

PA/HPA/PAI/MPAI

Purlin Anchors

Embedded purlin anchors offer solutions for wood-to-concrete and concrete-block connections which satisfy code requirements. The HPA offers the highest capacity in concrete. The PA's dual-embedment line allows installation in concrete or concrete block.

Material: PA/PAI — 12 gauge; HPA — 10 gauge; MPAI — 14 gauge

Finish: Galvanized; PAs available HDG or ZMAX® coating

Installation:

- Use all specified fasteners; some models have extra fastener holes. See General Notes.
- Purlin anchor must hook around rebar.
- Allowable loads are for a horizontal installation into the side of a concrete or masonry wall.
- For vertical installation in the top of GFCMU, refer to engineering letter L-C-PAGFCMUUP on strongtie.com.
- Strap may be bent one full cycle.
(Bent vertical 90° then bent horizontal.)

Edge Distance — Minimum concrete edge distance is 5". Minimum concrete block left-to-right edge distance is 20".

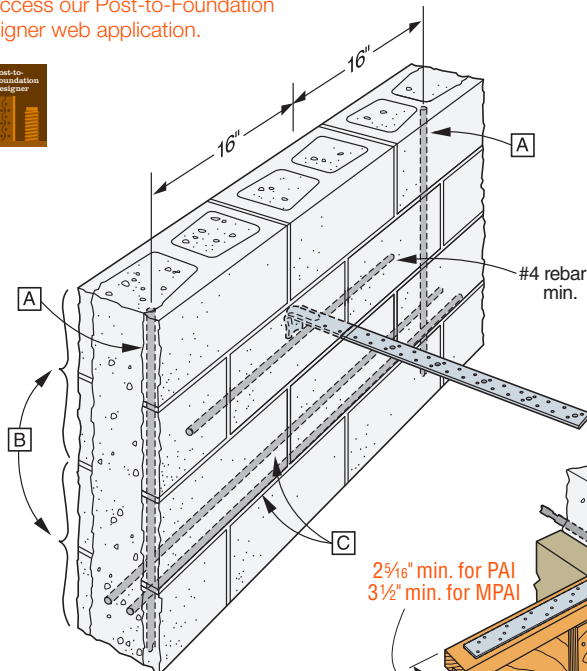
Concrete Block Wall — The minimum wall specifications are:

- One #4 vertical rebar, 32" long, 16" each side of anchor
- Two courses of grout-filled block above and below the anchor (no cold joints allowed)
- A horizontal bond beam with two #4 rebars, 40" long, a maximum of two courses above or below the anchor
- Minimum masonry compressive strength, $f'_m = 1,500$ psi

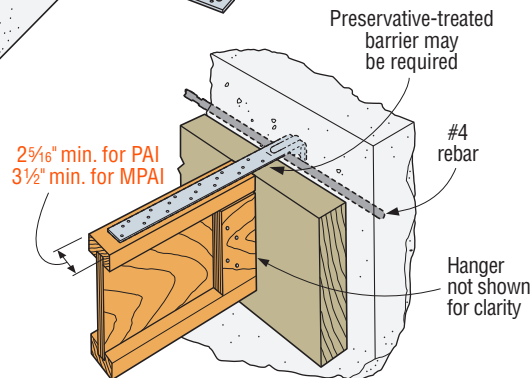
Options: See LTT and HTT tension ties for alternate retrofit solutions

Codes: See p. 13 for Code Reference Key Chart

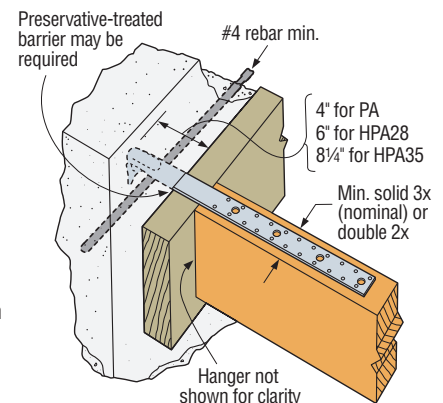
Web Applications: Visit app.strongtie.com/pfd to access our Post-to-Foundation Designer web application.



