PRIEST & ASSOCIATES CONSULTING, LLC

ENGINEERING EVALUATION

Engineering Extensions based on NFPA 285 (2012, 2019, and 2025 eds.) Tests

Project No. 10809B, Revision 8b

Prepared for:

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Abstract

NFPA 285 test reports were used to determine Engineering Extensions for the wall components of the 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 to these various components of the tested wall designs can meet the NFPA 285 criteria, albeit with specific limitations. Specific versions of NFPA 285 (2012, 2019, & 2025) are listed in the report as applicable.

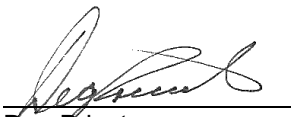
The conclusions reached by this evaluation are true and correct, within the bounds of sound engineering practice. All reasoning for our decisions is contained within this document.

Submitted by,

Howard Stacy
Principal / Partner
360-957-0311

January 27, 2026

Reviewed and approved,



Deg Priest
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January 27, 2026

Reviewed or revised by,

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January 27, 2026

INTRODUCTION

NFPA 285-19 and NFPA 285-25 tests were 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.

For the tested wall system, an analysis is conducted of the components that form the base wall system, enabling replacement components to be interchanged. This evaluation aims to determine the engineering extensions for components that can meet the requirements of NFPA 285.

Approvals for alternative constructions (DrJ Engineering Technical Evaluation Reports, ICC-ES ER Reports, Intertek Listings, 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.**

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 some instances, 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 CIs are therefore warranted. 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). Revision 6 addresses the latest testing per NFPA 285-25 with Atlas polyiso insulation and a worst-case WRB.

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 Use any Item 1 - 4	1) Cast Concrete Walls 2) CMU Concrete Walls 3) 20 GA (min.) 3⅝ in. (min.) steel studs spaced 24 in. OC (max.) ⅝ in. (min.) type X Special Fire Resistant Gypsum Wallboard Interior 4) FRTW (Fire-retardant-treated wood) studs: min. nominal 2 x 4 dimension, spaced 24 in. OC (max.) a. ⅝ in. type X Gypsum Wallboard Interior b. Bracing as required by code
Cavity Insulation Use any Item 1 - 4	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	½ in. or thicker exterior gypsum sheathing

Wall Component	Optional Substitutions
WRB over Base Wall Surface Use Item 1, 2, 3, or 4, depending on the insulation brand.	1) 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 equal to or less flammable (improved T_{ign}, Pk. HRR, THR, EHC) than the data listed below for Hunter, Atlas, or Mineral Wool. a. Tign 15.7 sec b. Pk HRR 464.56 kW/m^2 c. THR 28.14 MJ/m^2 d. EHC 16.44 MJ/kg 2) Soprema SOPRASEAL® STICK 1100T (with Hunter, Atlas insulation, or mineral wool) 3) WRBs approved for use in the referenced code compliance report or design listing for each type of exterior insulation specified below. Example. Exterior Insulation Item 5 (Atlas) may use WRBs listed in Appendix B. https://www.drjcertification.org/report/download/344 Refer to the web links below this table for the WRBs permitted for each insulation brand. 4) When using no exterior insulation, only use the WRBs listed in Appendix C on the base wall surface.
Exterior Insulation Use Item 1-11 Insulation mounted within or under vertical steel Z-girts spaced a maximum of 24 in. OC Item 5 may be installed with vertical 18 GA. steel furring (maximum 24 in. OC). Item 5 may use WRBs listed in Appendix B. NFPA 285-19 or -25 applies to Atlas or Hunter Insulation, or no Insulation. NFPA 285-12 applies to all other insulations unless otherwise specified in the approval for each insulation. See web links below this table for specific code years for each insulation approval.	1) Hunter (TER 1402-01) • XciFoil (Class A) 4 in. (max.) • Xci-286 four in. (max.) • Xci-CG (Class A) 4 in. (max.) • Xci Ply (Class A) 4¼ in. (max.) [3½ in. foam max., ¾ in. FR Plywood (max.)] 2) Carlisle CCW (TER 1407-01 & -02) • R2+Sheathe 4 in. (max.) • R2+Silver 4 in. (max.) • R2+Matte 4 in. (max.) • R2+Base 4¼ in. [3½ in. foam (max.) & ¾ in. FR Plywood (max.)] 3) Firestone Enverge CI (Intertek Design No. FST/FBI 30-09) • Foil Exterior Wall Insulation 4 in. (max.) 4) Firestone Enverge CI (Intertek Design No. FST/FBI 30-08) • Glass Exterior Wall Insulation 1 in. thickness (max.). 5) Atlas (TER 1306-03) • EnergyShield Pro 4 in. (max.) • EnergyShield CGF Pro 4 in. (max.) • EnergyShield Ply Pro 4¾ in. (max.) [4 in. EnergyShield CGF Pro with ⅝ or ¾ in. FRT Plywood over the insulation]. • EnergyShield XR 4 in. (max.) 6) DuPont • Thermax (CCRR-0435) 3 in. (max.) • Thermax NH Sheathing (CCRR-0440) 3 in. (max.) 7) Rmax (TER 1309-03) • Thermasheath 4½ in. (max.) • TSX-8500 4½ in. (max.) consisting of a single panel or multiple thinner panels • TSX-8510 4½ in. (max.) • ECOMAXci FR 4½ in. (max.) consisting of a single panel or multiple thinner panels • ECOMAXci FR White, 4½ in. (max), consisting of a single panel or multiple thinner panels 8) Johns Manville (CCRR-0444) • AP Foil 3½ in. (max.)

Wall Component	Optional Substitutions
	• CI Max 3½ in. (max.) 9) Siplast (TER 2304-113) • WALLcontrol Foil-faced sheathing 4 in. (max.) • Control glass-faced sheathing 4 in. (max.) 10) Unfaced Mineral Wool 2 in. (min.) 4 pcf density (min.) 11) No Insulation – Only use WRBs on the base wall listed in Appendix C
Cladding Max. air gap 1¼ in. with combustible insulation or no insulation. Max. air gap unlimited with mineral wool.	⅝ in. (16 mm) Nichiha Architectural Wall Panels (AWP) mechanically fastened to vertical steel Z-girts (min. 18 GA.) using the Nichiha mounting system. Other mounting systems include: • ClarkDietrich 18 GA. ProChannel Ci attached through to the studs (Air gap max 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited) • Cascadia Clips (Air gap max 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited) • ISOClips (Air gap max. 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited) • FERRO Cladding Support (Air gap max. 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited) • Knight Wall MFI – S or D Series (Air gap max 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited) • Knight Wall CI (Air gap max. 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited). May be vertical or horizontal. • Knight Wall HCI (Air gap max. 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited). May be vertical or horizontal. • Knight Wall ThermaZee (Air gap max. 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited). vertical or horizontal • CL-TALON (With mineral wool only. Mineral wool air gap not limited) • SMARTci GreenGirt (Air gap max. 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited). May be vertical or horizontal.

Note: *Window Headers/jambs shall incorporate* min. *25 GA. steel L flashing for Hunter or min. 24 GA. steel L flashing for Atlas or window treatment as noted within each approval referenced as listed below. If an approval has no restriction, then generic flashing may be used.*

Links to specific Insulation Approvals:

Hunter Panels – **TER 1402-01**
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 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 Fire Performance in Exterior Walls of Buildings of Type I-IV Construction (drjcertification.org)

Firestone Enverge CI
FST/FBI 30-09 (2) (intertek.com)

FST/FBI 30-08 (R2) (intertek.com)

Atlas Roofing Corporation – TER 1306-03
EnergyShield Pro, EnergyShield CGF Pro, EnergyShield Ply Pro, EnergyShield XR
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
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)

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) *Code Year Applicability*
   a. *Tested Assemblies per NFPA 285-2019 or -25*
   b. *Approved Assemblies per NFPA 285-12 (or newer as listed in each approval).*
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.*
6) *ICC-NTA Fire Test Report NCA040325-98(R1) NFPA 285-25 Test on Nichiha w/ Atlas Polyiso*

