

# Section 4: Architectural Design

4.1 Design Flexibility and Compatibility .....	3
4.2 Moisture Protection .....	3
4.3 Surface Treatments .....	6
4.4 Exterior Surface Treatments .....	6
4.5 Interior Surface Treatments .....	8
4.6 Coating Manufacturers.....	9



## 4.1 Design Flexibility and Compatibility

Depending on the structure, there are fundamentally different considerations to a well designed building. The three most critical design objectives are: aesthetics, functionality and sustainability. Each of these design objectives is significant, yet a truly successful project is one where project goals are identified early on and where the interdependencies of all building systems are coordinated concurrently.

When an Architect uses Hebel Autoclaved Aerated Concrete (AAC), a choice is made to use one of the most versatile, user friendly and environmentally responsible materials.

Design flexibility and compatibility with other building systems is easily achieved with Hebel AAC. The introduction of Hebel AAC should ideally occur during the early phases of a project to capitalize on the many product benefits. This early introduction also proves to be more economical for the Owner and Architect.



**Figure 4.3: Window trimmed with AAC**

Hebel AAC provides a multitude of design options and flexibility. While Hebel AAC can be a major component of the superstructure, it is also compatible with other building systems and materials such as brick, concrete, fiberglass, glass, light gage metal and wood. Creative designs can be achieved with Hebel AAC alone, or by combining these materials without loss of functionality.



**Figure 4.1: Condominiums built of AAC**



**Figure 4.2: AAC building**

## 4.2 Moisture Protection

Moisture protection is a primary consideration in building design and construction. The objective is to eliminate water from causing damage to the building or causing an unhealthy environment. While water does not harm the structure of Hebel AAC, it can result in short-term disadvantages such as increased thermal conductivity, which causes lower thermal insulation performance.

When addressing moisture protection, the properties of the building materials are the first consideration. Hebel AAC's material properties together with protection of the material by a suitable finish do not allow moisture to absorb deep into the material. This is due to the closed pore structure of Hebel AAC. The capillary action breaks down quickly and moisture cannot continue "pulling" very deep into the material. Only the surface directly in contact



**Figure 4.4: Autoclaves where AAC is pressurized and cured**

with the water is affected, allowing installation and finishing to be applied to Hebel AAC walls at various phases of construction. Interior walls and components of the building may be completed at a convenient schedule without concern of water damage.

During the manufacturing process, Hebel AAC is cured in an autoclave. At this time, AAC is under significant pressure and saturated with steam and moisture. By the end of the autoclaving process, the AAC contains approximately 30% (by weight) water, which dissipates naturally over time to stabilize at a moisture content of 4% to 8%.

The initial drying-out process includes two different rates of water dissipation. First, as the internal moisture content of AAC exceeds 18%, it experiences rapid diffusion. Vapor permeable coatings on wall surfaces and interior roof panels do not hinder this diffusion process in most situations. Although, depending on the time of construction, moisture levels can be at or below 18% by the time the building is “dried-in”. With expedited construction schedules, dehumidifiers



**Figure 4.5: A closer look at AAC**

may aid in the initial phase of drying. Vapor barriers should not cover AAC at this stage due to this natural process of water diffusion. After the internal moisture content of the AAC material falls below 18%, the rate of diffusion is reduced. Generally, the rate of drying is low enough that additional moisture and humidity entering the building can be effectively removed by the HVAC system. The moisture from the AAC is minor and unnoticeable to occupants.

High moisture levels are common in building materials during the first few months after construction. Moisture protection is achieved by proper design, detailing and construction practices. To expedite equilibrium of moisture content in AAC, follow these design and construction measures:

- 1) Coatings: Specify and use coatings which repel water, yet allow the AAC to breathe on both interior and exterior walls. These coatings should allow vapor penetration, but not moisture penetration.
  - a. If a waterproof coating which restricts vapor flow through the exterior surface of a wall is applied to AAC, such as a basement wall, moisture within the AAC can only be diffused toward the interior of the building, increasing the time necessary to achieve equilibrium moisture content in the wall. Do not to seal both the interior and exterior surfaces of walls with any type of vapor barrier such as damp proofing on the exterior surface and vinyl wallpaper on the interior surface. If two impermeable systems are used, internal moisture becomes trapped.
- 2) HVAC System: Design of proper air handling systems is critical to building efficiency and occupant health. Air handling equipment should be designed at the proper size for the building needs, using maximum building loads.