PA/PAI/MPAI Purlin to Grout-Filled Concrete-Block Wall
(refer to installation notes above)



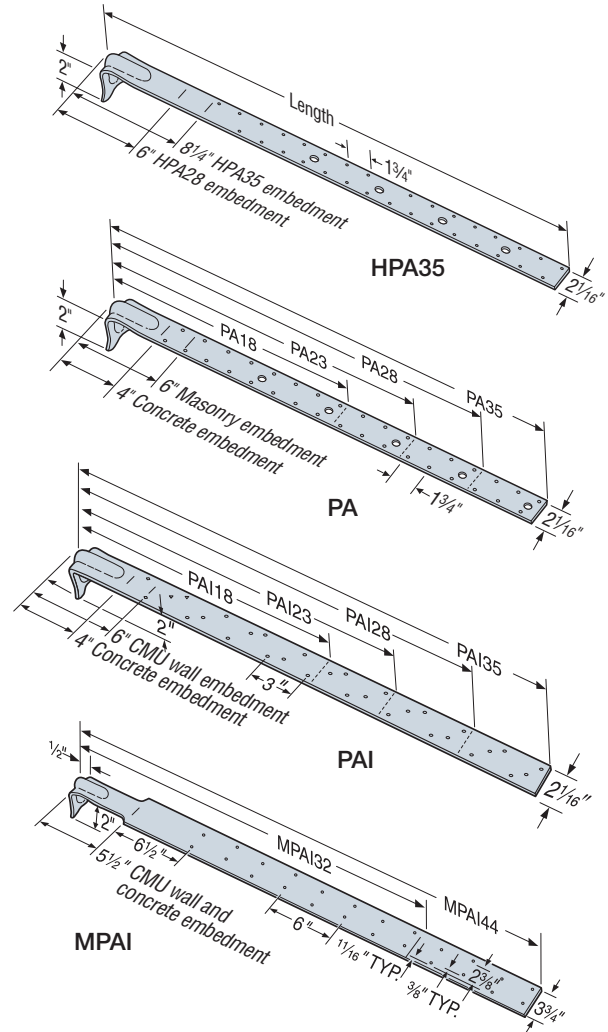
PAI Purlin to Concrete Wall
(MPAI similar)



PA/HPA Purlin to Concrete Wall
PAI/MPAI for I-joist applications

ASCE7 12.11.2.2.5 States:

... Diaphragm to structural wall anchorage using embedded straps shall have the straps attached to or hooked around the reinforcing steel, or otherwise terminated to effectively transfer forces to the reinforcing steel.



PA/HPA/PAI/MPAI

Purlin Anchors (cont.)

These products are available with additional corrosion protection. For more information, see p. 16.

