Technical Sheet and Installation Guide

Hebel RAAC® Wall Panel

Autoclaved Aerated Concrete

German Technology

hebel RAAC USA Inc.

POWERED BY XELLA GROUP DE

Xella

About us

Xella Aircrete North America, the leading manufacturer of **Hebel RAAC® Autoclaved Aerated Concrete (AAC)** is an amazingly innovative building material that has been used in Europe for more than 80 years and in the US for more than 15 years. Products and systems have been developed for all types of the construction industry: Industrial, commercial, high-rise buildings, schools, hospital and more.

Hebel® AAC is a lightweight concrete that is formed into blocks and reinforced panels for a wide range of loadbearing and non-loadbearing construction applications. It is manufactured from sand, cement, recycled material, lime, gypsum, aluminium paste and water. It is moulded, cut and steam pressure cured in an autoclave before being packed, ready for transport.

Hebel® AAC delivers more benefits than the traditional materials such as strength, acoustics, fire and pest resistance and is installed faster, saving valuable construction time. It has a unique combination of thermal mass and insulation providing a more comfortable living environment.

Why Hebel

One of the world's leading manufacturers of Hebel autoclaved aerated concrete [AAC], Xella Aircrete North America is transforming the building industry with Hebel, its ultra-lightweight concrete.

Committed to providing the United States with environmentally responsible building products that conserve material and energy usage, Xella·s Hebel Aerated Concrete is recognized as the largest producer in Europe by capacity based on management estimates based on different sources and member of the Green Building Council. In addition, it has a high UL rating for fire resistance.

Xella Aircrete North America is a division of Germany-based Xella International.

More than 6.000 employees for Xella's total 97 plants and offices throughout 30 countries worldwide, including North America, Europe and Asia.

Hebel Aerated Concrete provides contractors with strong, easy-to-install blocks and reinforced panels that are one-third the weight of traditional concrete and replace traditional multi-step construction processes. In addition, Hebel is energy efficient, fire resistant and long lasting, which, over time, will reduce energy, insurance and maintenance costs to building owners. A wide range of industries can benefit from Hebel's custom blocks and reinforced panels, including those in the commercial, educational, hospitality, industrial, institutional, governmental and residential markets.

Aerated Concrete Hebel®:
Unique properties in a single material.

Benefits

Thermal Insulation
Buildings constructed of HEBEL AAC provide substantial energy savings in both hot and cold climates. The unique closed cellular structure and the thermal mass contribute to a high R-value and air-tightness which reduce heating and cooling costs and improve indoor air quality. Buildings have seen savings on air conditioning up to 35% by using HEBELMC.

Structural Performance
Strength can resist wind pressures without reinforcement. Shear wall strength can resist lateral loads. High impact resistance.

Fire Resistant
HEBEL AAC has proven to remain fully intact and withstand the stress of fire for up to 4 hours without any impairment to its stability. Even under intense heat, HEBEL AAC remains tightly sealed against smoke and gas, emitting no toxic fumes.

Acoustic Insulation
The solid wall construction of a building made of Hebel AAC provides exceptional acoustic insulation. Its porous structure and high surface mass, coupled with its ability to dampen mechanical vibration energy, greatly reduces outside environmental.

Resistance to humidity
Your works are always protected against moisture. It allows the passage of water vapor, reducing condensation. It is an inert material.

Green Building
Hebel and green building attributes

- Recyclable, inert & non-toxic.
  Energy saving, manufacturing through occupancy.
  Excellent life-cycle cost.
  Durable, natural finish options.
  Supports LEED credits.

Add up USGBC LEED Credits with Hebel

Physical Properties

The physical properties of HEBEL Autoclaved Aerated Concrete are unique to any other building material. Properties such as thermal insulation and fire resistance can not be met by another product alone.

