

May 29, 2025

Maika Boila
QuickPanel Systems, Inc.
4441 76th Ave #101
Calgary, AB, T2C 2G8
CANADA

RE: Analysis and Extension of NFPA 285 Test Results – QuickPanel Systems Inc. 4-mm ACM QuickPanel System
Project No. 1AJP00307.000.000

Dear Mr. Boila:

This analysis provides a summary of various exterior wall constructions that incorporate the QuickPanel's ACM QuickPanel System and will meet the requirements of NFPA 285.

The QuickPanel ACM system is an extruded aluminum support system intended to allow for flat ACM panel (non-route-and-return or shape-formed) to be cut to size and installed on project sites. The system uses a combination of male and female extruded aluminum shapes that interlock with one another and secure the ACM panels in place on the exterior face of buildings.

Since the 2000 edition of the International Building Code (IBC) wall systems that incorporate metal composite material (MCM) panels have been required to comply with the NFPA 285 test method, "*Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*". The relevant code section in the 2024 edition of the IBC (the most recent version as of the date of this engineering judgement) is Section 1406.10.3. This section requires Metal Composite Material (MCM) panels, of which ACM panels are a subset, installations on buildings of Types I through IV construction over 40 ft above grade plane to comply with NFPA 285.

QuickPanel Systems, Inc. has successfully tested their QuickPanel System in accordance with NFPA 285, and the test results are documented in Intertek Report No. G104467050SAT-001 R0, dated August 27, 2018. The construction of the assembly is detailed in the technical analysis following the table of NFPA 285 compliant exterior wall constructions.

Based on the results of this NFPA 285 test, additional testing of water-resistive barriers per ASTM E1354, 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.

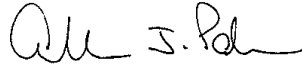
This analysis does not address performance characteristics such as weatherability, durability, or structural issues.

If you have any questions, please feel free to contact us at 312-604-5540 or 443-313-9891, respectively.

Sincerely,



David Hintz
Lead Engineer



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

Table 1 – NFPA 285 Wall Component Options with ACM QuickPanel System

Wall Component	Materials
Base Wall System – Use either 1, 2, 3, or 4	<ol style="list-style-type: none"> 1. Cast concrete wall 2. Concrete Masonry Unit wall 3. Steel Stud Wall Assembly: <ul style="list-style-type: none"> • 1-layer 5/8-inch thick, Type X, gypsum wallboard on interior • Steel studs: min 35/8-inch deep, min 20-gauge, spaced max 24-inch O.C. 4. Wood Stud Wall Assembly: <ul style="list-style-type: none"> • 1-layer 5/8-inch thick, Type X, gypsum wallboard on interior • Wood studs: min 2x4 FRTW dimensional lumber spaced max 24-inch O.C. • Optional: FRTW exterior wood sheathing used on exterior face of studs. Must be covered by exterior gypsum sheathing if used. • 1-layer min 5/8-inch thick, Type X, exterior gypsum sheathing
Floor Line Firestopping	4 lb./cu ft. mineral wool in each stud cavity and at each floor line – attached with Z-clips or equivalent
Cavity Insulation – Use either 1, 2, or 3	<ol style="list-style-type: none"> 1. None 2. Fiberglass batt or mineral wool insulation (faced or unfaced) 3. Any insulation (faced or unfaced) determined to be noncombustible in accordance with ASTM E136.
Exterior Gypsum Sheathing – Use either 1, 2, or 3	<ol style="list-style-type: none"> 1. None – Exterior sheathing is optional only when concrete or CMU block wall (Base Wall Systems #1 or #2) are used 2. Min 1/2-inch thick, Type X, exterior gypsum sheathing when base wall is framed with steel studs (Base Wall System #3) 3. Min 5/8-inch thick, Type X, exterior type gypsum sheathing when base wall is framed with wood studs (Base Wall System #4)
Weather-Resistive Barrier (WRB) – Use either 1, 2, or 3	<ol style="list-style-type: none"> 1. None 2. Any WRB material when covered by min 2-inch thickness of min 4-pcf mineral wool insulation. 3. Water-resistive barrier (WRB) materials as indicated in Table 2. WRB may be located behind or in front of exterior insulation, or over exterior sheathing when no insulation is used.
Exterior insulation	<ol style="list-style-type: none"> 1. None 2. Any thickness of min 4-pcf mineral wool insulation that is shown to be noncombustible per ASTM E136 or has maximum ASTM E84 flame spread index of 5. 3. Maximum 3-inch thick DuPont Thermax Brand Rigid insulation. All board joints covered with a max 4-inch width of approved DuPont LiquidArmor Flashing and Sealant applied at manufacturer approved application wet thickness. 4. Any thickness of insulation determined to be non-combustible in accordance with ASTM E136
Exterior Veneer – Use either 1 or 2	<ol style="list-style-type: none"> 1. Max 4-mm thick Larson® by Alucoil FR ACM panels 2. Any other MCM system that has been successfully tested by the panel manufacturer via the NFPA 285 test method. Acceptable NFPA 285 testing shall consist of successful NFPA 285 test results on a wall assembly incorporating a comparable thickness of combustible foam insulation behind

