

January 7, 2016

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RE: Engineering Analysis of Omnis Petrarch Panel System Demonstrating Compliance with the Intent of International Building Code, Chapter 14, Exterior Walls
JENSEN HUGHES Project No. 1AJP00148.000

JENSEN HUGHES, Inc. has completed our analysis of the exterior wall assembly incorporating the 5/16-inch thick Omnis Petrarch Panel System. Currently, the Omnis Petrarch Panel System is not able to be classified into any section of Chapter 14, Exterior Walls, in the International Building Code (IBC). The objective of this analysis is to demonstrate the Petrarch Panel System meets the intent of the Chapter 14 requirements for similar types of combustible exterior wall assemblies, specifically through testing in accordance with NFPA 285.

1.0 NFPA 285 TESTING

Section 1406 of the IBC limits the use of combustible materials on exterior walls to buildings that do not exceed 40-ft in height. Since the Petrarch Panels are considered to be combustible, the installation of this system is currently limited to buildings 40-ft in height or less. However, there are precedents set in the IBC for allowing the use of combustible materials on exterior walls of Types I, II, III, and IV construction for building heights greater than 40-ft above grade plane. For example, Section 1407 provides the requirements for Metal Composite Material (MCM) panel systems, Section 1408 applies to Exterior Insulation and Finish Systems (EIFS), Section 1409 applies to High Pressure Laminate (HPL) systems, and Section 2603.5 is applicable for the use of foam plastics in exterior wall assemblies. Each of these types of combustible wall systems are permitted to be installed on the exterior walls of Type I through IV construction buildings which exceed 40-ft in height when the materials/assemblies meet the requirements of various fire test standards. The NFPA 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*, test standard is the primary method to ensure excessive vertical and lateral flame spread does not occur over the face of the building.

Omnis Panels, Inc. conducted testing in accordance with NFPA 285 at Intertek Testing Services, NA/Architectural Testing, Inc. (Intertek/ATI) located in York, PA on April 15, 2015. Intertek/ATI Test Report No. E6586.02-121-24 provides a complete description of the test assembly constructed, the testing procedures followed, visual observations during the fire test, and completed testing results. As a result of this successful test, the Omnis Petrarch Panel System was found to be compliant with all requirements set forth by NFPA 285.

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The tested assembly which met the conditions of acceptance for the NFPA 285 test standard was constructed as follows (interior to exterior)

1. Single layer of $\frac{5}{8}$ -inch thick Type X gypsum wallboard complying with ASTM C1396;
2. Nominal 3- $\frac{5}{8}$ inch deep 20 gauge galvanized steel studs spaced 24-inches on center with intermediate bracing included every 4-ft horizontally;
3. Minimum 8-inch thick, 4 pcf mineral wool insulation installed in all stud cavities at each floor line;
4. Single layer of $\frac{5}{8}$ -inch thick exterior gypsum sheathing complying with ASTM C1177;
5. Single layer of Cosella Dörken Delta Façade S water-resistive barrier (WRB) stapled to the exterior gypsum sheathing;
6. Layer of nominal 2-inch thick ROXUL CAVITYROCK MD mineral wool insulation held in place by 2-inch deep, 2-inch legged galvanized steel Z-girts;
7. Nominal 5/16-inch thick Omnis Petrarch Panels installed on vertical aluminum channels creating a 1-inch air gap between the back of the Omnis Petrarch Panels and the face of the mineral wool insulation. Vertical panel joints were located at the edges of the window opening and a horizontal joint was located 2-foot above the window header; and
8. Aluminum (0.04-inch thick) flashing installed around the window perimeter.

2.0 WALL ASSEMBLY DEVIATIONS FROM TESTED ASSEMBLY

The tested wall assembly was representative of the typical field installation practices. Alternate base wall assemblies and water-resistive barrier materials may be used in the exterior wall assembly while retaining compliance with NFPA 285. The analysis which follows provides the technical justification for this modifications to the tested assembly.

2.1 Alternate Base Wall Assemblies

The as-tested base wall assembly consisted of 3- $\frac{5}{8}$ inch deep, 20 gauge steel studs spaced 24-inches on center. A single layer of $\frac{5}{8}$ -inch thick Type X gypsum wallboard was installed on the interior surface of the base wall construction. The wall stud cavities were filled at each floor line with minimum 4 pcf mineral wool insulation friction fit into the wall stud cavity between the steel studs. A similar steel stud/gypsum wallboard base wall assembly incorporating heavier gauge (i.e., thicker) studs, decreased stud spacing, and/or deeper studs will provide improved fire performance of the wall assembly. Commentary in the front of the UL Fire Resistance Directory as well as Section 12.5 of ASTM E2032, *Standard Guide for Extension of Data from Fire Endurance Tests*, support this conclusion.

Additional base wall assemblies include a concrete wall and a concrete masonry wall. In an NFPA 285 test, a concrete or concrete masonry wall will provide improved protection to the panel system installed on the exterior side from the room fire based on the concrete being noncombustible, its increased rigidity, significantly higher thermal mass, and increased level of fire performance. The National Concrete Masonry Association (NCMA) TEK Guide 7-1C, *Fire Resistance Rating of Concrete Masonry Assemblies*, provides minimum concrete thicknesses for various hourly fire-resistance ratings. A normal calcareous or siliceous gravel concrete wall with a minimum thickness of 2-inches will provide a 30-minute fire-resistance rating; a rating equal to the duration of the NFPA 285 test. Any exterior wall assembly will require a concrete wall thickness greater than 2-inches for structural reasons, and concrete block is typically much thicker than 2-inches, again for structural reasons. Based on the documented fire performance of concrete construction, a concrete or concrete block base wall assembly will provide the same or better fire performance than the tested steel stud/gypsum wall assembly.

2.2 Alternate WRB Materials

Jensen Hughes has conducted numerous NFPA 285 tests on exterior wall assemblies containing a minimum 2-inch thickness of mineral wool insulation (minimum 4 pcf) applied over full coverage asphaltic-butyl type WRB material products. The NFPA 285 testing demonstrated that the mineral wool insulation prevented ignition of the thick asphaltic-butyl WRB material. The mineral wool insulation shielded the WRB from the exterior window burner while the steel stud/gypsum wall behind the WRB provided

protection from the interior room fire. In particular, Photo No. 18 in the Intertek/ATI Test Report shows minimal damage to the WRB over the window opening. The remainder of the WRB was protected by the 2-inches of mineral wool and sustained no thermal damage.

Based on this observed fire performance data, it is our opinion that the installation of any WRB material, covered by a minimum of 2-inches of mineral wool insulation having a minimum density of 4 pcf, will not contribute to the overall fire performance of the exterior wall assembly. This assumption was confirmed during the NFPA 285 test, as discussed above.

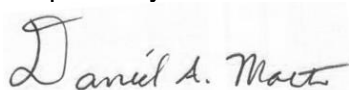
3. CONCLUSION

It is our engineering opinion, based on the above analysis and the results of the NFPA 285 test, that the Omnis Petrarch Panel System meets the fire performance criteria required for similar combustible exterior wall assemblies categorized in IBC Chapter 14. The panel system may also be installed on base wall assemblies other than the tested steel stud/gypsum wallboard assembly. Also, any water-resistive barrier may be used as long as a minimum of 2-inch thick, 4 pcf mineral wool is installed as the exterior insulation.

We appreciate the opportunity to assist you with this engineering analysis for your product. Please feel free to give us a call at (410) 737-8677 should you have any questions regarding the analysis or our conclusions.

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