- **Speed of Construction**
- **Thermal Insulation & Energy Savings**
- **Superior Fire Resistance**
- **Sustainable**
- **Relatively high strength for a low density**
- **Workability**
- **Acoustic Performance**
- **Precision**

This product meets Standards and Evaluation issued by:

ENERGY EFFICIENCY made in Germany

ASTM C 1693-11
ASTM C 1660-09

cradle to cradle PRODUCTS PROGRAM PRODUCTS

eco INSTITUT TESTED PRODUCT ID 0808 - 47110 - 001

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Uses and applications

The Hebel wall panel system uses its excellent thermal, fire resistance, and lightness features to be one of the best options as curtain wall solution in industrial and commercial projects. The process is simpler and quicker than conventional methods.

Construction Advantages

- Superior Fire rating.
- Speed of Construction.
- Durability (Low maintenance]
- Lightweight (37pcf]
- Lightweight equipment needed to install.
- 5 people crew to install.
- Custom made.
- Workability.

Application:

- Commercial
- Industrial
- Hospitality
- Assisted Living
- Dorms
- Fire walls

Certifications:

NOM, ONNCCE, ASTM, UL, IAPMO, ACI, USGBC, TOI.

More benefits of Hebel® Wall Panel

- Fire resistance.
- Strength and security.
- Wind load capacity.
- Acoustic performance.
- Thermal performance.
- Pest and rot resistant.
- Not Mildew.
- Low maintenance.
- Friendly to the environment and Sustainable.
- Grants LEED points.

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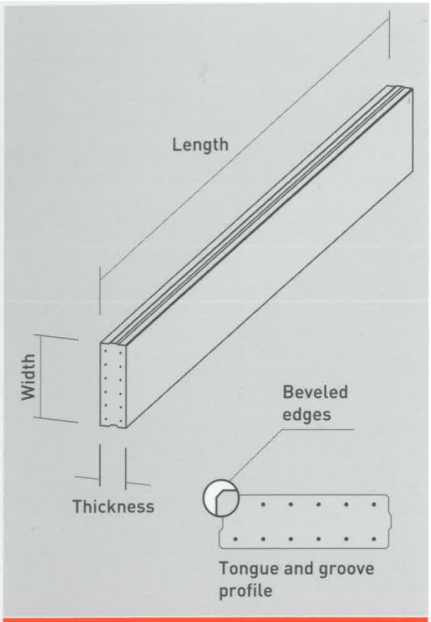


Fig. 1: Hebel® Wall Panel (AAC steel reinforced element).

1 Technical Sheet

1.1 Hebel® Wall Panel

General Features

Lightweight, fire resistant*, water penetration resistant**, pest resistant, fast and easy to install, versatile and affordable. Hebel AAC Wall Panel is a steel reinforced element. Reinforcement is Grade 70 steel covered with an anti-corrosive coat. Manufactured according to ASTMC1693/ASTMC1694

* Under ASTM E119-95 UL®
** ASTM E514

Uses

Hebel® Wall Panel can be used with steel or concrete structures as curtain walls in horizontal and/or vertical arrangement. Suitable for commercial and industrial buildings.

Dimensions
Length:[1] Up to 20 ft.
Width:[2] 24 in.
Nominal Thickness: [2][3] 4, 5, 6, 7, 8, 10 and 12 in.

[1] Tolerance ± 3/16", [2] Tolerance ± 1/8", [3] Nominal Thickness. Manufactured according to ASTM C 1693 / ASTM C1694.

Characteristic	Unit	AAC-4 Class	AAC-6 Class
Compressive Strength (f'aac)	psi	580	870
Nominal Density	pcf	31	37
Design Weight	pcf	37	45
Drying Shrinkage	%	<0.02	<0.02
Thermal Expansion Coeficient	1/°F	4.4×10^{-6}	4.4×10^{-6}
Modulus of Elasticity	psi	295,800	377,000
Thermal Conductivity	BTU-in/ ft²-h°F	0.9124	0.9811
Allowable Bearing Stress	psi	348	523

Table 1: Physical and Design Properties.

