



## Attached Documents

Please find attached the following UES Evaluation Reports on AAC:

1. UES Evaluation Report 405,
2. UES Evaluation Report 350,
3. UES Evaluation Report 381.

In addition we have attached the following additional information

4. Technical Data Sheet on MegBoard suggested for roof sheathing,
5. Data sheet for fire resistant self-adhered roof underlayment.

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### **HEBEL AUTOCLAVED AERATED CONCRETE (AAC) PANELS AND MASONRY BLOCKS, AND HEBEL THIN-BED MORTAR**

#### **CSI Section:**

**03 41 00 Precast Structural Concrete**

**04 22 26 Autoclaved Aerated Concrete Unit Masonry**

#### **1.0 RECOGNITION**

Hebel Autoclaved Aerated Concrete (AAC) Panels and Masonry Blocks, and Hebel Thin Bed Mortar recognized in this report have been evaluated for use as interior or exterior, unreinforced or reinforced, load-bearing or non-load-bearing, or shear walls, wall lintels, and roof and floor panels. Panels and Masonry Blocks can be used in any Type construction where non-combustible products are approved as defined by the IBC Chapter 6. The structural performance, physical characteristics, thermal conductivity, sound transmission, non-combustibility, and fire resistance properties were evaluated for compliance with the following codes and regulations:

- 2018, 2015, 2012 and 2009 International Building Code® (IBC)
- 2018, 2015, 2012 and 2009 International Residential Code® (IRC)

#### **2.0 LIMITATIONS**

Use of Hebel AAC Panels and Masonry Block units and Hebel Thin-Bed Mortar described in this report is subject to the following limitations:

**2.1** Hebel AAC Masonry Block structures shall be designed and installed in accordance with this report and the applicable code.

**2.2** Hebel AAC panel structures shall be designed using the procedures in this report, the guidelines in ACI 523.4R-09, and the applicable code.

**2.3** Panel connections shall be designed to the satisfaction of the building official.

**2.4** Hebel AAC wall panels used for lateral force-resisting systems shall be special AAC structural walls in accordance with Section 21.15 of ACI 523.4R shall be limited to Seismic Design Categories A and B.

**2.5** Hebel AAC roof and floor panels used as diaphragms of lateral force-resisting systems shall be limited to Seismic Design Categories A or B, in walls in accordance with Section 7.8.2.1 of ACI 523.4R.

**2.6** Use of AAC panels for loads that involve vibration and impact forces is outside the scope of this report.

**2.7** The manufacturer's published installation manual and this report shall be available at all times at the jobsite during construction. Where there is a conflict, the most restrictive shall govern.

**2.8** Plans, specifications, engineering calculations and other construction documents specifying the use of Hebel AAC Panels and AAC Masonry Blocks shall be submitted to the building official for approval. The calculations and documents shall be prepared by a registered design professional when required by the statutes of the jurisdiction where the project is to be constructed.

**2.9** Inspection and installation of construction using Hebel AAC Masonry Blocks shall comply with the requirements set forth in the applicable code listed in Section 1.0 of this report for structural masonry. Special inspection shall be provided and comply with Section 2.13 of this report.

**2.10** Installation of Hebel AAC panels shall comply with this report, the guidelines in ACI 523.4R-09, and the requirements for structural concrete in the IBC. Special inspection shall be provided in accordance with Section 2.14 of this report.

**2.11** Exterior walls and other building elements exposed to weather and/or moisture shall have code-complying weather-resistance coverings. Roof coverings used in conjunction with the panels shall be rated as required by Table 1505.1 of the IBC.

**2.12** Surfaces of basement walls in contact with the ground shall be waterproofed.

**2.13 Special Inspections of Masonry Blocks:** Special inspection of structural masonry shall conform to Section 1705.4 of the IBC. The special inspector's duties, at a minimum, include verifying Hebel AAC Masonry Block unit and Hebel Thin-bed mortar identification, unit placement, placement of field reinforcement, mortar preparation and application.

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.

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**2.14 Special Inspections of Panels:** Special inspection of structural concrete shall conform to Section 1705.3 of the IBC. The special inspector's duties shall include verification and inspection of concrete construction as specified in IBC Table 1705.3 as well as Hebel AAC panel and Thin Bed Mortar identification, panel placement and placement of field-installed reinforcement.

**2.15 Hebel AAC Panels and Masonry Block units** shall be manufactured by Litecrete, S.A. DE C.V. in Pesqueria, Nuevo Leon, Mexico.

**2.16 Hebel Thin-Bed Mortar** shall be manufactured in Pesqueria, Nuevo Leon, Mexico.

### 3.0 PRODUCT USE

#### 3.1 Hebel Autoclaved Aerated Concrete (AAC) Masonry Blocks

**3.1.1 General:** Hebel AAC Masonry Blocks are AAC masonry units used with Hebel Thin-Bed Mortar to construct masonry walls for interior or exterior, unreinforced or reinforced, load-bearing or non-load bearing, or masonry shear walls in accordance with the AAC provisions in Chapter 21 of the IBC. Hebel AAC Masonry Blocks and Hebel Thin-Bed Mortar may also be used where an engineering design is submitted in accordance with Section R301.1.3 of the IRC.

##### 3.1.2 Design

**3.1.2.1 General:** Walls constructed using Hebel AAC Masonry Blocks and Hebel Thin-Bed Mortar shall be designed in accordance with provisions as set forth in Sections 2101.2 of the IBC and Sections 3.1.2.2 through 3.1.2.6 of this report. AAC masonry block design shall comply with the requirements of Chapters 1 through 7 and Chapter 11 of TMS 402 for strength design.

**3.1.2.2 Required Strength:** Required strength shall be determined in accordance with the strength design load combinations in Section 1605.2 of the IBC.

**3.1.2.3 Design Strength:** AAC masonry members shall be proportioned such that the design strength exceeds the required strength. Design strength shall be determined as follows, under the 2018 edition IBC, in accordance with Chapter 11 of TMS 402-16, under the 2015 edition IBC Chapter 11 of the TMS 402-13 /ACI 530-13/ASCE 5-13 Building Code Requirements and Specification for Masonry Structures, under the 2012 edition IBC Chapter 8 of the TMS402-11/ASCE 5-11/ACI 530-11 under the 2009 edition IBC Appendix A of TMS 402-08/ASCE 5-08/ACI 530-08 under the 2009 IBC, as applicable.

**3.1.2.4 Seismic Design Provisions:** Hebel AAC masonry shall comply with the provisions of Section 2106 of the 2018 and 2015 editions of the IBC, and Chapters 1 and 8 of TMS 402-11 under the 2012 IBC, or Chapter 1 and Appendix A of TMS 402-08 under the 2009 IBC, as applicable. Structures using Hebel AAC Masonry Block units and Hebel Thin-Bed Mortar used in the seismic force-resisting system of structures, are not limited in height when assigned to Seismic Design Category B; except for ordinary reinforced AAC masonry shear walls, height is limited to 35 feet (48 768 mm), for structures assigned to Seismic Design Category C.

**3.1.2.5 Thermal Insulation:** Hebel AAC Masonry Blocks, when tested in accordance with ASTM C518, have thermal conductivity values, k, as shown in Table 1 of this report.

Table 1. Hebel AAC Masonry Block - Thermal Property, per inch of thickness

Strength Class	Thermal Conductivity, k
AAC-2	0.75
AAC-3	0.92
AAC-4	0.91
AAC-5	0.98
AAC-6	0.98

SI conversions:  $k = 1 \text{ Btu} \cdot \text{in} / \text{ft}^2 \cdot \text{h} \cdot ^\circ\text{F} = 0.144 \text{ W/m} \cdot \text{K}$

**3.1.2.6 Sound Transmission Class:** Walls constructed of minimum 8-inch-thick (203 mm) Hebel AAC Masonry Blocks provide a Sound Transmission Class (STC) rating of not less than 50 in accordance with Section 1207.2 of the IBC and Section AK102 of the IRC, when tested in accordance with ASTM E90.

**3.1.2.7 Fire Resistance** Walls constructed with Hebel AAC Masonry Blocks and Hebel Thin-Bed Mortar a minimum of 4 inches (100 mm) thick have a four-hour fire-resistance rating in either load bearing or non-load-bearing walls. AAC masonry units shall be laid in a running bond, and all the joints shall be mortared. Allowable loads on fire-resistance-rated AAC masonry bearing walls shall be limited to 77 percent of the calculated axial load.

**3.1.3 Installation:** The Litecrete published installation instructions, the Hebel Installation Manual and this report shall be strictly adhered to, and a copy of the instructions shall be available at all times on the jobsite during installation. Additionally, drawings and/or specifications shall supplement the published instructions, and feature detailed information concerning how the Hebel AAC Masonry Block units described in this report are to be integrated into the building under construction.

Exterior walls exposed to weather and/or outside moisture shall have a code-complying weather-resistive barrier. With the exception of the first course, which is placed on a leveling bed of ASTM C270 Type M mortar in accordance with Section 2104.1 of the 2018 and 2015 editions of the IBC (Section 2103.12 of the 2012 IBC, or Section 2103.11 of





2009 IBC), as applicable, the Hebel AAC Masonry Block units used in wall construction are laid with horizontal and vertical joints mortared with Hebel Thin-Bed Mortar. The tongue-and-groove block system does not require the vertical joints to be mortared. Hebel Thin-Bed mortar shall be mixed and applied according to Hebel's published installation instructions and the joints shall be 0.041 to 0.12 inch (1 mm to 3 mm) in thickness. The Hebel AAC Masonry Block unit walls shall be built in running bond, with the vertical joints staggered a minimum of one-quarter the length of the unit but not less than 4 inches (102 mm).

Cored blocks shall be placed within 24 inches (610 mm) of corners, each side of openings, and each side of movement joints to accommodate vertical reinforcement. Cores on the block shall be factory installed or drilled on site. Field-installed cores for 5-inch-thick (125 mm) blocks shall be minimum 2.75 inches (70 mm) in diameter. Field-installed cores for 6-inch-thick (152 mm) blocks shall be a minimum of 3 inches (76 mm) in diameter. Field-installed cores for blocks 8 inches (203 mm) thick or thicker shall be a minimum of 4 inches (102 mm) in diameter. Vertical reinforcement size and spacing shall be specified by the structural design professional. Vertical reinforcement shall be spliced to reinforcement dowels from the foundation and continue up the walls through the vertical cores with a 90-degree hook in the bond beam. The cores shall be filled with fine grout in accordance with ASTM C476. Figures 2 through 4 of this report illustrate details of a typical wall section.

A bond beam consisting of a row of U-block shall be installed at the top of each floor level of the AAC wall. Two deformed, minimum No. 4 reinforcing bars shall be installed in the U-shaped cavity that runs horizontally through the wall. The vertical reinforcement in the vertical core shall terminate with a 90-degree hook in the bond beam. A truss anchor plate or double wood sill plate shall be anchored to the bond beam. Bent pieces of deformed reinforcement shall be used to tie the cores and corner together. The details of reinforcement, including splice length, shall comply with TMS 402.

Hebel Thin-bed mortar shall be applied to clean surfaces using a  $\frac{3}{16}$ -inch-by- $\frac{3}{16}$ -inch (4.8 mm by 4.8 mm) notched trowel. Minimum ambient temperature during installation shall be 40°F (4°C). Hebel AAC Masonry Block units may be cut to exact shapes and sizes with a hand saw or an electric saw.

### 3.2 Hebel AAC Panels, Slabs and Lintels

**3.2.1 General:** Hebel AAC panels, slabs and lintels shall be designed and constructed in accordance with the requirements of Section 1901.2 of the IBC, ACI 523.4R-09, the manufacturer's installation instructions and this report. In the event of a conflict the most conservative shall govern. The manufacturer's installation instructions shall be strictly adhered to and be available at the jobsite during construction.

Allowable loads shall be as shown in Tables 7, 8 or 9 of this report, as applicable.

Typical installation details are illustrated in Figures 5 through 7 of this report. The figures are for general information only.

**3.2.2 Wall Panels:** Hebel AAC wall panels may be used as load bearing walls erected vertically between story heights or non-load bearing wall panels erected either vertically or horizontally between columns. Wall panels may be used with steel or concrete structures as curtain walls spanning horizontally or standing vertically. Initial wall panels shall be set in a leveling bed of Type M cement mortar complying with ASTM C270. A waterproof membrane shall be used between the foundation and the bottom of the wall panel. The exterior face of wall panels shall have code complying weather protection. Panels shall be attached to the structure in accordance with the approved plans. Panel to panel edges shall be joined with Hebel Thin-Bed Mortar complying with Section 4.1.2 of this report.

**3.2.3 Roof and Floor Panels:** Hebel AAC floor and roof slab panels may be used as simply supported floor and roof slabs. The panels shall be supported by load-bearing walls or structural beams. The panels shall be designed to comply with strength and serviceability requirements as specified in ACI 523.4R-09. Longitudinal joints between panels shall be reinforced with a No. 3, Grade 60, deformed reinforcement bar complying with ASTM A1064, in minimum 3,000 psi (20.7 MPa) compressive strength concrete. Ring beams shall be placed around panel perimeters and consist of two No. 4, Grade 60, deformed reinforcement bars complying with ASTM A1064, in minimum 3,000 psi (20.7 MPa) compressive strength concrete. Tables 7, 8, and 9 provide allowable load and span information.

