City of Los Angeles RR Values
for Holdowns in Shearwall and Wall Anchorage Assemblies

SIMPSON
Strong-Tie
®

Allowable holdown loads are based upon City of Los Angeles Research Reports (LA RR's) and City of Los Angeles Building Code (LABC). Holdown deflection is given for the highest allowable load shown for the holdown. To calculate deflections of structural systems (such as shearwalls), add the deflection of the holdown to the cumulative deflection of the other elements of the system according to the code (for shearwalls, see Section 23.223 of the 2002 LABC). The allowable holdown loads include a 1.33 load duration increase for wind or seismic and a 25% reduction for holdown connectors per the 2002 LABC 2315.5.6 for seismic loads. (Unless otherwise noted, dimensions are in inches; loads are in pounds.)
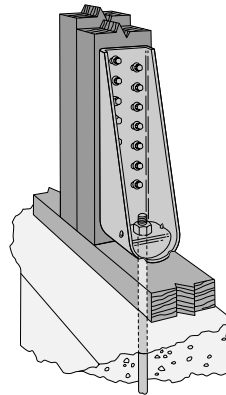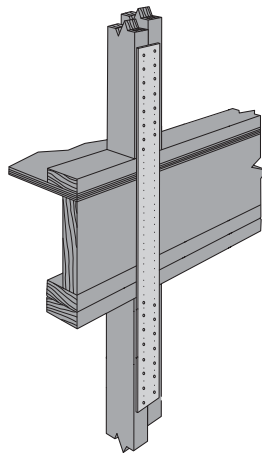
FEATURED PRODUCTS
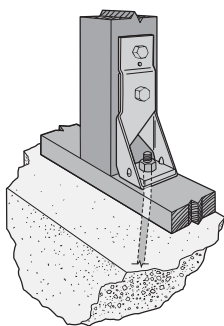
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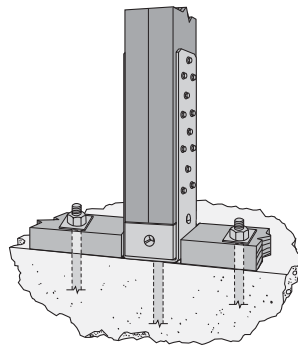
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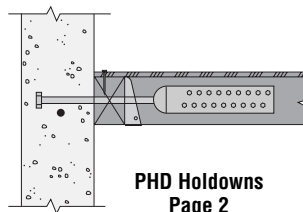
PHD Holdowns
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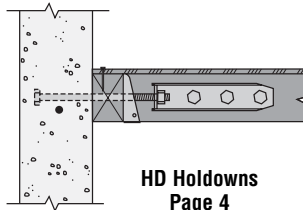
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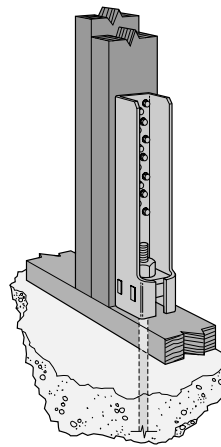
HDQ8 Holdowns
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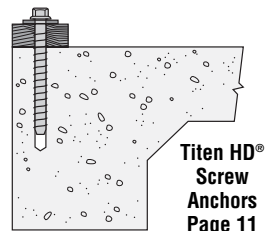
Titen HD®
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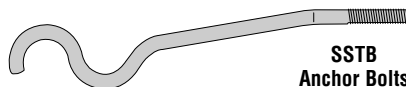
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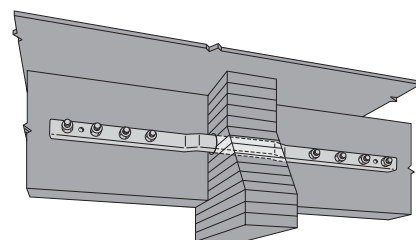
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City of Los Angeles RR Values
PHD and HDQ8 Holdowns in Shearwalls

SIMPSON
Strong-Tie
®

The PHD Predeflected Holdown and HDQ8 holdown are revolutionary developments in holdown connections. The PHD holdown is predeflected during manufacturing, to virtually eliminate deflection from material stretch.

FEATURES:
- SDS screws (included) which install easily, reduce fastener slip, and provide a greater net section area of the post compared to bolts.
- Smaller centerline reduces eccentricity in the stud.
- No stud bolts to countersink.
- The slot in the PHD seat provides for anchor bolt adjustment.
- HDQ8 has ⅝" of adjustability perpendicular to wall.
- Width fits easily in a 2x4 stud wall.

MATERIAL: See table. **FINISH:** Galvanized.

INSTALLATION:
- Use all specified fasteners. Refer to the current *Wood Construction Connector* catalog for General Notes and warranty information.
- Place PHD or HDQ8 over the anchor bolt. *(See SSTB tables)*
- Simpson's code-recognized SDS¼x3 wood screws are provided with the holdown. Lag screws will not achieve the same load. Shorter length SDS screws are also available.
- For an improved connection use a nylon locking nut or a thread adhesive on the anchor bolt. No washer is required for the PHD and a plate washer is provided with the HDQ8.
- To tie double 2x members together, the designer must determine the fasteners required to bind members to act as one unit without splitting the wood.
- Loads based on using Simpson SDS screws.

CODES: City of L.A. RR 25300 (PHD) and RR 25540 (HDQ8).

For holdowns, per ASTM test standards, anchor bolt nut should be finger-tight plus ⅓ to ½ turn with a hand wrench, with consideration given to possible future wood shrinkage. Care should be taken to not over-torque the nut. Impact wrenches should not be used.

Pressure-treated barrier may be required.

PHD Vertical Installation

Washer provided with Holdown

HDQ8 US Patents 6,006,487 and 6,327,831

PHD5 (others similar) Patent No. 5,979,130

HDQ8 Vertical Installation

Pressure-treated barrier may be required.

HDQ8 may be installed raised off the sill plate with no increase in deflection values.

Loads have been reduced 25% for Sec. 2315.5.6 of 2002 City of L.A. Building Code for Seismic Loads[6]
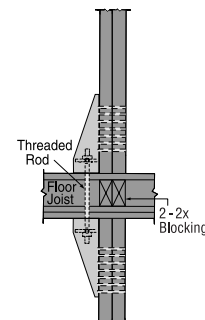
| Model No. | Ga | Dimensions | | | | Fasteners | | Max. Allowable Tension Load DF/SP | Holdown Deflection at Highest Allowable Design Load[2] | Holdown Deflection at Highest Allowable Design Load when Raised Off Sill Plate[2] |
		W	H	B	CL	Anchor[1] Bolt Diameter	No. of Simpson SDS¼ Wood Screws			
PHD2-SDS3	14	3	9⁵⁄₁₆	2⅞	1⅜	⅝	10 – SDS¼x1½	1865	0.063	0.081
							10 – SDS¼x2½	2280		
							10 – SDS¼x3	2710		
PHD5-SDS3	14	3	11⁹⁄₁₆	2⅞	1⅜	⅝	14 – SDS¼x1½	2015	0.077	0.077
							14 – SDS¼x2½	3090		
							14 – SDS¼x3	3515		
PHD6-SDS3	12	3⅛	13¹³⁄₁₆	2⅞	1⅜	⅞	18 – SDS¼x1½	2660	0.068	0.073
							18 – SDS¼x2½	4230		
							18 – SDS¼x3	4395		

