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1.1 Hebel Board

General Features

Hebel Board is an Autoclaved Aerated Concrete (AAC) and steel reinforced element. The steel wire reinforcement is Grade 70 and it’s covered with an anti-corrosive coating. Hebel Board can be cut and drilled with conventional tools.

Hebel Board is lightweight, fire resistant*, water penetration resistant**, pest resistant, fast and easy to install, versatile and affordable.

* Under ASTM E119
** ASTM E514

Uses

Hebel Board can be used as cladding for internal and external load-bearing and non load-bearing walls in metal or wood frame construction. Appropriate for residential, hotels, commercial and industrial buildings.

Dimensions:

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in</td>
<td>8 ft</td>
<td>24 in</td>
</tr>
<tr>
<td>3 in</td>
<td>8 ft</td>
<td>24 in</td>
</tr>
</tbody>
</table>

Table 1: Physical and design properties.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Hebel Board AAC-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Density</td>
<td>31 lb/ft²</td>
</tr>
<tr>
<td>Design Weight [1]</td>
<td>37 lb/ft³</td>
</tr>
<tr>
<td>Minimum Compressive Strength [f’c]</td>
<td>580 lb/in²</td>
</tr>
<tr>
<td>Module of Elasticity</td>
<td>295,000 lb/in²</td>
</tr>
<tr>
<td>Drying Shrinkage</td>
<td>0.0024 in/ft</td>
</tr>
<tr>
<td>Thermal Expansion Coefficient</td>
<td>$8 \times 10^{-6}$ J/K</td>
</tr>
</tbody>
</table>

[1] Values consider material’s moisture content.

Table 2: Hebel wall panel design weight.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>in*</td>
<td>lb/ft²</td>
<td>lb/piece</td>
</tr>
<tr>
<td>2</td>
<td>1.969</td>
<td>6.14</td>
<td>98.4</td>
</tr>
<tr>
<td>3</td>
<td>2.953</td>
<td>9.22</td>
<td>147.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.22</td>
<td>181.6</td>
</tr>
</tbody>
</table>


Table 3: Hebel Wall Panel Thermal Conductivity

Thermal Properties

<table>
<thead>
<tr>
<th>Hebel Wall Panels AAC-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Conductivity</td>
</tr>
<tr>
<td>0.9124 BTU-in/ft²²/F°</td>
</tr>
</tbody>
</table>

Units: BTU=british thermal unit, in= inches, ft²=square feet, h=hour, °F=Fahrenheit

Table 4: Hebel Wall Panel fire rating.
2 Design Considerations

2.1 General considerations

- Hebel Board shall be designed in order to comply with safety and serviceability requirements as specified by ACI 523.4R-09.

- Hebel Board should be installed in horizontal position in a “running bond” pattern.

- The wind loads, according to the region and Local Building Codes, will determine the number of screws required in each Hebel Board.

- Foundation should be constructed with a brick ledge (see Fig. 3a) or by installing a galvanized steel angle (see Fig. 3b).

- A water-resistive barrier (Tyvek®, building felt or similar) should be installed on all wall areas before Hebel Board, windows and doors installation.

- Control joints may be vertical and horizontal and are placed to prevent random cracking due to thermal expansion, contraction and structural movements.

- Vertical control joints should be spaced at 20 ft maximum from each other. The width of the vertical control joints should be 3/8” and should be sealed with backer rod and caulking.

- Horizontal control joints should be placed for multi-story construction according to structural and seismic design.

- The width of the horizontal control joint should be 5/8” for metal frame or 1” for wood frame, and should be sealed with backer rod and caulking.

3 Installation Guide

3.1 General Installation Guidelines

Before Installation of Hebel Board

1. Check the foundation:

- Make sure the slab foundation has a brick ledge of:
  • 2” deep [min] and 2” wide [max] for 2” Hebel Board (see Fig. 3a).
  • 2” deep [min] and 3” wide [max] for 3” Hebel Board (see Fig. 3a).
- In case the foundation doesn’t have a brick ledge, install a continuous galvanized steel angle 2” x 2” x ¼” to support Hebel Board (see Fig. 3b).
- Check level of the brick ledge.

2. Check the structure:

- Verify the complete and proper installation of all studs, trusses, lintels, bracing, reinforcing elements and connectors.
- Check plumb and alignment of studs of external walls. Studs (wood or metal) should not be spaced at more than 16 inches o.c. (please contact Xella’s technical department otherwise).

