Installation Guide

Hebel RAAC ® Masonry Components

Autoclaved Aerated Concrete

hebel®

Index

- Hebel RAAC® U-Block units can be used to build bond beams and lintels (to span door and Windows openings)

- Special Considerations for construction located on seismic areas must be followed in accordance with section 2106 of the IBC Code.

- Control joints on Hebel RAAC® Masonry AAC reinforced walls must be placed at máximum 16 ft o.c. (see Fig. 6 and 20)

1 Installation Guide

Before Installation of Hebel RAAC® AAC Masonry Components

1.1 Check Foundation

Foundation must be designed according to Local Building Codes.

Reinforced Masonry requires rebars for pilasters, vertical reinforcement (see Fig. 6). Rebar spacing must be according to Local Building Codes, IBC and ACI Codes. At opening locations (doors, Windows, etc), vertical rebar for pilaster must be placed on both sides (or less than 2 ft) of window and door openings (see Fig. 20).

Before concrete is poured, check slab dimensions and reinforcement to comply with construction drawings. Ensure the pipes, drains and other penetrations trough the slab have been installed

Fig. 4: Hebel RAAC® Block pallets.

Fig. 6: Check foundation (pipes, drains, reinforcement,etc).

properly. A brick ledge is recomended for the exterior walls (see Fig. 8).

Hebel RAAC® Masonry Components installations will be easier on a level slab.

1.2 Receiving and Distribution of Hebel RAAC® Wall Units

Carefully unload the Hebel® pallets using an all terrain forklift. Rubbing between pallets can cause damage to some pieces. Place pallets around the slab (above ground level) and close to work area (see Fig. 4 and 5).

1.3 Installation Requirements

The actual list of tools, equipment and other materials will depend on type of proyect and workforce.

Fig. 5: Forklift and flatbed trailer.

Tools:

- Hebel RAAC® Notched Trowel.
- Rubber Mallet (24 oz min).
- Brick Trowel.
- Masonry Level.
- Masonry Scrub Brush.
- Sanding Float.
- Hebel RAAC® Plastic Bucket.
- Spatula.
- Chalk-Line.
- Nylon Construction Line.
- Wooden Line Blocks.
- Tape Measure.

Equipment:

- ½" Power Drill.
- Stirrer for Power Drill.
- Hebel RAAC® Hand Saw.
- Hebel RAAC® Square.
- Hebel RAAC® Electric Band Saw (optional).
- Hebel RAAC® Chasing Tools.
- 4½" Angle Grinder.
- Safety Equipment (Hard hat, face shield, goggles, dust mask, earplugs, gloves, safety shoes, etc.).

Other Materials:

- Hebel® Metal Strip Connectors.
- Fiberglass Mesh.
- Backer-rod & Caulking.
- Cement-Sand Mortar.
- Hebel® Thin Bed Mortar.
- Hebel® Repair Mortar.
- Hebel® Stucco.
- Hebel® Rustic Finish.
- Base-Coats, Textures, etc.
- Anchors & Hebel® Nails.

1.4 Mixing Hebel® Thin Bed Mortar

Hebel RAAC® Thin Bed Mortar is prepared in a plastic bucket, adding clean water (for half bag of mortar add approximately 1.1 gallons of water) and mix with a stirrer using a power drill. Remix before application.

The consistency should allow mortar to flow easily through a notched trowel, leaving the shape of the teeth in the mortar bed (see Fig. 15). Mortar workability time is 4 hours.

Fig. 7: Tools and equipment.

1.5 Installing Hebel RAAC® Cored Block for Pilasters in First Course

A simple way to buil pilasters is by using Hebel RAAC® Cored Block units. They should fit over a rebar that is sticking up from the foundation, according to construction drawings. Optionally, if rebar is not embedded or misplaced, drill a hole into the slab, fill up the hole with epoxy adhesive and insert the rebar (see Fig. 8).

1.6 Hebel RAAC® Masonry Components Installation

a.Mark and Level the Slab

Once the foundation is ready, it will be necessary to mark (using a chalk line) the position of the walls, including door openings, in accordance with construction drawings. It is recommended to apply a water proofing barrier on the slab anywhere Hebel RAAC® Block Components will be installed (see Fig. 8).

Check around the reference wall lines marked on the slab to locate the highest point. At this point, add ½" (of cement-sand mortar bed) to 7 7/8" (of Hebel® Block height) to obtain the "top of leveling course".