Wind and SDC A&B — Allowable Tension Loads (160)													
Max Ledger Size	Model No.	Strap Length, L (in.)	Embed Length, l _e (in.)		Uncracked Concrete		Cracked Concrete		GFCMU Wall		Max. Allowable Strap Tension	Deflection at Allowable Load (in.)	Code Ref.
			Concrete	GFCMU	Required Nails (in.)	Tension	Required Nails (in.)	Tension	Required Nails (in.)	Tension			
4x Ledger	PA18	18½	4	6	(12) 0.148 x 3	2,430	(12) 0.148 x 3	2,260	(12) 0.148 x 3	1,890	NA	0.087	IBC®, FL
	PAI18	18	4	6	(10) 0.148 x 1 ½	2,025	(10) 0.148 x 1 ½	2,025	(9) 0.148 x 1 ½	1,055	NA	0.1	
	PA23	23¾	4	6	(16) 0.148 x 3	3,220	(12) 0.148 x 3	2,260	(16) 0.148 x 3	2,815	NA	0.118	
	PAI23	23	4	6	(15) 0.148 x 1 ½	3,035	(12) 0.148 x 1 ½	2,260	(14) 0.148 x 1 ½	1,805	NA	0.158	
	PA28	29	4	6	(16) 0.148 x 3	3,230	(12) 0.148 x 3	2,260	(16) 0.148 x 3	2,815	NA	0.085	
	PAI28	29	4	6	(16) 0.148 x 1 ½	3,230	(12) 0.148 x 1 ½	2,260	(16) 0.148 x 1 ½	2,705	NA	0.167	
	PA35	35	4	6	(16) 0.148 x 3	3,230	(12) 0.148 x 3	2,260	(16) 0.148 x 3	2,815	NA	0.085	
	PAI35	35	4	6	(16) 0.148 x 1 ½	3,230	(12) 0.148 x 1 ½	2,260	(18) 0.148 x 1 ½	2,815	NA	0.13	
	MPAI32	33½	5½		(16) 0.148 x 1 ½	2,885	(16) 0.148 x 1 ½	2,885	(16) 0.148 x 1 ½	2,355	NA	0.167	
	MPAI44	45½	5½		(16) 0.148 x 1 ½	2,885	(16) 0.148 x 1 ½	2,885	(24) 0.148 x 1 ½	2,865	NA	0.167	
	HPA28	32½	6	6	(22) 0.148 x 3	5,145	(20) 0.148 x 3	4,675	—	—	NA	0.133	
	HPA35	38½	8¼	8¼	(22) 0.148 x 3	5,145	(22) 0.148 x 3	5,145	—	—	NA	0.132	
SDC C–F — Allowable Tension Loads (160)													
Max Ledger Size	Model No.	Strap Length, L (in.)	Embed Length, l _e (in.)		Uncracked Concrete		Cracked Concrete		GFCMU Wall		Max. Allowable Strap Tension	Deflection at Allowable Load (in.)	Code Ref.
			Concrete	GFCMU	Required Nails (in.)	Tension	Required Nails (in.)	Tension	Required Nails (in.)	Tension			
4x Ledger	PA18	18½	4	6	(12) 0.148 x 3	2,430	(10) 0.148 x 3	1,980	(12) 0.148 x 3	1,890	3,220	0.087	IBC, FL
	PAI18	18	4	6	(10) 0.148 x 1 ½	2,025	(10) 0.148 x 1 ½	1,980	(9) 0.148 x 1 ½	1,055	4,180	0.1	
	PA23	23¾	4	6	(14) 0.148 x 3	2,830	(10) 0.148 x 3	1,980	(16) 0.148 x 3	2,815	3,220	0.118	
	PAI23	23	4	6	(14) 0.148 x 1 ½	2,830	(10) 0.148 x 1 ½	1,980	(14) 0.148 x 1 ½	1,805	4,180	0.158	
	PA28	29	4	6	(14) 0.148 x 3	2,830	(10) 0.148 x 3	1,980	(16) 0.148 x 3	2,815	3,935	0.085	
	PAI28	29	4	6	(14) 0.148 x 1 ½	2,830	(10) 0.148 x 1 ½	1,980	(16) 0.148 x 1 ½	2,705	5,070	0.167	
	PA35	35	4	6	(14) 0.148 x 3	2,830	(10) 0.148 x 3	1,980	(16) 0.148 x 3	2,815	3,935	0.085	
	PAI35	35	4	6	(14) 0.148 x 1 ½	2,830	(10) 0.148 x 1 ½	1,980	(18) 0.148 x 1 ½	2,815	5,070	0.13	
	MPAI32	33½	5½		(16) 0.148 x 1 ½	2,885	(16) 0.148 x 1 ½	2,885	(16) 0.148 x 1 ½	2,355	3,205	0.167	
	MPAI44	45½	5½		(16) 0.148 x 1 ½	2,885	(16) 0.148 x 1 ½	2,885	(24) 0.148 x 1 ½	2,865	3,205	0.167	
	HPA28	32½	6	6	(22) 0.148 x 3	5,145	(18) 0.148 x 3	4,090	—	—	5,145	0.133	
	HPA35	38½	8¼	8¼	(22) 0.148 x 3	5,145	(22) 0.148 x 3	5,145	—	—	5,145	0.132	