PHD8-SDS3 deleted — see HDQ8-SDS3

| Model No. | Ga | Dimensions | | | | Fasteners | | Max. Allowable Tension[4] DF/SP | Allowable Compression[4,5] | Deflection at Highest Allowable Tension Load[2] |
		W	H	B	CL	Anchor[1] Diameter	No. of Simpson SDS¼ Wood Screws			
HDQ8-SDS3	7	2⅞	14	2½	1¼	⅞	20 – SDS¼x3	6245	5380	0.052

Threaded Rod
Floor Joist
2 – 2x Blocking

Typical PHD Tie between Floors

1. The designer must specify anchor bolt type, length and embedment. See the SSTB Anchor Bolts.
2. Deflection at Highest Allowable Design Load: The deflection of holdown measured between the anchor bolt and the strap portion of the holdown when loaded to the highest allowable load listed in the table. This movement is strictly due to the holdown deformation and fastener slip under a static load test conducted on a wood jig.
3. The SDS screws install best with a low speed ½" right angle drill with a ⅜" hex head driver.
4. Allowable loads are for a single PHD or HDQ8 installation. Allowable loads may be doubled for installations where PHDs or HDQ8s are installed on both sides of the wood member, provided either the post is large enough or the holdowns are offset to eliminate screw interference.
5. HDQ8's compression load requires an additional standard nut and a 1¹⁵⁄₁₆x2¼x⅜" square washer (BP⅞-2) below the holdown. Maximum rod length is 6" from the concrete to achieve 5380 lbs using A36 steel. If rod length is longer, Designer needs to check rod for buckling capacity.
6. Loads may be increased by 1.33 where seismic uplift force is less than 75% of wind uplift force.
7. When using structural composite lumber columns, SDS screws must be applied to the wide face of the column.

City of Los Angeles RR Values
HDC Concentric Holdowns in Shearwalls

SIMPSON
Strong-Tie

HDC Holdowns eliminate eccentricity. They use SDS screws (included) which install easily, reduce fastener slip, and provide a greater net section area of the post compared to bolts.

FEATURES:
- Concentric to eliminate bending on the stud.
- Slot in the seat allows for ⅜" of adjustment perpendicular to plate. *(Standard N series cut washer required, 1¾" diameter - 0.134" thick.)*
- Witness slot in the base to inspect the nut.
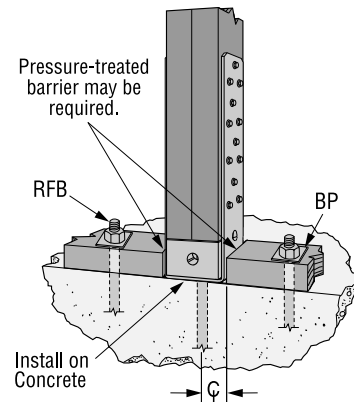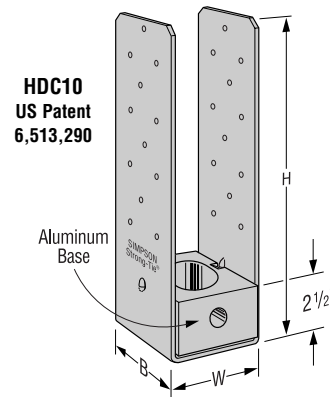
MATERIAL: 10 gauge strap.

FINISH: Galvanized strap, aluminum base.

INSTALLATION:
- Use all specified fasteners. Refer to the current *Wood Construction Connector* catalog for General Notes and warranty information.
- Install on concrete.
- Sized for 2-2x and 2-2x6 members.
- Center HDC on post.
- Install Simpson's code-recognized SDS¼x2½ wood screws, which are provided with the holdown. (Lag screws will not achieve the same load.)
- Maximum anchor bolt height above concrete is 2½".
- To tie double 2x members together, the designer must determine the fasteners required to bind members to act as one unit without splitting the wood.
- Aluminum standoff cannot be in contact with pressure-treated wood.

CODES: City of L.A. RR 25540.

HDC10
US Patent
6,513,290

Aluminum
Base

Pressure-treated
barrier may be
required.

RFB

BP

Install on
Concrete

Typical HDC Installation
with 2-2x4 studs

> **For holdowns, per ASTM test standards, anchor bolt nut should be finger-tight plus ⅓ to ½ turn with a hand wrench, with consideration given to possible future wood shrinkage. Care should be taken to not over-torque the nut. Impact wrenches should not be used.**

Loads have been reduced 25% for Sec. 2315.5.6 of 2002 City of L.A. Building Code for Seismic Loads[6]

Model No.	Post Size	W (in)	H (in)	B (in)	CL (in)	Anchor Bolt[1] (in)	Number of SDS ¼x2½	Allowable Tension Load DF/SP (lbs)	Concrete Bearing @ 2500 psi	Holdown Deflection at Highest Allowable Design Load[2] (in)
HDC5/22-SDS2.5	2-2x4	3⅛	9⅜	3	1⁹⁄₁₆	⅝	12	3,655	7,460	0.024
HDC5/4-SDS2.5	4x4	3⁹⁄₁₆	9⅛	3	1¹³⁄₁₆	⅝	12	3,655	9,060	0.035
HDC10/22-SDS2.5	2-2x4	3⅛	14⅜	3	1⁹⁄₁₆	⅞	24	7,345	7,460	0.037
HDC10/4-SDS2.5	4x4	3⁹⁄₁₆	14⅛	3	1¹³⁄₁₆	⅞	24	7,345	9,060	0.038

1. The designer must specify anchor bolt type, length and embedment. See the SSTB Anchor Bolts.
2. Deflection at Highest Allowable Design Load: The deflection of a holdown measured from the anchor bolt and the strap portion of the holdown when loaded to the highest allowable load listed in the catalog table. This movement is strictly due to the holdown deformation and fastener slip under a static load conducted on a wood jig.
3. SDS screws install best with a low speed ½" drill with a ⅜" hex head driver.

4. The HDC will be limited by wood compression capacity if installed on a sill plate. HDC5/22 and HDC10/22 will achieve an allowable load of 4005 lb. on a DFL plate. HDC5/4 and HDC10/4 will achieve an allowable load of 4940 lb. on a DFL plate, which does not take deflection into account.
5. When using structural composite lumber columns, screws must be installed in the wide face of the column.
6. Loads may be increased by 1.33 where seismic uplift force is less than 75% of wind uplift force.

City of Los Angeles RR Values
HD/HDA Holdowns in Shearwalls

SIMPSON Strong-Tie ®

FEATURES:
Use HDA/HDs for overturning requirements and other applications to transfer loads. All HDAs are self-jigging, ensuring code-required minimum 7 bolt diameter spacing from end of wood member.
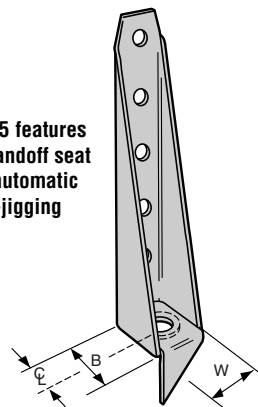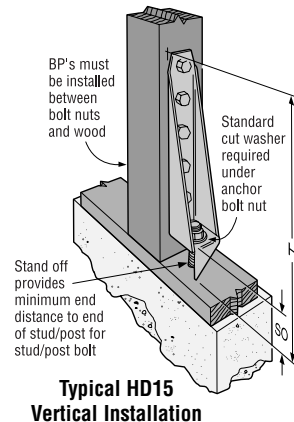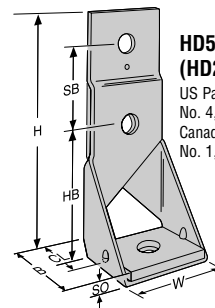
MATERIAL: See table.