	<p>the MCM. MCM panels shall be maximum 4-mm thick and shall be reviewed for use on project.</p> <p>MCM panels shall be installed with maximum air gap of 5/8-inch between back face of MCM and exterior insulation, or exterior sheathing if no insulation is used in wall assembly.</p>
Flashing of windows, doors, or other exterior wall penetrations.	Exterior wall rough openings of exterior walls shall incorporate 18-gauge steel flashing that engages with ACM QuickPanel System termination trim pieces.

Table 2 – Water-Resistive Barriers Applied Over Exterior Insulation or Over Exterior Sheathing when No Insulation is Included

Weather Resistive Barrier Manufacturer/Product
<p><u>DuPont</u></p> <ul style="list-style-type: none"> • DuPont™ Tyvek® CommercialWrap® • DuPont™ Tyvek® CommercialWrap® D • DuPont™ Tyvek® ThermaWrap™ • WeatherMate™ • WeatherMate™ Plus
<p><u>Kingspan</u></p> <ul style="list-style-type: none"> • Kingspan® GreenGuard® Max™ Building Wrap • Kingspan® GreenGuard® C500 Building Wrap • Kingspan® GreenGuard® Raindrop® 3D Building Wrap
<p><u>VaproShield</u></p> <ul style="list-style-type: none"> • RevealShield™ • RevealShield SA™ • PanelShield SA™

Engineering Analysis

1.1 QUICKPANEL SYSTEMS NFPA 285 TESTING

QuickPanel Systems, Inc. has conducted one successful NFPA 285 fire test on an exterior wall assembly incorporating their QuickPanel ACM System with an ACM panel. The assembly was constructed as follows (interior to exterior):

1. One layer of 5/8-inch thick Type X gypsum wallboard installed continuously over the interior surface of the wall assembly.
2. 35/8-inch deep, 20-gauge steel studs spaced 24-inches on center.
3. One layer of 1/2-inch thick Type X gypsum exterior sheathing installed continuously over the exterior face of the steel wall studs
4. 2-inch thickness of the DuPont Thermax Brand Rigid insulation board. All board joints covered with a DuPont LiquidArmor LT Flashing and Sealant.
5. 4-mm thick Larson by Alucoil ACM panels installed with QuickPanel’s ACM System.
 - QuickPanel System consisted of the horizontal runner (QP-1), REVEAL® Trim (QP-30/QP-33), Tremco® Spectrem® 1, and QuickPanel® ACM Panel.
6. 18-gauge “L” shaped steel flashing installed around entire window perimeter (header, jambs, and sill) under Termination REVEAL® Trim & Top Cat (QP-34).