Design Weight				
Thickness*	AAC-4		AAC-6	
in	psf	lb/ft**	psf	lb/ft**
4	12.3	24.6	14.7	29.5
5	15.3	30.7	18.4	36.9
6	18.4	36.9	22.1	44.2
7	21.5	43.0	25.8	51.6
8	24.6	49.1	29.3	59.0
10	30.7	61.4	36.8	73.7
12	36.8	73.7	44.2	88.5

*Nominal dimension. **Considering a 24 in panel width.

Table 2: Wall Panel Weight.

Thermal Properties		
Thickness* in	Thermal Resistance "R" ft² h °F/Btu	
	AAC-4	AAC-6
4	4.32	4.40
5	5.39	5.50
6	6.47	6.60
7	7.55	7.70
8	8.63	8.80
10	10.79	11.0
12	12.95	13.19

*Nominal dimension.

Table 3: Hebel® Wall Panel R' Value.

Acoustic Performance		
Assembly Type	STC	Report No.
Hebel® 6" wall AAC-4 Unfinished	44	AS-TL958AX
Hebel® 8" wall AAC-6 Unfinished	50	AS-TL1026AX
Hebel® 10" wall AAC-4 Unfinished	50	AS-TL978AX

***Note:** Testing performed at Acoustic Systems Inc., Austin, TX in accordance with ASTM E90, "Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions".

Table 4: Hebel® Wall Panel acoustic performance.

Fire Perfomance			
Material	Thickness* in	Fire Rating Hrs.	UL Design Number (UL Fire Resistance Directory 1998)
Reinforced Wall Panels AAC-4 and AAC-6	6 and up	4	U920

Note: Testing performed at Underwriters Laboratories Inc. under ASTM E119 (UL/ANSI 263) "Fire Tests of Building Construction and Materials".

Table 5: Hebel® Wall Panel fire rating.

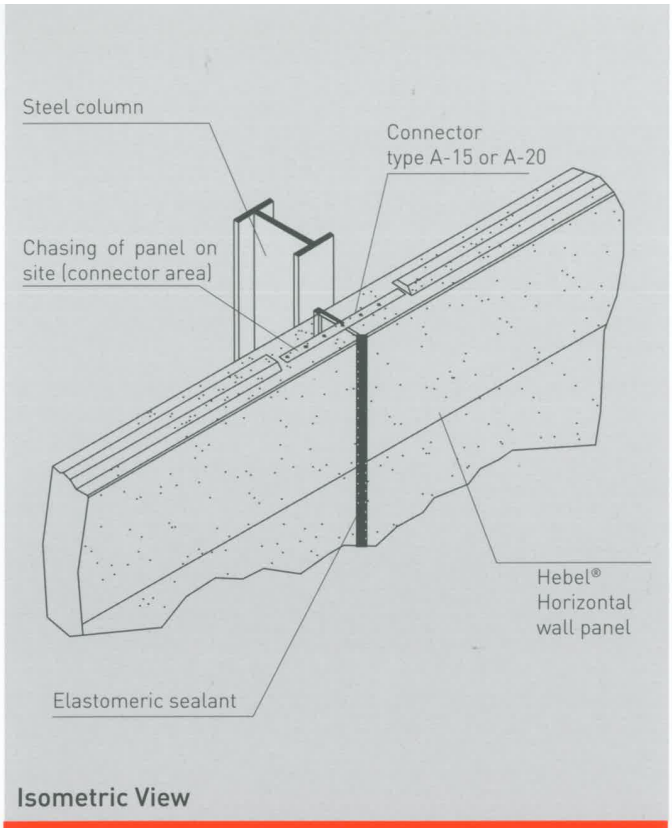


Fig. 2: Typical connection in Hebel® Horizontal Wall Panels using type "A" connector.