It is recommended to set the string line level from the "top of leveling course point ro assure level first course. The string should be stretched, hooking the line blocks properly. At the same time, the line should be checked using a line level.

b.Laying the First Course (Leveling Course)

Using a brush, clean block surface before installation. Lay the first course over a semi-dry cement-sand mortar leveling bed (minimum ½" thickness, maximum 2" thickness) see Fig. 10. Corner block are laid first and the first course should be completed before second course installation. Once the corner blocks are placed, use a brush to clean next block surface before mortar application. For next blocks, apply Hebel® Thin Bed Mortar.

c.Cutting Block (Adjustments and Chases)

A Hebel RAAC® handsaw or a band saw can be used to cut the block to specific lengths (adjustment pieces) see Fig. 17.

If required, cut a chase for utilities not exceeding the máximum depth of chases (see Section 3.7 – Utilities Installations).

d. Placing Control Joints in First Course

The location of control joint should be specified in construction drawings. Hebel RAAC® joints are vertical joints taken

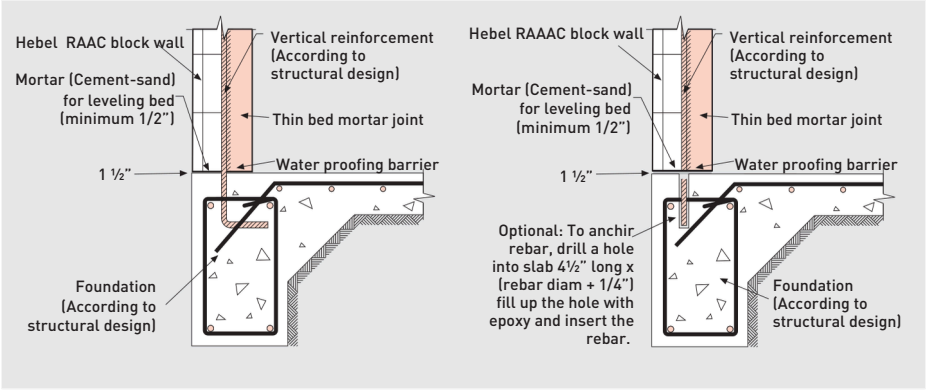

Fig. 8: Anchoring vertical reiforcement to foundation.

Fig. 9

Fig. 10

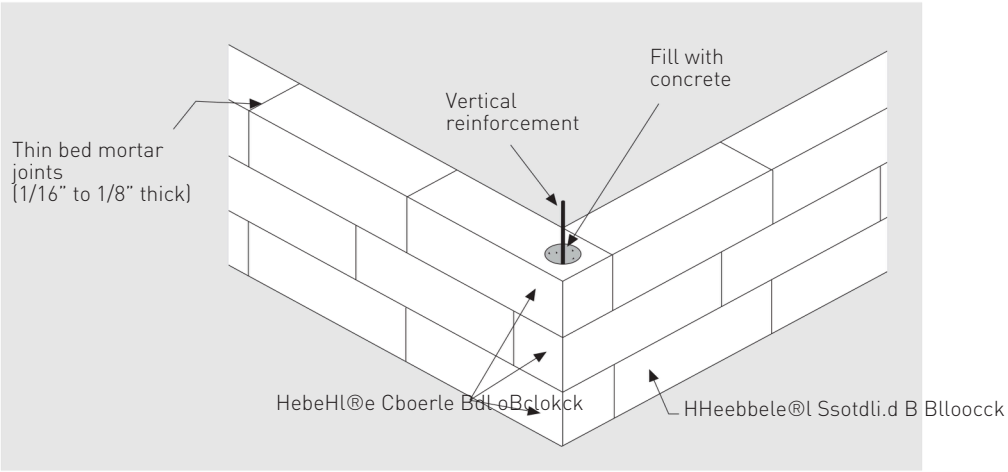

Fig. 11: Pilaster located at corner

through the full wall thickness and from bottom (first course) to top. The width of the control joints should be 3/8" thick but no more than ½ thick. The maximum space between Hebel® joints should be 15 ft (see Fig. 14 and 20).

e.Laying the Subsequent Courses

For subsequent courses, use only Hebel® Thin Bed Mortar on all joints between Hebel® Blocks (see Fig. 15). Use a brush to clean the block surface before mortar application. After block installation, remove spilled mortar using a spatula. Minimum overlapping of vertical joints between layers should be 4 inches (see Fig. 20). It is recommended to check alignment and level after each unit installation to achieve a plumbed wall.

