



**PRIEST & ASSOCIATES  
CONSULTING, LLC**

## ENGINEERING EVALUATION

Fire Resistance Evaluation of Nichiha Fiber Cement  
Cladding in Fire Rated Exterior Wall Assemblies

Project No. 10500

Prepared for:

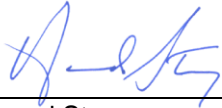
David Hohenstern  
**NICHIHA USA, Inc.**  
6465 E JOHNS CROSSING, SUITE 250  
JOHNS CREEK, GA 30097

August 11, 2017

*Abstract*

*The purpose of this evaluation is to provide the technical basis for IBC code compliance recognition of Nichiha AWP/EX panels and Sierra lap board for use as exterior cladding in fire resistance rated wall assemblies. Priest & Associates Consulting finds that the range of Nichiha fiber-cement based systems may be added as an exterior cladding component to fire resistance rated exterior wall constructions without detracting from the fire rating of the assembly.*

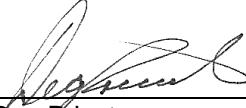
Submitted by,



Howard Stacy  
Senior Scientist  
360-957-0311

August 11, 2017

Reviewed and Approved,



Deg Priest  
President

August 11, 2017



## INTRODUCTION

The following Engineering Evaluation (EEV) has been developed to establish the basis allowing for the recognition of Nichiha Architectural Wall Panels (AWP/EX) and Sierra lap board in code-compliant fire resistance rated wall assemblies. The concepts provided herein are based on building code allowances, listed fire resistance rated wall assemblies and existing knowledge of the test performance of similar listed assemblies.

The purpose of this evaluation is to provide the technical justification that the installation of Nichiha fiber-cement based cladding products to fire rated loadbearing and nonbearing exterior wall assemblies will not detract from the fire resistance rating of the base wall construction. This analysis focuses on wood and steel stud lightweight gypsum wallboard (GWB) constructions.

*This document is intended to provide an expert opinion on the properties of the materials, products, or assemblies identified in this report as related to meeting a specific code or standard; other properties such as (but not limited to) acoustical, weather resistance, durability, toxicity level of smoke developed during combustion, etc., are not addressed nor implied.*

## DESCRIPTION

The Nichiha AWP/EX panels and Sierra lap board systems are fiber-cement based cladding products used for exterior cladding. The AWP/EX list includes but is not limited to products identified as Illumination Series, Architectural Block, Tuff Block, Empire Block, Industrial Block, Ribbed, RoughSawn, Vintage Wood, SandStone, Plymouth Brick, Canyon Brick, Vintage Brick, and Cinder Block. The Sierra lap siding products include products identified as Sierra Premium Shake and Savannah Smooth.

Nichiha panel and lap board systems are installed to base wall constructions in accordance with the manufacturer's installation instructions.

The range of Nichiha products is described in Progressive Engineering, Incorporated (PEI) Evaluation Report PER-14088. The fiber-cement formula and applications are consistent for all Nichiha cladding products. Panel and lap siding thicknesses range from a minimum of ½ in. to ¾ inch. All Nichiha fiber-cement siding products do not support combustion and have a Flame Spread Index rating of 0 and a Smoke Developed Index of 0 (ASTM E84 Class A).

## REFERENCED DOCUMENTS

1. Progressive Engineering, Incorporated (PEI) Evaluation Report PER-14088
2. Gypsum Association *Fire Resistance Design Manual*, GA-600-2015.
3. UL Fire Resistance Directory, Volume 1
4. ASTM E2032-09 (Reapproved 2013), *Standard Guide for Extension of Data from Fire Resistance Tests Conducted in Accordance with ASTM E 119*

## EVALUATION

This analysis addresses the allowance for the installation of Nichiha fiber-cement claddings to fire rated wall constructions which include the following exterior wall assembly options:

- Lightweight framed exterior fire rated base wall constructions (steel or wood studs) with gypsum sheathing (conforming to ASTM C1396 and/or C1177)
- Concrete or concrete masonry units
- Fire resistance rated base wall assemblies with optional exterior foam insulation including EPS, XPS and polyisocyanurate rigid foam sheathings



## Fire Resistance Rated Wall Assemblies

The ASTM E119/UL263 test methods evaluate the duration for which test specimens will contain a fire (resistance to heat transfer to the unexposed side), retain their standard integrity (ability to sustain a load), or both.