- Allowable loads have been increased for wind or earthquake loading with no further increase allowed. Reduce where other loads govern.
- Deflection listed is at the highest allowable load.
- Multiply seismic and wind ASD load values by 1.43 or 1.67, respectively, to obtain LRFD capacities.
- Nail quantities are based on Douglas fir (DF) or equivalent specific gravity of 0.50 or better. For use in spruce-pine-fir (SPF) or hem-fir (HF), nail quantities shall be increased by 1.15 to achieve loads listed.
- For wall anchorage systems in SDC C-F, the maximum strap allowable load shall not be less than 1.4 times the ASD anchor design load.
- Minimum center-to-center spacing is 3x the required embedment — i.e., standard installation is based on a minimum 5" end distance.
- Structural composite lumber beams have sides that show either the wide face or the lumber strands/veneers. Values in the tables reflect installation into the wide face.
- Concrete shall have a minimum compressive strength of $f'_c = 3,000$ psi.
- Grout-filled CMU (GFCMU) shall have a minimum compressive strength of $f'_m = 1,500$ psi.
- PA models installed vertically in the top of a grouted masonry wall with 6" embedment and (12) 0.148" x 3" nails achieve an allowable uplift load of 1,890 lb.
- For PA models, 0.148" x 1½" nails may be substituted for 0.148" x 3" nails at 100% of listed load and with a 15% increase in deflection. For installation over sheathing, use 3"-long nails minimum.
- For PAI/MPAI models, 0.148" x 1½" nails shall be used directly onto framing member. For installation over sheathing, use 2½"-long nails minimum.
- Fasteners:** Nail dimensions are listed diameter by length. See pp. 23–24 for fastener information.

PA/HPA Purlin Anchors

PA/HPA purlin anchors offer solutions for CFS to concrete and concrete block connections which satisfy code requirements. The HPA offers the highest capacity in concrete. The PAs dual embedment line allows installation in concrete or concrete block.

Material: PA — 12 gauge; HPA — 10 gauge

Finish: Galvanized. PAs available in HDG or ZMAX® coating.

Installation:

- Use all specified fasteners; some models have extra fastener holes. See General Notes.
- Purlin anchor must hook around rebar.
- Allowable loads are for a horizontal installation into the side of a concrete or masonry wall.
- Strap may be bent one full cycle.
(Bent vertical 90° then bent horizontal.)

Edge Distance — Minimum concrete edge distance is 5".
Minimum concrete block left-to-right edge distance is 20".

Concrete Block Wall — The minimum wall specifications are:

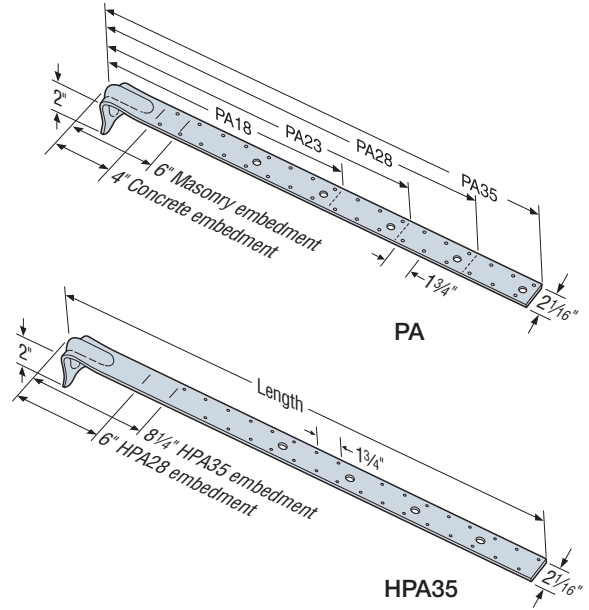
- A** One #4 vertical rebar, 32" long, 16" each side of anchor.
- B** Two courses of grout filled block above and below the anchor (no cold joints allowed).
- C** A horizontal bond beam with two #4 rebars, 40" long, a maximum of two courses above or below the anchor.
- D** Minimum masonry compressive strength, $f'_m = 1,500$ psi.