**3.2.4 Roof and Floor Panel Fire-Resistance Rating.** Roof and floor panels have the fire-resistance ratings as shown in Table 2 of this report. Roof panel assemblies shall be covered with an approved adhesively applied roof covering.

Table 2 – Fire-Resistance Rating	
Slab Thickness (inch)	Fire-Resistance Rating (hours)
4	1
5	4

SI: 1 inch = 25.4 mm

**3.2.5 Sound Transmission Class:** Wall, roof, and floor assemblies of minimum 8-inch (203 mm) thickness constructed in accordance with this report have a sound transmission class (STC) of not less than 50 for air-borne noise when tested in accordance with ASTM E90 in accordance with Section 1207.2 of the IBC, and an impact insulation class (IIC) rating of not less than 50 when tested in accordance with ASTM E492 in accordance with Section 1207.3 of the IBC.





**3.2.6 Thermal Insulation.** Hebel AAC wall, roof and floor panel assemblies have the thermal transmission properties shown in Table 3 of this report.

Table 3 – Thermal Characteristics, per inch of thickness		
Strength Category	Thermal Resistance, R (ft <sup>2</sup> ·h·°F/Btu)	Thermal Conductivity, k (Btu·in/ft <sup>2</sup> ·h·°F)
AAC-2	1.32	0.75
AAC-4	1.09	0.91
AAC-6	1.02	0.98

**3.2.7 Combustibility.** Hebel AAC wall, roof and floor panels are non-combustible and meet the requirements of Section 703.5 of the IBC.

**3.2.8 Fire Classification.** Hebel AAC roof panels, without coverings, have a Fire Classification of Class A as defined by Exception 1 of Section 1505.2 of the IBC.

## 4.0 PRODUCT DESCRIPTION

### 4.1 Hebel AAC Masonry

**4.1.1 Hebel AAC Masonry Blocks:** Hebel AAC Masonry Blocks are precast, noncombustible masonry units manufactured of autoclaved aerated concrete produced from cement, lime, gypsum, quartz sand, water, and an expanding agent (aluminum paste) admixture. The Hebel AAC Masonry Block units shall be produced in strength classes designated AAC-2, AAC-3, AAC-4, AAC-5 and AAC-6, having compressive strengths and densities as summarized in Table 4 of this report.

Table 4. Hebel AAC Masonry Block Physical Requirements		
Strength Class	Compressive Strength, psi, minimum	Density lb/ft <sup>3</sup> , minimum
AAC-2	290	25
AAC-3	435	25
AAC-4	580	31
AAC-5	725	37
AAC-6	870	37

SI conversions: 1 psi = 0.006895 MPa, 1 lb/ft<sup>3</sup> = 16.0185 kg/m<sup>3</sup>

The Hebel AAC Masonry Block units are available in four different configurations: Blocks, Jumbo Blocks, U Blocks and Cored Blocks and various dimensions as shown in Table 5 of this report. Dimensions for U Blocks and Cored Blocks are shown in Figure 1 of this report.

Table 5. Hebel AAC Block Unit Dimensions			
Block Configuration	Thickness (inches)	Height (inches)	Length - (inches)
Blocks	2, 3, 4, 5, 6, 7, 8, 10, 12	8, 12, 16	24
Jumbo Blocks	6, 7, 8, 10, 12	24	40, 48
U Blocks	5, 6, 7, 8, 10, 12	8	24
Cored Blocks	5, 6, 7, 8, 10, 12	8	24

SI conversions: 1 inch = 25.4 mm

The Hebel AAC Masonry Block units in the Blocks and Cored Blocks configurations are also available with tongue and groove edges. The dimension of the tongue and groove shall be 1 inch high by 2 inches wide (25.4 mm by 51mm). The AAC units share the same physical and structural properties. Strength classes AAC-2, AAC-3, AAC-4 AAC-5, and AAC-6 comply with ASTM C1386, ASTM C1691, ASTM C1693-11 (2017), and IBC Section 2103.1.

**4.1.2 Hebel Thin-Bed Mortar:** Hebel Thin-Bed Mortar consists of inorganic aggregates, cement, and organic additives. Hebel thin-bed mortar for AAC complies with Section 2103.2.1 of the 2018 and 2015 editions of the IBC (Section 2103.12 of the 2012 IBC, Section 2103.11 of the 2009 IBC), as applicable. Hebel Thin-Bed Mortar is pre-bagged in dry form from the factory. Each bag weighs 48.5 pounds (22 kg). Mixing instructions are printed on the bag for the addition of water and the appropriate mixing sequence. Hebel Thin-Bed Mortar shall be used with Hebel AAC Masonry Blocks as recognized in this report. The working life of the thin-bed mortar mixture is four hours. The Thin-Bed Mortar when stored in unopened bags and protected from moisture has a one-year shelf life from the date of manufacture.

**4.1.3 Fasteners:** Fasteners and mechanical connections shall be approved by the building official for each project.

**4.2 Hebel AAC panels:** Hebel AAC panels are manufactured from autoclaved aerated concrete and consist of reinforced, precast, noncombustible panels complying with ASTM C1452 and ASTM C1694, as applicable, in strength classes AAC-2, AAC-4 and AAC-6. Available panel strengths and densities are as shown in Table 6 of this report.

Table 6. Hebel AAC Panel Physical Requirements		
Strength Class	Minimum Compressive Strength (psi)	Nominal Dry Bulk Density (lb/ft <sup>3</sup> )
AAC-2	290	25
AAC-4	580	31
AAC-6	870	37

1 psi = 0.006895 MPa, 1 lb/ft<sup>3</sup> = 16.0185 kg/m<sup>3</sup>

**4.2.1** The reinforced wall panels, lintels, floor panels and roof panels are reinforced with two layers of factory-installed reinforcement with protection from corrosion in accordance with ASTM C1452 and ASTM C1694, as applicable. Steel wire reinforcement shall comply with the requirements of Section 1901.2 of the IBC, ACI 523.4R-09, the manufacturer's installation instructions and this report, and shall have a minimum  $f_y$  of 70 ksi (485 MPa) and be minimum nominal  $5/32$ -inch (4 mm actual) diameter to maximum nominal  $5/16$ -inch (8 mm actual) diameter and spaced maximum 9.44 inches (240 mm) on-center. Metal fasteners and other embedment's shall be corrosion-resistant and compatible with the AAC.





**4.2.2 Hebel AAC Wall Panels:** Hebel AAC wall panels are 24 inches (610 mm) wide, up to 20 feet (6,096 mm) in length and widths of 4, 5, 6, 7, 8, 10 or 12 inches (102, 127, 152, 178, 203, 254 or 305 mm). Panel edges may be flat, notched or tongue-and-grooved.

**4.2.3 Hebel AAC Floor Slab and Roof Slab Panels:** Hebel AAC floor and roof slab panels are 24 inches (610 mm) wide, up to 20 feet (6,096 mm) in length and widths of 4, 5, 6, 7, 8, 9, 10 or 12 inches (102, 127, 152, 178, 203, 229, 254 or 305 mm). Slab edges may be flat, notched or tongue-and-grooved.

**4.2.4 Hebel AAC Lintels:** Hebel AAC lintels are reinforced beams used to cover spans above door and window openings in both load bearing and non-load bearing walls. The lintels are manufactured in standard heights of 8, 10, 12, and 24 inches nominal (200, 250, 300 and 600 mm actual), and various lengths and widths.

**4.2.5 Hebel Thin-Bed Mortar:** Hebel thin-bed mortar for AAC complies with ASTM C1660 and Section 2103.2.1 of the 2018 and 2015 editions of the IBC (Section 2103.12 of the 2012 IBC, Section 2103.11 of the 2009 IBC). Thin-bed mortar is a dry mix, pre-packaged in 48.5 lbs. (22 kg) bags. The working life of the thin-bed mortar is four hours. When stored in unopened bags and protected from moisture the thin-bed mortar has a one-year shelf life from the date of manufacture.

**4.2.6 Grout:** Cement grout used with Hebel AAC panels shall consist of one part Portland cement and three parts fine aggregate (sand) conforming to ASTM C476.

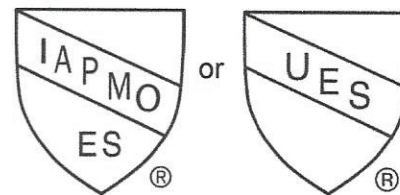
## 5.0 IDENTIFICATION

Hebel AAC Masonry Block units are identified on the pallets by labels which shall include the manufacturer's name (Litecrete, S.A. de C.V.) and/or brand name (Hebel), a code indicating the production plant and date of production, product type, strength class and density, the IAPMO Uniform ES Mark of Conformity, and the Evaluation Report Number (ER-405). A die-stamp label may also substitute for the label.

Hebel AAC panels, slabs and lintels are identified by labels or die-stamps which include the manufacturer's name (Litecrete, S.A. de C.V.), brand name (Hebel), product type, strength class and density, the IAPMO Uniform ES Mark of Conformity, and the Evaluation Report Number (ER-405).

Hebel Thin-Bed Mortar is identified by packaging which shall include the name Litecrete, S.A. de C.V., the brand name (Hebel), the weight, and mixing and application instructions.

Either UES Mark of Conformity may be used as shown below:



IAPMO UES ER-405

## 6.0 SUBSTANTIATING DATA

**6.1** Data in accordance with the ICC-ES Acceptance Criteria for Concrete Floor, Roof and Wall Systems and Concrete Masonry Wall Systems (AC15), dated February 2010 (editorially revised February 2019); manufacturer's descriptive literature and installation instructions. Testing was performed by laboratories in compliance with ISO/IEC 17025, and include:

**6.1.1** Reports of Impact Sound Transmission testing in accordance with ASTM E492.

**6.1.2** Reports of testing for compliance with the Standard Specification for Reinforced AAC Elements in accordance with ASTM C1452.

**6.1.3** Report of testing for compliance with the Standard Specification for Precast AAC Wall Construction Units in accordance with ASTM C1386.

**6.1.4** Report of flexural bond strength testing in accordance with ASTM E518.

**6.1.5** Report of diagonal tension (shear) testing in accordance with ASTM E519.

**6.1.6** Report of compressive strength test of mortar in accordance with ASTM C109.

**6.1.7** Reports of Airborne Sound Transmission testing in accordance with ASTM E90.

**6.1.8** Report of testing for noncombustible materials in accordance with ASTM E136.

**6.1.9** Report of fire testing in accordance with ASTM E119.

**6.1.10** Reports of testing for compliance with the Standard Specification for Thin-bed Mortar for Autoclaved Aerated Concrete (AAC) Masonry in accordance with ASTM C1660.

**6.2** Manufacturer's descriptive literature and installation instructions.





## 7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Hebel Autoclaved Aerated Concrete (AAC) Masonry Block Units, Panels, and Thin-Bed Mortar to assess their conformance to the codes shown in Section 1.0 of this report and documents the product's certification. Products are manufactured at locations noted in Sections 2.15 and 2.16 of this report is under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)



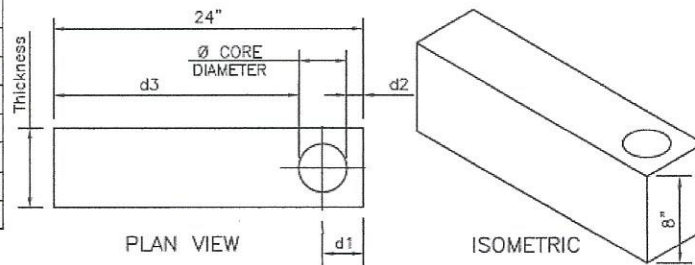
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Thickness	Core Diameter	d1	d2	d3
5	2.75	2.46	1.08	20.17
6	3.54	2.94	1.17	19.29
7	3.54	3.44	1.67	18.79
8	4.33	3.93	1.76	17.91
10	4.33	4.91	2.74	16.93
12	4.33	5.90	3.73	15.94

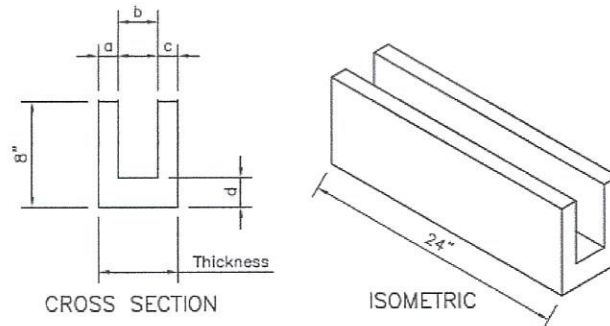
All Cored Block units are 24-inches nominal length  
SI conversions: 1 inch= 25.4 mm