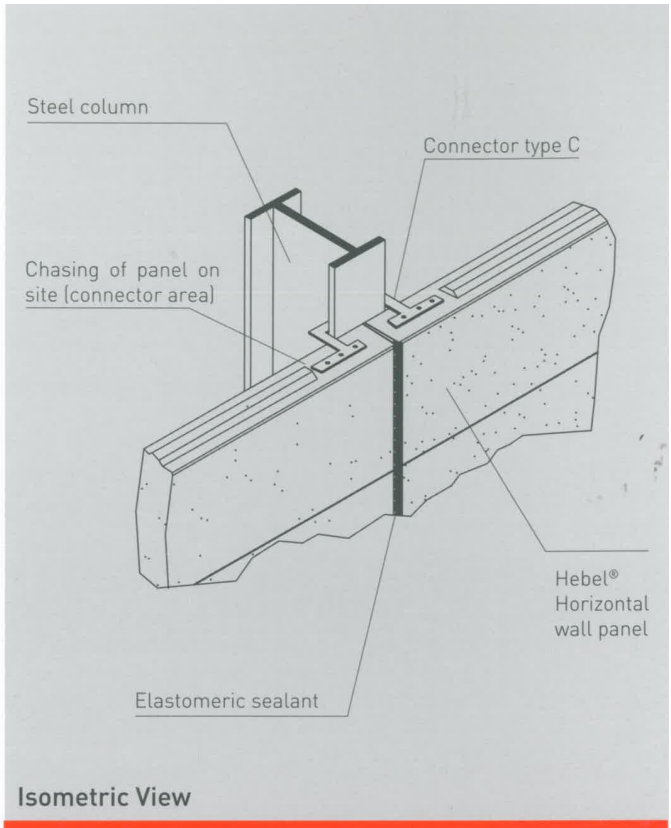


Fig. 3: Typical connection in Hebel® Horizontal Wall Panels using type "C" connector.

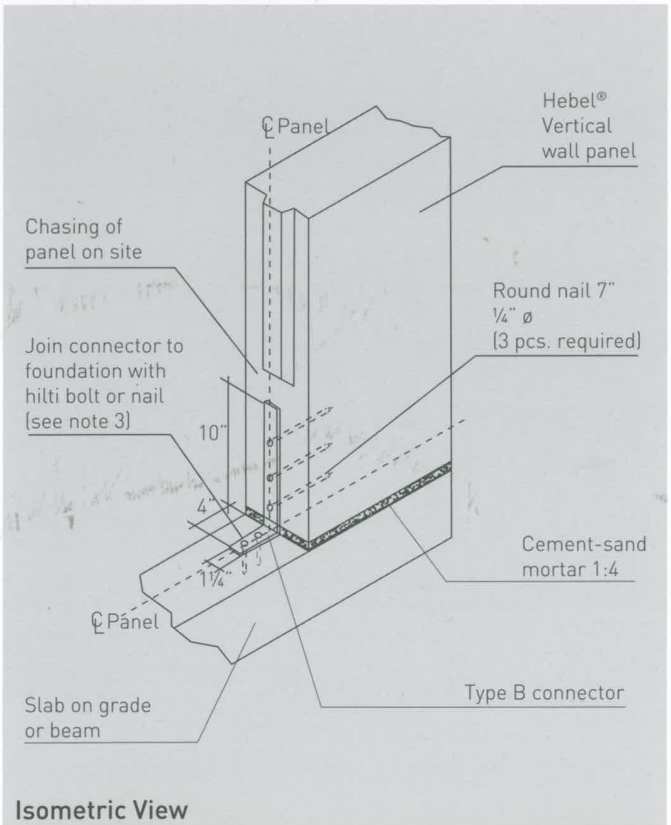


Fig. 4 : Typical bottom connection in Hebel® Vertical Wall Panels using type "B" connector.