EVALUATION METHOD

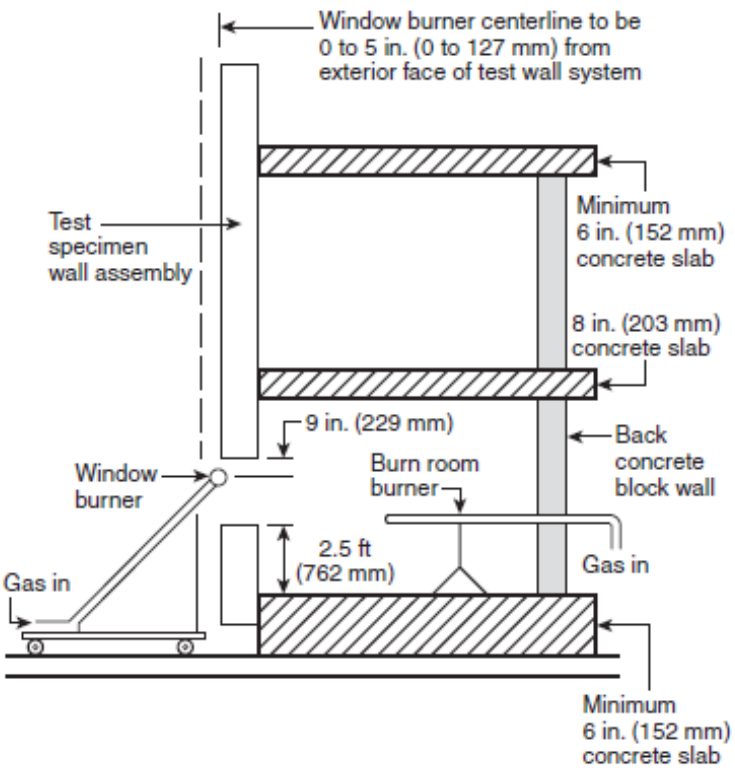
NFPA 285 Criteria

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 exterior face of the wall.

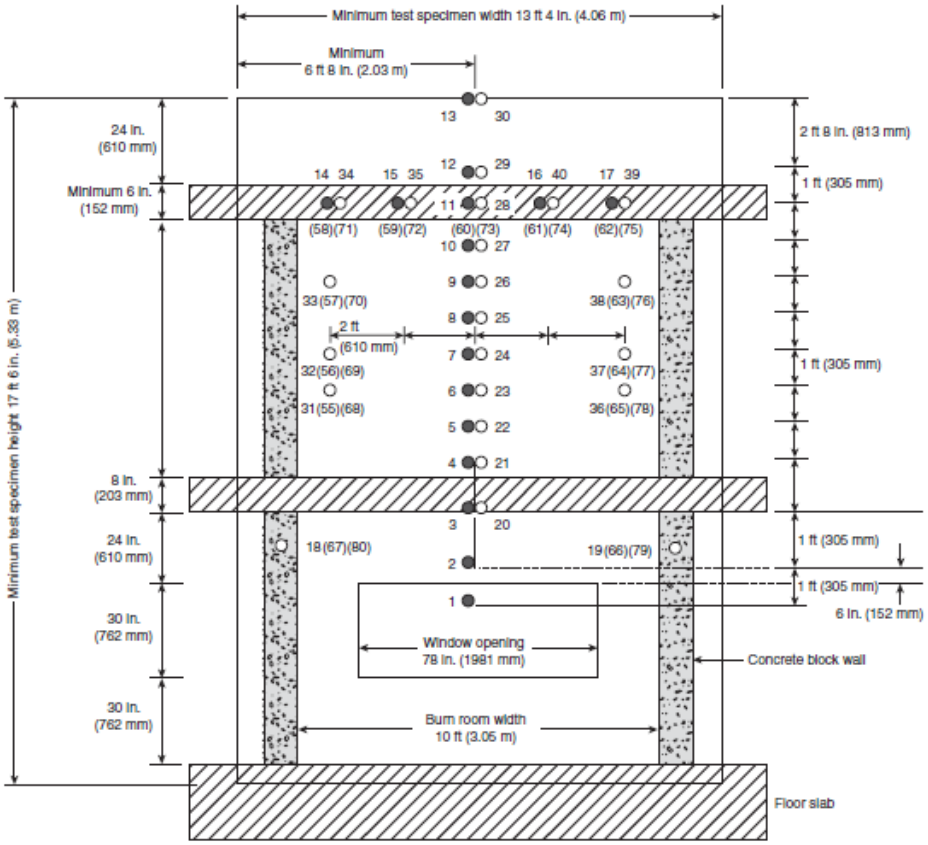
Thermocouples are placed strategically to monitor temperature, which serves as an indicator of flame spread.

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):

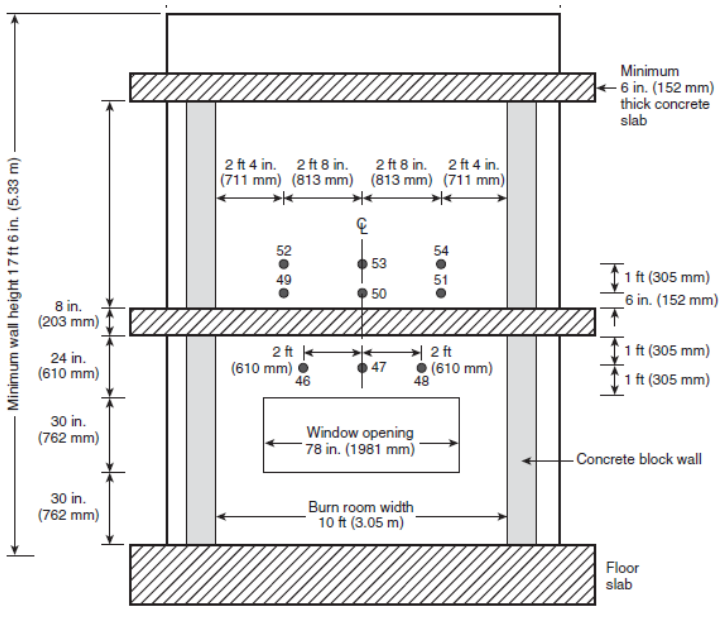
1) Flames shall not spread vertically 10 ft above the window opening as determined visually or by thermocouples at the 10 ft level. Failure occurs when Thermocouples 11 or 14 - 17 exceed 1000 °F.
2) Flames shall not spread (visually) horizontally 5 ft on either side of the centerline of the window opening.
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, use the descriptions in the referenced reports.

Reports Submitted (Refs. 2 & 6)

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 1
⅝ in. type X gypsum wallboard	Clark Dietrich 20 GA. 3⅝ in. steel studs spaced 24 in. OC	None 4 in. 4 pcf mineral wool fire stop at floor lines – friction fit	½ in. DensGlass	Sopraseal 1100T	Atlas 4 in. EnergyShield XR	1¼ in.	⅝ in. Nichiha AWP 3030 attached with vertical ClarkDietrich 18 GA. ProChannel Ci is attached through to the studs. Note 2

Note 1: Joints Tested per NFPA 285-19. Window Header/Jambs used 25 GA. L flashing.
Note 2. Joints Tested per NFPA 285-25. Window Opening 24 GA Steel Flashing.

Both standard years are the same in relation to joint positions.

Analysis of Components

When comparing the flammability of NFPA 285 wall systems, the elements that could increase flame spread should be considered.

1) **Interior Gypsum Wallboard**
   The tests used 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 tests 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 may be more flexible and prone to warping. Heavier or deeper studs are permitted.
3) **Cavity Insulation**
   The tests did not incorporate cavity insulation. However, any noncombustible insulation or listed fiberglass (faced or unfaced) may be used, as neither increases flammability.
4) **Exterior Sheathing**
   The tests used ½ inch DensGlass exterior sheathing. Any exterior gypsum sheathing (min. ½ in.) may be used.
5) **WRB over Exterior Sheathing**
   The constructions tested used Sopraseal Stick 1100T applied to exterior gypsum sheathing.

6) **Exterior Insulation**

The first test used a 4-inch Hunter Xci CG (Class A), which represents the maximum thickness for the Hunter panel product. This allows the use of Hunter Xci Foil (Class A) or Xci 286, with 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 unprotected gaps between the foam panel and the edges on one side of the opposing girts, which is considered a more onerous condition than horizontally mounted girts (which can serve as potential fire blocks to the vertical spread of flame).

The 2nd test used 4 in. Atlas EnergyShield XR. This allows the use of various Atlas insulations as listed below (XR being the worst case).