CORED BLOCK

Thickness	a and c	b	d
5	1.5	2	2.125
6	1.5	3	2.125
7	1.75	3.5	2.125
8	2	4	2.125
10	2	6	2.125
12	2	8	2.125

SI conversions: 1 inch= 25.4 mm



U - BLOCK

FIGURE 1. HEBEL MASONRY – U BLOCK AND CORED BLOCK

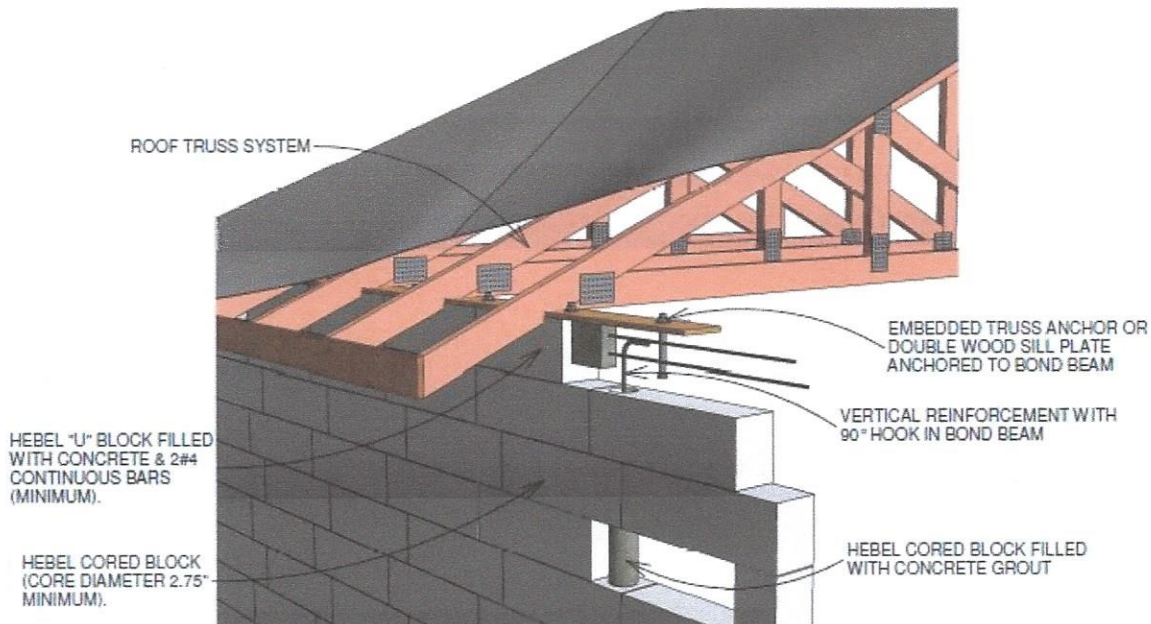


FIGURE 2. HEBEL MASONRY – SECTION @ TOP OF WALL



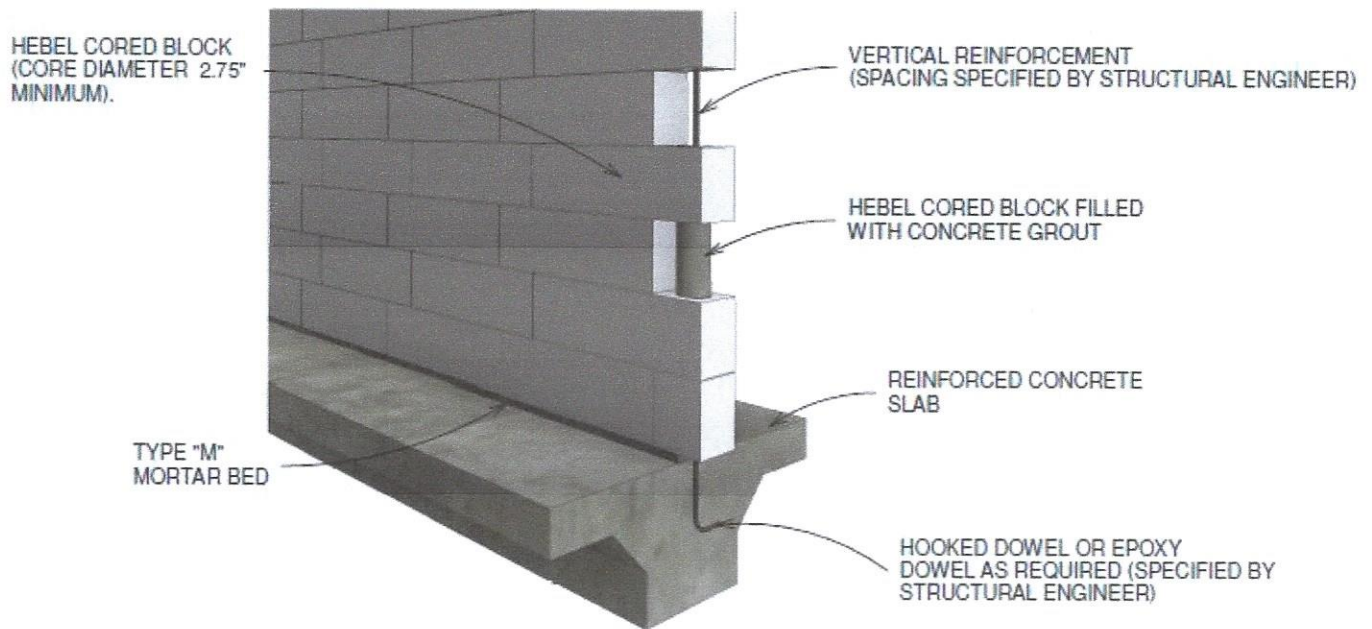


FIGURE 3. HEBEL MASONRY – SECTION @ FOUNDATION

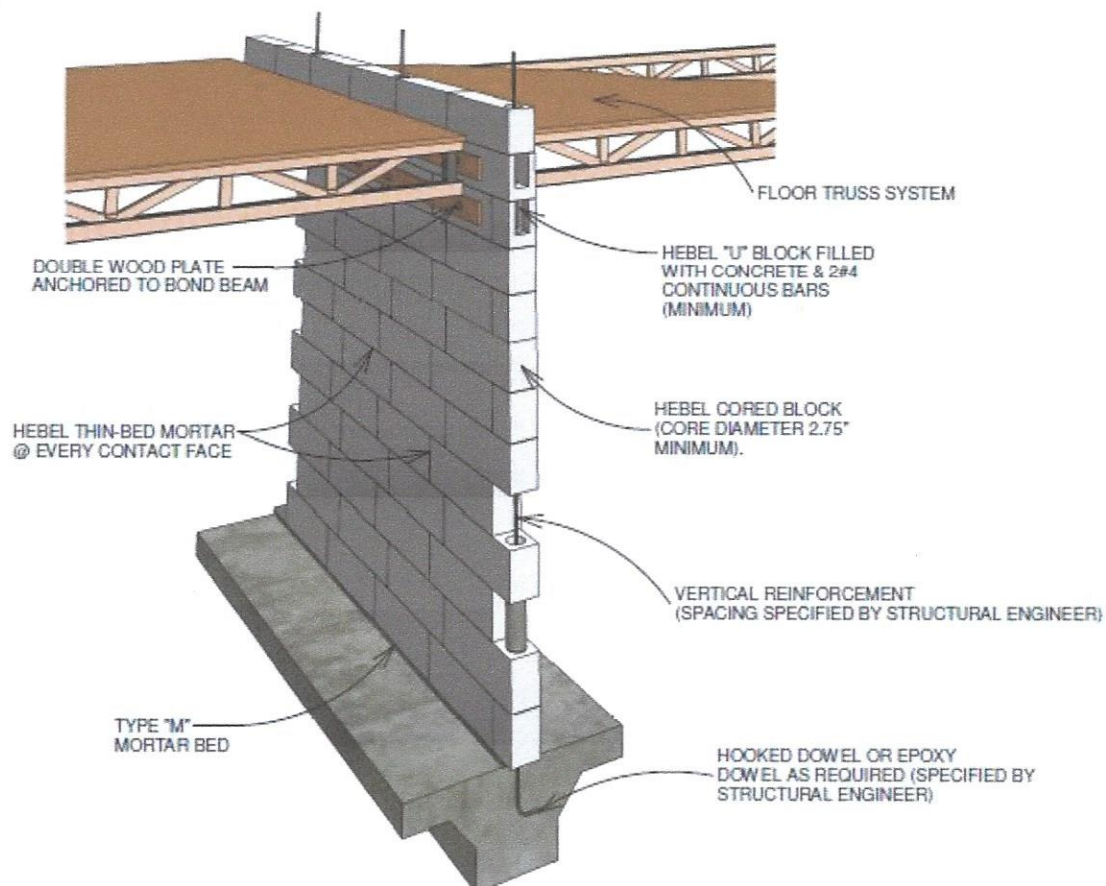


FIGURE 4. HEBEL MASONRY – TYPICAL WALL SECTION



# EVALUATION REPORT

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405

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Table 7. AAC-6 Floor Panel Allowable Loads <sup>2,3</sup>

	Table 7. AAC-6 Floor Panel Allowable Loads <sup>2,3</sup>													
Nominal Panel Thickness (inch)	Moment Capacity (lb-ft/ft)	Superimposed Uniform Load <sup>1</sup> , w (psf)												Dead Weight (psf)
		63	68	73	84	89	94	99	104	110	115	120	125	
		Maximum Permissible Span <sup>4,5,6,7</sup> (feet)												
4	814	8	7	7	7	7	7	7	6	6	6	6	6	15
5	1340	10	9	9	9	9	9	8	8	8	8	8	8	18
6	1,985	13	13	13	12	12	12	11	11	11	11	10	10	22
7	2,776	15	15	15	14	14	13	13	13	13	12	12	12	26
8	3,680	17	17	17	16	15	15	15	15	14	14	14	14	31
9	4,732	19	19	18	18	17	17	17	16	16	15	15	15	35
10	5,917	19	19	19	19	19	19	18	18	18	17	17	17	40
12	6,333	20	20	20	20	20	19	19	19	19	19	19	19	44

For SI: 1 inch = 25.4 mm; 1 foot = 305 mm; 1 psf = 47.88 Pa, 1 lb-ft/ft = 4.488 N-m/m<sup>3</sup>; 1 pcf = 16.02 kg/m<sup>3</sup>

Table 8. AAC-4 Roof Panel Allowable Loads <sup>2,3</sup>

	Table 8. AAC-4 Roof Panel Allowable Loads <sup>2,3</sup>															
Nominal Panel Thickness (inch)	Moment Capacity (lb-ft/ft)	Superimposed Uniform Load <sup>1</sup> , w (psf)														Dead Weight (psf)
		20	23	26	31	37	42	47	52	57	63	68	73	78	84	
		Maximum Permissible Span <sup>4,5,6,7</sup> (feet)														
4	571	11	11	11	10	9	9	9	8	8	8	7	7	7	7	12
5	937	14	13	13	9	12	11	11	10	10	10	9	9	9	9	15
6	1,389	16	16	15	14	14	13	13	12	12	11	11	11	11	10	18
7	1,942	18	18	17	16	16	15	15	14	14	13	13	13	12	12	21
8	2,576	19	19	19	18	18	17	16	16	15	15	15	14	14	14	25
9	3,311	21	20	20	19	19	19	18	18	17	17	16	16	15	15	28
10	4,141	20	20	20	20	20	20	20	19	19	18	18	17	17	17	31
12	6,056	20	20	20	20	20	20	20	20	20	20	21	20	20	19	37

For SI: 1 inch = 25.4 mm; 1 foot = 305 mm; 1 psf = 47.88 Pa, 1 lb-ft/ft = 4.488 N-m/m<sup>3</sup>; 1 pcf = 16.02 kg/m<sup>3</sup>

Table 9. AAC-6 Roof Panel Allowable Loads <sup>2,3</sup>

	Table 9. AAC-6 Roof Panel Allowable Loads <sup>2,3</sup>															
Nominal Panel Thickness (inch)	Moment Capacity (lb-ft/ft)	Superimposed Uniform Load <sup>1</sup> , w (psf)														Dead Weight (psf)
		20	23	26	31	37	42	47	52	57	63	68	73	78	84	
		Maximum Permissible Span <sup>4,5,6,7</sup> (feet)														
4	814	12	12	12	12	11	11	10	10	9	9	9	9	8	8	15
5	1340	15	15	15	14	14	13	13	12	12	11	11	11	10	10	18
6	1985	18	18	17	17	16	15	15	14	14	13	13	13	12	12	22
7	2776	19	19	19	19	18	18	17	16	16	15	15	15	14	14	26
8	3680	21	20	20	19	19	19	19	18	18	17	17	17	16	16	29
9	4732	20	20	20	20	20	20	20	19	19	19	19	18	18	18	33
10	5917	20	20	20	20	20	20	20	20	20	20	20	20	20	19	37
12	8653	20	20	20	20	20	20	20	20	20	20	20	20	20	20	44

For SI: 1 inch = 25.4 mm; 1 foot = 32005 mm; 1 psf = 47.88 Pa, 1 lb-ft/ft = 4.488 N-m/m<sup>3</sup>; 1 pcf = 16.02 kg/m<sup>3</sup>

<sup>1</sup> Superimposed uniform loads are nominal out-of-plane loads as defined in IBC Section 1602.1 and derived from strength design.