Typical wall and header section details are provided in Figures 1 and 2. A complete description of the tested wall constructions, the test observations, and the test results are provided in G104467050SAT-001 R0, dated August 27, 2018 [1].

The analysis which follows provides the technical substantiation for modifications to the tested wall assemblies for the following wall construction features:

1. Alternate base wall assembly construction
2. Stud cavity insulation materials
3. Exterior sheathing materials
4. Alternate WRB materials
5. Alternate exterior insulation materials
6. Alternate exterior cladding materials

1.2 ALTERNATE BASE WALL ASSEMBLY CONSTRUCTION

STEEL STUD WALL ASSEMBLIES

QuickPanel's successfully tested NFPA 285 wall assembly utilized 3 $\frac{5}{8}$ -inch deep, 20-gauge steel stud spaced at 24-inches on center. The interior surface of the stud framing was covered with a single layer of $\frac{5}{8}$ -inch thick Type X gypsum wallboard. 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 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. Therefore, Table 1 allows for minimum 3 $\frac{5}{8}$ -inch studs, of minimum 20-gauge, and at a maximum spacing of 24-inches on center.

CONCRETE AND CMU BLOCK WALLS

Table 1 allows for concrete walls and concrete masonry unit block walls. 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 as compared to the typical steel stud and single layer gypsum wallboard assembly.

Table 1 of the Concrete Masonry & Hardscapes Association (CMHA) TEK 07-01D, *Fire Resistance Ratings of Concrete Masonry Assemblies* [2], 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 most commonly 8-inches deep, 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 and gypsum base wall assembly.

WOOD STUD-FRAMED WALLS

Table 1 allows for the use of minimum 2x4-inch dimensional fire-retardant treated wood (FRTW) lumber studs, spaced at maximum 24-inches on center. Through Jensen Hughes' experience from conducting and witnessing NFPA 285 tests, we have observed that when wood studs are used within a base wall assembly that has $\frac{5}{8}$ -inch thick, Type X interior and exterior gypsum coverings, minimal char damage is sustained by the wood studs throughout an NFPA 285 test. Since the wood studs only experience minimal char damage during an NFPA 285 test, vertical and lateral flame propagation does not occur from the compartment of fire origin such that failure criteria are observed. Based on this observed test assembly performance, it is Jensen Hughes' opinion that FRTW wood studs can be used as the framing for the base wall assembly as long as one layer of $\frac{5}{8}$ -inch thick, Type X gypsum is used on both the interior and exterior faces of the assembly.

All stud framed base walls require one layer of $\frac{5}{8}$ -inch thick, Type X gypsum wallboard installed on the interior face of the wall assembly. However, when FRTW wood studs are used, $\frac{5}{8}$ -inch thick gypsum sheathing must be used on the exterior face as well. For steel stud, minimum $\frac{1}{2}$ -inch exterior gypsum sheathing may be used.

Base Wall System 4 also allows for plywood or OSB to be installed on the exterior face of the wood studs as long as it is covered by exterior gypsum sheathing. When located behind the exterior gypsum sheathing, and in the wall stud cavity, the additional layer of plywood or OSB will not adversely impact the compliance of the wall assembly with NFPA 285 as it will be protected by the interior and exterior layers of gypsum wallboard. The optional use of plywood in fire-resistance rated wall assemblies is included in a number of UL fire resistance design listings (e.g., UL Designs U302, V419, and V423). Wall

assemblies tested to the more severe ASTM E119 fire resistance test standard has determined that this added combustible layer does not adversely impact the overall wall fire performance. In an NFPA 285 wall assembly incorporating wood studs, the plywood is protected in a manner similar to the wood studs with gypsum wallboard on the interior and exterior sides of the base wall assembly, shielding the plywood or OSB from direct flame impingement during the 30-minute NFPA 285 test.