**Figure 4.6: Thermal efficiency**

3) Building Envelope: When a structure incorporates both Hebel AAC Wall and Floor/Roof panels together, (with special attention focused on common thermal leaks, such as doors, windows, and other openings) the result can be the highest performance attainable for an air tight building envelope. This adds to the overall thermal efficiency and can positively influence a buildings energy rating. While the moisture content of Hebel AAC decreases during construction, if construction schedules require quick occupancy, dehumidifiers may be desirable during the first year of occupancy. These temporary dehumidifiers would take care of the excess moisture being emitted from the walls and roof systems. In instances where the humidity levels inside a building are high and the temperatures drop below the dew point, condensation will form – regardless of the building materials. As long as the humidity and temperature are properly controlled, the dew point temperature should never be realized. Normal building operating conditions are 75° F and 60% relative humidity. 75° F is well above the dew point temperature of 60° F for 60% relative humidity and condensation formation should not occur. All buildings must be protected from the influence of external moisture sources.

Moisture protection with Hebel AAC is obtained without additional treatments, allowing construction details to focus on simplicity and aesthetics. AAC exterior walls can be finished with water-protecting brick façades or stucco, paints or bituminous coatings and with proper flashing and architectural details. Depending on the desired aesthetics of the building, an exterior wall coating can be chosen from a wide selection of options and will provide the desired moisture protection.

### 4.3 Surface Treatments

Due to Hebel AAC compatibility, various surface treatments are available for exterior and interior applications. Colors and textures can be applied to enhance aesthetic or match existing buildings. Exterior surface treatments include coatings of textured surfaces or smooth, in various colors and designs, paint and a variety of façade options. Interior wall treatments are much the same yet include; gypsum board, wallpaper, tile or paneling.



Figure 4.7: Exterior surface treatment over AAC

With consideration, limitless design variations can be incorporated, including exposed joint or unique coating techniques. Coatings manufactured for AAC are designed to be physically compatible with Hebel AAC products. Select coating manufactures are referenced in Section 4.6. Patching mortars, made specifically for AAC, are available to repair damaged areas preceding the application of surface treatments. Reference the Hebel AAC Installation Guides or specifications and more information.

### 4.4 Exterior Surface Treatments

#### Lightweight Stucco

Coatings such as lightweight Portland cement stuccos must be manufactured specifically for AAC. These stuccos are designed with comparable strength and density properties of AAC to withstand high thermal tension and have permanently high elasticity. To enhance bonding and workability, AAC lightweight stuccos are polymer modified, vapor permeable as well as hydrophobic, preventing water infiltration.

Hebel AAC block applications are generally coated with a single coat of exterior lightweight

stucco at a minimum thickness of 5/16 inch. After the surface has hardened, a texture coat at 1/8 inch follows. Coatings should always be applied in accordance with manufacturer's specification. After the stucco has set, two coats of vapor permeable masonry paint can be applied.

Hebel AAC Panels with mortared joints must be treated prior to the application of coatings. The panel joints should be coated with a thin layer of a cement-based compound. Along the panel joints, an alkaline resistant fiberglass



Figure 4.8: Details of exterior coating



Figure 4.9: AAC's design versatility

mesh should be embedded into the cement-based compound. The basecoat of cement-based compound is applied over the entire surface at a minimum thickness of 1/8 to 3/16 inch. Within one hour, when the basecoat is dry, skip trowel a light texture over the basecoat. Once the textured coat has set, apply two coats of vapor permeable masonry paint.

## Paint

In exterior applications, paint can be applied directly to horizontal tongue and groove panels without mortar. In this application, the paint must seal any surface irregularities of the panels, requiring an acrylic coating with a higher fill capacity. The polymeric coatings are typically applied in two coats to achieve a total thickness of at least 1 mm.



Figure 4.10: Painting over exterior AAC walls

Paint can also be applied directly to walls with mortared joints constructed of Hebel AAC blocks and panels. This application requires precision to achieve an acceptable appearance. Extreme care must be taken in joint preparation.

The joints in a Hebel AAC mortared wall are much thinner than in conventional

masonry construction and therefore are more likely to reveal minor imperfections.

Even with the acrylic coatings noted above, joints may be visible. For applications where appearance is not a dominant consideration, such as industrial buildings or garages, applying paint directly to a Hebel AAC wall can be an inexpensive and time-saving alternative. Any paint that is used must be vapor permeable to allow moisture inside the block to escape.

## Façades

Ventilated façades as an exterior surface treatment is beneficial from a humidity and thermal point of view. Façade treatments such as wood shakes, brick, stone, metal siding, vinyl siding and cementitious panels can be utilized. A furring strip substructure is advantageous since it allows back ventilation. The furring strips are best attached to Hebel using fasteners compatible with AAC. Install all external materials per the specific manufacturer's recommendations. Typical waterproofing details including weep holes, flashing, lapping, connections and membranes should be incorporated in order to achieve the desired weather tight construction.