<sup>2</sup> Design unit weight of material is 37 pcf for AAC-4 and 45 pcf for AAC-6

<sup>3</sup> Roof and floor slabs are designed for dead weight and uniformly distributed downward superimposed loads only. Uplift (wind) forces required further investigation to determine uplift load capacity.

<sup>4</sup> Total load deflection (DL + LL) shall not exceed 1/300 of span for floor panels.

<sup>5</sup> Total load deflection (DL + LL) shall not exceed 1/300 of span for roof panels having spans less than or equal to 19.4 feet.

<sup>6</sup> Total load deflection (DL + LL) shall not exceed 1/200 of span for roof panels having spans greater than 19.4 feet.

<sup>7</sup> More stringent deflection limits and/or analysis of long-term deflection shall be provided if slabs support nonstructural panels likely to be damaged by large deflections.



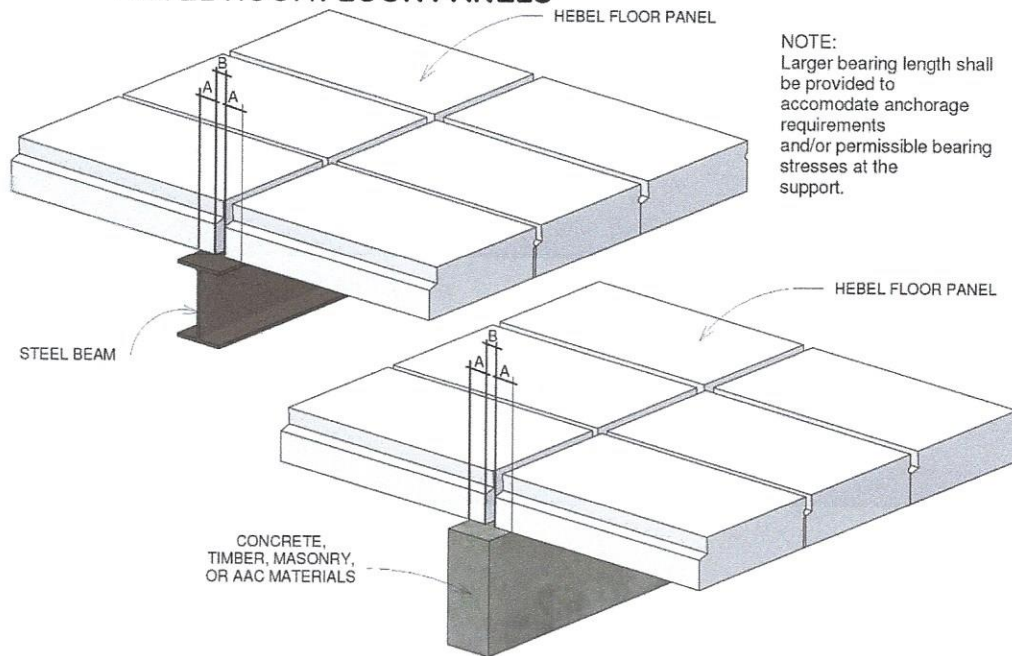


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**FIGURE 5. TYPICAL FLOOR PANEL CONNECTION AND MINIMUM BEARING DEPTH OF HEBEL ROOF/FLOOR PANELS**



NOTE:  
Larger bearing length shall be provided to accommodate anchorage requirements and/or permissible bearing stresses at the support.

**STEEL, REINFORCED OR PLAIN CONCRETE, TIMBER CONSTRUCTION**

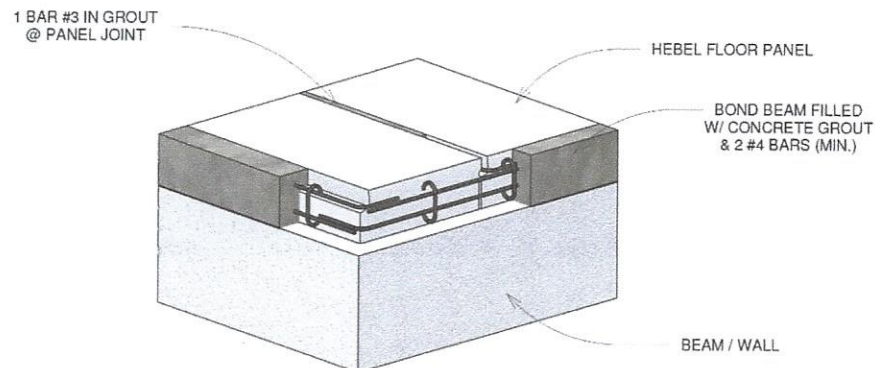
Minimum "A" is 2" (50 mm) or L/80  
whichever is greater.  
 $B \geq 3/4"$  (19 mm)  
(where L = clear span + A)

**MASONRY CONSTRUCTION**

Minimum "A" is 2.75" (70mm) or L/80  
whichever is greater.  
(where L = clear span + A)

**AAC MATERIAL CONSTRUCTION**

Minimum "A" is 2" (50mm) for center bearing and  
2.75" (70mm) for end bearing

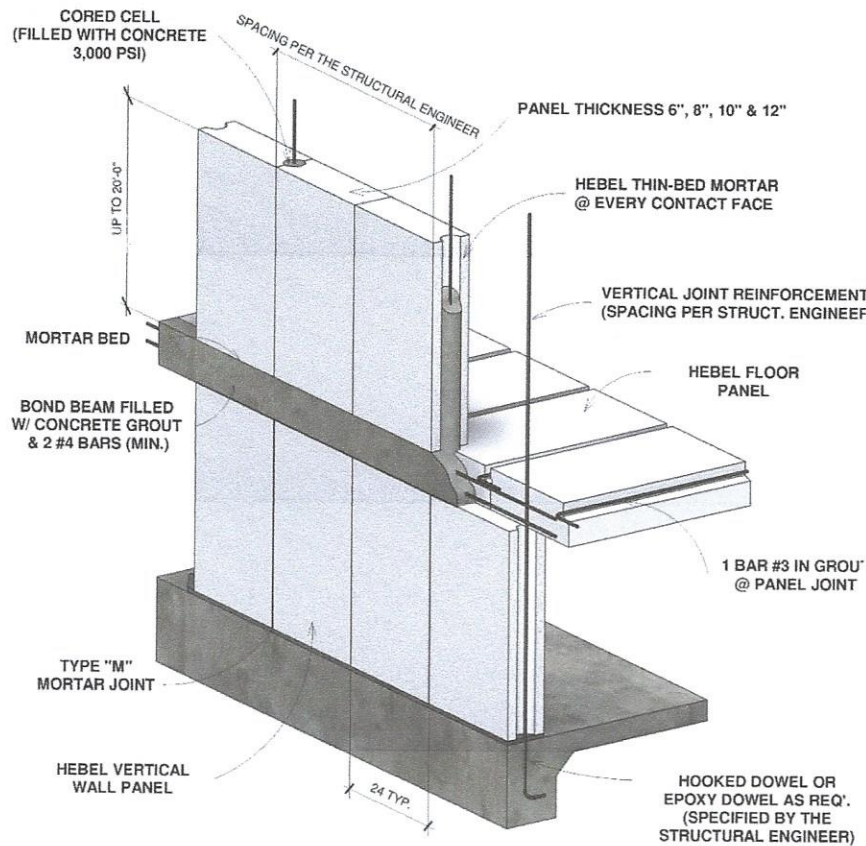




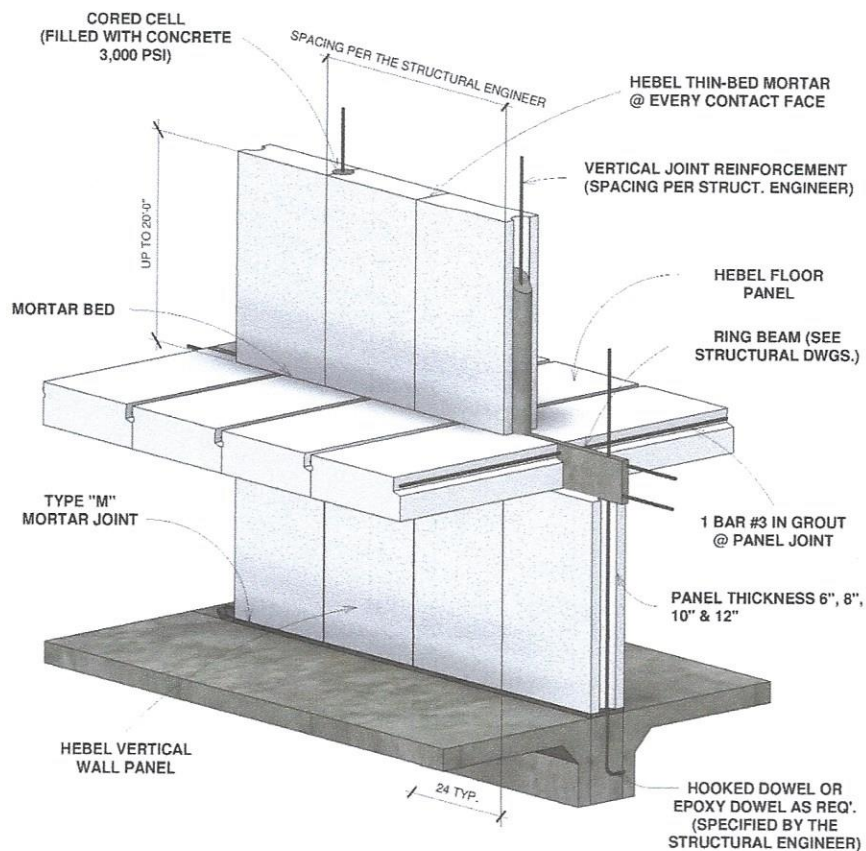
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**FIGURE 6.  
TYPICAL EXTERIOR  
WALL SECTION**



**FIGURE 7.  
TYPICAL INTERIOR  
WALL SECTION**





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## HEBEL POWER FLOOR PANELS AND HEBEL THIN-BED MORTAR

### CSI Sections:

03 41 00 Precast Structural Concrete

### 1.0 RECOGNITION

Hebel Power Floor Panels and Hebel Thin-Bed Mortar recognized in this report has been evaluated for use as structural floor assemblies. The strength, durability and noncombustibility properties of the Hebel Power Floor Panels and Hebel Thin-Bed Mortar complies with the intent of the provisions of the following codes and regulations:

- 2015, 2012 and 2009 International Building Code® (IBC)

### 2.0 LIMITATIONS

Use of the Hebel Power Floor Panels and Hebel Thin-Bed Mortar recognized in this report is subject to the following limitations:

**2.1** Hebel Power Floor Panels shall be manufactured, identified and installed in accordance with this report and the applicable code. In the event of a conflict the more restrictive governs.

**2.2** Construction plans, details and calculations for the Hebel Power Floor Panels shall be approved by the building official. Calculations and details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

**2.3** Supporting joists shall be designed in accordance with the IBC to support design loads, including the self-weight of the floor panels.

**2.4** Use of Hebel Power Floor Panels for vibratory or impact loads is outside the scope of this report.

**2.5** Use of Hebel Power Floor Panels as a lateral force-resisting system is outside the scope of this report. Use of diaphragm shear values noted in Section 3.2 of this report are limited to Seismic Design Categories A and B.

**2.6** Hebel Power Floor Panels and thin-bed mortar are manufactured in Pesqueria, Nuevo Leon, Mexico, under a quality control program with inspections by an accredited inspection agency.

### 3.0 PRODUCT USE

**3.1 General:** Hebel Power Floor Panels recognized in this report are used as structural flooring supported by wood or steel structural joists or trusses.

**3.2 Design:** Hebel Power Floor Panels shall be installed over wood or steel joists or trusses spaced a maximum of 24 inches on-center (610 mm). Joists and trusses shall be designed in accordance with the IBC to support the loads, including the self-weight of the floor panels. The nominally 3-inch thick panels weigh approximately 9 psf (450 Pa). The maximum allowable uniform load shall not exceed 305 psf (14.6 kPa) when supported a maximum of 24-inches (610 mm) on-center. Table 1 of this report lists the maximum allowable diaphragm shear loads.

Table 1. Allowable Diaphragm Shear Values

Systems	Maximum Diaphragm Shear (plf)	Joist Requirements, minimum
Wood systems – parallel to joists	392	2x6 nominal DF lumber spaced 24" o.c., minimum specific gravity of 0.50
Wood systems – perpendicular to joists	258	
Steel systems- parallel to joists	430	1.5" x 5.5" steel joists, minimum No. 22 gage (0.028-inch), spaced 24" o.c.
Steel systems – perpendicular to joists	343	

SI conversions: 1 inch = 25.4 mm; 1 plf = 1.488 kg/m

### 3.3 Installation:

**3.3.1 General:** Hebel Power Floor Panels shall be installed in accordance with this report and the approved construction plans. A copy of the plans and this report shall be available at the jobsite at all times during installation.