1.3 STUD CAVITY INSULATION MATERIALS

FIBERGLASS, MINERAL WOOL, OR OTHER NON-COMBUSTIBLE INSULATION MATERIALS

QuickPanel's NFPA 285 test did not have any insulation in the base wall stud cavity. Based on Jensen Hughes' experience conducting and witnessing NFPA 285 tests, the inclusion of any fiberglass, mineral wool, or other non-combustible insulation, will not adversely impact compliance of the wall assembly with NFPA 285. Rather, the inclusion of fiberglass, mineral wool, or other non-combustible insulation in the wall stud cavity typically improves the overall wall fire performance. When compared to an empty stud cavity, the inclusion of fiberglass or mineral wool insulation will increase the fire resistance and thermal insulation that the stud wall provides to the exterior combustible components.

This is further supported by many fire-resistance rated wall designs from the UL Online Fire Resistance Directory. Many wall design listings describe wall assemblies, tested to the more severe ASTM E119 fire exposure conditions, where the inclusion of fiberglass or mineral wool insulation is an optional item in the assembly. The optional inclusion of the stud cavity insulations indicates that their inclusion will not adversely impact the fire-resistance rating of the assembly (like the inclusion of plywood as an internal layer as previously discussed). An increase in the fire resistance performance of a wall assembly will result in the base wall assembly providing a greater degree of thermal protection to the exterior combustible components from interior fire exposure.

The fiberglass or mineral wool insulation can be faced or unfaced. The minimal amount of fuel load added to the assembly by these facer materials is very low and the facers are protected on both sides by the interior gypsum wallboard or the exterior gypsum sheathing.

1.4 EXTERIOR SHEATHING MATERIALS

EXTERIOR GRADE GYPSUM SHEATHING

QuickPanel's NFPA 285 test assembly used ½-inch Densglass exterior gypsum sheathing over the light gauge steel stud framing. Therefore, exterior walls that are framed with steel studs may use ½- or ⅝-inch thick exterior gypsum sheathing. If wood studs are used in an assembly, it is the opinion of Jensen Hughes that ⅝-inch thick exterior gypsum sheathing is required to provide exterior protection to the studs since they are a combustible material.

1.5 ALTERNATE WRB MATERIALS

WRB MATERIALS INSTALLED OVER EXTERIOR GYPSUM SHEATHING (WHEN NO EXTERIOR INSULATION) OR OVER/BEHIND EXTERIOR INSULATION

QuickPanel's NFPA 285 test used 2-inches of the DuPont Thermax Brand Rigid insulation with LiquidArmor LT flashing and sealant applied to the board joints. This combination of insulation and joint sealant acts as a weather-resistive barrier in project installations and does not require additional WRB materials for fenestration purposes. However, projects commonly specify an additional weather barrier material in addition to the Thermax/LiquidArmor combination to ensure against the penetration of air/water through the building envelope. Additionally, in projects where no exterior insulation is used on the wall, a weather barrier will be required to be installed over the exterior sheathing. For these circumstances Table 2 contains materials that, in Jensen Hughes' experience, are minimally combustible and have minimal heat content. The materials in Table 2 are sheet goods or commonly "building wrap" materials which Jensen Hughes have determined to have relatively low flammability metrics, and we have witnessed testing of these materials in NFPA 285 tests to not contribute to flame spread either over the exterior face or within the air cavities of exterior wall systems.

Comparative fire performance properties for these materials were either developed by testing conducted by Jensen Hughes in accordance with ASTM E1354 (Cone Calorimeter apparatus) or by ASTM E1354 test reports provided to Jensen Hughes from various WRB manufacturers who performed testing at accredited third-party laboratories. It is our engineering opinion that the materials listed in Table 2 will not adversely impact the overall wall fire performance and will maintain compliance with NFPA 285.