1. 4" (max.) Atlas EnergyShield Pro
2. 4" (max.) EnergyShield CGF Pro
3. 4¾" (max.) EnergyShield Ply Pro (4" EnergyShield CGF Pro with ⅝" or ¾" FRT Plywood)
4. 4" (max.) Atlas EnergyShield XR

Note: ½" (min.) exterior gypsum sheathing may be attached to exterior side of any item listed above. ⅝" (min) FRT plywood may be attached to exterior side of Item 1 or 2 listed above.

Note: GP DensGlass and GP DensElement (both min. ½") may be installed exterior to ES Pro and ES Pro CGF.

MgO Board may be installed over the polyiso foam boards. NexGen MaxTerra 12mm, 16mm, or 20mm mechanically attached or adhered with construction adhesive 2" dabs spaced 18" apart or 1' long, ¼" wide ribbons spaced 1' apart.

Ref. DrJ Engineering TER 1306-03

7) **Air Gap**

The first construction (Ref. 2) utilized a nominal ⅜ in. (10 mm) air gap between the Nichiha cladding and the surface of the exterior insulation. The air gap may be reduced, since smaller air gaps typically spread flames less than larger ones.

The 2nd construction (Ref. 6) used a 1¼ in. air gap between the Nichiha cladding and the surface of the exterior insulation. The air gap may be reduced, since smaller air gaps typically spread flames less than larger ones.

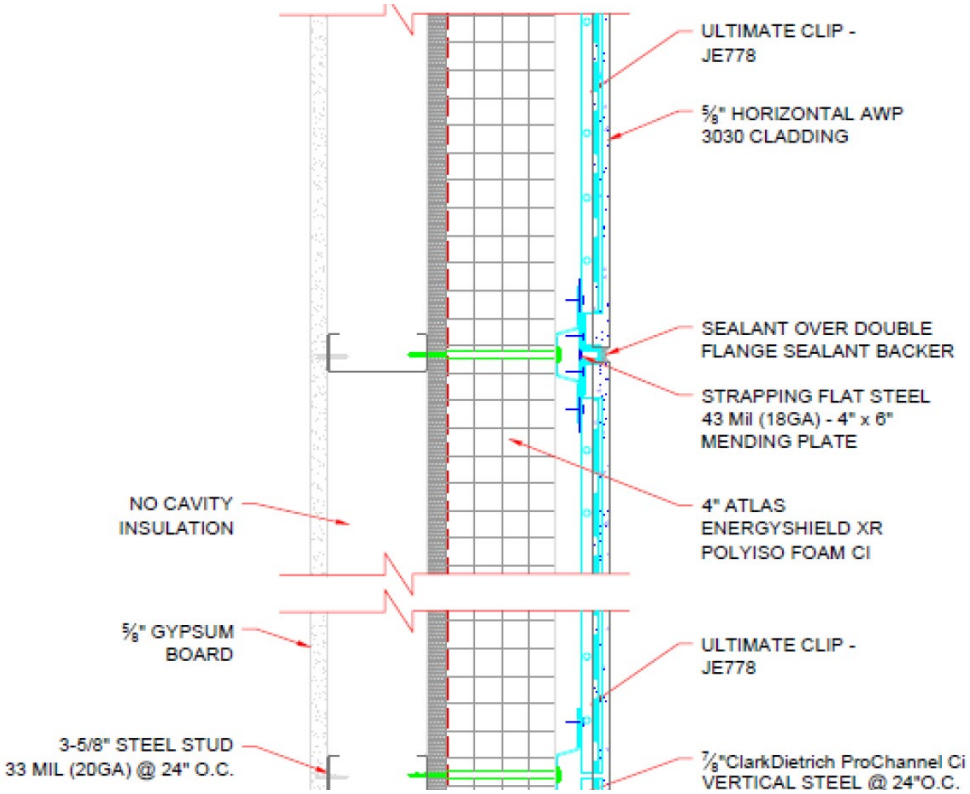
8) **Exterior Cladding**

The first construction (Ref. 2) utilized Nichiha Architectural Wall Panels (AWP), Vintagewood Panel, ⅝ in. thick.

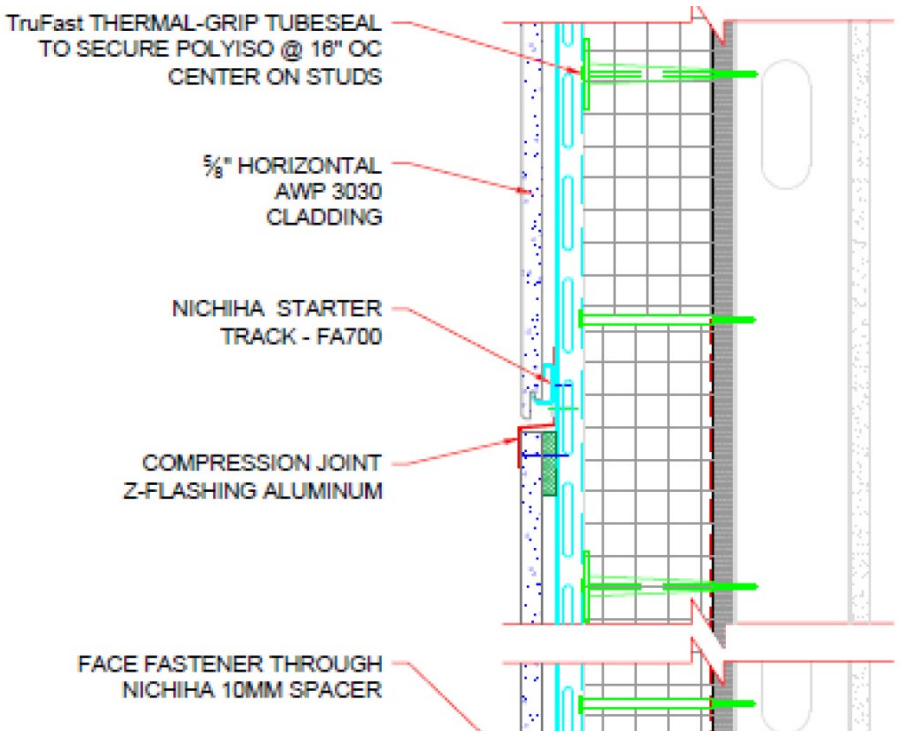
The 2nd construction (Ref. 6) utilized Nichiha Architectural Wall Panels (AWP 3030), Panel, ⅝ in. thick, with the following joint treatment.

Lastly, the horizontal joint of the assembly was positioned approximately 24-1/4-in. above the window header, extended the full width of the wall assembly, and incorporated Nichiha's Compression Joint. The vertical joint of the assembly was positioned approximately 5-7/8-in. from the vertical centerline of the assembly, extended from the window header to the top of the wall assembly, and incorporated Nichiha's Double Flange Sealant Backer (FH1015R). For further details, refer to "Appendix C – Drawings".

Drawings in Ref. 6 are shown below.



Vertical Joint



Horizontal Joint

Engineering Extensions

Base Walls

Since the tests submitted (Refs. 2 & 6) 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 in. (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 the stud cavity depth.
4) FRTW studs: min. nominal 2 x 4 dimension, spaced 24 in. OC (max.)
   a. ⅝ in. type X Gypsum Wallboard Interior
   b. Braced as required by code.
   c. Fire blocking at the floor line per code.

The use of Fire-retardant-treated wood (FRTW) framing, as covered under IBC Section 2303.2, is allowed in Type III construction within bearing and non-bearing exterior walls, provided the required fire rating is 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 tests submitted (Refs. 2 & 6) did not utilize stud cavity insulation. In the referenced designs, any noncombustible cavity insulation may be used. Additionally, any listed fiberglass insulation, whether faced or unfaced, 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 tests 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 tests 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 equal to or less flammable (improved T_{ign}, Pk. HRR, THR, EHC) may also be used.

Alternative WRBs are permitted as specified in the code-compliance report or the 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 some instances, 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. Refer to the NFPA 285-25 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 on Hunter Panels Xci CG (Class A) with a 4 in. thickness. Based on the flammability characteristics and allowances described in TER 1402-01 for Hunter Panels Xci products, testing with 4 in. thick Xci CG (Class A) allows 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, EnergyShield XR
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)

No Insulation.
When no insulation is used, WRBs that are allowed over insulation (e.g., TER 1306-03 list of WRBs over insulation) may be used bare, with no insulation attached to the base wall. This may be allowed because the base wall is less combustible than the exterior insulation.