FINISH: HDA's – galvanized, may be ordered HDG;
HD's – Simpson gray paint or HDG.

INSTALLATION:
• Use all specified fasteners. Refer to the current *Wood Construction Connectors* catalog for General Notes and warranty information.
• Contact engineered wood manufacturers for connections that are not through wide face.
• For an improved connection use a steel nylon locking nut or a thread adhesive on the anchor bolt.
• Bolt holes shall be a minimum of ⅟₃₂" to a maximum of ⅟₁₆" larger than the bolt diameter *(per the 2001 NDS, Section 11.1.2)*.
• Standard washers are required between the base plate and anchor nut *(HD models only)*. Stud bolts require bearing plates opposite all holdowns. The load transfer plate is an integral part of the HDA; no washer is required.
• See Epoxy-Tie Adhesives and SSTB Anchor Bolts on pages 7 and 10 for anchorage options. The design engineer may specify any alternate anchorage calculated to resist the tension load for your specific job.
• Locate the holdown on the wood member to maintain a minimum distance of seven bolt diameters from the end of the member to the centerline of the first bolt. *(HD models only.)*
• To tie double 2x members together, the designer must determine the fasteners required to bind members to act as one unit without splitting.
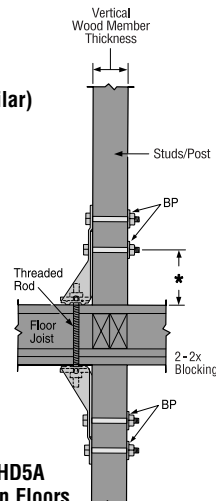
CODES: City of L.A. RR 25528

> **For holdowns, per ASTM test standards, anchor bolt nut should be finger-tight plus ⅓ to ½ turn with a hand wrench, with consideration given to possible future wood shrinkage. Care should be taken to not over-torque the nut. Impact wrenches should not be used.**

HD15 features a standoff seat for automatic self-jigging

HD15

BP's must be installed between bolt nuts and wood

Standard cut washer required under anchor bolt nut

Stand off provides minimum end distance to end of stud/post for stud/post bolt

Typical HD15 Vertical Installation

HD5A (HD2A similar)
US Patent No. 4,665,672
Canada Patent No. 1,253,481

Vertical Wood Member Thickness

Studs/Post

BP

Threaded Rod

Floor Joist

2 - 2x Blocking

BP

* HDA self-jigging holdowns automatically maintain 7D stud/post bolt end distance.

Typical HD5A Tie between Floors

Loads have been reduced 25% for Sec. 2315.5.6 of 2002 City of L.A. Building Code for Seismic Loads[5]

Model No.	Material		Dimensions							Fasteners		Allowable Tension Load[1] (DF/SP)						Holdown[4] Deflection at Highest Allowable Design Load	Holdown[4] Deflection at Highest Allowable Design Load When Raised Off Sill Plate
												Wood Member Thickness							
	Base	Body	HB[2]	SB	W	H	B	SO	CL	Anchor Dia[3]	Stud Bolts	1½	2	2½	3	3½	5½		
HD2A	7 ga	12 ga	4⁹⁄₁₆	2½	2¾	8	2⁹⁄₁₆	⅜	1⁷⁄₁₆	⅝	2-⅝	1165	1540	1925	2080	2080	2070	0.030	0.051
HD5A	3 ga	10 ga	5¼	3	3⅛	9⁷⁄₁₆	3⁹⁄₁₆	½	2³⁄₁₆	¾	2-¾	1405	1865	2320	2780	3010	2985	0.030	0.075
HD6A	⅜	7 ga	6³⁄₁₆	3½	3¼	11¹¹⁄₁₆	3⁷⁄₁₆	⁹⁄₁₆	2¹⁄₁₆	⅞	2-⅞	1705	2240	2765	3305	3825	4135	0.025	0.078
HD8A	⅜	7 ga	6³⁄₁₆	3½	3¼	14⁹⁄₁₆	3⁷⁄₁₆	⁹⁄₁₆	2¹⁄₁₆	⅞	3-⅞	2415	3265	4060	4850	5595	5935	0.062	0.087
HD10A	⅜	7 ga	6³⁄₁₆	3½	3¼	18¹⁄₁₆	3⁷⁄₁₆	⁹⁄₁₆	2¹⁄₁₆	⅞	4-⅞	2960	4155	5200	6235	7155	7425	0.089	0.172
HD14A	⅜	3 ga	7	4	3½	20⁹⁄₁₆	3⅝	⅝	2³⁄₁₆	1	4-1	—	—	—	—	8310	10,035	0.105	0.225
HD5	3 ga	7 ga	5¼	3	2⅞	6⅜	3½	⅜	2⅛	¾	2-¾	1450	1900	2360	2810	3055	3030	0.036	0.041
HD7	⁵⁄₁₆	3 ga	6⅛	3½	3½	11¾	3⅜	3⁷⁄₁₆	2⅛	1⅛	3-⅞	2445	3250	4005	4820	5665	6085	0.029	0.042
HD9	⅜	3 ga	7	4	3½	16½	4⁷⁄₁₆	3⅝	2⅛	1⅛	3-1	—	—	4490	5425	6425	7795	0.026	0.039
HD12	⅜	3 ga	7	4	3½	20⁹⁄₁₆	4⁷⁄₁₆	3⅝	2⅛	1⅛	4-1	—	—	5260	6310	8225	9840	0.041	0.045
HD15	⅜	3 ga	7	4	3½	24½	4⁷⁄₁₆	3⅝	2⅛	1¼	5-1	—	—	7185	8635	9850	11,480	0.044	0.055

1. Minimum post size is required to ensure the tension load carrying capacity of the critical net section meets the holdown capacity. HD14A requires a minimum 4x6 nominal post. HD15 requires a minimum of 4x8 (in a 3½" wide shearwall) or a 6x6 nominal post. All other HD and HDA holdowns require a 3½" minimum wood member depth *(perpendicular to the length of bolt in wood member)*.
2. HB is the required minimum distance from the end of the stud to the center of the first stud bolt hole. All models except HD5 and HD7 provide an extension to the base to allow proper bolt end spacing. End distance may be increased as necessary for installation.
3. The designer must specify anchor bolt type, length and embedment.

4. Deflection at highest allowable design load: The deflection of a holdown measured between the anchor bolt and the strap portion of the holdown when loaded to the highest allowable load listed in the table. This movement is strictly due to the holdown deformation under a static load test conducted on a steel jig.
5. Loads may be increased by 1.33 where seismic uplift force is less than 75% of wind uplift force.