UNRESTRICTED USE OF WRB MATERIALS BEHIND MIN 2 INCHES OF MINERAL WOOL INSULATION

NFPA 285 testing witnessed by Jensen Hughes' personnel has routinely demonstrated that covering WRB materials with a minimum 2-inch thickness of minimum 4-pcf mineral wool insulation prevents ignition of WRB materials in an NFPA 285 test. In this scenario, the mineral wool insulation shields the WRB from the exterior window burner while the steel stud/gypsum base wall behind the WRB provides protection from the interior room fire. Therefore, when a minimum of 2 inches of mineral wool insulation are used in an exterior wall assembly, it is the opinion of Jensen Hughes that any commercially available WRB may be used over the exterior sheathing, covered by the mineral wool insulation. The mineral wool must meet fire performance requirements as stated in the “*Exterior Insulation Materials*” section below.

EXTERIOR INSULATION MATERIALS

DUPONT THERMAX

QuickPanel's NFPA 285 test assembly used 2 inches of DuPont Thermax as the exterior insulation. Section 2603.5.3 of the International Building Code (IBC) states that the potential heat of the foam plastic insulation installed on a project wall assembly must not exceed the potential heat of the insulation used in an NFPA 285 test assembly. Since the tested assembly used 2 inches of Thermax it is permissible to use 2 inches or less of the same insulation material in project assemblies.

The referenced test assembly used the DuPont LiquidArmor LT flashing and sealant applied over the board joints and fasteners to seal the joints of the wall system. DuPont has done extensive testing on both Thermax insulation and the LiquidArmor LT in accordance with NFPA 285, ASTM E1354, and other relevant test standards, and have their own NFPA 285 engineering extensions table issued from Jensen Hughes. Based on the materials permissions of DuPont's NFPA 285 extensions table, Table 1 of this report does not limit the treatment of Thermax board joints to any particular LiquidArmor flashing product, including the LiquidArmor LT, Cm, and QS. All products must be applied in accordance with the manufacturer's installation instructions and the Jensen Hughes engineering analysis. Any DuPont LiquidArmor product present in DuPont's NFPA 285 extensions table may be used in a ACM QuickPanel wall system as well.

NONE

Using Section 2603.5.3 (explained in the previous ‘*Dupont Thermax*’ section) as a technical basis, it is permissible to use the QuickPanel System with no exterior insulation in the wall system. This would effectively be a reduction in the overall fuel loading of the exterior wall system.

When no exterior insulation is used in a wall system it is typical for the exterior sheathing to be treated with a weather-resistant-barrier material to prevent air and water intrusion through the building envelope. Refer to for acceptable WRB materials for use in a “no exterior insulation” scenario.

MINERAL WOOL INSULATION

In Jensen Hughes' NFPA 285 fire testing experience mineral wool insulations do not adversely impact the overall wall fire performance. Many commercially available mineral wool products states in their literature that the material meets the criteria of ASTM E136 which verifies that the material is noncombustible and will not release an appreciable amount of heat upon exposure to fire. Some mineral wool insulations use binder materials in quantities that don't result in passing the ASTM E136 noncombustibility test. Since some mineral wool insulations do not meet the ASTM E136 criteria, but do not necessarily contribute to exterior flame spread, it is the opinion of Jensen Hughes that mineral wool insulations that have a maximum 5 flame spread index when tested in accordance with ASTM E84 are also permissible to use as the exterior insulation in a wall with the ACM QuickPanel System.

Based on this technical rationale and our fire testing experience, it is the opinion of Jensen Hughes that mineral wool is an acceptable substitution for the DuPont Thermax insulation.

1.6 EXTERIOR CLADDING MATERIALS

ACM PANELS

QuickPanel's NFPA 285 test assembly used 4-mm thick Larson® by Alucoil FR ACM panels, one of the many commercially available FR core ACM panel products. Although ACM panel products are similar in their core composition, they are not identical. Consequently, the flammability of the cores differ from product to product. Despite the difference between ACM products, Table 1 does not limit the use of the ACM QuickPanel System with the Larson® by Alucoil ACM panel. It is the

opinion of Jensen Hughes that the primary purpose of QuickPanel’s NFPA 285 test was to evaluate how the aluminum ACM QuickPanel System components responded when exposed to fire. Photographic documentation from the test report indicates that ACM QuickPanel System channels did not disengage from one another and retained the ACM panels in place for the duration of the test. Burn through of the ACM panel was observed, allowing the Thermax Brand Rigid insulation to become involved in the exterior flame plume. However, this is typical behavior of ACM panels and assemblies in NFPA 285 and is not a consequence of the ACM QuickPanel System.