Hebel® metal strip ties should be placed every two courses at:

- Connection of secondary walls to main walls.
- Connection of walls to concrete columns.

f.Installing Hebel® Cored Block in Subsequent Layers for Pilasters

It's very important to check that Cored Block holes between courses are properly aligned when installing. Make certain that all rebars attaches to bars sticking up from the foundation comply with reinforcement specifications.

g.Control Joints in Subsequent Layers

Metal strips folded at midpoint (V-shaped) should be set at every 2 courses unless there are two pilasters (vertical reinforcement) on both sides of control joints (one pilaster each side) and less than 10" from control joint (see Fig. 20). Once the wall is built, fill the gap using backer-rod and seal with caulking.

h.Fill Up Pilasters

Procede to pour concrete (f'c= 3,000 psi min) into pilasters (cylinders) to complete wall Fig. 15 installation (see Fig. 18).

i.Building On-Site Lintels Using U-Blocks

When the use of Hebel® Lintels are not possible, and depending on the span and service load, lintels over door and windows openings can be made on site using Hebel® U-Block.
Install temporary bearer and prop supports before putting U-Block in place. Apply Hebel® Thin Bed Mortar to the vertical joints (see Fig. 16).
Once the U-Blocks are set, place construction rebars according to drawings and with concrete (see Fig. 19 and 20).

Caution: Use safety gear: Hard hat, dust mask and goggles to avoid excessive inhalation of dust and protection of the eyes when handling Hebel® Masonry Components.

Fig. 12

Fig. 13

Fig. 14

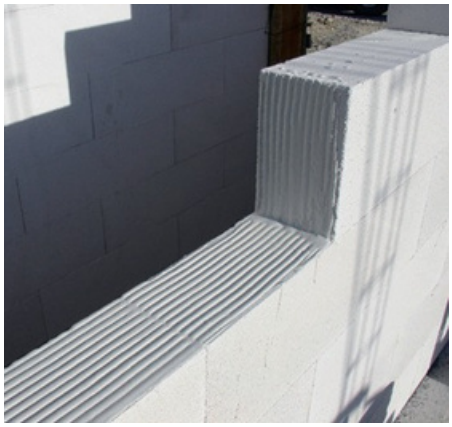

Fig. 15

Fig. 18

Fig. 21: Construction interior view.

Fig. 16

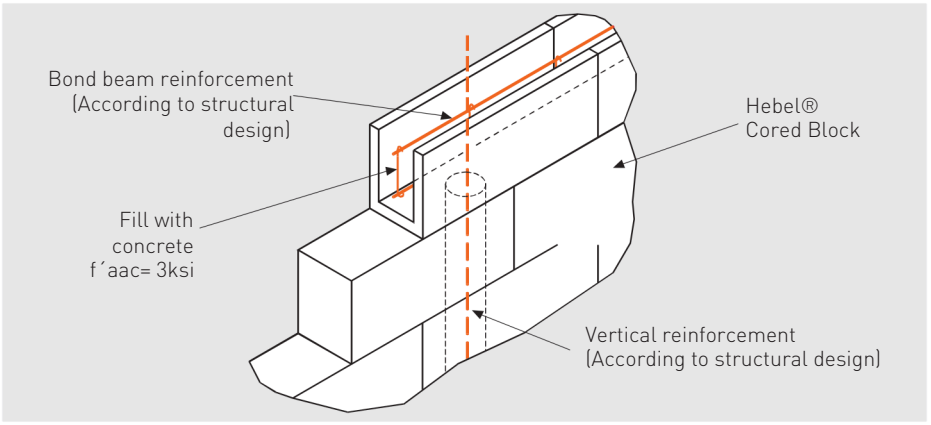

Fig. 19: Bond beam and pilaster connection.