Air Gap
For combustible insulation, the air gap may be up to 1¼ in.

Since the Nichiha panels behaved like a noncombustible cladding in the NFPA 285 tests (no surface ignition), any reasonable air gap may be used for mineral wool, as both sides of the air gap contain "essentially" noncombustible components.

Claddings/Attachment

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

⅝ in. (16 mm) Nichiha Architectural Wall Panels (AWP) mechanically fastened to vertical or horizontal steel Z-girts (min, 18 GA.) using the Nichiha mounting system.

Other mounting systems include:

- ClarkDietrich 18 GA. ProChannel Ci attached through to the studs (Air gap max. 1¼ in. with approved exterior insulation as listed above. Mineral wool air gap not limited)
- Cascadia Clips (Air gap max 10 mm with approved exterior insulation as listed above. Mineral wool air gap not limited)
- ISOClips (Air gap max. 10 mm with approved exterior insulation as listed above. Mineral wool air gap not limited)
- FERRO Cladding Support (Air gap max. 10 mm with approved exterior insulation as listed above. Mineral wool air gap not limited)
- Knight Wall MFI – S or D Series (Air gap max. 10 mm with approved exterior insulation as listed above. Mineral wool air gap not limited)
- Knight Wall CI (Air gap max. 10 mm with approved exterior insulation as listed above. Mineral wool air gap not limited). May be vertical or horizontal.
- Knight Wall HCI (Air gap max. 10 mm with approved exterior insulation as listed above. Mineral wool air gap not limited). May be vertical or horizontal.

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

CONCLUSIONS

NFPA 285 tests were conducted on a Nichiha exterior wall design with a 4-inch thickness of Hunter Panels and Atlas 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 of the components tested from the submitted wall system allowed us to form a base wall system from which replacement components can be interchanged.

In conclusion, we have determined that engineering extensions to various components of the tested wall designs, as shown herein, can meet the NFPA 285 criteria, subject to specific limitations.

APPENDIX A
Alternate Mounting Systems

As a baseline, per tested assemblies, the Nichiha attachment flange shall be a minimum. 18 GA. steel.

Cascadia Clips®

IAPMO ER 0363 for HPL lists Cascadia for use with mineral wool only. This system can be used with mineral wool (any reasonable air gap) and Nichiha, as Nichiha behaves like a noncombustible cement board type in NFPA 285 tests (no surface ignition).

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 1¼ in.

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.

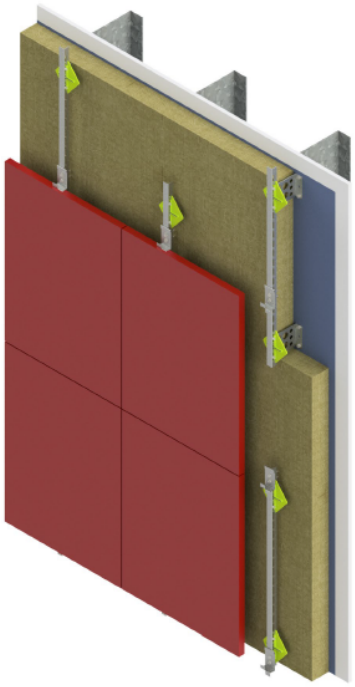
Material Composition:

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)

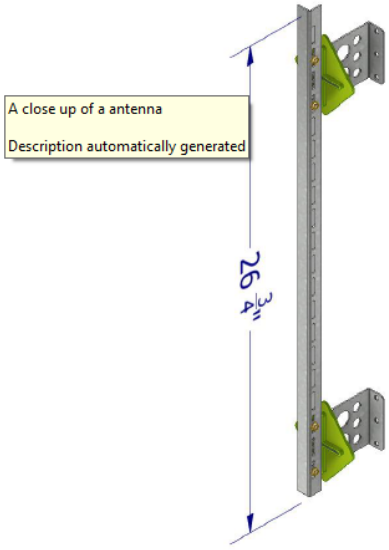
Nichiha EEV 10809C lists the ISOClips for use with mineral wool. They may be used with mineral wool (any reasonable air gap). These may be used with approved exterior insulation, as they are mainly steel, and the plastic is not directly exposed. The air gap may not exceed 1-1/4 in.

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

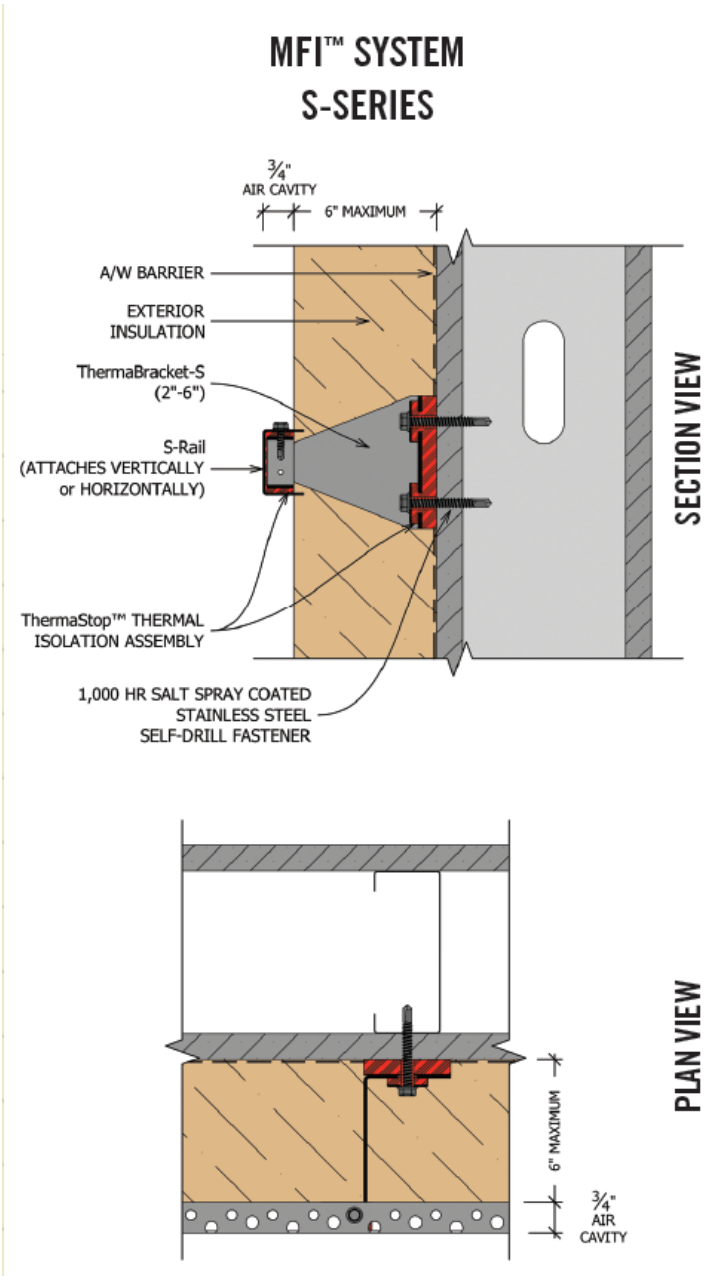
The exterior panel support spec sheet shows steel construction with a minimal plastic thermal break.