Jensen Hughes acknowledges that the passing results of the test are a result of the individual components combined for a full assembly. However, it is our opinion that the ACM QuickPanel used with other ACM panel products in a similar assembly of other materials approved by this document will result in equivalent or similar fire performance. Therefore, Table 1 permits the use of other ACM panel products in place of the Larson® by Alucoil FR ACM panels but requires that an ACM panel system have achieved passing results of an NFPA 285 test with comparable components for the project in which it is being evaluated. For example, if another ACM panel product is proposed for use over Thermax Brand Rigid insulation, then the ACM panel must have documented testing to show that it has been tested over a similar combustible foam plastic insulation of comparable or greater thickness than Quick Panel’s NFPA 285 test.

1.7 WALL OPENING PERIMETER PROTECTION

QuickPanel’s NFPA 285 test assembly was constructed with one layer of 5/8-inch thick Type X gypsum wallboard installed at the header and jambs of the wall opening covering the steel stud framing. An 18-gauge “L” shaped steel flashing was installed around the entire wall opening perimeter (i.e. header, jambs, and sill), full wall width. The steel flashing covered the gypsum wallboard, the exposed cut edge of the Thermax insulation, and the QuickPanel System termination track (QP-34) at the opening header. Therefore, Table 1 requires the use of 5/8-inch thick Type X gypsum wallboard and the 18-gauge “L” steel flashing at the perimeter of all openings in the exterior wall assembly (windows, doors, loading docks, etc.), to be representative of the protection the Thermax insulation and ACM panels as tested. Sills do not need to be protected at door openings.

Conclusion

QuickPanel Systems, Inc. has conducted a successful NFPA 285 test on an exterior wall assembly incorporating their ACM QuickPanel System, Larson by Alucoil FR ACM panels, and the DuPont Thermax insulation. Additional successful NFPA 285 testing has been conducted on wall assemblies incorporating the Thermax Rigid Board insulation in a variety of other wall assemblies covering many different material configurations. Based on this successful testing, alternative wall constructions were developed as detailed in Table 1 of this letter. The additional wall construction features will result in wall assemblies which will still meet NFPA 285 and provide a comparable level of fire performance as the tested wall assemblies. The technical justification for the use of additional wall system components is provided herein to support their use in an exterior wall assembly which will continue to meet the conditions of acceptance of NFPA 285.

References

This NFPA 285 compliance table is uses the following referenced documents:

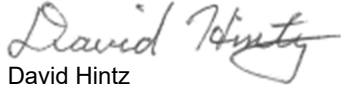
1. Intertek Testing Report No. G104467050SAT-001 R0, dated August 27, 2018.
2. Concrete Masonry & Hardscapes Association. (2023). *TEK 07-01D Fire Resistance Ratings of Concrete Masonry Assemblies* [Technical Note]. <https://www.masonryandhardscapes.org/>.

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.

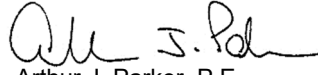
This analysis does not address performance characteristics such as weatherability, durability, or structural issues.

We trust this engineering analysis will be of use to QuickPanel Systems, Inc. Should you have any questions regarding our analysis, please contact us at 443-313-9891 or at aparker@jensenhughes.com.