Fig. 17

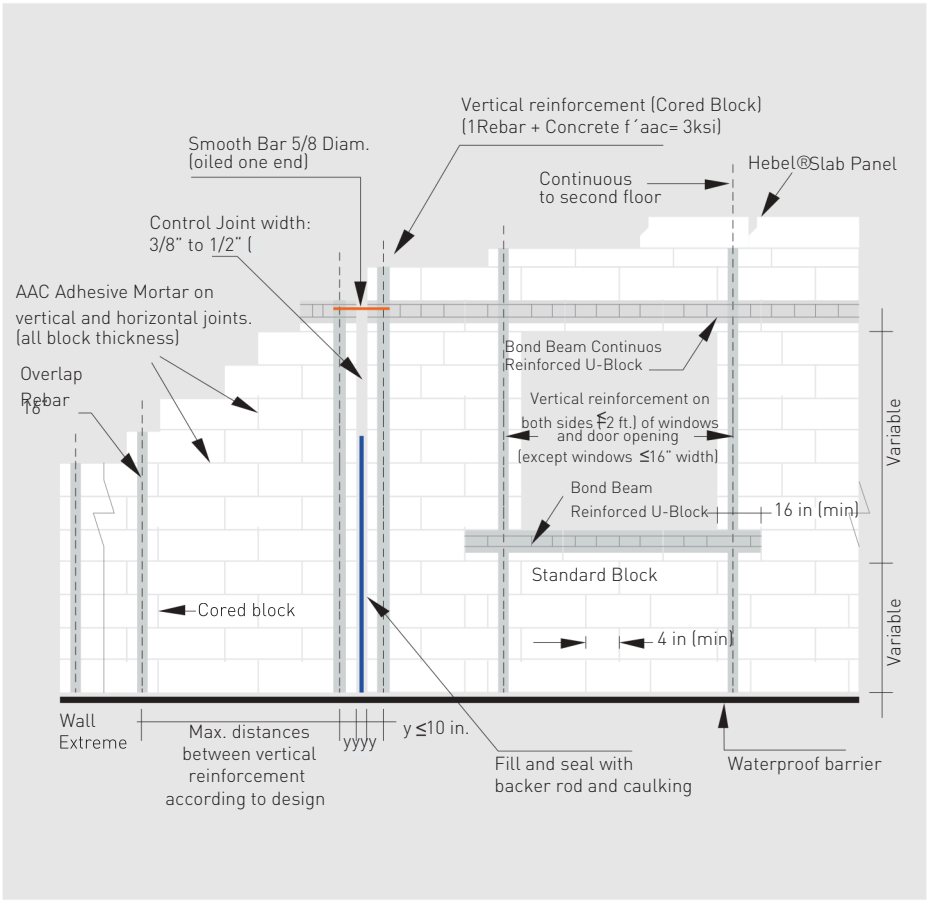

Fig. 20: Reinforced Masonry details and specifications.

Fig. 22: Three-story hotel construction.

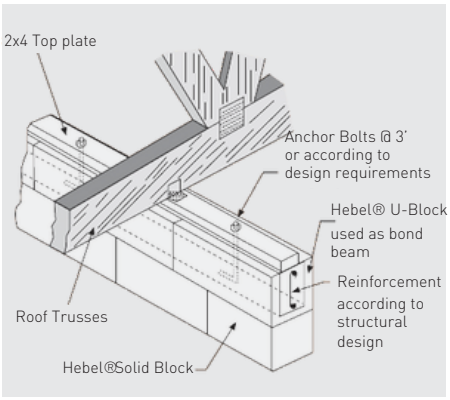

Fig. 23 A: Anchoring wood top plate to U-Block top bond beam.

Fig. 23 B: Anchoring wood top plate to U-Block top bond beam.

j.Installing U-Blocks to Build Bond Beams

Generally, bond beams are required through the top of the exterior and interior walls. Lay U-Block course, applying Hebel® Thin Bed Mortar on all joints (vertical and horizontal joints). At each pilaster location, drill a hole in the bottom side of the U-Block so the vertical bars can be attached into the bond beam, to comply with the reinforcement requirements.

Before pouring concrete, place rebars and anchor bolts according to construction drawings (see Fig. 19 to 23)

Fig. 24: Hebel®chasing tools.

Fig. 25: Water supply pipes.

Fig. 27: Electrical conduits in Hebel® Wall.

1.7 Utilities Installation After the Walls are Built

For electrical conduits and piping installation, cut a chase using an electrical router or a chasing tool.To lodge electrical boxes, a power drill (drill bits) or router can be used (see Fig. 24 and 25).

When the required depth of chase is bigger then maximum depth recommended, use additional Hebel RAAC® Cored Blocks to lodge the pipes or interrupt wall continuity (see Fig. 26).

After installation, use Hebel RAAC® Repair/ Patching Mortar or cement-sand mortar to fill the chases (see surface patching). During finishing step, place fiberglass mesh over the repair area according to recommendations (see Section 4 and Fig. 29).