Figure 4.11: Applying coating to exterior AAC panels



Figure 4.12: AAC with brick façade

## Joint Treatment

Follow coating manufacturer recommendations for joint treatment of exterior and interior joints. In any case, the horizontal and vertical joints in Hebel AAC walls must be weather tight. Consult with your design professional for suitable options depending on the project requirements. All materials must be compatible with AAC.

## Ceramic Tiles

Ceramic tiles are not recommended for direct application to AAC. They do not provide suitable weather protection because of the varied thermal conductivity of ceramics as compared to AAC. This difference can cause considerable tension, leading to loose or cracked surface of the ceramic tiles.

## 4.5 Interior Surface Treatments

### Plaster

AAC Interior coatings are designed for use with Hebel AAC products. Skim coat plasters and lightweight interior plasters must have material properties that are compatible with AAC. To provide maximum adhesion and resiliency, bonding agents are often incorporated into these products.



Figure 4.13: Filling AAC wall panels for a smooth surface

Wall panels should be coated with a skim coat plaster to achieve a smooth, consistent surface. With block applications, lightweight interior plasters provide a thicker coating to level and straighten walls. This also provides a base for interior paints and finishes.

Interior plaster is usually applied in a single coat to a thickness of 3/32 to 1/8 inch, following the manufacturer's recommendations. The surface is then finished to a smooth and even quality.

Depending on the size and complexity of a project, plaster can be applied by either a sprayer or trowel.

### Gypsum Board

Gypsum board may be applied to Hebel AAC exterior and interior walls. Pressure treated furring strips can be used to fasten gypsum boards.

### Wall Tile

Tile can be applied directly to Hebel AAC walls using either a cement thin set mortar or an adhesive. Surface preparation is only necessary when the AAC wall surface requires leveling. If the AAC wall requires leveling, a Portland cement or gypsum-based parge coat can be applied prior to setting the ceramic tile. In moist applications, such as shower areas, use only Portland



Figure 4.14: Tile applied over AAC

cement parge coatings. The ceramic tile can then be adhered to the prepared wall with a cement thin set mortar or an adhesive.

### Paneling

Paneling systems can be installed using furring strips. Wood, plastic, masonite and composite paneling can all be installed using furring strips in the same manner as suggested for gypsum board. The furring strips are best attached to Hebel AAC using fasteners compatible with AAC. An alternative is to fasten the gypsum board directly to the wall using a commercial adhesive and screws only if moisture resistant gypsum board is used. Consistent with standard construction practice, moisture resistant gypsum board is recommended in high humidity regions such as bathrooms and saunas.

### Paint

Hebel AAC walls can be directly painted, yet joint preparation is critical and requires skillful detail to achieve a smooth surface. The joints in Hebel AAC mortared wall systems are thinner than conventional masonry construction and can expose slight imperfections. In applications such as industrial building or garages, where appearance is not a high priority, applying paint directly to an Hebel wall can be an inexpensive and timesaving alternative. Paint used with AAC must be vapor permeable to allow moisture to escape.



Figure 4.15: Interior AAC walls

### Wallpaper

Wallpaper which is vapor permeable can be directly applied to an Hebel AAC wall. Vinyl wallpaper is not recommended. To level or smooth the AAC surface prior to wallpaper installation, use a Portland cement or gypsum-based parge coating.

### Ceilings

Ceilings may be finished with AAC coatings as referenced in this section. Suspended ceilings and grids can be installed and fastened directly into an Hebel floor/roof panel or into pressure treated furring strips fastened to the Hebel floor/roof system.

### Floor Topping

Hebel floor panels are cut to specified dimensions during production. Toppings are usually not required since all Hebel panels are produced with zero camber. If necessary, a leveling topping can be used to create a smoother surface. Hebel floor panels allow toppings such as carpet, vinyl sheet, vinyl composition tile, ceramic tile, rubber tile, terrazzo, wood and linoleum.

## 4.6 Coating Manufacturers

The following pages feature a few AAC coating manufacturers.



Elite Building Products, Inc.  
Contact: Bill Olsen, Don Williams  
Plant Locations: 4235 Buford Highway, Duluth, GA 30114  
2501 CR 544, Haines City, FL 33845  
Phone: 888-403-5483  
Fax: 678-206-0254  
Web: <http://www.elitebuilding.com>  
Email: [support@elitebuilding.com](mailto:support@elitebuilding.com)



Elite Building Products markets a broad range of decorative specialty finishes, patching materials, and thinned mortars for Hebel AAC. Like any good structural material, AAC must be protected against the elements so that its extraordinarily good characteristics are maintained. To accomplish this, Elite Building Products systems and materials were developed which are now a fundamental component of AAC construction.