Sincerely,



David Hintz
Lead Engineer



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

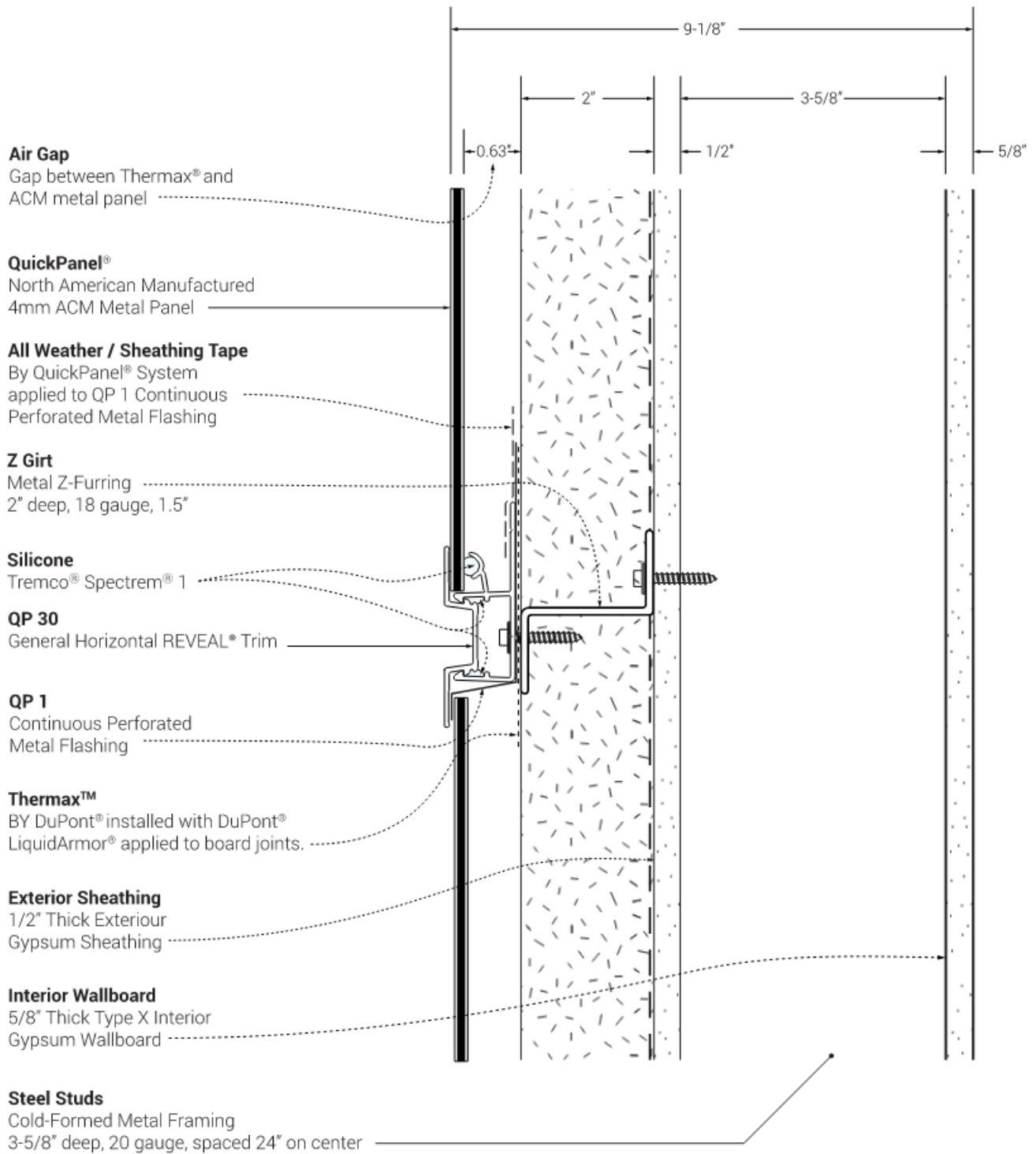


