JENSEN HUGHES

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Ms. Amanda Woodard
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RE: Analysis and Extension of NFPA 285 Test Results – Hoover Architectural Solutions Reynobond 4-mm FR MCM Wall Panel System
Project No. 1AJP26006.01

Ms. Woodard,

Jensen Hughes, Inc. has completed our analysis providing the technical justification for alternate NFPA 285 complying exterior wall constructions incorporating Hoover Architectural Solutions, LLC's (Hoover Architectural) 4-mm thick Reynobond® metal composite material (MCM) cladding.

Section 1406 of the 2018, 2021, and 2024 Editions of the International Building Code (IBC) (Section 1407 in previous editions of the IBC) requires that exterior wall systems that use MCM panels as the exterior cladding material on buildings of Type I through IV construction and are greater than 40 ft above grade plane shall meet the requirements of NFPA 285 "*Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*," 2025 Edition.

Hoover Architectural provided Jensen Hughes with the following test reports for this analysis, which document compliant results with NFPA 285 testing of the most current core formulation of the Reynobond® MCM panels as of the issue of this letter:

1. Intertek Report No. G105260808SAT-001 R1, dated January 18, 2023
2. Intertek Report No. G106406856SAT-002 R0, dated March 10, 2026

Based on the results of these NFPA 285 tests, additional testing of water-resistive barriers per ASTM E1354, guidance provided by Annex B of the 2023 and 2025 versions of the NFPA 285 standard, and our experience with the NFPA 285 fire test, it is our judgment that the various configurations of exterior walls described in the attached tables will meet the performance requirements of NFPA 285.

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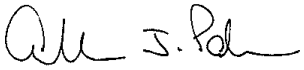
This analysis is based on the specific construction materials installed in the manner described in the referenced test report(s). Changes or modifications to the construction and/or materials used in the tested assembly may result in a different fire performance and may change this analysis.

This analysis does not address performance characteristics such as weatherability, durability, or structural issues.

If you have any questions, please feel free to contact us at aparker@jensenhughe.com or 443-313-9891, respectively.

Sincerely,





David Hintz
Lead Engineer

Arthur J. Parker, P.E.
Principal Fire Protection Engineer

Table I 1 – NFPA 285 Compliant Wall Assemblies Containing 4-mm Reynobond® FR MCM Panels

Wall Component	Materials
Base wall system – Use either 1, 2, or 3	1. Cast concrete 2. Concrete Masonry Unit (CMU) 3. Steel stud framing: Minimum 3⅝-inch depth, min. 20-ga studs, at max 24-inch OC. One layer of ⅝-inch thick Type X gypsum wallboard installed to interior face of studs.
Floor line fire stopping (required for *'Base wall system 3'*)	Minimum 4 inch deep, minimum 4 lb./cu ft. mineral wool friction fit into each stud cavity at each floor line.
Cavity Insulation – Use either 1, 2, or 3	1. None 2. Faced or unfaced fiberglass batt insulation 3. Faced or unfaced mineral wool insulation
Exterior sheathing	Minimum ½-inch thick exterior glass mat gypsum sheathing Exterior gypsum sheathing is not required when *'Base wall systems Items 1 or 2'* are used.
Weather-resistive barrier (WRB) applied over exterior gypsum sheathing	Any weather-resistive barrier materials may be used when covered by a minimum 2-inches of minimum 4 pcf mineral wool Exterior insulation.
Exterior insulation	Mineral wool insulation - Minimum 4 pcf density, minimum 2 inches thick when installed over combustible weather barrier materials. Mineral wool insulation shall be Class A in accordance with ASTM E84. • It is permissible to use Tenmat 102-50 intumescent cavity fire barriers over the face of the mineral wool insulation if required by the jurisdiction.
Exterior Veneer	Hoover Architectural 4-mm Reynobond® FR MCM Panels – Panels system installed with maximum 2-inch air gap between MCM panel and Exterior Insulation
Flashing of window, door and other exterior wall penetrations	As an option, flash window, door and other exterior penetrations with limited amounts of asphalt, silicone, acrylic, or butyl-based flashing tapes. Flashing materials used in wall openings may extend up to a maximum of 4 inches onto the exterior face of the sheathing.
Opening Protection	Protective materials are not required to be installed around wall opening (windows, doors, etc.) headers, jambs, or sills.