Typical installation details are illustrated in Figures 1 through 5 of this report. These typical details are intended for general guidance only and shall be substantiated for approval by the code official.

**3.3.2 Hebel Power Floor Panels:** Hebel Power Floor Panels shall be protected from moisture and abrasion by application of an approved topping.





**3.4 Fasteners:** Fasteners shall be SFSintec's #12 DEKFAST metal screws or similar. For installation to wood joists screws shall be minimum 4½-inch (114 mm) long with minimum 3½-inch (88.9 mm) long threaded ends. Fasteners shall penetrate a minimum of 1½-inch (38 mm) into wood framing. Wood framing shall be of a species with a minimum SG of 0.50 or greater. For use with steel joists, screws shall penetrate a minimum of ¾-inch (19 mm) through steel framing. Table 2 of this report lists the allowable shear load per fastener.

Table 2. Allowable Load per Fastener (lbs)			
	Shear	Pull-through	Pull-out
Wood	150	108	154 <sup>1</sup>
Steel	151	108	171

SI conversions: 1 lbs = 4.448 N

<sup>1</sup> per inch of penetration

Fasteners shall be spaced nominally 8-inches (203 mm) on-center along each joist line with edge distances as shown in Figure 1 of this report.

**3.5 Miscellaneous:** Hebel Power Floor Panels shall be installed over wood or steel floor joists or trusses spaced a maximum of 24-inches (610 mm) on-center. Panels shall be installed in a running bond pattern with joints staggered at least 24-inches (610 mm) as shown in Figure 1 of this report. Panels shall be fastened to the joists or trusses with fasteners as described in Section 3.4 of this report. Joints between AAC panels shall be filled with Hebel Thin Bed mortar prior to placement of adjacent panels.

## 4.0 PRODUCT DESCRIPTION

**4.1 General:** Hebel Power Floor Panels are manufactured from autoclaved aerated concrete (AAC) and consist of factory-steel reinforced noncombustible panels complying with ASTM C1452 and C1694, as applicable, as strength class AAC-4. See Table 3 of this report for minimum compressive strength and density requirements.

Table 3. Physical Requirements		
Strength Class	Minimum Compressive Strength (psi)	Nominal Dry Bulk Density (lb/ft <sup>3</sup> )
AAC-4	580	31

SI conversions: 1 psi = 0.006895 MPa, 1 lb/ft<sup>3</sup> = 16.02 kg/m<sup>3</sup>

The panels are 24 inches (610 mm) wide by 27⅞ inches (75 mm) thick by 72 inches (1830 mm) or 80 inches (2030 mm) long. The panels have internal reinforcement consisting of 4 mm diameter (0.157 inch) reinforcing bars complying with ASTM C1452 and C1694, as applicable, with a minimum yield strength of 70 ksi (485 MPa) and a minimum tensile strength of 80 ksi (550 MPa). Longitudinal bars are spaced 9½ inches (241 mm) on-center running in the long direction and cross bar reinforcement is spaced 13¾ inches (350 mm)

in the 72-inch (1830 mm) long panel and 15⅜ inches (390 mm) in the 80-inch (2030 mm) long panel on-center running in the short (width wise) direction. Cross bar reinforcement is welded to longitudinal reinforcement to provide mechanical anchorage.

The Hebel Power Floor Panels have a typical moisture content at delivery of 20 to 35 percent by weight. Moisture content reduces over time and reaches equilibrium at approximately 5 percent by weight after six months to one year.

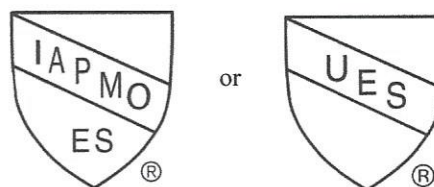
**4.2 Thin-Bed Mortar:** The thin-bed mortar complies with Section 2103.2.1 of the 2015 IBC (Section 2103.12 of the 2012 IBC, Section 2103.11 of the 2009 IBC). The thin-bed mortar is dry-mixed and pre-bagged from the factory with each bag weighing 48.5 pounds (22 kg). The thin-bed mortar shall be used with Hebel Power Floor Panels recognized in this report. The working life of the thin-bed mortar is four hours. When stored in unopened bags and protected from moisture the thin-bed mortar has a one-year shelf life from the date of manufacture.

## 5.0 IDENTIFICATION

Hebel Power Floor Panels are identified on the pallets by labels which shall include the manufacturer's name (Litecrete, S.A. de C.V.) and/or trademark (Litecrete), brand name (Hebel), product type, strength class and density, the IAPMO Uniform ES Mark of Conformity, and the Evaluation Report Number (ER-350). A die-stamp label may also substitute for the label.

Hebel Thin Bed Mortar is identified by packaging, which shall include the name Litecrete S.A. de C.V., the brand name (Hebel), the weight, and mixing and application instructions.

Either Mark of Conformity may be used as shown below:



IAPMO UES ER-350

## 6.0 SUBSTANTIATING DATA

Data in accordance with the ICC-ES Acceptances Criteria for Concrete Floor, Roof and Wall Systems and Concrete Masonry Wall Systems (AC15), dated February 2010; manufacturer's Quality Control Procedures; manufacturer's descriptive literature and installation instructions. Test results are from laboratories in compliance with ISO/IEC 17025.

**6.1** Reports of testing for compliance with the *Standard*





# EVALUATION REPORT

Number: **350**

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*Specification for Autoclaved Aerated Concrete (AAC) in accordance with ASTM C1693.*

**6.2** Reports of testing for compliance with the *Standard Specification for Reinforced Autoclaved Aerated Concrete (AAC) Elements* in accordance with ASTM C1694.

**6.3** Reports of testing for compliance with the *Standard Specification for Thin-bed Mortar for Autoclaved Aerated Concrete (AAC) Masonry* in accordance with ASTM C1660.

**6.4** Report of testing for noncombustible materials in accordance with ASTM E136.

## **7.0 STATEMENT OF RECOGNITION**

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on Hebel Power Floor Panels and thin-bed mortar used as structural flooring supported by wood or steel structural joists or trusses to assess conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification.

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)



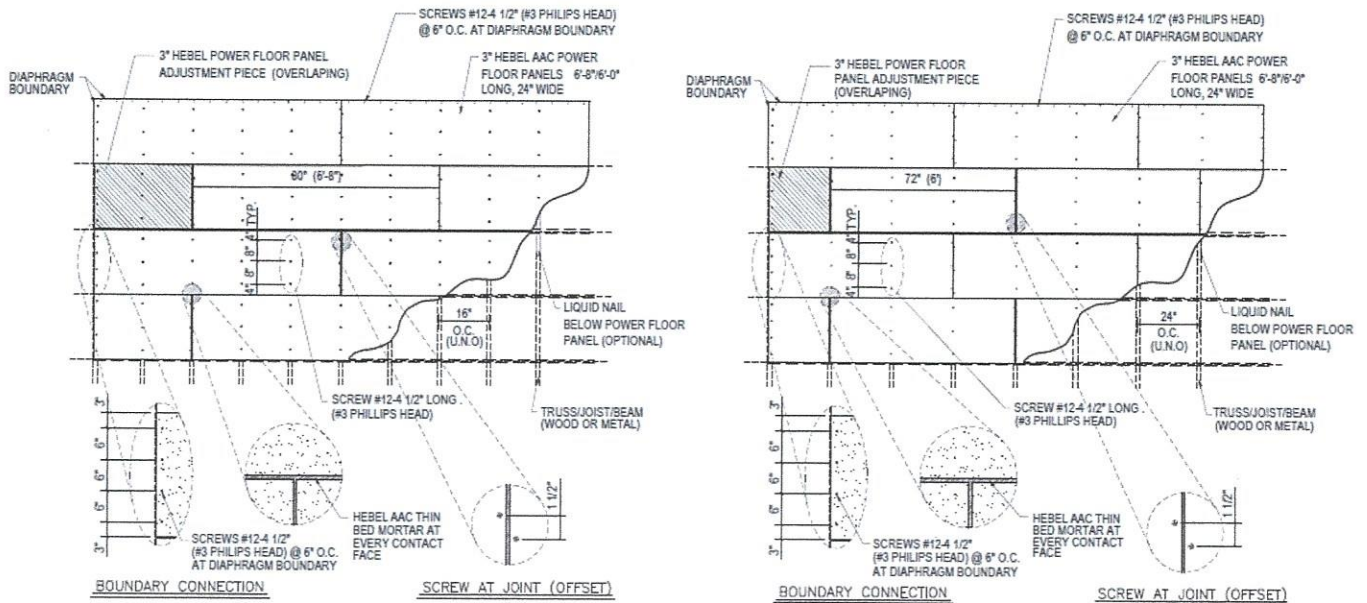
# EVALUATION REPORT

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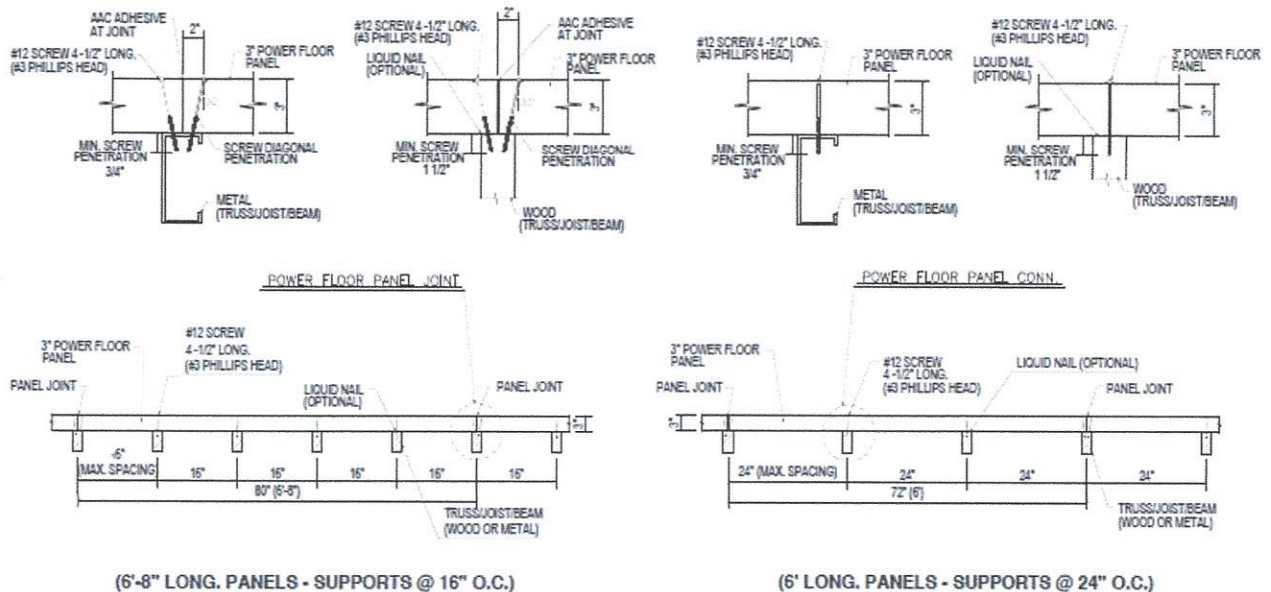
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(6'-8" LONG. PANELS - SUPPORTS @ 16" O.C.)

(6' LONG. PANELS - SUPPORTS @ 24" O.C.)

FIGURE 1. HEBEL POWER FLOOR SYSTEM LAYOUT



(6'-8" LONG. PANELS - SUPPORTS @ 16" O.C.)

(6' LONG. PANELS - SUPPORTS @ 24" O.C.)