Figure 1. Typical Wall Section Detail QuickPanel NFPA 285 Test Assembly

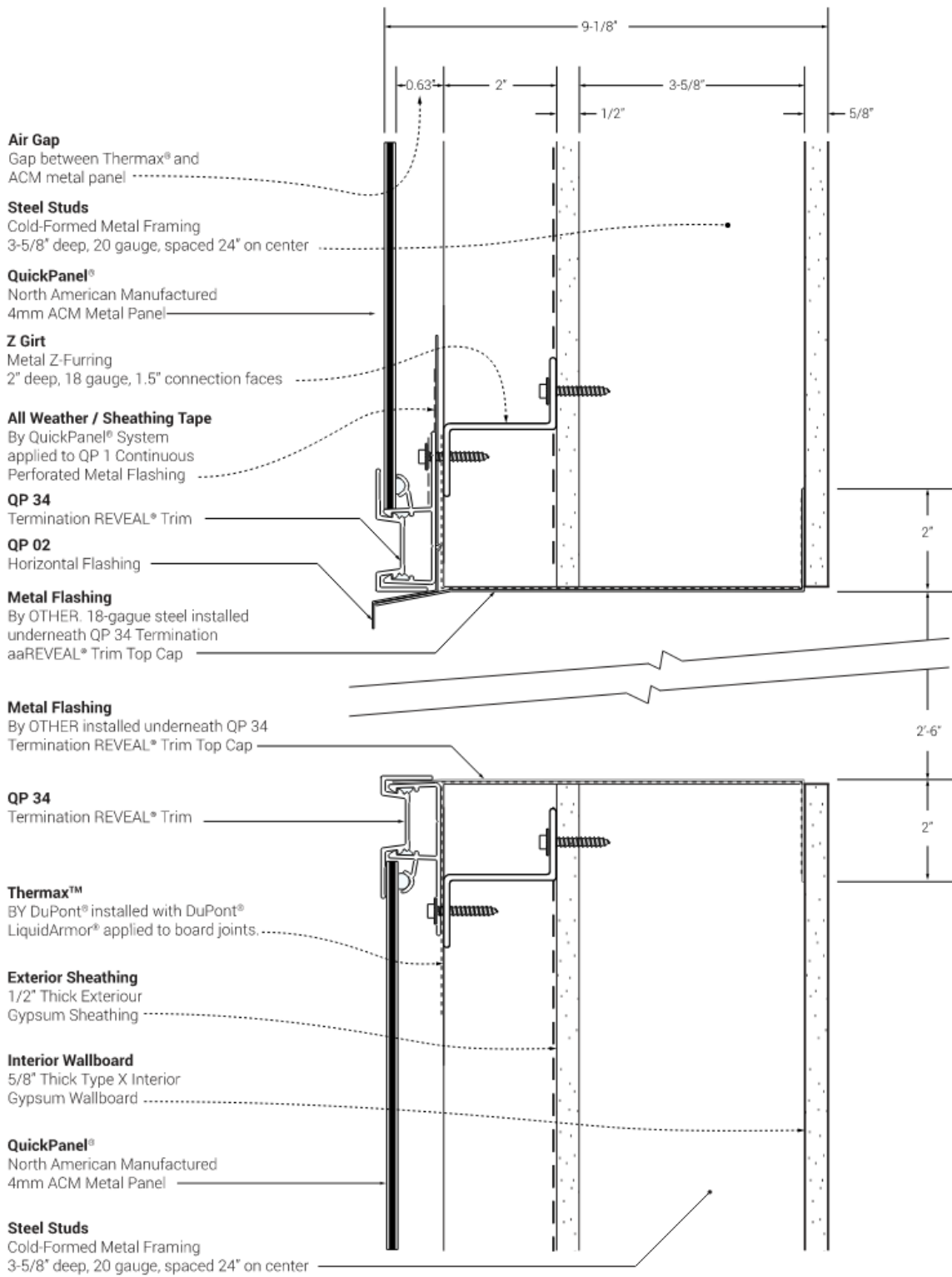


Figure 2. Header Section Detail for QuickPanel NFPA 285 Test Assembly