City of Los Angeles RR Values
LTT/HTT Tension Ties in Shearwalls
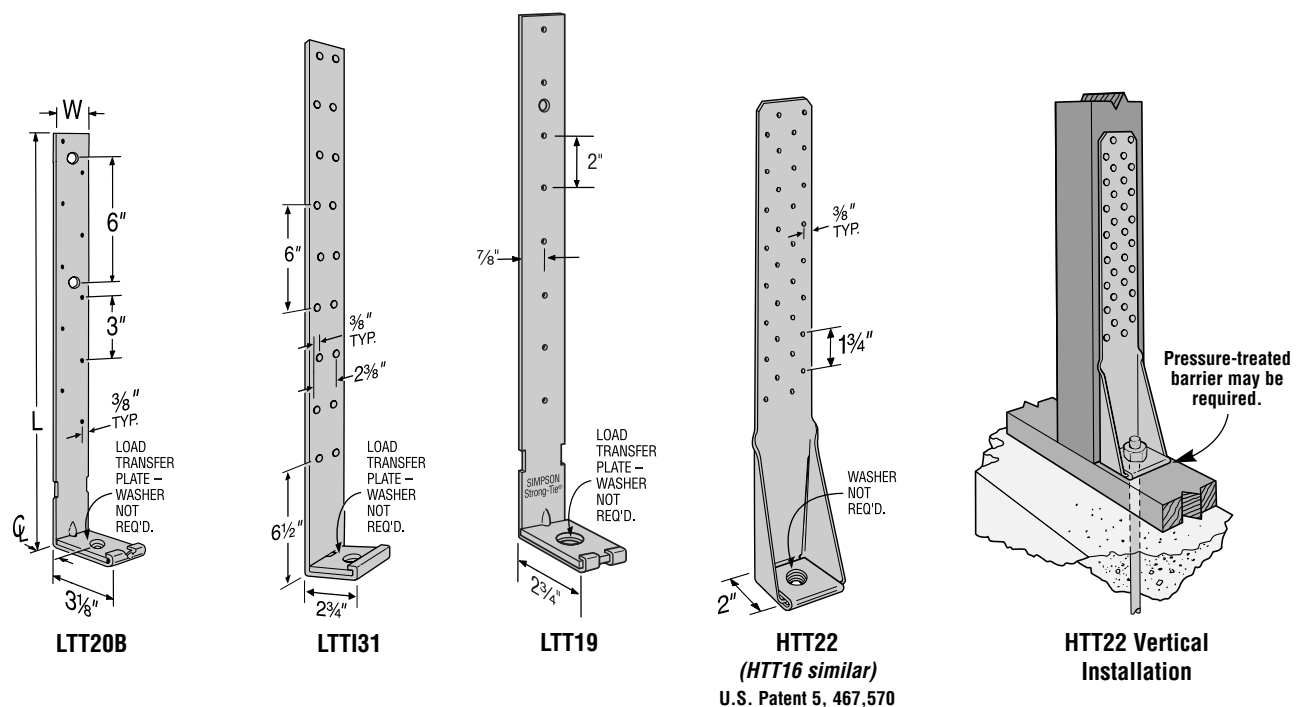
SIMPSON Strong-Tie®

MATERIAL: See table.

FINISH: Galvanized.

INSTALLATION:
- Use all specified fasteners. Refer to the current *Wood Construction Connector* catalog for General Notes and warranty information.
- Use the specified number and type of nails to attach the strap portion to the wood member *(minimum 4x width – 2-2x4 or 4x4, except LTT19)*.
- Bolt the base to the wall or foundation with a suitable anchor; see table for the required bolt diameter.

CODES: City of L.A. RR 24818 (LTT, LTTI) and 25318 (HTT).

> **For holdowns, per ASTM test standards, anchor bolt nut should be finger-tight plus ⅓ to ½ turn with a hand wrench, with consideration given to possible future wood shrinkage. Care should be taken to not over-torque the nut. Impact wrenches should not be used.**

LTT20B LTTI31 LTT19 HTT22 *(HTT16 similar)* U.S. Patent 5, 467,570 HTT22 Vertical Installation

Loads have been reduced 25% for Sec. 2315.5.6 of 2002 City of L.A. Building Code for Seismic Loads[6]

Model No.	Material (Ga)		Dimensions			Seat Thick-ness	Fasteners		Allowable[3] Tension Loads DF/SP (lbs)	Holdown[5] Deflection at Highest Allowable Design Load
	Strap	Plate	W	L	₵		Anchor Bolts[1]	Nails		
LTT19	16	3	1¾	19⅛	1⅜	⁵⁄₁₆	¾	8-16d sinkers	905	0.065
LTT20B	12	3	2	19¾	1⅜	⁵⁄₁₆	¾	10-16d	1315	0.109
LTTI31	18	3	3¾	31	1⅜	¼	⅝	18-10dx1½	1355	0.056
HTT16	11	—	2½	16	1⅜	⁷⁄₁₆	⅝	18-16d	2610	0.010
HTT22	11	—	2½	22	1⅜	⁷⁄₁₆	⅝	32-16d sinkers	3940	0.031

1. Anchor bolt type, length, and embedment to be specified by the designer.
2. 16d sinkers or 10d common nails are permitted to be substituted for the 16d common nails at 0.84 of the listed values (LTT).
3. The allowable loads for the LTT and HTT style tension ties are based off a minimum nail penetration of 12 x nail diameters into the main member with the exception of the LTTI31 which only requires 1½" nail penetration.
4. Do not install LTT or LTTI off mudsill.

5. Deflection at highest allowable design load: The deflection of a tension tie measured between the anchor bolt and the strap portion of the tension tie when loaded to the highest allowable load listed in the table. This movement is strictly due to the tension tie deformation under a static load test conducted on a steel jig. Tension ties raised off the mudsill have larger deflection values.

6. Loads may be increased by 1.33 where seismic uplift force is less than 75% of wind uplift force.
7. Nails: 16d = 0.162" dia. x 3½" long (0.162" dia. x 2½" long nail may be substituted with same load capacity), 16d sinker = 0.148" dia. x 3¼" long, 10d x 1½" = 0.148" dia. x 1½" long.

City of Los Angeles RR Values
LSTA/MSTA/CMST Straps in Shearwalls

SIMPSON
Strong-Tie
®

LSTA/MSTA Straps

Loads have been reduced 25% for Sec. 2315.5.6 of 2002 City of L.A. Building Code for Seismic Loads

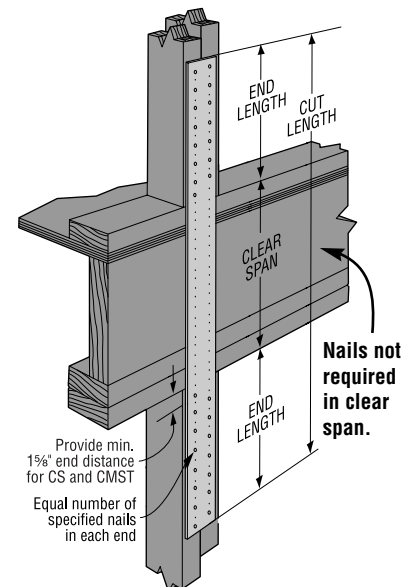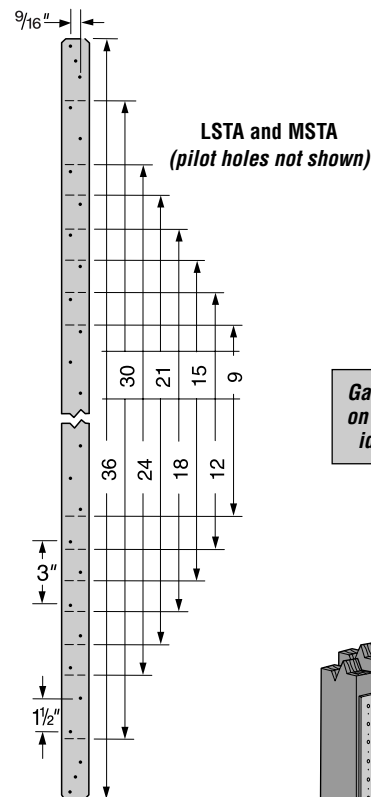| Model No.	Material (Ga)	Dimensions		Fasteners (Total)	Allowable Tension Load DF/SP (lbs)	
		W	L		10d[1]	16d[1]
LSTA9	20	1¼	9	8	455	540
LSTA12	20	1¼	12	10	565	675
LSTA15	20	1¼	15	12	680	810
LSTA18	20	1¼	18	14	790	945
LSTA21	20	1¼	21	16	905	970
LSTA24	20	1¼	24	18	970	970
LSTA30	18	1¼	30	22	1255	1285
LSTA36	18	1¼	36	26	1285	1285
MSTA9	18	1¼	9	8	460	545
MSTA12	18	1¼	12	10	570	680
MSTA15	18	1¼	15	12	685	820
MSTA18	18	1¼	18	14	800	955
MSTA21	18	1¼	21	16	910	1090
MSTA24	18	1¼	24	18	1030	1225
MSTA30	16	1¼	30	22	1265	1510
MSTA30	16	1¼	36	26	1495	1600