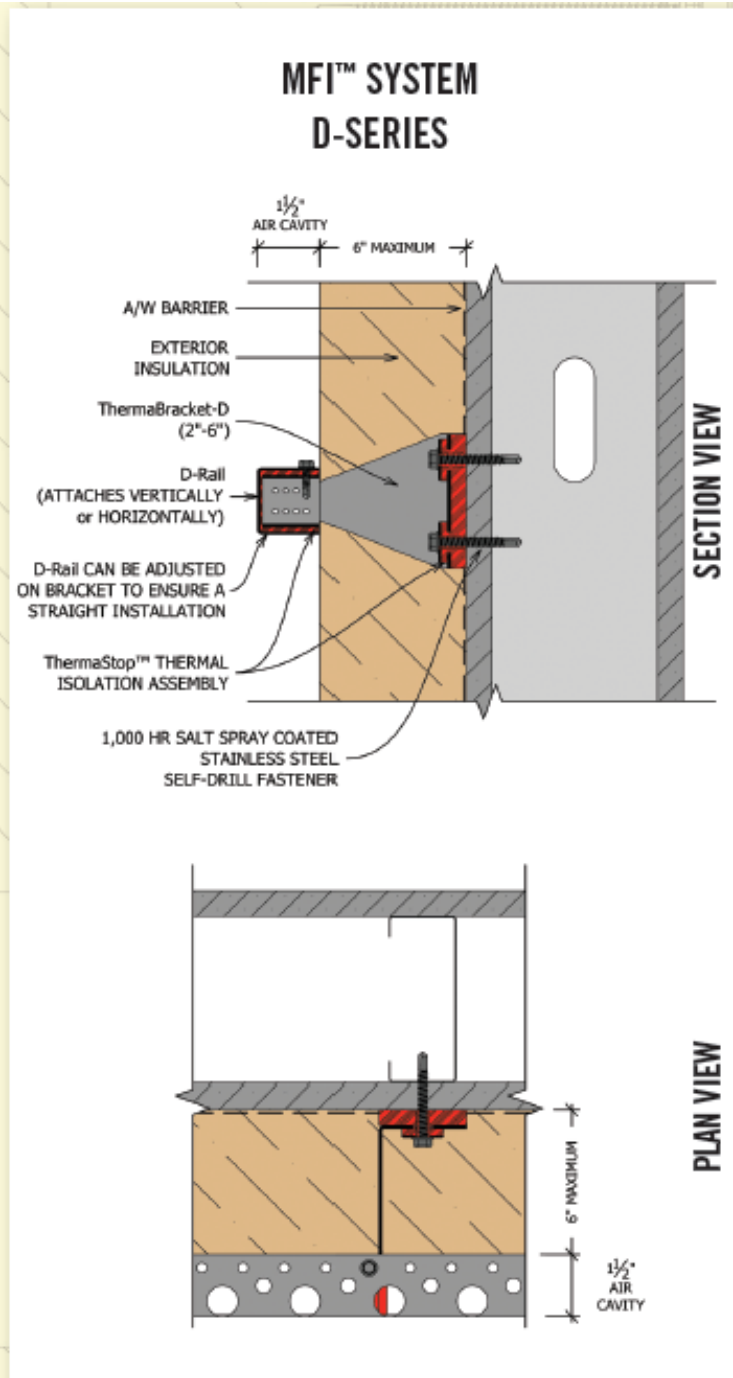
These may be used with mineral wool (any reasonable air gap).

These may also be used with approved exterior insulation, as they are primarily made of steel. The plastic thermal break is intermittent (not full-wall coverage) and will not spread flames beyond its footprint (a few inches). The air gap may not exceed 1-1/4 in.

Knight Wall MFI®

S or D Series





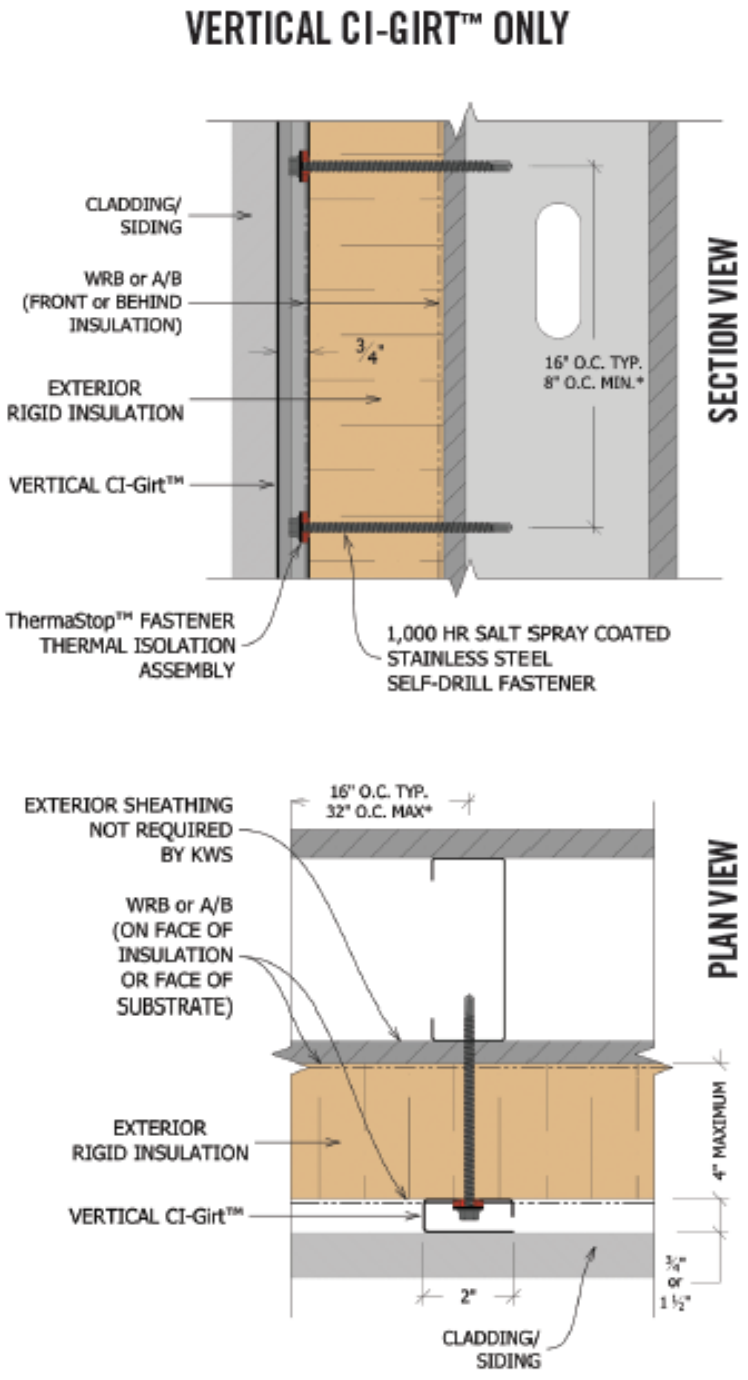
https://knightwallsystems.com/wp-content/uploads/2016/03/mfi_sell_sheet_2016-1.pdf

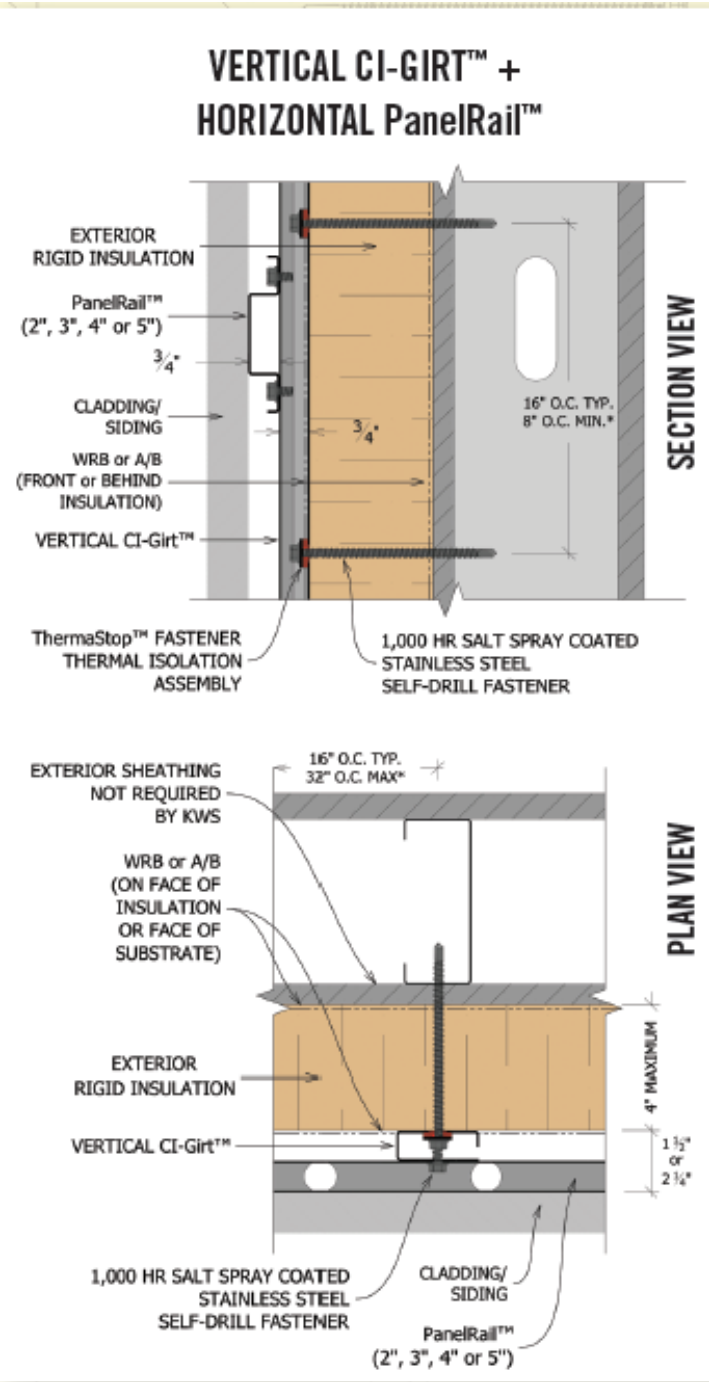
The MFI sell sheet shows that it is mostly steel with minimal plastic.