For more than 30 years Litewall SL has been the chosen exterior stucco finish for autoclaved aerated concrete. Through years of true pioneering research, Litewall SL, Gypspray, Acryl M and other related materials were developed to provide a product family of the highest quality and compatibility with AAC.

Long term durability and decorative appeal is not all that counts. Equally important is having a quality product which is easy to use and highly cost effective. Elite provides this, and as specialists in the materials that compliment AAC, we offer invaluable application and consulting knowledge catered to your project. Please feel free to contact us.



Company: Sider-Oxydro, Inc.  
Contact: Ivan Burgand  
Address: 153 Regur Road, Hawkinsville, GA 31036  
Phone: (478) 892-9800 – Toll Free: (888) 743-3750  
Fax: (478) 892-9820  
Web: [www.sider-oxydro.com](http://www.sider-oxydro.com)  
Email: [marketing@sider-oxydro.com](mailto:marketing@sider-oxydro.com)



Since 1962, Sider-Oxydro's commitment to innovation through technology continues to expand our product line for AAC including:

- Exterior cement and acrylic finishes
- Interior gypsum plasters
- Thin and coarse bed mortars
- Waterproofing
- Repair mortars
- Floor coatings

Our products for AAC are blended under strict regulations and followed by a precise quality control. You can be assured of a perfect blend in every bag. Furthermore, our proven blending technology, use of advanced additives and fiber reinforcement are crucial to assure longevity and durability of our products. Shown by an exemplary track record, the quality and performance of our products equate our dedicated customer service.



**Company:** Sto Corp.  
**Contact:** Michael Sweeney  
**Address:** 3800 Camp Creek Parkway, Building 1400, Suite 120, Atlanta, GA 30331  
**Phone:** 888-786-2955  
**Fax:** 404-346-3119  
**Web:** [www.stocorp.com](http://www.stocorp.com)  
**Email:** [marketingsupport@stocorp.com](mailto:marketingsupport@stocorp.com)



#### **About Sto Corp.**

Sto Corp., based in Atlanta, Georgia, is an innovative world leader and producer of a broad range of versatile cladding and coating systems for building construction, maintenance and restoration. Sto Corp. is ISO 9001 certified and operates production plants strategically located to serve more than 200 distributor shipping locations across North America. At research and development laboratories in the U.S. and Europe, Sto continues to revolutionize the industry with the highest quality products and application technology.

#### **Sto AAC Base Coat SC**

Sto AAC Base Coat SC is a one-component, polymer modified, cement base coat for use on AAC substrates.

#### **Sto AAC Base Coat TC**

Sto AAC Base Coat TC is an acrylic-based material used as a base coat over AAC substrates. It is a two component product to be combined with Portland Cement.

#### **Sto AAC Finishes**

Sto AAC Finish is a ready-mixed, flexible textured wall finish used as a decorative and protective wall finish over prepared vertical, above grade, exterior AAC substrates.

#### **Sto AAC Mesh**

Sto AAC Mesh is a specially designed, coated glass fiber fabric used for reinforcement of AAC substrates with Sto AAC base coat.

**DISCLAIMER.** This document is not intended to replace the knowledge, experience and judgment of design professionals. Xella Aircrete North America, Inc. is **not** responsible for ensuring weather-tightness, overall functionality or fitness for use of the panels, nor compliance with federal, state, or local laws, ordinances or regulations, including building, environmental and other codes.

**WARNING.** Property damage, personal injury or death may result from improper design, use, or installation. Licensed design and construction professionals, who maintain good standing with the governing authority and have the necessary knowledge, experience and judgment of the specific building system and its components, should be retained to ensure a proper design, use, and installation.

**MODIFICATIONS.** Xella Aircrete North America, Inc. reserves the right to change its Technical Manual, Design Guide, safe working loads, panel dimensions or installation techniques at any time without prior notice. Last modified: 1/7/2010.

**WARRANTY/DAMAGES.** This document and all further technical advice are based upon Xella Aircrete North America, Inc.'s present knowledge and experience. However, Xella Aircrete North America, Inc. assumes no liability for providing such information and advice. Xella Aircrete North America, Inc. disclaims all CONDITIONS AND WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. XELLA AIRCRETE NORTH AMERICA, INC. SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INDIRECT OR INCIDENTAL DAMAGES (INCLUDING LOSS OF PROFITS or USE) OF ANY KIND.