1. Nails are 16d common (0.162 x 3½") 10d common (0.148 x 3"). 2½" long nails of the
   same diameter may be substituted with no reduction in capacity.
2. Allowable loads are based upon LA RR 25149.
3. Other straps may be used if Engineer, licensed in California, calculates capacity.
4. Loads may be increased by 1.33 where seismic uplift force is less than 75%
   of wind uplift force.
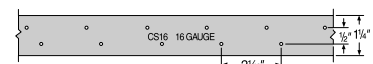5. MSTA12 through MSTA36 available with additional corrosion protection.

LSTA and MSTA
(pilot holes not shown)

Gauge stamped on part for easy identification

CMST Coiled Straps

Loads have been reduced 25% for Sec. 2315.5.6 of 2002 City of L.A. Building Code for Seismic Loads

Model No.	Material (Ga)	Total L	End L	Cut Length	Fasteners (Total)	Allowable Tension Load DF/SP (lbs)	Nail Spacing
CMST12	12	40'	45"	clear span + 93"	100-16d	7050	1¾"
			105"	clear span + 213"	118-10d	7050	3½"
CMST14	14	52½'	34"	clear span + 71"	74-16d	4530	1¾"
			78"	clear span + 159"	88-10d	4530	3½"
CS16	16	150'	14"	clear span + 31"	28-8d	1240	2¹⁄₁₆"
			11"	clear span + 25"	22-10d	1240	

1. Allowable loads are based upon LA RR 25293 and LA RR 25119.
2. Other straps may be used if Engineer, licensed in California, calculates capacity.
3. See LA RR's 25119, 25149, 25293 and 25489. For LA RRs that list straps without loads, engineer must verify loads.
4. Loads may be increased by 1.33 where seismic uplift force is less than 75% of wind uplift force.
5. CS16 available with additional corrosion protection.
6. 16d = 0.162" dia. x 3½" long, 10d = 0.148" dia. x 3" long. 2½" long nails of the same diameter may be substituted
   with no reduction in capacity.

Provide min. 1⅝" end distance for CS and CMST

Equal number of specified nails in each end

Nails not required in clear span.

**Typical CMST Installation
as a Floor Tie**
(requires minimum 2-2x studs)

CS16   16 GAUGE

CS16 Hole Pattern
(all other CS straps similar)

CMST14   14 GAUGE
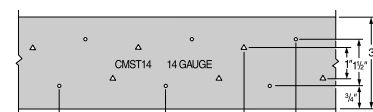
CMST14 Hole Pattern
(CMST12 similar)

TECHNICAL BULLETIN

City of Los Angeles RR Values
SET, ET and AT Adhesives

SIMPSON
Strong-Tie
®

Page 7 of 16

SIMPSON EPOXY ANCHORING ADHESIVES

Ideal for threaded rod anchoring and rebar dowelling in a variety of substrates. Simpson epoxies offer some of the industry's highest load values as well as extensive testing and code report listings. The gel consistency allows for easy installation in horizontal, vertical as well as overhead applications. Dual cartridge system offers maximum flexibility and easy installation.

SIMPSON SET EPOXY

SET offers some of the highest load values available for an adhesive anchor, making it ideal for high-load applications as well as general anchoring.

- Ideal when trying to get high load values with decreased embedment.
- Tested under ICC-ES's AC58 criteria to resist seismic and wind loads as well as elevated temperature creep.

CODES: City of L.A. RR 25279, ICC-ES ESR-1772, Caltrans approved, NSF/ANSI Standard 61, except SET1.7KTA.

SETPAC-EZ
(9 oz.)

SET22
(22 oz.)

SET1.7 KTA
(1.7 oz.)

SIMPSON ET EPOXY

Simpson's original epoxy formulation that offers load values equal to or higher than most adhesive formulations on the market. High load values, ease of installation and competitive pricing make this formula an exceptional value for general anchoring applications.

CODES: City of L.A. RR 25120 and RR 25185, ICC-ES ER-4945

ET22

ET56

SIMPSON ACRYLIC-TIE® ANCHORING ADHESIVE

Ideal for threaded rod anchoring and rebar dowelling in a variety of substrates, Acrylic-Tie is an easy dispensing, fast cure adhesive that will cure in temperatures down to 0º F. Acrylic-Tie offers load values comparable to or higher than most epoxy adhesives and higher than any other acrylic adhesive on the market. Tested under ICC-ES's AC58 criteria to resist seismic and wind loads as well as elevated temperature creep. Acrylic-Tie offers the installation flexibility that contractors need and the fast bolt-up times they desire.

CODES: City of L.A. RR 25459, ICC-ES ER-5791, NSF/ANSI Standard 61.

For information on Simpson Strong-Tie Anchor Systems full line of adhesive and mechanical anchors, powder actuated fastening systems and carbide drill bits call and request our latest full line Anchor Systems catalog (C-SAS) or visit our website www.simpsonanchors.com

AT13

FAST-PAC

City of Los Angeles RR Values
SET, ET and AT for Holdowns in Shearwalls

Single Adhesive Anchor Allowable Tension Loads for SET, AT and ET[1,3,5,6,7,8,9,10,11,12]

Adhesive Solutions - Load at Minimum Edge (One Edge Condition)[14]

Threaded Rod[2] Dia. (in.)	Min. Edge Dist. (in.)	Min. Embed Depth (in.)	SET f'c ≥ 2,000 psi[13] (lbs.)	SET f'c ≥ 4,000 psi[13] (lbs.)	AT f'c ≥ 2,000 psi (lbs.)	ET f'c ≥ 2,500 psi (lbs.)
5/8	1 7/8	4 1/2	1920	1920	1415	–
		5	2625	–	–	1500
		5 1/2	–	3070	2735	–
		9 3/8	4265	4990	4265	–
3/4	2 1/4	5	2880	2880	2165	–
		6 3/4	3455	4095	3600	–
		11 1/4	5270	6245	5615	–
	2 1/2	6 3/4	–	–	–	2345
7/8	2 5/8	6	3265	3265	2320	–
		7 3/4	3915	3915	4000	–
		13 1/8	6365	6365	5220	–
	2 7/8	7 1/2	–	–	–	2550
1	3	7	3650	4670	3050	–
		9	4380	5605	4015	–
		15	7115	9110	5835	–
	3 1/8	8 1/4	–	–	–	3050
1 1/8	3	7	3650	4670	3050	–
		9	4380	5605	4015	–
		15	7115	9110	5835	–
1 1/4	3 3/4	9	6185	6185	5015	–
		11 1/4	7425	7425	6015	–
		18 3/4	9985	9985	7935	–