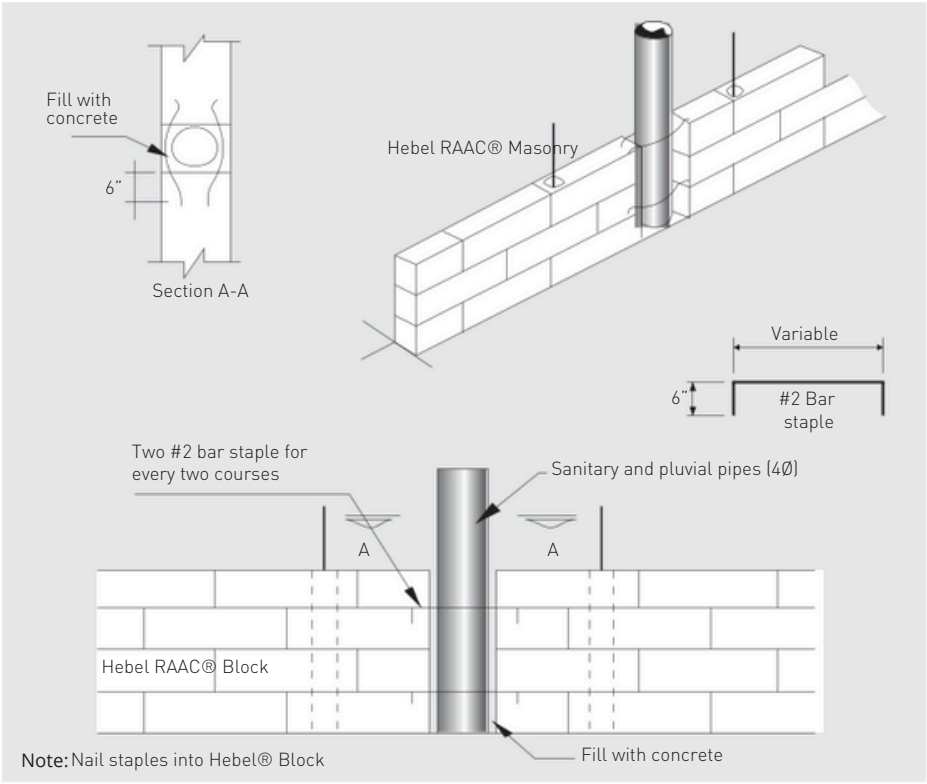

Fig. 26: PVC drainage pipe detail.

2 Renders and Finishes

2.1 Products

Surface Patching

Rasp block joints and other areas where the AAC surface is out of plane. Surface must be clean, free of dirt, oil and any other matter. Loose or damaged material must be removed.

Use Hebel RAAC® Thin Bed Mortar, Repair Mortar or cement-sand mortar to patch chips, breaks, chases for utilities and other imperfections on the wall aurface. Products are applied using a spatula or trowel.

Before application, clean surface using a scrub brush. After application, a rubber float is commonly used to smooth the Wall Surface.

Fiberglass Mesh

Hebel RAAC® fiberglass mesh should be installed directly over one layer of render (embedded into first coat of plaster, e.g stucco) in all control joints, around windows, doors, and through utility locations (see Fig. 29).

Fig.28:Builtusing Hebel® Masonry Components.

Finishes

Hebel RAAC®masonry walls can be finished with Hebel RAAC® stucco, acrylic texture coats, or a combination of stucco as a base-coat and acrylic texture as a finish coat, also laminated stones, ceramic or clay tiles, concrete pieces and ornamentals products.

Base-Coat

Apply a layer (¼" thickness minimum) of stucco (cement-based or acrylic) or acrylic base-coats (Hebel RAAC®, STO AAC products or similar), according to manufacturer instructions. Reinforce base-coat using fiberglass mesh embedded partially (see Fig. 29) or in 100% of the surface area according to base-coat manufacturer.

Finish Coat

Apply ready-mix acrilic based products as decorative and protective finish coat (top-coat). Apply finish directly over the primed wall surface. Apply product by troweling with a stainless steel finishing trowel, depending on the finish specified (see Fig. 28).