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

These may also be used with approved exterior insulation, as they are primarily made of steel. The plastic thermal break is intermittent (not full-wall coverage) and will not spread flames beyond the plastic footprint's size (a few inches). The air gap may not exceed 1-1/4 in.

Knight Wall CI®





ci_sell_sheet_2016 (knightwallsystems.com)

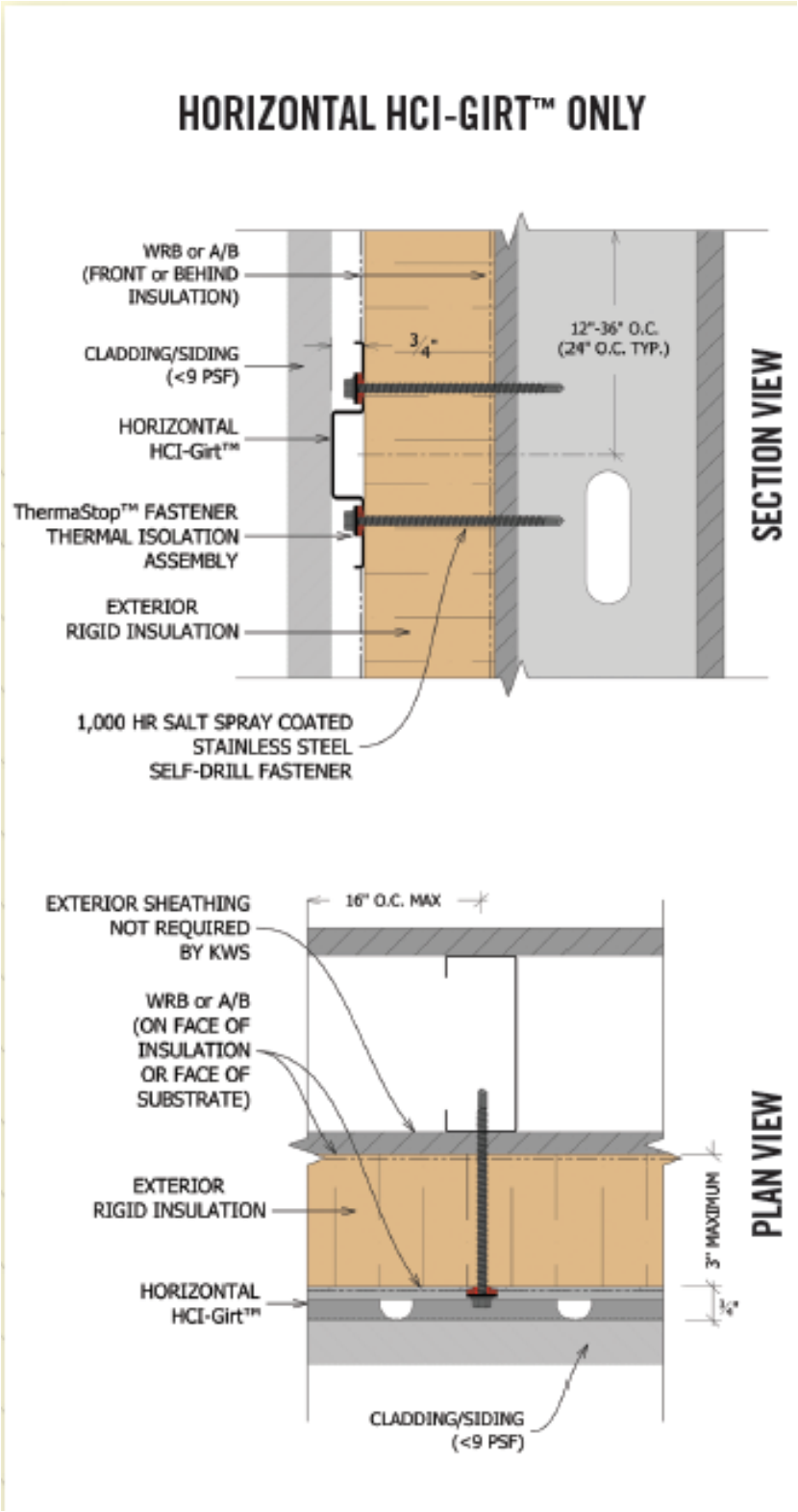
CI sell sheet shows all steel.

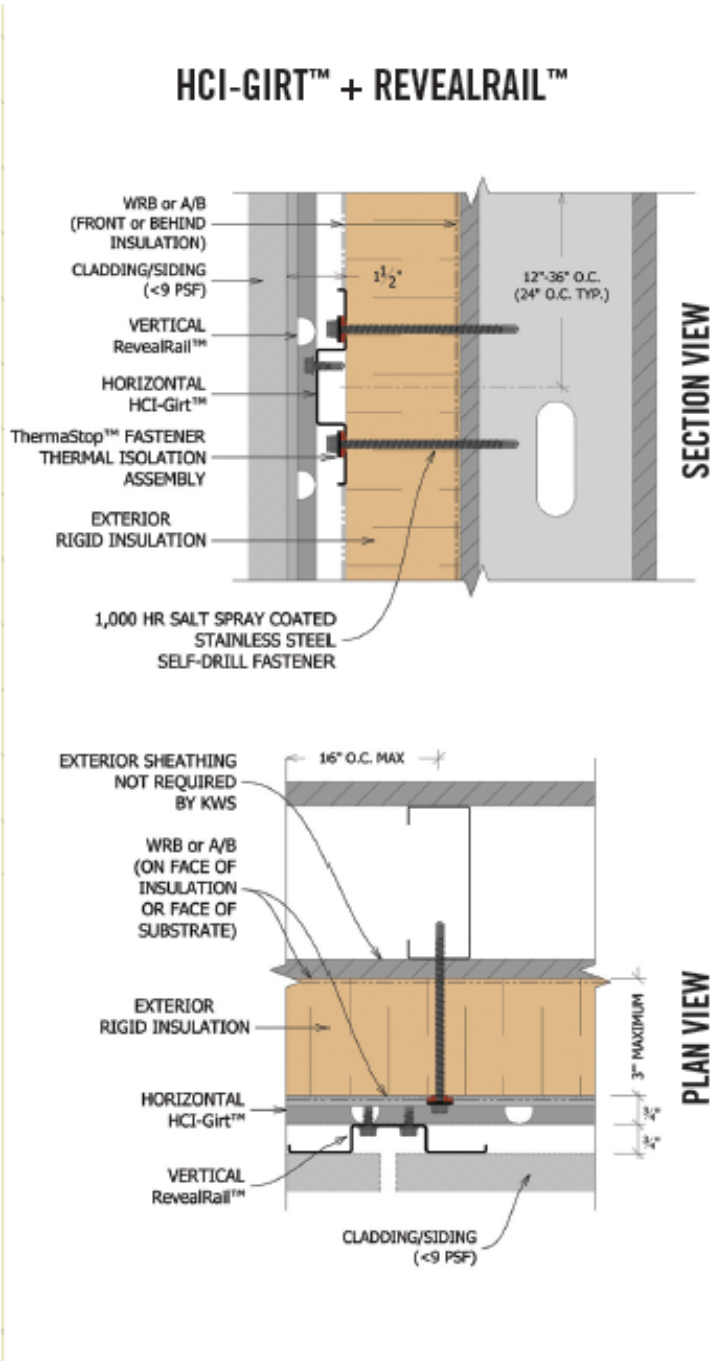
These may be used with mineral wool (any reasonable air gap).