3. Check Hebel Board pallets:

- Carefully unload the Hebel pallets using an all terrain fork-lift. Flat surfaces are required for unloading and storage areas.
- Place Hebel Board pallets close to their final position around the building and over wood blocks (panels must not be in contact with ground).
- Check Hebel Board quantity.

Fig. 2: Verify structure before Hebel Board installation.
4. Check the utilities:

- Make sure that water pipes have been installed appropriately with all vertical runs located between the studs and not on the external face of the frame.
- Ensure hermetic water and gas pipes.
- Check for electrical conduits, phone lines, TV antenna, cable, dryer ventilation, etc.

5. Application Requirements:

Tools:
- Plastic Bucket
- Masonry Level
- Rubber Mallet (24 oz min)
- Stirrer for Power Drill
- Spatula
- Chalk Line
- Finishing Trowel
- Sanding Float
- Masonry Scrub Brush
- Tape Measure

Equipment:

- Circular Saw (7⅛” min) with metal cutting blade for 2” Hebel Board.
- Circular Saw (10⅛” min) with metal cutting blade for 3” Hebel Board.
- D-Handle Drill ½” for fastening Hebel Board.
- Power Drill ½” (Low RPM) for Stirrer.
- Screwdriving Bits (Phillips).
- Clamps.
- Safety Gear (goggles, dust mask, gloves, apron, hard hat, etc.).

Additional material:

- Cement–Sand Mortar.
- Screws #12 (see Table 5 for specifications).
- Hebel Thin Bed Mortar and Hebel Repair Mortar.
- Fiber Glass Mesh.
- Weather-resistant barrier and cramps-irons.
- Anticorrosive Paint.
- Base-coat, Stucco, and Finish Coat.

Note: Technical support is available for builders and architects. Contact your Xella AAC Texas sales office for more information.
3.2 Hebel Board Installation

a. Water-Resistant barrier

Wrapping the frame before Hebel Board installation is extremely important in preventing the build-up of moisture within the wall. Install it as a flashing under the Hebel Board before windows and doors are installed, extending it from the bottom to the top of the entire height of the wall and around corners. Overlap the roll following manufacturer instructions (see Fig.5).

Attach the water-resistant barrier with cramps-irons over wood or with self-drilling screws over metal studs.

b. Corner Board installation

The first and most important step in Hebel Board installation is placing the corner boards. The corner Hebel Board should be installed in horizontal position with a 2” or 3” overhang (depending on panel thickness), so it may remain flush with the other corner board (see Fig. 6).

It is important to check the level and alignment using a mason’s level. In case of uneven brick ledge, use a ½” of cement-sand mortar bed to ensure the level of the first Hebel Board (maximum bed thickness 1½”). Correct small alignment differences, using a rubber mallet.

For fastening Hebel Board use #12 screws (0.21in) as specified in Tables 5 and 6. Pre-drilling of holes is not required. Use a minimum of 2 fasteners (screws) per stud/board (see Fig. 7 and 8). Excessive tightening can cause damage to Hebel Board, resulting in improper placement.

<table>
<thead>
<tr>
<th>Hebel Board Thickness</th>
<th>#12 Screw Length</th>
<th>Usable Thread Length</th>
<th>Penetration Length (Minimum)</th>
<th>Load Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2”</td>
<td>3-1/4”</td>
<td>2-3/4”</td>
<td>1-1/4”</td>
<td>324</td>
</tr>
<tr>
<td>3”</td>
<td>4-3/8”</td>
<td>3-1/2”</td>
<td>1-3/8”</td>
<td>324</td>
</tr>
</tbody>
</table>

Table 5: Screws specifications.

Fig. 5: Interior side of the water-resistant barrier.

Fig. 6: Overlap Hebel Board at corners.

Fig. 7: Use minimum 2 fasteners per stud / board.

(1) A 4.0 safety factor is considered.
(2) Screw #12 - Roofgrip by ITW-Buildex or similar.
c. Subsequent Hebel Boards

The subsequent Hebel Boards should be mortared and fastened with the appropriate screws to ensure the best results. The Hebel Boards are placed in a running bond pattern using Hebel thin bed mortar to join all board edges and then screw boards firmly into place (see Fig. 8 and 9).

Hebel thin bed mortar is prepared in a plastic bucket, adding water and mortar from the bag [see instructions on the bag] and mixing it with a stirrer on a power drill. Remix before application. Use a brush to clean the joint surface before mortar application. Thin bed mortar is applied using a notched trowel over the horizontal and vertical joints before the next board installation.

The number of screws per board shall be specified by the structural engineer but a minimum of 2 screws per stud must be used (see Tables 5 and 6).