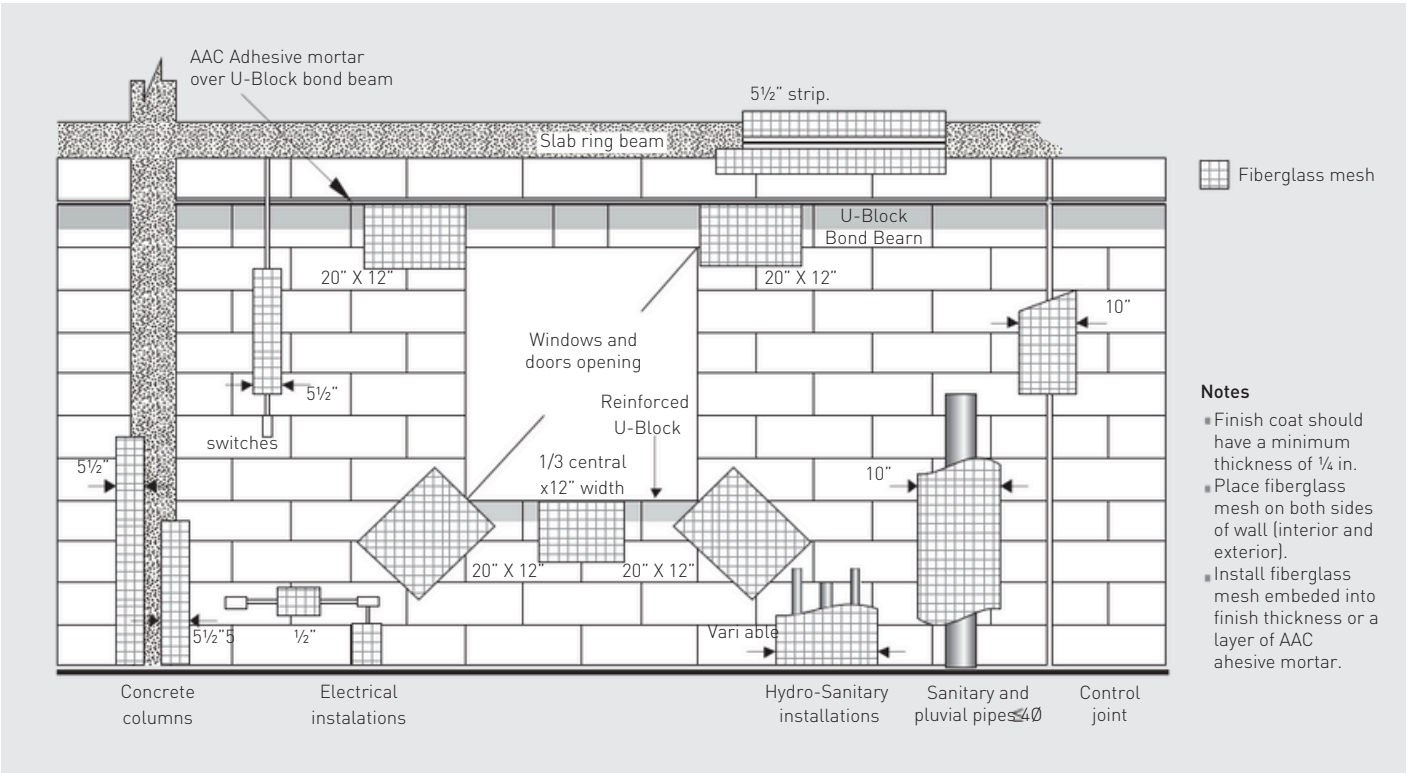

Fig. 29: Fiberglass mesh installation.

5. Fastners

Fasteners

Anchors used with AAC shall be made of plastic or nylon. Wood, fiber, lead, metal or expansión anchors are not recommended. Use power drills to make holes for fasteners and masonry drill-bits recommended (diameter) on table 9 (drill-bit diameter may differ from recommended by fastener manufacturer; specifications have been adapted for AAC). Percusion drilling or inverting the rotation direction when drilling shall be avoided. The anchor shall penetrate tightly in the hole to avoid rotation when placing the screw. When using Fischer anchors, the external finish layer surrounding the hole should be removed to allow the anchor to fully penetrate into the AAC element.

Hebel® AAC Nail:

Hebel®galvanized AAC nails are designed specifically to provide a definitive anchorage in the AAC. Hebel® AAC nails are directly hammered-into the AAC element – no drilling is required.

Screws

Always use screws of the diameter recommended on table 9. Minimum length of screw is defined by the anchor length plus the thickness of the finish layer and the thickness of the element to be fixed.

Precautions

Load values (pull-out strength) shown in chart shall be used only as a reference suggested guide; field testing is

according to project requirements. The load values (lb) shown in chart are for direct pull-out and a safety factor of 5 is included in them. Full penetration of screws into the anchor is assumed to obtain such load values.

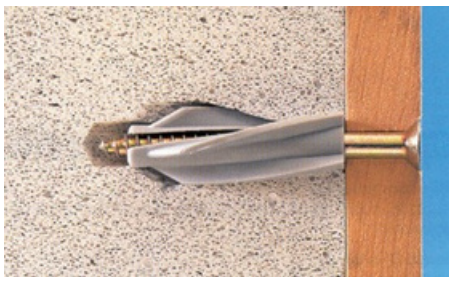

Fig. 30: Minimum screw length.