Generally speaking, Nichiha panel and lap siding systems may be used together with the assemblies described in IBC Table 721.1(2) without changing the assigned hourly rating. In addition, Nichiha cladding systems can be used as exterior wall cladding when installed on any fire resistance rated base wall assembly, including those listed for use in GA-600 (Ref. 2), by Underwriter's Laboratories (Ref. 3), or by any other recognized third party testing and certification agency.

A wide variety of UL fire rated exterior wall designs include the allowance for "Fiber-Cement Siding" with a minimum thickness of ¼ in. and mounted in accordance with the manufacturer's installation instructions. These designs include but are not limited to loadbearing wood stud framed constructions such as UL V306 or U354 which allow for the installation of any fiber-cement siding over foam plastic exterior insulation to the wood stud framing. In addition, UL Design Nos. V454 and U425 provide examples of versatile bearing or nonbearing exterior steel stud wall constructions having identical allowances for fiber-cement siding. The V306 and V454 designs are summarized to illustrate the broad range of fire rated wall systems and component applications.

### V306 (Loadbearing wood stud framing)

- Interior membrane - ⅝ in. type X GWB (limited to USG Type SCX)
- Framing - Wood studs, nominal 2 x 4 in., spaced a maximum of 24 in. OC
- Cavity insulation – Optional, BASF spray applied foam plastic insulation (limited to specific 0.5 and 2.0 lb SPF's)
- Exterior sheathing – any ⅝ in. type X UL Classified GWB
- Weather Resistant Barrier (WRB) – Optional, any code approved WRB
- Exterior Insulation – Optional, Expanded polystyrene (EPS)
- Exterior claddings – Optional, including aluminum, steel, vinyl, wood, **fiber-cement**, stucco, brick among others. Claddings are fastened over exterior foam plastic insulation to wood studs

### V454 (Loadbearing and nonbearing steel stud framing)

- Gypsum wallboard – Any ⅝ in. type X UL Classified GWB, fastened to interior and exterior sides of the steel studs in accordance with the listing
- Framing – Minimum 20 GA. steel studs, spaced a maximum of 24 in. OC
- Cavity insulation – Optional, glass fiber, mineral wool or various SPF's per the listing
- WRB – Optional code approved
- Exterior insulation – EPS, XPS, Polyisocyanurate rigid insulation, various SPF's
- Exterior claddings – Various generic sidings including aluminum, steel, vinyl, wood, **fiber-cement**, stucco, brick among others. Claddings are fastened over exterior foam plastic insulation to steel studs

The allowance for the installation of Nichiha fiber-cement siding products to the exterior of fire rated base wall constructions is justified by Rule 2 of Harmathy's Ten Rules of Fire Endurance (Ref. 4):

*The fire endurance of a construction does not decrease with the addition of further layers.*

The addition of fiber-cement siding to loadbearing and nonbearing base wall assemblies has also been shown in Intertek Design Nos. JH/FCS 60-01 and JH/FCS 60-04 that representative fiber-cement siding products can improve the fire resistance rating of a base wall assembly. The referenced listings provide for 1 hour ratings when minimum ¼ in. fiber-cement siding is installed over steel and wood stud wall



assemblies constructed with ½ in. type X<sup>1</sup> GWB on the exterior face and ⅝ in. type X on the interior face. UL Design No. U317 gives a 45 minute rating to a wood stud bearing assembly with ½ in. type C GWB mounted to both sides. The fact that the fire classification is improved to 1 hour by the addition of fiber-cement siding is indicative of the added fire resistance time that could be expected by the installation of Nichiha sidings to a similar construction, although this must be verified by actual full scale fire testing. These observations are included in this analysis to provide additional evidence that the Nichiha fiber-cement sidings will at a minimum, not detract from the fire rating of wall assemblies when tested in accordance with ASTM E119.

## **CONCLUSION**

Priest & Associates Consulting has provided herein the technical justification for the code compliance of Nichiha AWP/EX and Sierra lap fiber-cement siding systems as exterior cladding for various fire resistance rated exterior wall assemblies when installed in accordance with Nichiha installation instructions.

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<sup>1</sup> Since “generic” ½ in. “type X” GWB is no longer produced in North America, it is assumed that this is actually ½ in. proprietary type C, although the manufacturer is not listed.