Options: See S/LTT and HTT Tension Ties for alternate retrofit solutions

Codes: See p. 13 for Code Reference Key Chart

ASCE 12.11.2.2.5 states:

... Diaphragm to structural wall anchorage using embedded straps shall have the straps attached to, or hooked around the reinforcing steel or otherwise terminated to effectively transfer forces to the reinforcing steel.

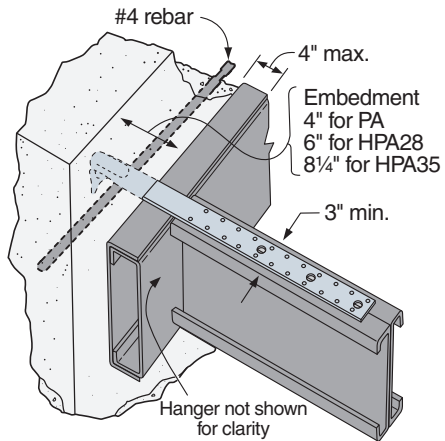


These products are available with additional corrosion protection. Additional products on this page may also be available with this option. Check with Simpson Strong-Tie for details.

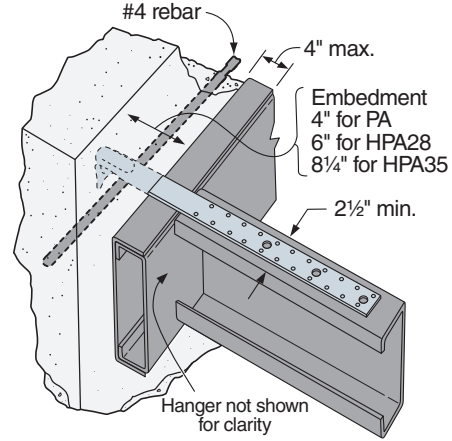
Wind and SDC A&B — Allowable Load (lb.)										Code Ref.
Model No.	Strap Length L (in.)	l _e ^a (in.)	Fasteners ^a			Tension Load		Max. Allowable Strap Tension	Masonry Installation Tension Load	
			Rafter/Stud /Joist Thickness			UnCracked	Cracked			
			33 mil (20 ga.)	43 mil (18 ga.)	54 mil (16 ga.)					
PA18	18½	4	(16) #10	(16) #10	(8) #10	2,430	2,260	NA	1,895	
PA23	23¾	4	(22) #10	(16) #10	(8) #10	3,220	2,260	NA	2,815	
PA28	29	4	(22) #10	(16) #10	(8) #10	3,230	2,260	NA	2,815	
PA35	35	4	(22) #10	(16) #10	(8) #10	3,230	2,260	NA	2,815	
HPA28	32½	6	(28) #10	(20) #10	(10) #10	5,145	4,675	NA	—	
HPA35	38½	8¼	(32) #10	(22) #10	(12) #10	5,145	5,145	NA	—	
SDC C–F — Allowable Load (lb.)										IBC
PA18	18½	4	(16) #10	(16) #10	(8) #10	2,340	1,980	3,220	1,895	
PA23	23¾	4	(22) #10	(16) #10	(8) #10	2,830	1,980	3,220	2,815	
PA28	29	4	(22) #10	(16) #10	(8) #10	2,830	1,980	3,935	2,815	
PA35	35	4	(22) #10	(16) #10	(8) #10	2,830	1,980	3,935	2,815	
HPA28	32½	6	(28) #10	(20) #10	(10) #10	5,145	4,090	5,145	—	
HPA35	38½	8¼	(32) #10	(22) #10	(12) #10	5,145	5,145	5,145	—	

