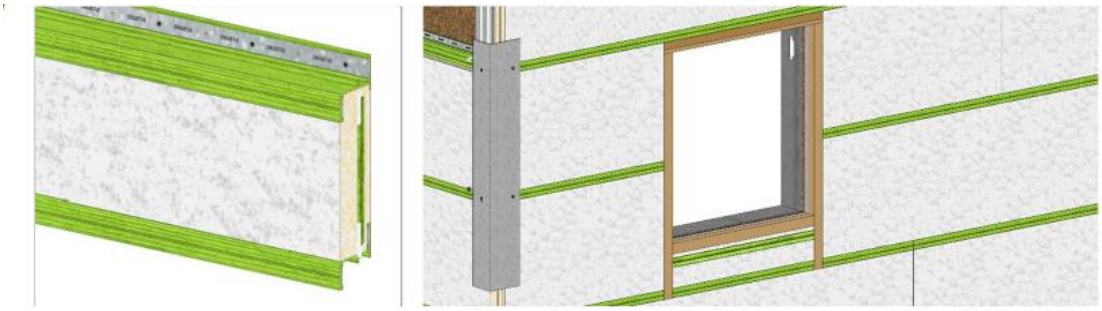


FIGURE 1. SMARTCI™ SYSTEM

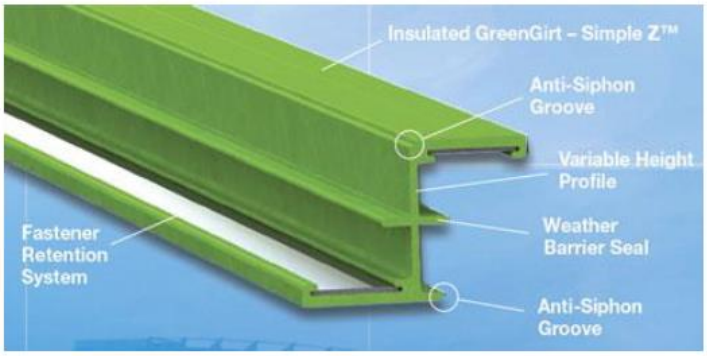



FIGURE 2. GREENGIRT™

DrJ Engineering TER 1501-06 allows this system to be used with Hunter Panels' insulation or mineral wool. Hunter TER 1402-01 allows fiber cement with CG Class A or Xci-Ply (Class A). Since Nichiha is a type of fiber cement, GreenGirt may be allowed. May be vertical or horizontal since Nichiha 285 test was vertical Z. The system may be used with approved exterior insulation

END OF REPORT