Single Adhesive Anchor Allowable Tension Loads for SET, AT and ET[1,4,5,6,7,8,9,10,11,12]

Adhesive Solutions - Load at Minimum Edge (Two Edge Condition)[14]

Threaded Rod[2] Dia. (in.)	Min. Edge Dist. (in.)	Min. End Dist. (in.)	Min. Embed Depth (in.)	SET f'c ≥ 2,000 psi[13] (lbs.)	SET f'c ≥ 4,000 psi[13] (lbs.)	AT f'c ≥ 2,000 psi (lbs.)	ET f'c ≥ 2,500 psi (lbs.)
5/8	1 7/8	4 3/8	4 1/2	1865	1920	1415	–
			5	1865	–	–	1500
			5 1/2	–	2185	1975	–
			9 3/8	3075	3600	3075	–
3/4	2 1/4	4 3/8	5	2145	2490	1885	–
			6 3/4	2145	2540	2285	–
			11 1/4	3515	4165	3935	–
	2 1/2	5 1/8	6 3/4	–	–	–	2050
7/8	2 5/8	5	6	2420	2420	2000	–
			7 3/4	–	–	2495	–
			13 1/8	5160	5160	3605	–
	2 7/8	5	7 1/2	–	–	–	2265
1	3	5	7	2535	3245	2195	–
			9	2535	3245	2195	–
			15	5710	7310	3950	–
	3 1/8	5	8 1/4	–	–	–	2440
1 1/8	3	5	7	2535	3245	2195	–
			9	2535	3245	2195	–
			15	5710	7310	3950	–
1 1/4	3 3/4	5	9	4270	4270	3055	–
			11 1/4	4605	4605	3130	–
			18 3/4	7900	7900	5075	–

Holdowns

Model No.	Threaded Rod[2] Dia. (in.)	Single Holdown Allowable Tension Load (lbs.)	CL (In.)
LTTI31	5/8	1355	1 3/8
HTT16		2610	1 3/8
HTT22		3940	1 3/8
HD2A		2080	1 7/16
HDC5/22		3655	1 9/16
HDC5/4		3655	1 13/16
PHD2		2710	1 3/8
PHD5		3515	1 3/8
LTT19	3/4	905	1 3/8
LTT20B		1315	1 1/2
HD5A		3010	2 3/16
HD5		3055	2 1/8
HD6A	7/8	4135	2 1/16
HD8A		5935	2 1/16
HD10A		7425	2 1/16
HDC10/22		7250	1 9/16
HDC10/4		7250	1 13/16
PHD6		4395	1 3/8
HDQ8		6245	1 1/4
HD14A	1	10035	2 3/16
HD7	1 1/8	6085	2 1/8
HD9		7795	2 1/8
HD12		9840	2 1/8
HD15	1 1/4	11480	2 1/8

1. Any Single Holdown using a given Anchor diameter may be used with any Single Adhesive Solution using the same Anchor diameter. The allowable load for the connection will be the lesser of the single Holdown allowable load or the adhesive anchor allowable load.
2. Threaded rod anchor material shall be a minimum of ASTM A307.
3. The single anchor adhesive allowable loads are adjusted for one concrete edge.
4. The single anchor adhesive allowable loads are adjusted for two concrete edges. Loads for three edge conditions for 6" and 8" stemwalls are not considered.
5. Linear interpolation may be used for intermediate embedment depths.
6. Reference City of LA Research Report for allowable load adjustments for spacing.
7. Allowable maximum holdown device loads are based upon LA RR 25528, 25300, and 25318 and include the 1/3 stress increase for wind or seismic and the 25% reduction for holdown connectors per 2002 LABC 2315.5.6. See also pages 2 thru 5 of this technical bulletin.
8. Allowable adhesive loads are based upon LA RR 25279 (SET), 25459 (AT) and 25185 (ET), and have been increased 33%, where allowed, for design per LABC Chapter 16, for wind or earthquake loading with no further increase allowed.
9. Special inspection is required by reinforced concrete, steel, or reinforced masonry deputy inspector with controlled activity in drilled in anchor bolts.
10. See drill bit diameter chart for SET, AT and ET.
11. Reference current City of LA Research Reports for all limitations and restrictions for holdown devices and adhesives. Limitations and restrictions include, but are not limited to, fire resistive construction, vibratory or impact loads, temperature sensitivity, special inspection, cure time, wood fasteners and wood member design.
12. Minimum concrete thickness is 1.5 times the embedment depth.
13. Linear interpolation may be used between the 2000 psi and 4000 psi allowable load values for SET.
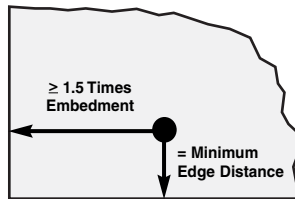14. See one, two and three edge condition drawings on page 9.

City of Los Angeles RR Values
SET, ET and AT for Holdowns in Shearwalls

SIMPSON
Strong-Tie
®

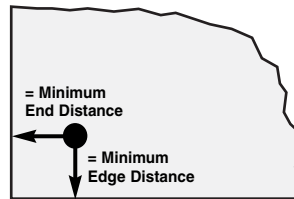**Single Adhesive Anchor Allowable Tension Loads for SET[1,3,4,5,6,7,8]**
Load in Stem Wall at Minimum Edge and Minimum End (Three Edge Condition)

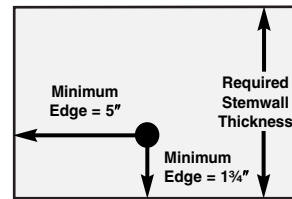| Threaded Anchor Rod[2] Dia. (in.)	Min. Embed Depth (in.)	Min. Concrete Foundation Stem Wall Thickness, $f'_c \geq 2{,}000$ psi (in.)	Min. Edge Dist. (in.)	Min. End Dist. (in.)	Min. Spacing Dist. (in.)	SET $f'_c \geq 2{,}000$ psi (lbs.)
⅝	10	6	1⅞	5	40	4000
⅞	15	8	2⅝	5	60	6800

1. Allowable load must be the lesser of the single holdown allowable load or the single adhesive anchor allowable load.
2. Threaded anchor rod material shall be minimum ASTM A307.
3. Minimum concrete thickness is 1.5 times the anchor embedment depth.
4. Single holdowns may be used with any single adhesive anchor of same corresponding diameter.
5. Allowable adhesive loads are based upon LA RR 25279 (SET) and have been increased 33% for design per LABC Chapter 16, for wind or earthquake loading with no further increase allowed.
6. Special inspection is required by reinforced concrete, steel, or reinforced masonry deputy inspector with controlled activity in drilled in anchor bolts.
7. See drill bit diameter chart for SET.
8. Reference current City of LA Research Reports for all limitations and restrictions for adhesives. Limitations and restrictions include, but are not limited to, fire resistive construction, vibratory or impact loads, temperature sensitivity, special inspection, and cure time.
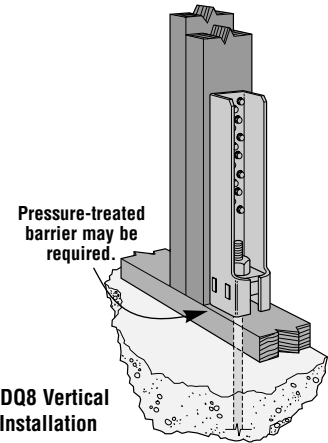
Pressure-treated barrier may be required.