These may also be used with approved exterior insulation since they are all steel. Any air gap may not exceed 1-1/4 in.

It may be vertical or horizontal, as the Nichiha 285 test was conducted with a vertical Z.

Knight HCI™ Systems





hci_sell_sheet_2016 (knightwallsystems.com)

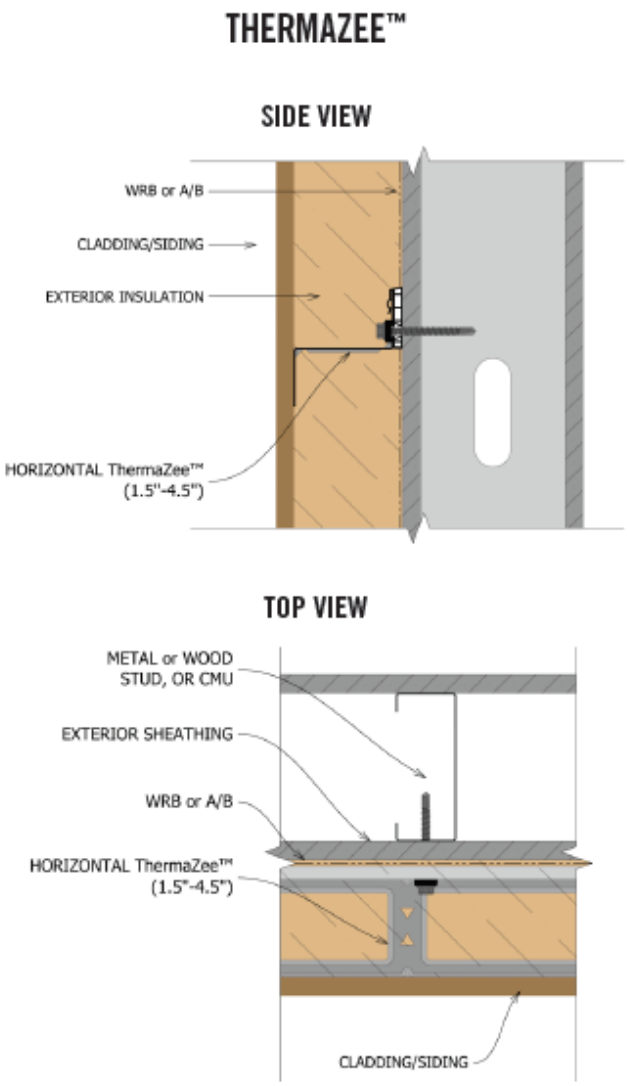
The HCI sell sheet shows all steel.

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 1¼ in.

It may be vertical or horizontal, since the Nichiha NFPA 285 test was conducted vertically.

Knight Thermazee



thermazee_sell_sheet_10072020 (knightwallsystems.com

All-metal Z girt.

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

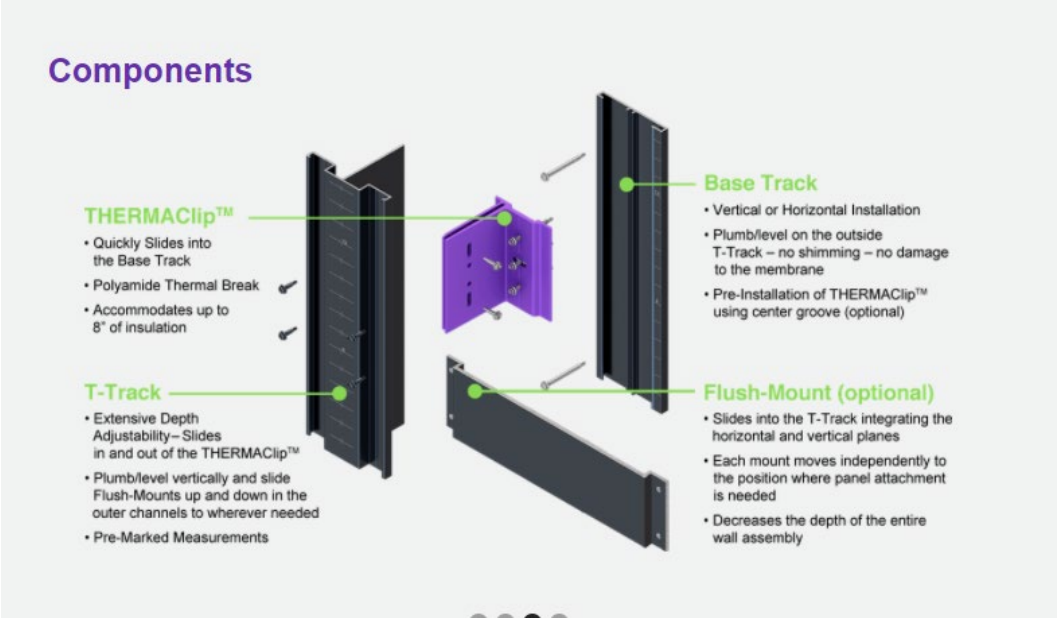
These may also be used with approved exterior insulation since they are all steel. Any air gap may not exceed 1¼ in.

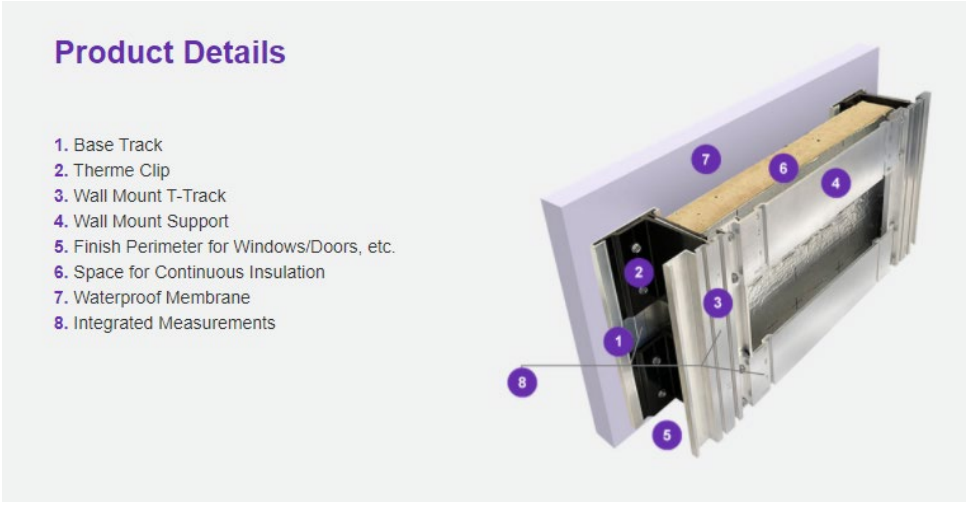
May be vertical or horizontal since the Nichiha 285 test was vertical Z.

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 incorporates a major plastic component and NFPA 285 data are not available, only mineral wool will be permitted.