FIGURE 2. HEBEL POWER FLOOR SYSTEM CONNECTIONS

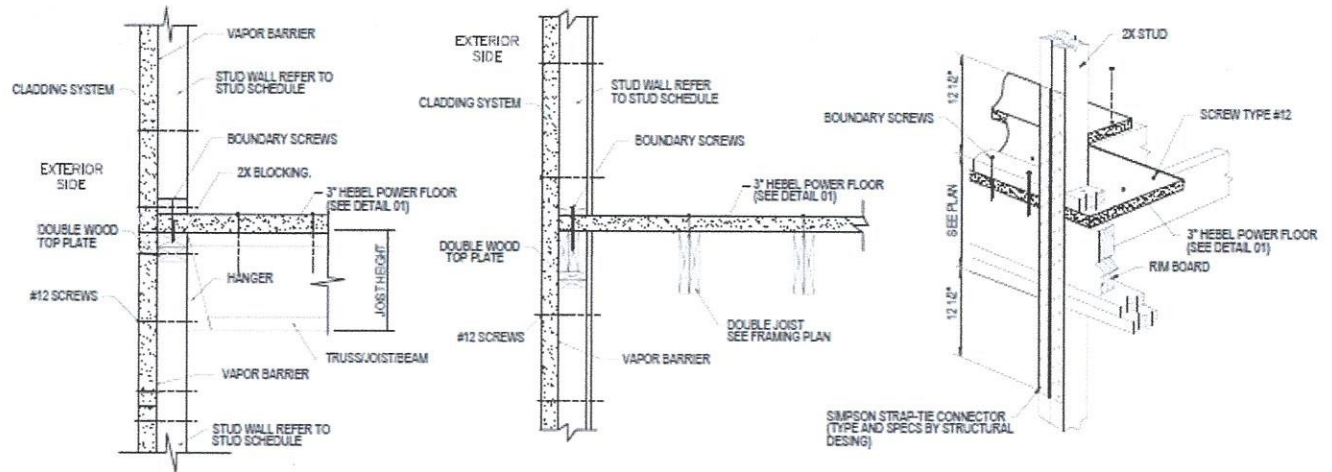




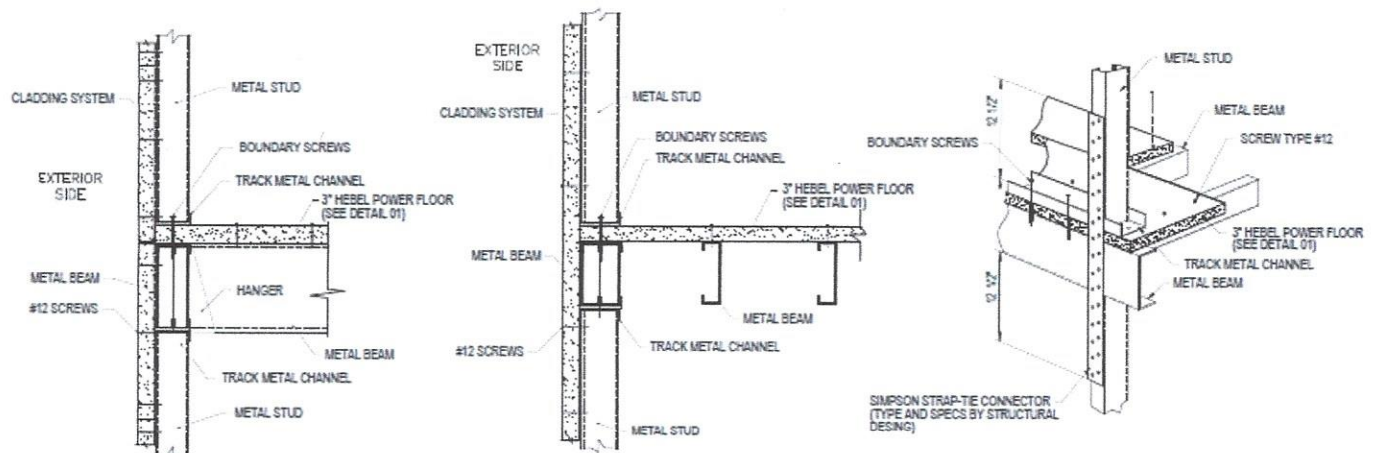
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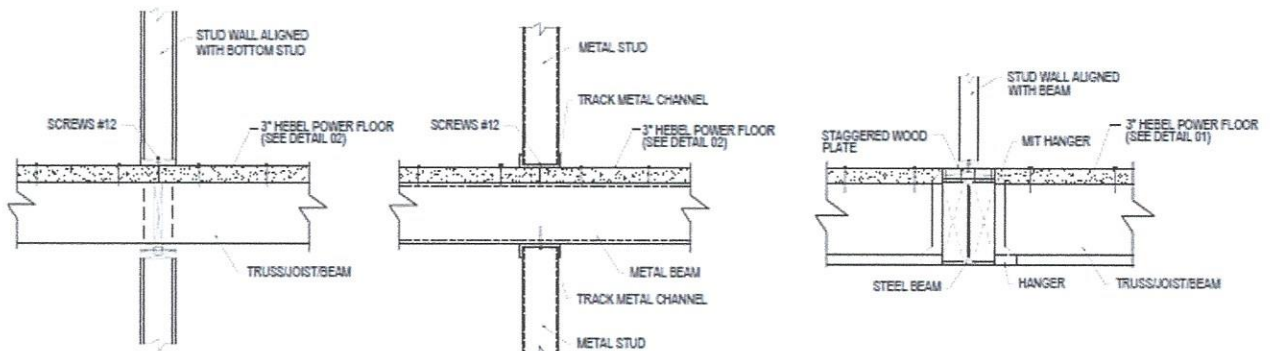
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**FIGURE 3. HEBEL POWER FLOOR SYSTEM BORDER CONNECTIONS (WOOD FRAMING)**



**FIGURE 4. HEBEL POWER FLOOR SYSTEM BORDER CONNECTIONS (METAL FRAMING)**



**FIGURE 5. HEBEL POWER FLOOR SYSTEM INTERIOR CONNECTIONS (WOOD & METAL FRAMING)**



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## HEBEL POWER PANEL WALL SYSTEM AND HEBEL THIN-BED MORTAR

### CSI Section:

03 41 00 Precast Structural Concrete

### 1.0 RECOGNITION

Hebel Power Panel wall system and Hebel Thin-Bed Mortar described in this report have been evaluated for use as wall panels. The strength, durability and noncombustibility were evaluated for compliance with the following codes and regulations:

- 2015, 2012 and 2009 International Building Code® (IBC)

### 2.0 LIMITATIONS

Use of Hebel Power Panel wall system and Hebel Thin-bed Mortar recognized in this report are subject to the following limitations:

**2.1** Hebel Power Panels shall be manufactured, identified and installed in accordance with this report and the applicable code. In the event of a conflict the more restrictive governs.

**2.2** Construction plans, details and calculations for the Hebel Power Panel wall system shall be approved by the building official. Calculations and details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

**2.3** Supporting studs and framing shall be designed in accordance with the applicable code to support design loads.

**2.4** Use of Hebel Power Panel wall system as a seismic lateral force-resisting system is outside the scope of this report. Use of shear values noted in Section 3.2 of this report are limited to Seismic Design Categories A and B.

**2.5** Hebel Power Panels and Hebel Thin-bed Mortar are manufactured in Pesquería, Nuevo Leon, Mexico, under a quality control program with inspections by an accredited inspection agency.

### 3.0 PRODUCT USE

**3.1 General:** Hebel Power Panels recognized in this report are used as structural wall panels supported by wood or steel structural supports.

**3.2 Design:** Hebel Power Panels shall be installed over wood or steel studs spaced a maximum of 24 inches on-center (610 mm). Supporting studs shall be designed in accordance with the applicable code to support the loads. The nominally 2-inch thick panels weigh approximately 6 psf (295 Pa). [Table 1](#) of this report provides maximum allowable out-of-plane (wind) loads. The maximum allowable shear load is 127 plf (183 kN/m) when using #12 DEKFAST, or similar, fasteners.

**Table 1. Allowable Out-of-Plane (Wind) Loads<sup>1</sup>**

	Positive (psf)	Negative (psf)
Wood Studs <sup>2</sup>	41	41
Steel Framing <sup>3</sup>	64	41

SI conversions: 1 inch = 25.4 mm; 1 psf = 0.04788 kPa

<sup>1</sup> Supports at maximum 24 inches on-center

<sup>2</sup> Minimum nominal 2x6, DF No. 2 or better

<sup>3</sup> Minimum 5.50" x 1.625", No. 18 gage (0.051 inch), 51 ksi

### 3.3 Installation:

**3.3.1 General:** Hebel Power Panels shall be installed in accordance with this report and the approved construction plans. A copy of the plans and this report shall be available at the jobsite at all times during installation.

Typical installation details are illustrated in [Figures 1](#) through [4](#) of this report. These typical details are intended for general guidance only and shall be substantiated for approval by the building official.

**3.3.2 Hebel Power Panels:** Hebel Power Panels shall be protected from moisture and abrasion by application of an approved wall covering.

**3.4 Fasteners:** Fasteners shall be SFSintec's #12 DEKFAST metal screws or #12 DEKFAST wood screw or similar. For installation to wood studs, screws shall be minimum 3¼-inches (83 mm) long with minimum 3-inch (76.2 mm) long threaded ends. Fasteners shall penetrate a minimum of 1½-inch (38 mm) into wood studs. Wood framing shall be of a species with a minimum SG of 0.50 or greater. For use with steel joists screws shall penetrate a minimum of ¾-inch (19 mm) through steel framing. See [Table 2](#) of this report for allowable shear load per fastener.





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**Table 2. Allowable Load per Fastener (lbs)**

	Shear	Pull-through	Pull-out
Wood	150	108	154 <sup>1</sup>
Steel	151	108	171

SI conversions: 1 lbs = 4.448 N

<sup>1</sup> per inch of penetration

Fasteners shall be spaced nominally 8-inches (203 mm) on-center along each stud line with edge distances as shown in [Figure 1](#) of this report.

**3.5 Miscellaneous:** Hebel Power Panels shall be installed over wood or steel studs spaced a maximum of 24-inches (610 mm) on-center. Panels shall be installed in a running bond pattern with joints staggered at least 24-inches (610 mm) when stud spacing is 24 inches (610 mm), or at least 16 inches (406 mm) when stud spacing is 16 inches (406 mm), as shown in [Figure 1](#) of this report. Panels shall be fastened to the studs with fasteners as described in Section 3.4 of this report. Joints between Hebel Power Panels shall be filled with Hebel Thin-Bed Mortar prior to placement of adjacent panels.

## 4.0 PRODUCT DESCRIPTION

**4.1 General:** Hebel Power Panels are manufactured from strength class AAC-4 autoclaved aerated concrete (AAC) complying with ASTM C1452 and C1694, as applicable, with factory installed steel reinforcement. The wall panels are noncombustible. [Table 3](#) of this report contains minimum compressive strength and density requirements.

**Table 3. Physical Requirements**

Strength Class	Minimum Compressive Strength (psi)	Nominal Dry Bulk Density (lb/ft <sup>3</sup> )
AAC-4	580	31

SI conversions: 1 psi = 0.006895 MPa, 1 lb/ft<sup>3</sup> = 16.02 kg/m<sup>3</sup>

The wall panels are 24 inches (610 mm) wide by 2 inches (51 mm) thick by 48 inches to 96 inches (1,220 to 2,440 mm) long. The panels have internal reinforcement consisting of 4 mm diameter (0.157 inch) reinforcing bars complying with ASTM C1452 and C1694, as applicable, with a minimum yield strength of 70 ksi (485 MPa) and a minimum tensile strength of 80 ksi (550 MPa). Longitudinal bars are spaced 9½ inches (241 mm) on-center running in the long direction and cross bar reinforcement is spaced 15 inches (380 mm) in the 48 inch (1220 mm) long panel and 13¼ inches (340 mm) in the 96 inch (2440 mm) long panel on-center running in the short (width wise) direction. Cross bar reinforcement is welded to longitudinal reinforcement to provide mechanical anchorage.

The Hebel Power Panels have a typical moisture content at delivery of 20 to 35 percent by weight. Moisture content

reduces over time and reaches equilibrium at approximately 5 percent by weight after six months to one year.

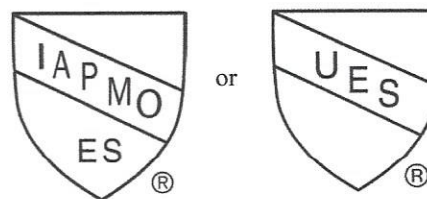
**4.2 Hebel Thin-Bed Mortar:** The Hebel Thin-bed Mortar complies with ASTM C1660 and Sections 2103.2.1 of the 2015 IBC (Section 2103.12 of the 2012 IBC, Section 2103.11 of the 2009 IBC). The Hebel Thin-bed Mortar is dry-mixed and pre-bagged from the factory with each bag weighing 48.5 pounds (22 kg). The Hebel thin-bed Mortar shall be used with Hebel Power Panels recognized in this report. The working life of the thin-bed mortar is four hours. When stored in unopened bags and protected from moisture the thin-bed mortar has a one-year shelf life from the date of manufacture.

## 5.0 IDENTIFICATION

Hebel Power Panels are identified on the pallets by labels which shall include the manufacturer's name (Litecrete, S.A. de C.V.) and/or trademark (Litecrete), brand name (Hebel), product type, strength class and density and the Evaluation Report Number (ER-381). A die-stamp label may also substitute for the label.

Hebel Thin-bed Mortar is identified by packaging which shall include the name Litecrete, S.A. de C.V., the brand name (Hebel), the weight, and mixing and application instructions.

Either Mark of Conformity may be used as shown below:



**IAPMO UES ER-381**

## 6.0 SUBSTANTIATING DATA

Data in accordance with the ICC-ES Acceptances Criteria for Concrete Floor, Roof and Wall Systems and Concrete Masonry Wall Systems (AC15), dated February 2010; manufacturer's Quality Control Procedures; manufacturer's descriptive literature and installation instructions. Test results are from laboratories in compliance with ISO/IEC 17025.