Fig. 8: Typical Hebel Board Wall System.

Fig. 9: Hebel Board in a running bond pattern.
d. Two Story Building

In metal and wood frame construction, the upper Hebel Board can rest on the lower Board as high as 10 rows (20 ft) maximum.

Table 6: Allowable load capacity.

<table>
<thead>
<tr>
<th>Panel Length (ft-in)</th>
<th>Max. number of screws per panel</th>
<th>Allowable load capacity per screw (lb)^123</th>
<th>Allowable load capacity per panel (lb)^1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>6</td>
<td>537</td>
<td>806</td>
</tr>
<tr>
<td>3'-4&quot;</td>
<td>9</td>
<td>806</td>
<td>1209</td>
</tr>
<tr>
<td>5'-4&quot;</td>
<td>12</td>
<td>1075</td>
<td>1612</td>
</tr>
<tr>
<td>6'-8&quot;</td>
<td>15</td>
<td>1343</td>
<td>2015</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>18</td>
<td>1612</td>
<td>2418</td>
</tr>
</tbody>
</table>

1 Studs are considered to be at every 16".
2 Maximum 3 screws per stud.
3 Screws placed at 6" minimum distance O.C. and from panel edge for 2-screw / stud array and at 4" minimum distance O.C. from panel edge for 3-screw / stud array.
4 Use of #12 screws are considered for the results shown in this chart.

e. Surface patching

Use Hebel Repair Mortar to patch chips, breaks and other imperfections on the external surface of the Hebel Board (see Fig. 10).

Hebel Repair Mortar is prepared in a plastic bucket, adding water and mortar from the bag [see instructions on the bag] and mixed with a stirrer and a power drill or by manual means [depending of quantity to be used]. It is applied using a spatula.

f. Windows

The Hebel Board installed below the window should have a sloping sill site cut in the Board. The sill should have a slope of at least 15°.
3.3 Cutting Hebel Board

All Hebel Board can be cut to fit window openings or frame heights. The width of the Hebel Board can be cut to a minimum of 12” along its length except the bottom panel, to avoid breaks and waste (see Fig. 13 to 15).

Cutting procedures:

a) Prepare a flat surface for cutting site.
b) To support Hebel Board, wood pieces must be placed at the edges of the Panel. For transversal cuts, add wood pieces along the side of the cuts. For longitudinal cuts, add wood pieces to avoid cracking in the panel at every 30” (maximum).
c) Check for full contact between wood pieces and Hebel Board. Wedge if necessary.
d) Trace the cut dimension and place a ruler as a guide.
e) Cut the Hebel Board using a circular saw with a metal cut blade (see application requirements).

Note: Hebel Board reinforcement exposed during the cutting process must be coated with any anticorrosive paint.

Caution: Use safety gear: Hard hat, gloves, dust mask and goggles to avoid excessive inhalation of dust and protection of the eyes when handling Hebel Board.
4 RENDERS AND FINISHES

4.1 PRODUCTS

Most finish systems for exterior AAC (Autoclaved Aerated Concrete) Hebel Board consist of three main components: base-coat or stucco, reinforcing mesh, and a finish coat. Additionally, Hebel Board exterior walls can be finished with laminated stones, ceramic or clay tiles, concrete pieces and ornamentals.

SURFACE PREPARATION:
Rasp joints and other areas where the AAC surface is out of plane to a smooth in-plane surface. Surface must be clean, free of dirt, oil and any other foreign matter. Loose or damaged material must be removed. Apply a tinted primer (acrylic based) in case of acrylic base-coats.

BASE-COAT:
Apply a layer (¼” thickness min) of Hebel stucco (cement-based or acrylic) or ⅛” min. of an acrylic base-coat (Sto AAC products or similar), according to manufacturer instructions.

Reinforce base-coat or Hebel stucco using fiber-glass mesh embedded in 100% of the surface area (see Fig. 16 and 17).

FINISH COAT:
Apply ready-mix acrylic based products as decorative and protective finish coat -top-coat- (Sto AAC products, acrylic textures or similar). Apply finish directly over the primed wall surface. Apply finish by spraying or troweling with a stainless steel trowel, depending on the finish specified (see Fig. 18 to 20).

Fig. 16: Base-coat application.
Fig. 17: Fiber glass mesh installation.
Fig. 18: Finished wall (base-coat and texture).
Fig. 19: Hebel Board residencial projects.

Fig. 20: Exterior and interior finish options on Hebel Board walls.

Fig. 21: Hebel Board on exterior walls.