Allowable Pull-Out Loads
Anchoring to Autoclaved Aerated Concrete

AAC Fasteners & Hebel RAAC® Nails	Anchor / Nail		Drill Bit	Screw	LoadValue* (pull-out strenght)	
					AAC-4	AAC-6
	Length	ØDiam			Block & Panel	
	in	in	Ø in	# or Ø in	lb	lb
Hebel® AAC Nail 4"(1) (min penetration: 3")	4	¼	Fixed directly with hammer	Not Required	51	88
Hebel® AAC Nail 4"(1) (min penetration: 3")	6	¼	Fixed directly with hammer	Not Required	88	137
Universal Plastic Anchor(2) (For use in all solid walls)	11/8 11/2 2	¼ 5/16 3/8	¼ 5/16 5/16	#10 #12 ¼	22 26 44	26 31 62
Thorsman(2)						
Anchor Red TP 2X (4)	13/8	¼	3/16 ¼	#8 #10	37 ---	--- 42
Anchor Brown TP 2B	15/8	5/16	¼	#10	49	62
Anchor Blue TP 3	13/4	3/8	5/16	#12	73	84
TOX VLF(3)				Anchor		
Anchor 6/70	23/4	¼	¼	with screws	66	---
Anchor 8/80 - 8/135	31/8+	5/16	5/16	included	102	---
Anchor 10/100 - 10/160	4+	3/8	3/8	(pre-assembled)	120	---
HILTI(2)						
Anchor HUD-1 (10x50)	2	3/8	3/8	5/16	71	90
Anchor HUD-1 (12x60)	23/8	1/2	7/16	3/8	128	185
Fisher(1)						
Anchor GB10 (5)	2	3/8	3/8 1/2	¼ ¼	126 ---	--- 104
Anchor GB14	3	5/8	5/8	3/8	165	225
Anchor S10H80R	31/8	3/8	3/8	5/16	123	150

Notes: (1)Available at Xella Aircrete North America, Inc. (2)Available at Hilti Shops, Home Depot, Lowe's, etc. (3)Available at www.demandproducts.com (4)For AAC-6 (Block & Panel) use 1/4" drill bit. (5)ForAAC-6 (Block & Panel) use 1/2" drill bit. *Safety Factor [SF]=5. Use masonry drill bits. Anchorsdo not include screws (except TOX anchors).

Table 9: Anchoring into Hebel® AAC Masonry components.

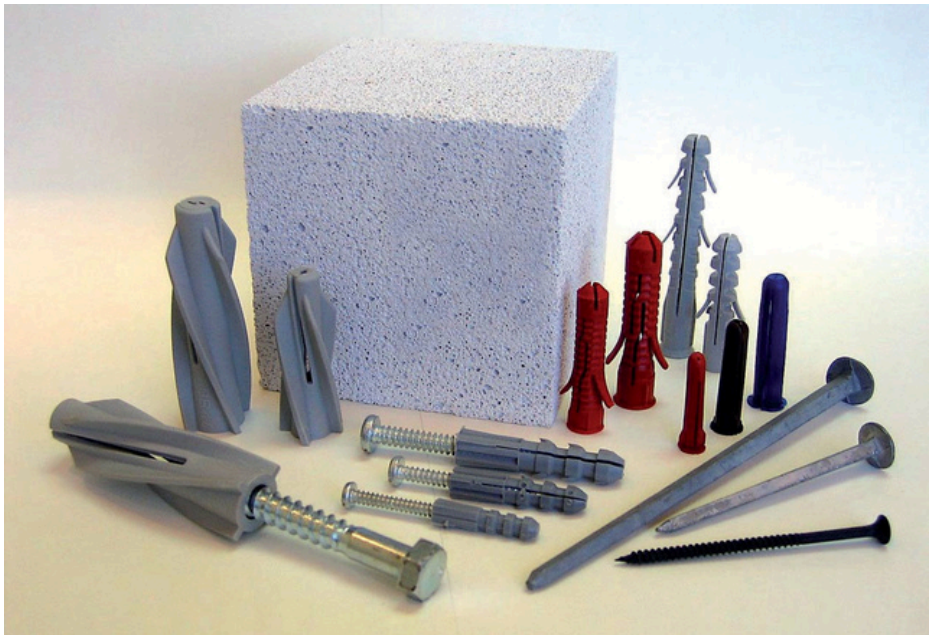

Fig. 31: Recommended nails & anchors.