**6.1** Reports of testing for compliance with the *Standard Specification for Autoclaved Aerated Concrete (AAC)* in accordance with ASTM C1693.

**6.2** Reports of testing for compliance with the *Standard Specification for Reinforced Autoclaved Aerated Concrete (AAC) Elements* in accordance with ASTM C1694.



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6.3 Reports of testing for compliance with the *Standard Specification for Thin-bed Mortar for Autoclaved Aerated Concrete (AAC) Masonry* in accordance with ASTM C1660.

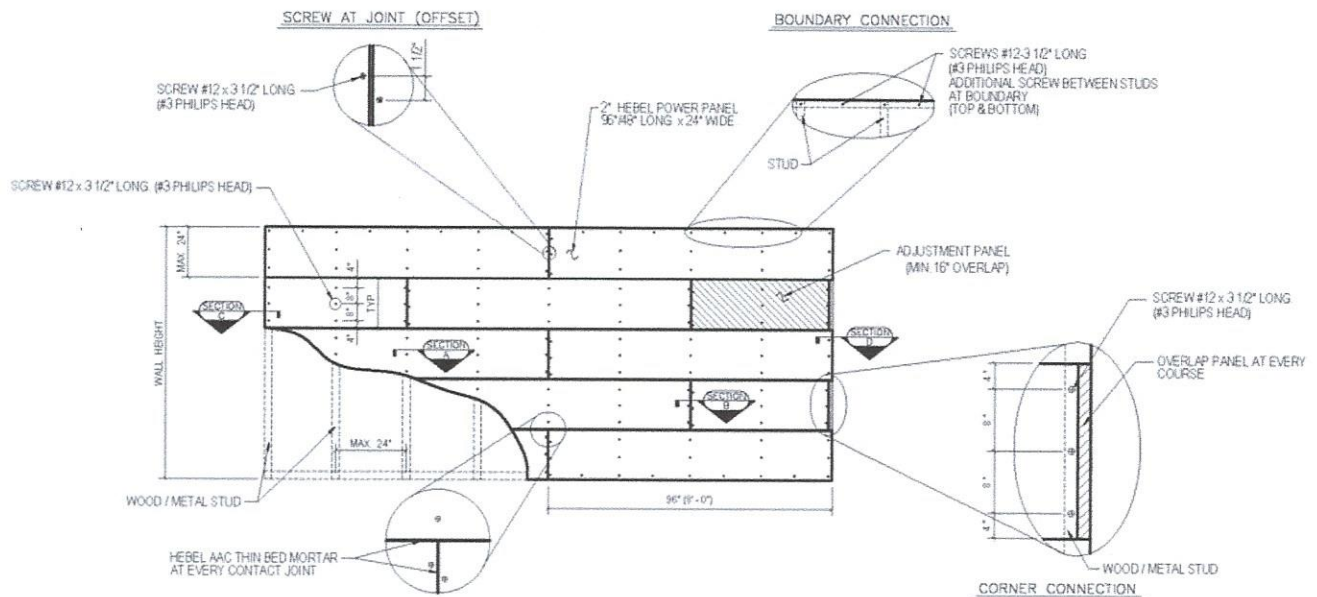
6.4 Report of testing for noncombustible materials in accordance with ASTM E136 *Behavior of Materials in a Vertical Tube Furnace at 750° C*<sup>1</sup>.

## 7.0 STATEMENT OF RECOGNITION

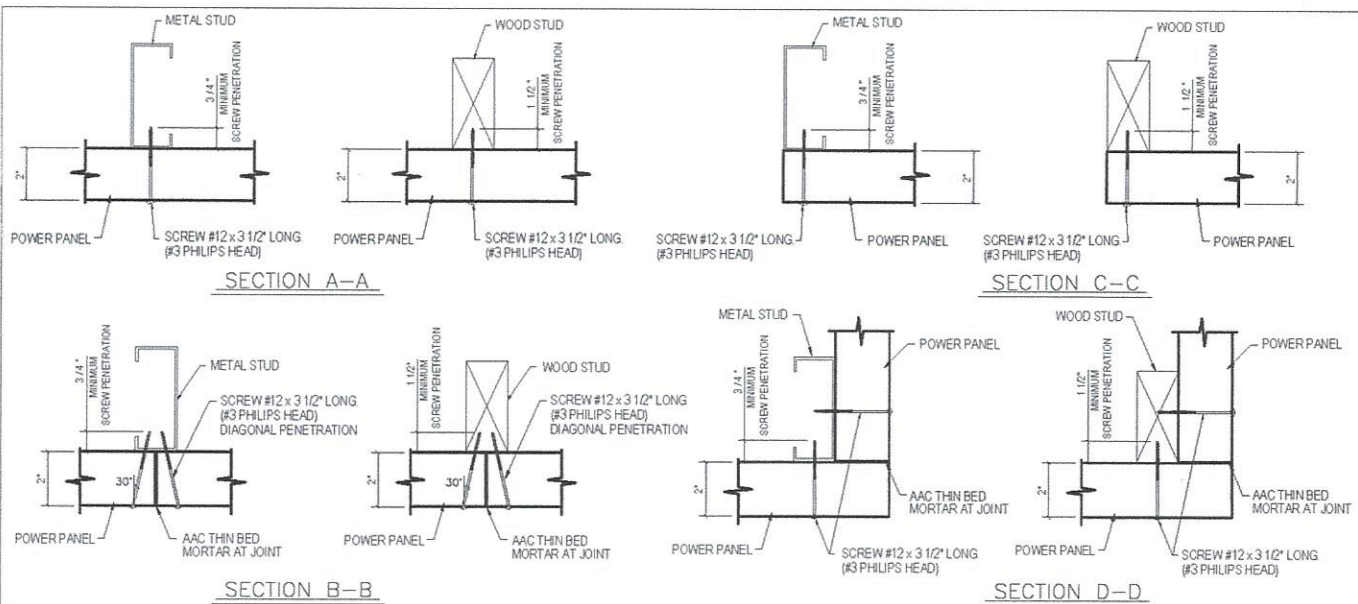
This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on Hebel Power Panel wall system and Hebel Thin-bed Mortar used as structural wall panels supported by wood or steel structural supports to assess conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification. Products are manufactured at locations noted in Section 2.5 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit [www.uniform-es.org](http://www.uniform-es.org) or email us at [info@uniform-es.org](mailto:info@uniform-es.org)





**FIGURE 1. HEBEL POWER PANEL WALL SYSTEM LAYOUT**



**FIGURE 2. HEBEL POWER PANEL SYSTEM CONNECTIONS**

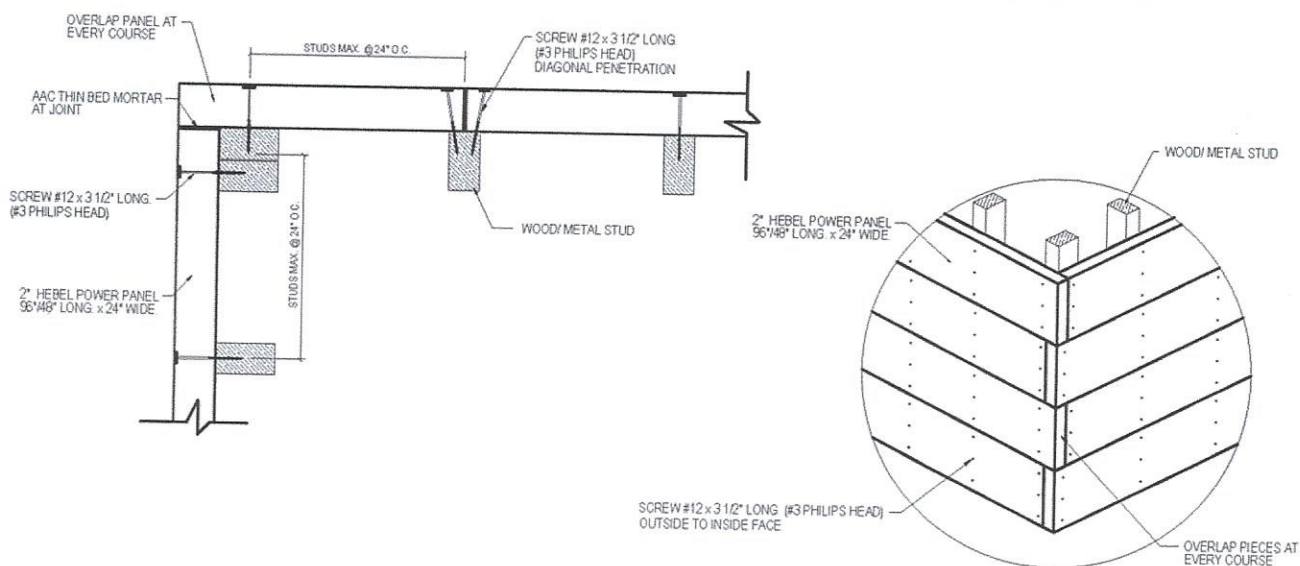


FIGURE 3. HEBEL POWER PANEL SYSTEM - CORNER CONNECTION

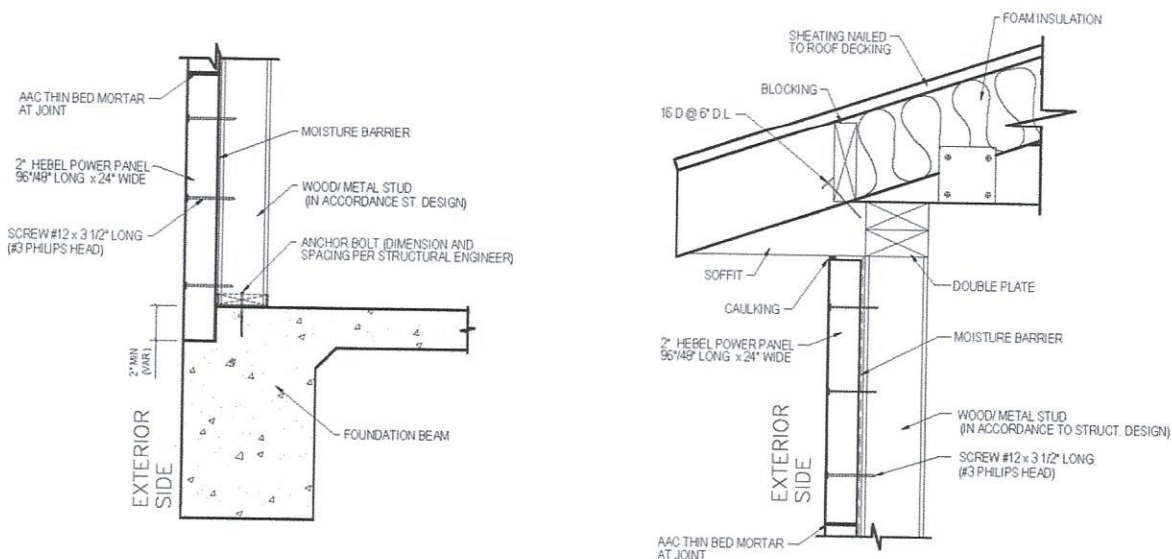


FIGURE 4. HEBEL POWER PANEL SYSTEM - EXTERIOR WALL SECTIONS



# POLYSTICK® XFR

## FIRE RESISTANT SELF-ADHERED ROOF UNDERLAYMENT

### PRODUCT DESCRIPTION

Polystick XFR is a dual purpose fire resistant and self-adhered waterproofing underlayment. Utilizing ADESO® dual-compound selfadhered technology, Polystick XFR features a SBS (elastomeric) modified bitumen upper compound and an aggressive self-adhesive compound on the bottom. Polyglass' patent pending Burn-Shield Technology™ provides superior fire resistance.

Polystick XFR features a slip-resistant film surface which can be exposed up to 180 days. With a temperature resistance of up to 265°F, Polystick XFR is ideally suited for high temperature roof covering systems such as steel and copper roofing, where fire resistance is required or desired.

Can be installed as part of a multi-ply underlayment system when used as a secondary layer above Polystick MTS PLUS or Polystick XFR.

### TYPICAL APPLICATIONS

- Over combustible decks and under metal roof coverings to achieve class A fire ratings.\*\*
- Specifically designed as underlayment for high temperature applications.
- Approved for application under metal roof panels, asphalt shingles, mechanically attached tiles.
- Can be used as part of a multi-ply underlayment system.

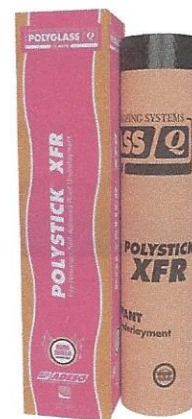
### FEATURES AND BENEFITS

- Fire spread/penetration and ember resistance in systems tested under UL 790.
- 180 days exposure.
- Approved up to 265°F.
- Fiberglass reinforced for added strength and dimensional stability.