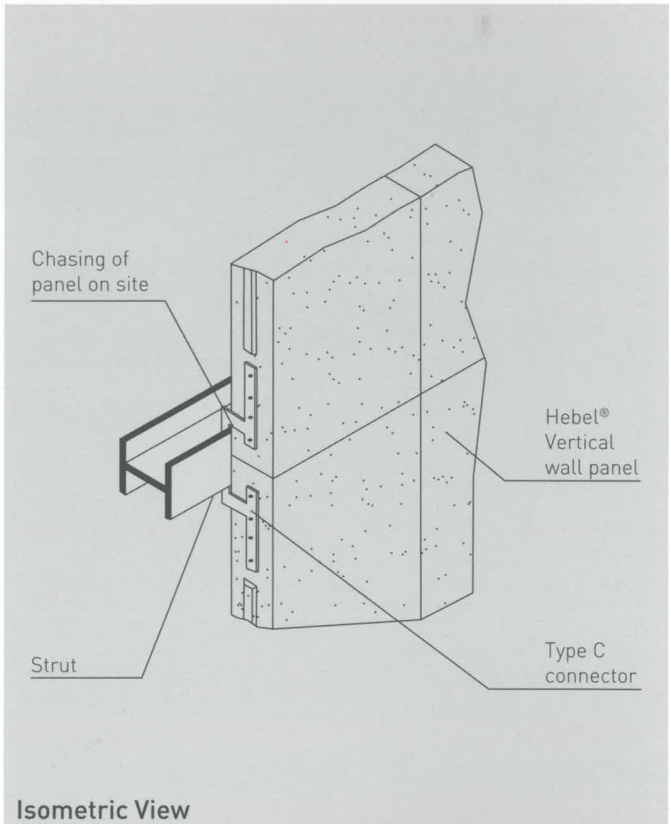


Fig. 5: Typical middle connection in Hebel® Vertical Wall Panels using type "C" connector.

2 Design Considerations

2.1 General Considerations

- Hebel® Wall Panels can be used as a partition or curtain wall and shall be designed in order to comply with safety and serviceability requirements as specified by ACI 318-95 and following guidelines of ACI 523.4/R-09.

- Main structure [steel or concrete] should be designed according to Local Building Codes.

- The design of Hebel® Wall Panel should consider wind loads according to Local Building Codes and the slenderness ratio must be revised as follows:

  al Hebel® Wall in horizontal arrangement:

- Maximum quantity of panels installed without brackets: 20 pieces [maximum total height: 40 ft].

- Panel slenderness ratio:
  Forts;?in. l/ts;40
  Fort2':Sin. l/ts;38
  For fitting units
  I16 in **s;** b **s;** 24 in) l/t **s;** 35

  Where: t=Panel thickness, l=Panel length, b=Panel width.