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

SMARTci GreenGirts

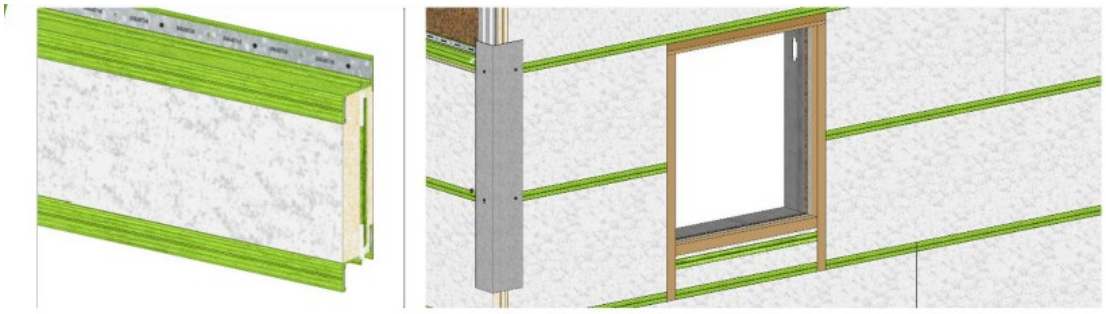


FIGURE 1. SMARTCI™ SYSTEM

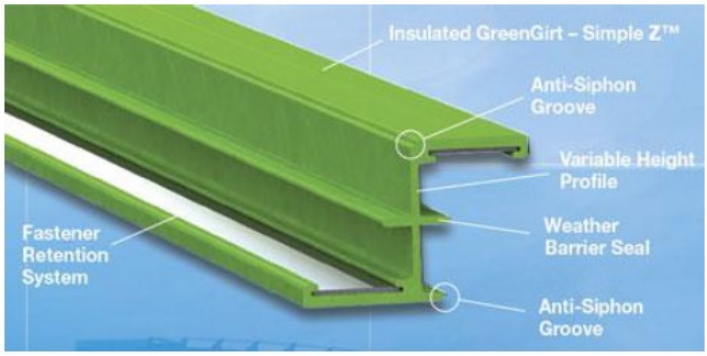


FIGURE 2. GREENGIRT™

DrJ Engineering TER 1501-06 allows this system to be used with polyiso 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 the Nichiha 285 test was vertical Z. The system may be used with approved exterior insulation

Appendix B

Atlas Polyiso Allowed WRBs Under the Insulation

WRB over Base Wall Use any of these items	1. None 2. DuPont™ Tyvek Wraps in ESR 2375 – stapled (one or two layers). Dupont Tyvek HomeWrap Style 1055B, Dupont Tyvek StuccoWrap Style 1062X, Dupont Tyvek DrainWrap Style 1063X, Dupont Tyvek CommercialWrap Style 1062B, Dupont Tyvek CommercialWrap D Style 1083 3. Henry Air-Bloc® 32MR (75 wet mils) - Discontinued 4. Any WRB which has been tested per ASTM E1354 (at a minimum of 50 kW/m² heat flux) and shown by analysis to be less flammable (improved T_{ign}, Pk. HRR) than those listed above.[2] Examples of such are detailed below: a. BASF Enershield® HP, Enershield®-I b. CCW 705, Fire Resist 705 VP, Metal Clad 705FR, Metal Clad 705FR LT, Fire Resist 705 FR-A, Fire Resist Barritech NP, NP LT, VP, or VP LT c. Dow Chemical DefendAir 200 Low Temp or DefendAir 200 C (Charcoal) d. Dryvit Backstop® NT™, Backstop NT™ Smooth, Backstop NT™ Spray, Backstop NT™ Texture, Backstop NTX™Smooth, Backstop NTX Texture, or Backstop NT-VB. e. DuPont™ Tyvek Fluid Applied (0.8 mm) f. GE Momentive Elemax 2600 g. GCP Perm-A-Barrier® VPL LT, NPL 10, NPL, NPS, VPS, VPL, AWM, VPL 50RS,VPS 30, or VPL 50 h. Henry Air-Bloc® 21FR, Air-Bloc® 17MR, Air-Bloc 16MR i. Henry Blueskin® SA, Blueskin VP 160 j. Henry WeatherSmart, WeatherSmart Drainable, WeatherSmart Commercial (previously Fortifiber) k. Hohmann & Barnard Enviro-Barrier™ VP, X Barrier™, Enviro-Barrier™ l. Jumpstart HWW-65A, HWW-65B, HWHP-80A, HWMP-90A, HWD2-72A, HWHPT-92A, HWMPC-110A m. Parex WeatherSeal Spray and Roll On n. Prosoco R-Guard® Spray Wrap, Spray Wrap MVP, R-Guard® MVP , R-Guard® VB, R-Guard® Cat-5, or Cat-5 Rainscreen o. Sto Emerald Coat® or Gold Coat® p. STS Wall Guardian® FW 100A q. Tremco ExoAir® 230 (31.5 mils), ExoAir® 130, ExoAir® 111

WRB over Base Wall Use any of these items	r. Vaproshield Wrapshield SA®, Revealshield SA® s. WR Meadows Air-Shield™ LMP (Gray), Air-Shield™ LMP (Black), Air-Shield™ TMP, Air-Shield™ LSR, Air-Shield™ SMP t. Soprema® LM 204 VP, Sopraseal® Stick VP, Sopraseal® 1100T, Soprasolin HD u. Siga Majvest 500 SA v. Dörken Systems Inc. DELTA®-STRATUS SA w. Pecora XL-Perm^{ULTRA} VP, XL-Perm^{ULTRA} NP, ProPerm VP x. NaturaSeal NS-A-250LP, NS-A-250HP y. Master Wall Rollershield-RS z. Siplast WALLcontrol™ Modified Silicone (STPE) VP Liquid AWB aa. Siplast WALLcontrol™ Reinforced Aluminum Butyl Adhered AWB bb. Siplast WALLcontrol™ Monolith VP Adhered AWB cc. FT Synthetics Block-Aide dd. Atlas EnergyShield WAVE Modified Silicone (STPE) VP Liquid AWB ee. Sika SikaGard 535 ff. Dorken Delta-Vent SA, Delta-Vent S or Delta-Vent S/Plus, Delta-Fassade S, Delta-Foxx/Plus, Delta-Maxx/Plus, Delta Vent SA gg. Kamak 321 K-NRG Seal VP hh. Polyglass VertiWrap VPS, VertiWrap NPS, VertiWrap VPL, VertiWrap VPL LT, VertiWrap NPL ii. PolyGuard Spray-N-Roll (aka STPE), Airlok Sheet 400 NP, Airlok Sheet UV400 NP, Airlok Flex VP, Stretch Flex, FlexGuard

Ref. DrJ TER 1306-03
https://www.drjcertification.org/report/download/344

Appendix C

WRBs Allowed on Base Wall with No Exterior Insulation

WRB over Base Wall with No Insulation Use any Item 1 - 24	1) None 2) CCW Metal Clad 705FR Metal Clad 705FR LT, Fire Resist 705 VP Fire Resist Barritech NP, Barritech NP-LT, Barritech VP or VP LT 3) Dow Chemical DefendAir 200 Low Temp or DefendAir 200 C (Charcoal) 4) Dryvit Backstop NT, Backstop NT Smooth, Backstop NT Spray, Backstop NT Texture, Backstop NTX Smooth, or Backstop NTX Texture 5) GE Momentive SEC 2500 Silshield, SilShield SEC2600 AWB (a.k.a. Elemax 2600) 6) GCP Permabarrier AWM, VPL, VPS, NPS, NPL, VPL LT 7) Henry Foilskin, Metal Clad, Air Bloc 21 FR, Blueskin VP 160 or Air Bloc 17MR 8) Henry WeatherSmart, WeatherSmart Drainable, WeatherSmart Commercial 9) Jumpstart HWW-65A, HWW-65B, HWHP-80A, HWMP-90A, HWD2-72A, HWHPT-92A, HWMPC-110A 10) Parex WeatherSeal Spray and Roll On 11) Prosoco R-Guard VB, R-Guard Cat-5, R-Guard Cat-5 Rainscreen, Spraywrap MVP 12) Sto EmeraldCoat 13) VaproShield WrapShield SA, VaproShield RevealShield SA 14) Soprema Soprasolin HD (with any cladding) 15) Dupont Tyvek Wraps in ESR 2375, Dupont Tyvek HomeWrap Style 1055B, Dupont Tyvek StuccoWrap Style 1062X, Dupont Tyvek DrainWrap Style 1063X, Dupont Tyvek CommercialWrap Style 1062B, Dupont Tyvek CommercialWrap D Style 1083 16) WR Meadows Air-Shield SMP 17) Pecora XL-Perm^{ULTRA} VP, XL-Perm^{ULTRA} NP, ProPerm VP 18) Master Wall Rollershield-RS 19) Siplast WALLcontrol Monolith VP Adhered AWB 20) 3M 3015, 3015VP 21) Dörken Delta-Vent SA, Delta-Vent S or Delta-Vent S/Plus, Delt-Fassade S, Delta-Foxx/Plus, Delta-Maxx/Plus, Delta Vent SA 22) Karnak 321 K-NRG Seal VP 23) Polyglass VertiWrap VPS, VertiWrap NPS 24) PolyGuard Airlok Sheet UV400 NP, Airlok Flex VP, FlexGuard

END OF REPORT