The following sections discuss the technical justifications for the alternate exterior wall details covered in Table 1.

1.0 Base Wall Assemblies

1.1 STEEL STUD-FRAMED AND GYPSUM WALLBOARD

The referenced test reports that incorporated the 4-mm Reynobond® FR MCM panels as the cladding of the NFPA 285 assembly used steel studs and gypsum wallboard as the framing/sheathing materials for the base wall assemblies. The steel studs used in these wall assemblies were 6-inch deep, 18-ga thick and were spaced 16 inches on center. A steel stud/gypsum wallboard base wall assembly incorporating heavier gauge 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*, supports this conclusion.

It is also the experience of Jensen Hughes that the stud size and spacing do not affect the outcome of NFPA 285 tests to a certain extent. The typical size, thickness, and spacing of stud framing in NFPA 285 test assemblies is 3⅝-inch deep, 20-ga steel studs, spaced max 24 inches on center. The typical stud size and spacing comply with many UL Wall Designs for 1-hr non-load or load-bearing fire-resistance ratings (e.g., UL Designs U419, U423, and U425), indicating these framing members are capable of providing the required support for the wall assembly. Additionally, Jensen Hughes has witnessed many passing tests of a wide variety of wall constructions that use these typical base wall construction conditions for a variety of NFPA 285 compliant assemblies, including ACM panel veneers. Therefore, it is the opinion of Jensen Hughes that as long as project wall installations comply with these typical stud metrics at a minimum that the substrate wall will not adversely affect the NFPA 285 compliance of the project wall.

Therefore, Table 1 allows for studs of minimum 3⅝ inch depth, minimum 20-gauge thickness, and stud spacings of maximum 24-inches on center.

1.2 CAST CONCRETE AND CMU BASE WALLS

Additional base wall assemblies listed in Table 1 include a concrete wall and a concrete masonry wall. In an NFPA 285 test, a concrete or concrete masonry base wall will provide improved protection to the wall assembly from the burn room fire exposure based on its increased rigidity, significantly higher thermal mass, and increased level of fire performance. Table 1 of the Concrete Masonry and Hardscape Association (CMHA) TEK Guide 7-1D, *Fire Resistance Rating of Concrete Masonry Assemblies* [3], 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 typically 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. This technical conclusion is supported by NFPA 285, Annex B, Section B.6.

Therefore, based on the documented fire performance of concrete construction, a concrete or concrete block base wall assembly will provide sufficient thermal protection to the exterior wall assembly from an interior fire exposure for the full duration of the NFPA 285 test.

2.0 Floorline Firestopping

To prevent floor to floor interior fire spread within the wall stud cavity, all wall cavity spaces must be filled with noncombustible mineral wool, having a minimum density of 4 lb/ft^3, friction fit in each wall cavity at each floor line. This is a standard detail included in nearly all NFPA 285 tests and has shown that it provides sufficient protection to prevent flame spread through the floor line during NFPA 285 tests. The floorline firestopping requirement directly matches the materials incorporated in the tested assemblies from the referenced reports.

3.0 Cavity Insulation Materials

The referenced test assemblies included no insulation within the stud cavity of the base wall. Based on these tested conditions the following sections discussing stud cavity insulation materials are allowed.

3.1 FIBERGLASS AND MINERAL WOOL BATTS

Based on the fire performance of the tested assemblies, the inclusion of any fiberglass, mineral wool or other noncombustible insulation will not adversely impact the fire-resistance rating or NFPA 285 compliance of the wall assemblies.

Fiberglass or mineral wool insulation may be installed in the wall cavity of an assembly that was tested without any insulation or with fiberglass insulation based on numerous UL design listings which describe fire resistance rated wall assemblies (tested to the more severe ASTM E119 fire exposure conditions) where the inclusion of fiberglass or mineral wool insulation is optional. Optional items in UL assemblies are items that have been determined can be added or omitted from a design without impacting the fire resistance rating of the building element. UL Designs U419 and U423 are just two examples where steel stud framed wall assemblies with one layer of ⅝-inch thick, Type X gypsum wallboard on each face of the studs achieves a 1-hour fire resistance rating, and indicate that glass fiber or mineral wool insulation, independent of density and thickness, can be optionally added to the wall design. The fiberglass or mineral wool insulation can be faced or unfaced. The minimal amount of fuel loading added to the assembly by these materials is very low and the facers are protected on both faces by gypsum wallboard or sheathing. This conclusion is supported by NFPA 285, Annex B, Section B.8.1.