HDQ8 Vertical Installation

≥ 1.5 Times Embedment
= Minimum Edge Distance

One Edge Condition

= Minimum End Distance
= Minimum Edge Distance

Two Edge Condition

Minimum Edge = 5″
Required Stemwall Thickness
Minimum Edge = 1¾″

Three Edge Condition

Drill Bit Diameter Chart

Rod Dia.	ET, SET Drill Bit Dia.	AT Drill Bit Dia.
½	9/16	9/16
⅝	¾	11/16
¾	⅞	13/16
⅞	1	1
1	1⅛	1 1/16
1⅛	1¼	1 3/16
1¼	1⅜	1 5/16

City of Los Angeles RR Values
SSTB Selection Guide for Concrete

Model	Single Holdown Maximum Allowable Tension Load	Concrete[4]			
		Single Pour		Two Pour[6]	
		Without Inspection	With Inspection	Without Inspection	With Inspection
LTT20B	2610	SSTB16	SSTB16	SSTB20	SSTB20
LTTI31					
HTT16					
HD2A					
PHD2[7]	2710	SSTB20	SSTB16	SSTB24	SSTB20
HD5A	3010	SSTB24	SSTB16	–	SSTB20
HTT22	3940	–	SSTB16	–	SSTB20
HDC5/22[10]					
HDC5/4[10]					
PHD5[7]					
HD6A	4395	SSTB28	SSTB28	SSTB34	SSTB34
PHD6[7]					
HD8A	5935	SSTB28[2]	SSTB28	SSTB34[3]	SSTB34
HDQ8[7]					
HD10A	7425	–	SSTB28	–	SSTB34
HDC10/22[10]					
HDC10/4[10]					

1. ⅝" dia SSTB bolts require a minimum of 5" end distance and ⅞" dia SSTB bolts require a minimum of 3⅞" end distance.
2. SSTB28 may be used with a minimum 12" end distance in end wall installation or may be used with a minimum of 5" end distance in a corner installation with a minimum 12" return.
3. SSTB34 may be used with a minimum 12" end distance in end wall installation or may be used with a minimum of 5" end distance in a corner installation with a minimum 12" return.
4. ⅝" dia SSTB bolts in concrete require a minimum of 6" wide stem wall and ⅞" dia SSTB bolts require a minimum of 8" wide stem wall.
5. Installation and material requirements are listed on page 10.
6. Assumes cold joint between first and second pour located 4" below the top of concrete.
7. SSTBL models are recommended for PHD and HDQ8 holdowns on 2-2x and 3x sill plates.
8. No cold joint within the effective depth of embed unless provisions are made to transfer the load.
9. The design engineer may specify an alternate anchorage system, provided the anchor diameter is the same.
10. Increase the embedment depth 2½" to accommodate the HDC standoff block.

City of Los Angeles RR Values
SSTB Anchor Bolts

SIMPSON
Strong-Tie
®

Extensive SSTB testing has been done to determine the design load capacity at a common application, the garage stem wall.

FEATURES:
- Rolled threads for higher tensile capacity.
- Offset angle reduces side-bursting, provides more concrete cover.
- Stamped bolt head for identification after pour.
- Stamped embedment line aids installation.
- Configuration results in minimum rebar interference.

MATERIAL: ASTM A36

FINISH: None. HDG available.

INSTALLATION:
- Use the SSTB Selection Guide on page 9 to select the appropriate SSTB size for the holdown and foundation type to be used.
- SSTB is suitable for monolithic and two-pour installations.
- Nuts and washers are not supplied with the SSTB; install standard nuts, couplers and/or washers as required.
- Hot-dip galvanized nuts shall be over tapped per ASTM A563-2004.

REINFORCED CONCRETE BLOCK
- Before concrete pour, install diagonally at approx. 45° in the cell per plan view detail.
- Horizontal #4 rebar (minimum 56" long centered about the anchor bolt)—approximately one rebar 12" from the top and two rebars approximately 28" from the top. Vertical #4 rebar (minimum 24" long)—install with maximum 24" o.c. spacing.
- Grout all cells with minimum 2000 psi concrete. Vibrate the grout per the 2002 LABC, Section 2104.6.2.

REINFORCED CONCRETE FOUNDATION:
- Install SSTB before the concrete pour using an AM *(refer to the current Wood Construction Connectors catalog for AM)*. Install the SSTB diagonally at approximately 45° from the wall. Install one #4 rebar 3" to 5" from the top of the foundation *(may be foundation rebar if adjacent to SSTB)*. The SSTB does not need to be tied to the rebar.
- Minimum concrete compression strength is 2500 psi.
- Unless otherwise noted, do NOT install where: (a) a horizontal cold joint exists within the embedment depth between the slab and foundation wall or footing beneath, unless provisions are made to transfer the load, or the slab is designed to resist the load imposed by the anchor; or (b) slabs are poured over concrete block foundation walls.
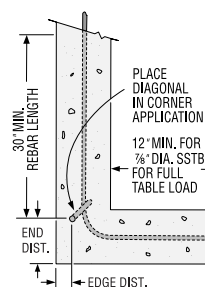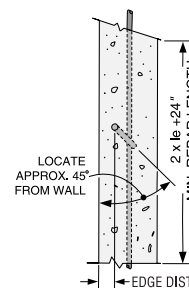
CODES: City of L.A. RR 25248.
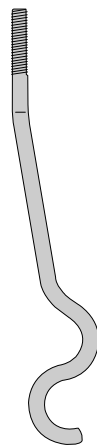
SSTB16
(others similar)
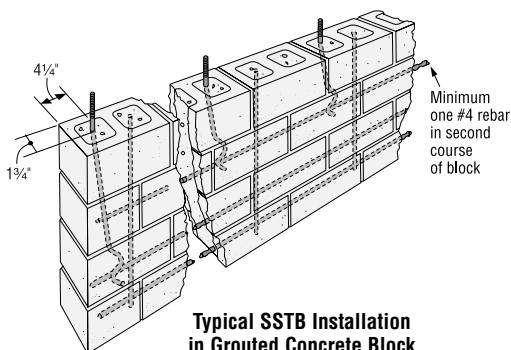U. S. Patent
5,317,850
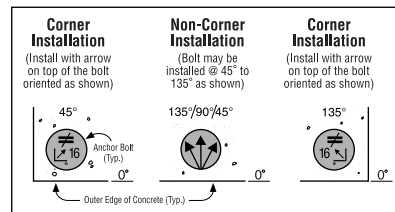
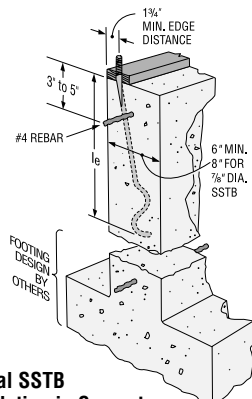**Plan View of SSTB Placement in Concrete**

Typical Plan View
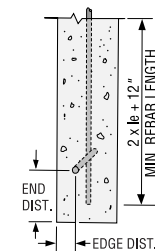**Corner Installation**

Typical Plan View
Continuous Stemwall

Typical SSTB Installation
in Grouted Concrete Block

Typical SSTB
Installation in Concrete
Maintain minimum rebar cover, per
ACI-318 concrete code requirements