### TECHNICAL DESCRIPTION\*

Physical Properties	ASTM Method	ASTM Value	Typical Performance
Maximum Load, min	ASTM D5147	35 lbf/in [4.4 kN/m]	69 lbf/in [12 kN/m] MD 40 lbf/in [7 kN/m] XMD
Elongation at break, min of modified bitumen portion	ASTM D5147	10%	50% MD 60% XMD
Tear Resistance, min	ASTM D5147	20 lbf [89 N]	157 lbf [700 N] MD 79 lbf [350 N] XMD
Thermal Stability, max	ASTM D1970	0.1 in [3 mm]	pass
Adhesion to Plywood [min at 40°F]	ASTM D1970	2.0 lbf/ft	15 lbf/ft
Adhesion to Plywood [min at 75°F]	ASTM D1970	12.0 lbf/ft	25.0 lbf/ft
Waterproof integrity of Lap Seam	ASTM D1970	pass	pass
Flexibility at -29°C [-20°F]	ASTM D5147	pass	pass
Sealability around Nail	ASTM D5147	pass	pass
Slip Resistance	ASTM D1970	pass	pass
Moisture Vapor Permeance, max	ASTM E96	max 0.1 U.S. Perms [5.7 ng/Pa.S.m²]	pass

\*The properties in this table are "as manufactured" unless otherwise noted



### PRODUCT DATA\*\*\*

Net Coverage (Approx)..... 150 ft² (13.9 m²)  
 Gross Coverage (Actual) ..... 160 ft² (15 m²)  
 Weight (Approx) ..... 75 lbs (34 kg)  
 Thickness (Nominal) ..... 80 mils (2.0 mm)  
 Roll Size ..... 49'3" x 39 3/8" (15 m x 1 m)  
 Rolls/Pallet.....20

\*\*\*All values are nominal at time of manufacturing

### APPLICABLE STANDARDS

- ASTM D1970
- UL Classified
- ICC ESR-1697
- Florida Building Code
- Miami-Dade County Approved
- Texas Department of Insurance
- Listed by California State Fire Marshal



### PRODUCT CODES

- PSXFR



www.polyglass.us

# POLYSTICK® XFR

## FIRE RESISTANT SELF-ADHERED ROOF UNDERLAYMENT

### UL CLASS A LISTING BY METAL ROOF COVERING TYPE\*\*

Deck	Anchor Sheet (Optional)	Insulation (Optional)	Second Ply (Optional)	Underlayment	Roof Covering
Plywood (15/32"), spaced sheathing or 7/16" OSB	ASTM D226 (III) 30# Felt	Polytherm Polyiso	<b>Polystick XFR</b>	<b>Polystick XFR</b>	UL listed copper panels or steel standing seam panels, stone coated shingles, 26 gauge minimum
Deck	Anchor Sheet (Optional)	Insulation (Optional)	Second Ply (Required)	Underlayment	Roof Covering
Plywood (15/32"), spaced sheathing or 7/16" OSB	ASTM D226 (III) 30# Felt	Polytherm Polyiso	<b>Polystick XFR</b>	<b>Polystick XFR</b>	UL listed aluminum panels, 0.032" minimum

\*\* Unlimited Slope. Refer to published UL product listings (TGFUR25992) for specific fire rated assemblies.

### APPLICATION INSTRUCTIONS

- Polystick XFR may be applied directly to the roof deck where allowable by Code, or to various approved substrates such as ASTM D226 type roofing felts and Polytherm insulation. For additional substrate requirements and information refer to Polyglass published "Suitable Substrates for Self-Adhered (SA) Membranes."
- Do not apply directly on to existing shingles or other roof coverings.
- Apply only when the substrate is dry and project related temperatures (air, roof deck, membrane) are 40° F and rising.
- Cut the Polystick XFR to a suitable, workable length prior to placement.
- Lay the material flat in place, starting at the lowest point. Overlap seams 3" at black side lap area and a minimum 6" at end laps.
- Peel half of the release film from the roll and apply firm, even pressure from the center to the outer edge. Remove the backing from the remaining half of the roll and apply pressure.
- Be sure to follow all local building code recommendations and requirements with regards to the width of ice dam materials.
- If full roof coverage application is desired, proper venting of the structure is recommended. Consult a design professional for proper venting requirements. Applications involving non-ventilated attics or sheathing with radiant barriers, an anchor sheet is recommended to allow venting and prevent the creation of a double vapor barrier condition.
- In steep slope applications where back nailing may be recommended, be sure that all nails are covered by the overlapping next sheet.
- Polystick XFR must be covered within 180 days of installation or unless otherwise limited by the Authority Having Jurisdiction.

### MANUFACTURING FACILITIES

- Fernley, NV
- Hazleton, PA
- Waco, TX
- Winter Haven, FL

### CORPORATE HEADQUARTERS

Polyglass U.S.A., Inc.  
1111 West Newport Center Drive  
Deerfield Beach, FL 33442  
[www.polyglass.us](http://www.polyglass.us)

General Line: (888) 410-1375  
(954) 233-1330

Customer Service: (800) 222-9782  
Technical Service: (866) 802-8017

**Questions?** [technical@polyglass.com](mailto:technical@polyglass.com)

**Product Disclaimer:** Unless otherwise incorporated into or part of a supplemental manufacturer's warranty, Polyglass warrants its product(s) against manufacturing defects in its product that directly results in leakage for a period of 1 year.

Refer to safety data sheet (SDS) for specific data and handling of our products. All data furnished refers to standard production and is given in good faith within the applicable manufacturing and testing tolerances.

Polyglass U.S.A., Inc., reserves the right to improve and change its products at any time without prior notice. Polyglass U.S.A., Inc. cannot be held responsible for the use of its products under conditions beyond its own control. For most current product data and warranty information, visit [www.polyglass.us](http://www.polyglass.us)



[www.polyglass.us](http://www.polyglass.us)





**MEGABOARD**  
MULTI-PURPOSE CONSTRUCTION BOARD

**ARMORMEGA/MEGABOARD STRUCTURAL CEMENT BOARD**

Published 03/17/2017

TECHNICAL DATA SHEET		
ITEM	TYPICAL VALUES ( STANDARD / Tested )	STANDARD / REFERENCE
Bending Strength(Modulus of Rupture) , psi	≥ 1305 PSI / 9 Mpa Standard Value*, Test Value Ave: 2523 PSI/17.4 Mpa	ASTM C 1185/ISO 8335
Concentrated load on 3/4" (18 mm) board(Dry and Wet)	0.068"(1.6 mm) deflection@400 lb (1.78 KN) static, 0.033"(0.84 mm) deflection@200 lb (0.89 KN) static	ASTM E 661/AC 318*
Uniform Load on 3/4"(18mm) Board (Dry and Wet)	Average Deflection of 0.44" under load of 100 psf, Ultimate load of 330 PSF	ASTM E 330/AC 318*
Fastener Holding (lbf) 3/4"(18 mm) Board	Dry: Lateral/withdrawl(210/20) Test results: (383/294)	ASTM D1761/AC 318*
	Wet: Lateral/withdrawl(160/15) Test results: (375/155)	
Linear Variation With Change In Moisture (from 50% to 90% relative humidity)	≤1 % ( Test result 0.08% )	ASTM C 1185-08 /AC 318*
Saturated Thickness Swelling (24-hour water immersion)	≤3% (Test result: 0.01%)	ASTM D1037†/AC 318*
Mold Resistance	0/0	ASTM G3273/ASTM G 21
PH Value	10.5-11.5	ISO 8335 Standard*
Density – Oven Dry	≥ 1000 Kg/M <sup>3</sup> /62.4 lbs/ft <sup>3</sup>	ASTM C 1186
Moisture Content (at 65% RH)	6% - 12%	ASTM C 1186 Section 10
Frost Resistance	50 cycles, zero damage	ASTM C 1186 Section 12
Formaldehyde Content	Zero	MSDS
Asbestos Content	Zero	MSDS
Rot & Termite Resistance	Resistant to destruction	Resistant / No Food Value
Surface Burning Characteristics	CLASS A (0 Flame / 0 Smoke)	ASTM E84/UL 723/ULC S102
Noncombustibility	Passed ASTM E 136 Section B ASTM E 2652	ASTM E136
UL Listing (28 assemblies pending)	1 hr, 1.5 hrs & 2 hrs UL assembly H509/M524	ASTM E 119/UL 723

\* These values are the minimum allowable performance requirements of ASTM C 1186/ISO 8335 standard/AC 318 Criteria)

† Test values are from Certified Test labs.

**NOTES:**

1 ) All MEGABOARD™ installations must be designed and reviewed by a qualified architect or engineer. Panels perpendicular to supports. 3/4" minimum for floors, subject to load table and building code limitations. Refer to installation specifications for additional information on proper use and installation of MegaBoard™.

2 ) This technical data sheet replaces all previously published technical data sheets or physical & mechanical property sheets

**MegaBoard Packaging Info: 3/4"x4'x8' (18mmx1220mmx2440m): Weight 125 lbs/sheet, 3.9 lb/SF, 35 PCs/pallet, 350 pcs/truck**

**MegaBoard edge finishing: T&G or Shiplap on long edges**

**www.armoroc.ca Ectek Internal Inc. 1 416 564 4617**

### **MegaBoard ICC-ES Listings: (Sep. 2018)**

**ESL - 1151 ASTM E 136 Noncombustible**

**ESL - 1152 ASTM E 119 2 hrs Rated subfloor/Roof Assembly**

**ESL - 1153 ASTM E 90 Sound Transmission Class (STC) Rating**

**ESL - 1154 ASTM E 94 Sound Impact Insulation Class (IIC) Rating**

**ESL - 1155 ASTM E 330 Uniform Static Load**

**ESL - 1156 ASTM E 661 Impact Load and Concentrated Load**

### **MegaBoard UL subfloor/Roof Assemblies (Mar /2019)**

#### **UL LISTED FLOOR / CEILING ASSEMBLIES:**

- UL H509 – (1-1/2, 2 hrs) Megaboard directly over C channel Joist.
- [UL L567](#) - (1 Hour) 3/4" MegaBoard directly over Marino/WARE JoistRite
- [UL L580](#) - (1 Hour) 3/4" MegaBoard directly over Marino/WARE JoistRite
- [UL L564](#) - (1 Hour) 3/4" MegaBoard directly over ClarkDietrich TradeReady
- [UL M511](#) - (1 Hour) 3/4" MegaBoard over metal deck over iSpan
- [UL M515](#) - (1 Hour) 3/4" MegaBoard directly over iSpan
- [UL L551](#) - (1 Hour) 3/4" MegaBoard directly over Steel Trusses (Trussteel)
- [UL L565](#) - (1 Hour) 3/4" MegaBoard directly over Steel Trusses (multiple mfrs)
- [UL L597](#) - (1 Hour) 3/4" MegaBoard directly over Steel Trusses (multiple mfrs)
- [UL M507](#) - (1 Hour) 3/4" MegaBoard directly over Steel Trusses (multiple mfrs)
- [UL M513](#) - (1 Hour) 3/4" MegaBoard directly over Steel Trusses (multiple mfrs)
  
- [UL L556](#) - (1, 1-1/2, 2 Hour) 3/4" MegaBoard directly over Steel C-Joist or Wood
- [UL L501](#) - (1 Hour) 3/4" MegaBoard directly over Wood Joist
- [UL L502](#) - (1 Hour) 3/4" MegaBoard directly over Wood Joist
- [UL L505](#) - (1, 1-1/2, 2 Hour) 3/4" MegaBoard directly over Wood Joist
- [UL L511](#) - (1, 1-1/2, 2 Hour) 3/4" MegaBoard directly over Wood Joist
- [UL M502](#) - (1 Hour) 3/4" MegaBoard directly over Wood TJI (System 8)
- [UL M506](#) - (1 Hour) 3/4" MegaBoard directly over Wood TJI (System 8)
- [UL L521](#) - (1 Hour) 3/4" MegaBoard directly over Wood Trusses
- [UL L550](#) - (1 Hour) 3/4" MegaBoard directly over Wood Trusses
- [UL L563](#) - (1 Hour) 3/4" MegaBoard directly over Wood Trusses
- [UL M501](#) - (1 Hour) 3/4" MegaBoard directly over Wood Trusses
- [UL M503](#) - (1 Hour) 3/4" MegaBoard directly over Wood Trusses
- [UL M508](#) - (1 Hour) 3/4" MegaBoard directly over Wood Trusses

#### **UL Roof Assemblies:**

- [UL P555](#)- (1 Hour) 3/4" MegaBoard roof sheathing over metal trusses (no deck)
- [UL P523](#)- (1 & 1-1/2 Hour) 3/4" MegaBoard roof sheathing over metal trusses
- [UL P526](#)- (1 & 1-1/2 Hour) 3/4" MegaBoard roof sheathing over metal trusses
- [UL P557](#)- (1 Hour) 3/4" MegaBoard roof sheathing over metal trusses