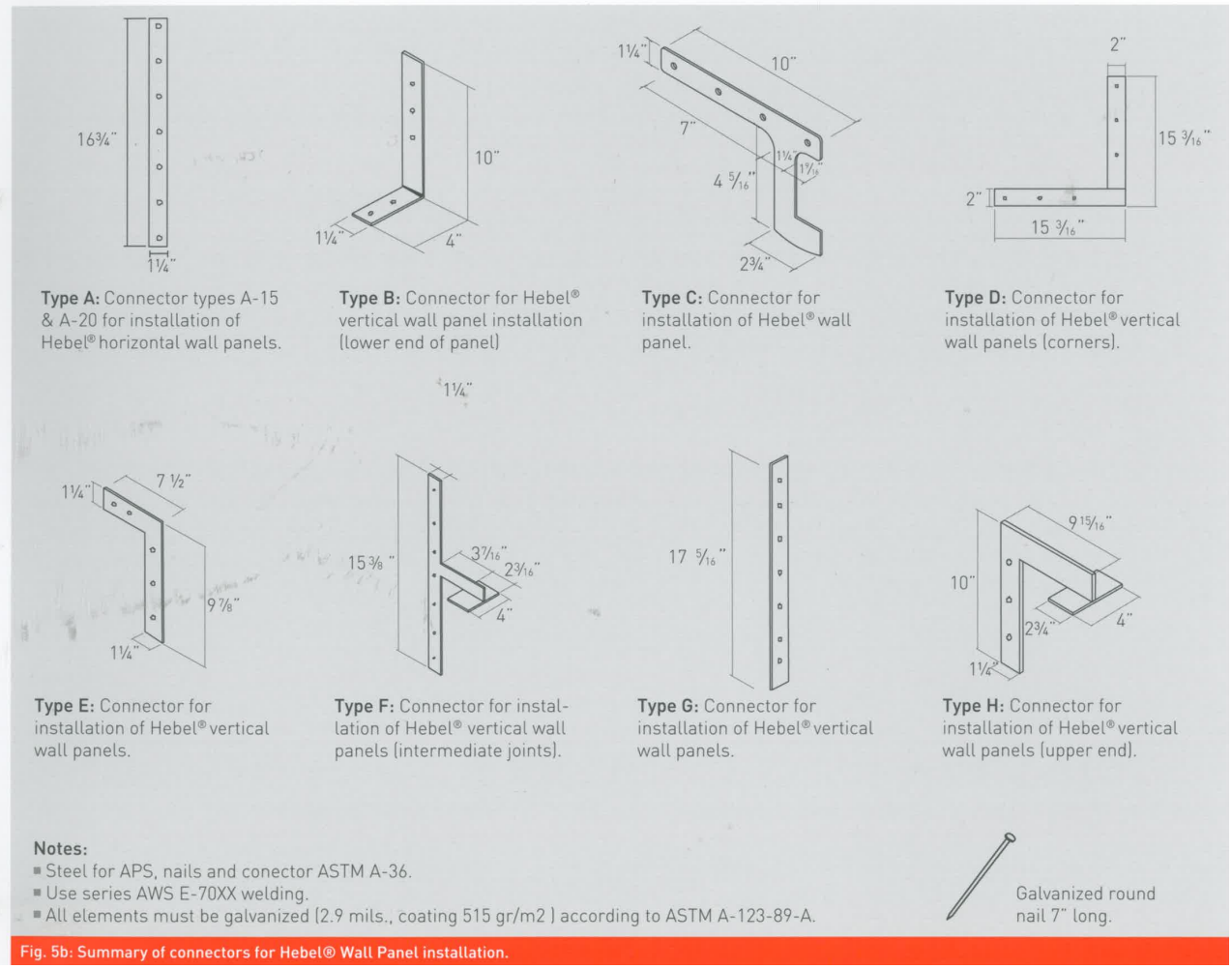
  b] Hebel® Wall in vertical arrangement:
  - Maximum height of wall: 60 ft
  - Panel slenderness ratio:
    For single unit walls or top course of a multi-course wall l/t **s;** 40

    For multi-course walls, except the courseontop l/ts;35

    Where: t=Panel thickness, !=Panel length, b=Panel width.

- Fitting panels should not be less than 16 in. wide. If more than one fitting panel is required on a wall, at least two normal [non-fitting] panels shall be installed between them.

- Maximum capacity for steel connectors can be checked in Table 1.



Type A: Connector types A-15 & A-20 for installation of Hebel® horizontal wall panels.

Type B: Connector for Hebel® vertical wall panel installation (lower end of panel)

Type C: Connector for installation of Hebel® wall panel.

Type D: Connector for installation of Hebel® vertical wall panels (corners).

Type E: Connector for installation of Hebel® vertical wall panels.

Type F: Connector for installation of Hebel® vertical wall panels (intermediate joints).

Type G: Connector for installation of Hebel® vertical wall panels.

Type H: Connector for installation of Hebel® vertical wall panels (upper end).

Notes:
- Steel for APS, nails and conector ASTM A-36.
- Use series AWS E-70XX welding.
- All elements must be galvanized (2.9 mils., coating 515 gr/m2) according to ASTM A-123-89-A.

Galvanized round nail 7" long.

Fig. 5b: Summary of connectors for Hebel® Wall Panel installation.