Fasteners & Nails

Autoclaved Aerated Concrete

Technical Sheet

	Anchor / Nail		Drill Bit for Masonry	Screw	CLoad Value* (pull-out strength)	
	Length	Ø Diam			AAC-4 Block	AAC-6 Panel
	in	in	Ø in	Ø in	Lb	Lb
 **Hebel AAC Nails®**					Available at Xella AAC Texas, Inc.	
Hebel AAC Nail 4 in. Min. Penetration: 3 in.	4"	1/4"	Fixed directly with hammer	Not Required	51	88
Hebel AAC Nail 6 in. Min. Penetration: 5 in.	6"	5/16"		Not Required	88	137
 **Universal Plastic Anchor**					Available at Construction Depots	
Anchor TP 14 - 1/4"	1⅛"	1/4"	1/4"	#10	22	26
Anchor TP 56 - 5/16"	1½"	5/16"	5/16"	#12	26	31
Anchor TP 38 - 3/8"	2"	3/8"	5/16"	1/4"	44	62
Note: For use in solid walls (Anclo® or similar).						
 **THORSMAN®**					Available at Construction Depots	
Anchor Red TP 2X (2)	1⅜"	1/4"	3/16"	#8	37	---
			1/4"	#10	---	42
Anchor Brown TP 2B	1½"	5/16"	1/4"	#10	49	62
Anchor Blue TP 3	1¾"	3/8"	5/16"	#12	73	84
 **TOX VLF®**					Available at www.demandproducts.com	
			No pre-drilling for AAC-4 Class	Anchor with screws included (pre-assembled)		
Anchor 6/70	2¾"	1/4"	1/4"		66	---
Anchor 8/80 - 8/135	3⅛"+	5/16"	5/16"		102	---
Anchor 10/100 - 10/160	4"+	3/8"	3/8"		120	---
 **HILTI® Plastic Anchors**					Available at Hilti Shops and Construction Depots	
Anchor HUD-1 [10x50]	2"	3/8"	3/8"	5/16"	71	90
Anchor HUD-1 [12x60]	2⅜"	1/2"	7/16"	3/8"	128	185
More Products: www.us.hilti.com						
 **FISCHER®**					Available at Xella AAC Texas, Inc.	
Taquete GB 10 (2)	50	10	3/8"	1/4"	57	---
			1/2"	1/4"	---	47
Taquete GB 14	75	14	5/8"	3/8"	75	102
Taquete S10H80R	80	10	3/8"	5/16"	56	68

Notes:
(1) Anchors without screws, except TOX VLF anchors.
(2) Drill bit diameter change between AAC-4 y AAC-6 classes.
*Safety Factor [SF] = 5.

IMPORTANT
Information has been adapted considering Autoclaved Aerated Concrete (AAC) material and may differ from original fastener manufacturer.

Technical Sheet

		Type	Diameter (in)	Edge Distance (in)	Anchorage Depth (in)	Allowable Loads	
						Shear (lb) AAC-4	Tension (lb) AAC-4
	**Senco®**						
	8d	---	8d	1	1¾	60	---
	2" Staple	---	---	1	1 ¼	63	---
	**Generic®**						
	HPS-1	5/16 x 4⅜	5/16	2½	3⅜	76	23
	HRD	3/8	3/8	2½	---	109	73
				5	---	173	82
				7½	---	190	86
		3/8	3/8	2½	2½	141	120
				5	2½	248	120
				7½	2½	248	127
	HIT HY 150	---	5/8	2½	8	148	157
			5/8	5	8	320	157
			5/8	7	8	494	157
	HIT HY 70		5/8	5	4	300	120
	#8	Deck Screw	---	2½	3	63	86
			---	5	3	65	86
			---	7 ½	3	66	86
	Tubenail		3/8	2½	4	143	---
				5	4	271	---
				7 ½	4	288	---
				2½	3¼	---	133
				7½	3¼	---	200
			3/16	2 ½	2½	55	56
				5	2½	65	56
				7 ½	2½	65	56
	**Berner®**						
	Bent Nail		5/16	2½	3	113	116
				5	3	239	122
				7 ½	3	241	122
			3/16	2½	3¼	124	---
				5	3¼	157	---
				7 ½	3¼	163	---

Notes:
(1) Anchors without screws, except TOX VLF anchors.
(2) Drill bit diameter change between AAC-4 y AAC-6 classes.
*Safety Factor [SF] = 5.

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