1. Loads may not be increased for short-term loading.
2. For concrete installs, the minimum compressive strength, $f'_c = 3,000$ psi.
3. Multiply Seismic and Wind ASD load values by 1.4 or 1.67, respectively, to obtain LRFD capacities.
4. In accordance with 2012, 2015 and 2018 IBC Section 1613.1, detached one- and two-family dwellings in Seismic Design Category (SDC) C may use "Wind and SDC A&B" allowable loads.
5. Minimum center-to-center spacing is 3 times the required embedment ($S_{min} = 3 \times l_e$) for PA/HPAs acting in tension simultaneously, where l_e = embedment depth. Standard installation is based on minimum 5" end distance.
6. Install fasteners symmetrically and with a minimum of 4 of the required fasteners between the embedment line and the first tooling hole. In some cases, not all of the fastener holes will need to be filled.
7. For wall anchorage systems in SDC C-F, the maximum strap allowable load shall not be less than 1.4 times the ASD anchor design load.
8. For PA straps, concrete embedment shown; embedment in masonry shall be 6".
9. See the current *Fastening Systems* catalog at strongtie.com for more information on Simpson Strong-Tie fasteners.

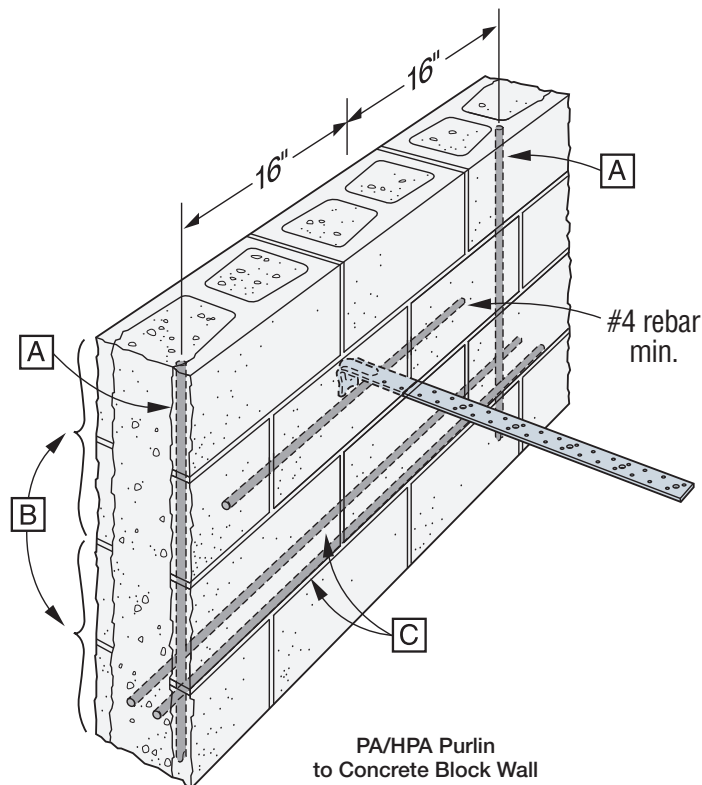
PA/HPA Purlin Anchors



PA/HPA Purlin to Concrete Wall
Back-to-Back Joist Installation



PA/HPA Purlin to Concrete Wall
Single C-Shape Joist Installation



PA/HPA Purlin
to Concrete Block Wall
(refer to installation
notes above)