Therefore, it is the opinion of Jensen Hughes that these insulation items can be incorporated into the assembly and will not adversely impact the fire-resistance rating of the assembly.

4.0 Exterior Sheathing Materials

The referenced tested wall assemblies incorporated a single layer of ½-inch thick glass mat faced exterior gypsum sheathing. Any exterior gypsum sheathing complying with ASTM C1177 that is ½-inch thick or greater will provide the same or better fire performance. This is supported by NFPA 285, Annex B, Section B.10.1.

5.0 Weather-Resistive Barrier Materials

Testing in accordance with ASTM E1354 "*Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products using an Oxygen Consumption Calorimeter*" is typically conducted to develop data to evaluate relative flammability of various WRB materials against one another and is typically used as the technical basis for substitution of WRBs materials in NFPA 285 compliant assemblies.

The referenced tested assemblies both used 2 inches of min 4-pcf mineral wool insulation as the exterior insulation. Mineral wool insulation has demonstrated through years of NFPA 285 testing to not propagate flame along the surface of the material. Also, Jensen Hughes personnel have conducted and/or witnessed many proprietary NFPA 285 fire tests where combustible WRB materials are covered with 2 inches of 4 pcf mineral wool insulation. In these tests, it has been routinely observed that 2 inches of mineral wool insulation provides sufficient protection to prevent ignition or burning of even the most flammable types of WRB materials (asphaltic-based peel-and-stick membranes). Therefore, Table 1 specifies any WRB material may be used as long as it is covered by minimum 2 inches of 4-pcf mineral wool insulation. This conclusion is supported by NFPA 285, Annex B, Section B.11.3.2.2.

As a conservative measure to ensure the NFPA 285 compliance of the system, a Class A flame spread rating in accordance with ASTM E84 is required for any mineral wool insulation used as an exterior insulation material. Most commercial construction materials are tested in accordance with ASTM E84 as a means of approval within the United States. It is expected that any commercially available mineral wool insulation will have already been tested to this standard and this requirement will not be prohibitive to the use of various mineral wool products for this application.

6.0 Exterior Insulation

The continuous insulation used in both referenced test assemblies was 2-inches of 4 pcf mineral wool insulation and was installed over a combustible weather resistive barrier. As described in Section 5.0, based on Jensen Hughes' experience with NFPA 285 and the historically observed performance of mineral wool in NFPA 285 fire tests allows us to confidently conclude that a minimum of 2 inches of mineral wool insulation will sufficiently protect underlying WRB materials from ignition and limit contribution to exterior flame propagation. Therefore, the mineral wool insulation thickness is required to be minimum 2 inches as included in the referenced test assemblies, and any greater thickness is permitted as well.

7.0 Exterior Cladding

The table is built for Hoover Architectural's 4-mm Reynobond® FR MCM panel and therefore this is the only cladding material included in the table. The referenced test assemblies used either a $1^{15}/_{16}$ inch air gap and a 2-inch air gap between the MCM panels and the mineral wool insulation. Therefore, a maximum air gap of 2 inches is permitted for Reynobond installations covered by Table 1.

8.0 Wall Opening Perimeter Protection

The exterior wall assemblies successfully tested in accordance with NFPA 285 included various test wall opening protection materials which protected the header, jambs, and sill with 0.040-inch thick aluminum flashing. The 0.040-inch thick aluminum flashing is representative of protection provided by a typical thermally thin, lightweight window frame. The light gauge aluminum flashing provides minimal protection to the exterior wall assembly at the wall opening when conducting the NFPA 285 test and is intended to be representative of the minimal protection afforded by a real window framing assembly. In an actual building wall construction, no special opening protection materials are required. Using any additional materials installed around wall openings (wood bucking, steel, mineral wool insulation, steel door frames. etc.) are not required to maintain compliance with NFPA 285.

References

1. Intertek Report No. G105260808SAT-001 R1, dated January 18, 2023
2. Intertek Report No. G106406856SAT-002 R0, dated March 10, 2026
3. Concrete Masonry and Hardscapes Association (CMHA) TEK 07-10D, "*Fire Resistance Rating of Concrete Masonry Assemblies*," Herndon, VA, 2017.
4. National Fire Protection Association (NFPA), NFPA 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*," Quincy, MA, 2025.