Typical Plan View
End Wall

City of Los Angeles RR Values
SSTB Anchor Bolts

SIMPSON Strong-Tie®

Model No.	Dia	Length	Min Embed l_e	Min. Wall Width	Min. Edge Distance	Min. End Distance	Allowable Tension Load					
							Concrete[3]		Concrete Block[5,6]			
							Without Inspection	With Inspection[7]	Without Inspection[10]	With Inspection[7,10]	End Wall Without Inspection	End Wall With Inspection[7]
SSTB16	⅝	17⅝	12⅝	6	1¾	5	2695	4150	1800	3600	700	1400
SSTB20	⅝	21⅝	16⅝	6	1¾	5	2985	4600	1800	3600	700	1400
SSTB24	⅝	25⅝	20⅝	6	1¾	5	3360	5175	1800	3600	700	1400
SSTB28	⅞	29⅞	24⅞	6	1¾	3⅞	4415	6800	—	—	—	—
SSTB28	⅞	29⅞	24⅞	8	1¾	3⅞	4995	7690	—	—	—	—
SSTB28	⅞	29⅞	24⅞	8	1¾	5	5290	8150	2400	4800	1810	3620
SSTB28	⅞	29⅞	24⅞	8	1¾	12[4]	6560	10,100	2400	4800	1810	3620
SSTB34	⅞	34⅞	28⅞	8	1¾	5	5290	8150	2400	4800	1810	3620
SSTB34	⅞	34⅞	28⅞	8	1¾	12[4]	6560	10,100	2400	4800	1810	3620
SSTB36	⅞	36⅞	28⅞	8	1¾	12[4]	6560	10,100	2400	4800	1810	3620
SSTB36	⅞	36⅞	28⅞	8	1¾	5	5290	8150	2400	4800	1810	3620

1. Loads may not be increased for short-term loading.
2. Minimum anchor center-to-center spacing is $2l_e$ for anchors acting in tension at the same time for full load.
3. Concrete shall have a minimum f'c=2500 psi.
4. SSTB28, 24, and 36 may be installed with 5" minimum end distance and achieve the same load as with a 12" end distance when installed in a corner with a minimum 12" return. See Typical Plan Views on page 10.

5. For concrete block installation, the minimum edge distance is 1¾" and the minimum end distance is 4¼".
6. For the CMU assembly, the minimum grout compressive strength (f'c) shall be 2000 psi and the minimum compressive strength of masonry (f'm) shall be 1500 psi.
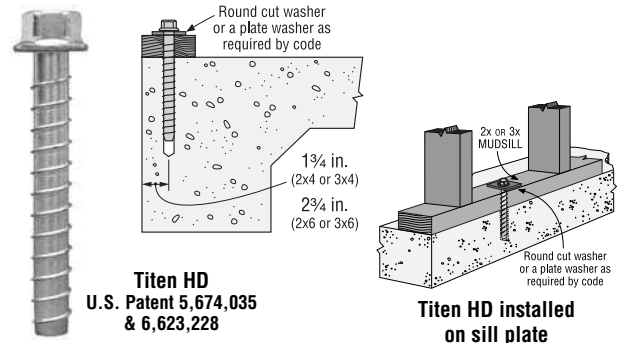7. Inspection refers to SSTB placement and not the concrete or the concrete block.

8. Order the SSTBL models for longer thread length (5½") ex. SSTB24L. SSTBL and SSTB loads are the same.
9. SSTB34 has 4½" of thread and SSTB36 has 6½". These two models are not available in SSTBL versions.
10. Minimum end distance required to use the highest tabulated load values for the SSTB in a CMU wall is the embedment (l_e).

City of Los Angeles RR Values
Titen HD® Screw Anchors as Replacement for Cast-In-Place Anchor Bolts

Wood sill plates for interior and exterior walls must be anchored to the foundation using either prescriptive spacing requirements of the building code or as determined by the engineer. Additionally it is required that the anchorage be within 12" of the end of the wood sill. This requirement is often very challenging with cast-in-place anchor bolts because the concrete contractor does not know where the framer will splice the plates. As such, building officials will commonly require installation of a retrofit bolt.

Simpson Strong-Tie's Titen HD is an ideal solution for these types of retrofit applications. The Titen HD is a patented, high-strength threaded anchor for concrete. The self-undercutting, non-expansion characteristics of the Titen HD allow it to be used in near edge conditions. The proprietary cutting teeth enable the Titen HD to be installed with less effort and time than traditional expansion anchors. This heat-treated anchor undercuts the concrete to form a strong mechanical interlock over the entire length of the anchor. The anchor can be installed with a standard ANSI masonry drill bit and is removable. The product is offered mechanically galvanized for use with ACQ or CA treated lumber.

The Titen HD can be used as a direct replacement for cast-in-place anchor bolts. For braced wall lines or shearwalls, this product provides the advantages of post installing the anchor bolts and eliminating oversized mudsill holes. The framer can install the Titen HD by simply drilling through the plate and concrete, cleaning out the hole, and installing the Titen HD. The following table provides information for the Titen HD used as a direct 1-to-1 replacement for cast-in-place bolts.

Round cut washer or a plate washer as required by code

1¾ in. (2x4 or 3x4)
2¾ in. (2x6 or 3x6)

Titen HD U.S. Patent 5,674,035 & 6,623,228

2x or 3x MUDSILL

Round cut washer or a plate washer as required by code

Titen HD installed on sill plate

Titen HD Size (in)	Titen HD Model #	Sill Plate Size (in)	Min. End Dist. (in)	Min Stem Wall Width (in)
½ x 6	THD50600H	2x or 3x	8	6
⅝ x 6	THD62600H	2x	10	6
⅝ x 6½	THD62612H	3x	10	6

1. Min. concrete strength 2500 psi.
2. For ACQ or CA lumber order products Mechanically Galvanized (MG). For additional information, visit **www.strongtie.com/info**
3. Designs based on a minimum emdedment of 3¼" for ½" Titen HDs and 3¾" for ⅝" Titen HDs.
4. Refer to LA RR 25560 and the current *Simpson Anchor & Fastening Systems for Concrete & Masonry* catalog for installation instructions and additional information.
5. Direct 1 to 1 replacement is based on parallel-to-plate, perpendicular-to-plate, and tension comparisons to a cast-in-place anchor bolt of equivalent diameter.

City of Los Angeles RR Values
BP Bearing Plates

SIMPSON Strong-Tie®

Bearing Plates give greater bearing surface than standard cut washers and help distribute the load at these critical connections. The Bearing Plate is designed to meet the City of Los Angeles Building Code Sections 1806.6.6.1 (2) and 2315.5.6 requirements for sill plate anchors and holdown studs/post bolts.
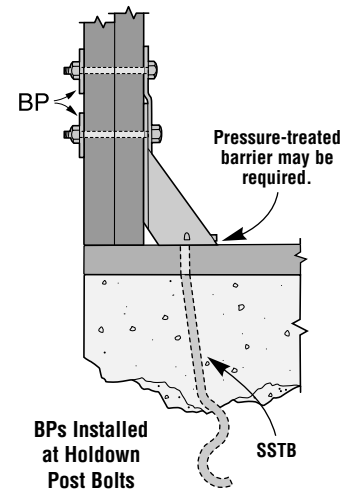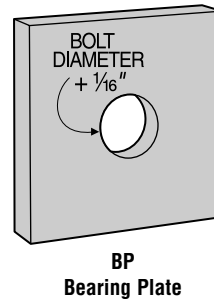
MATERIAL: See table.

FINISH: None. HDG available, contact factory.

INSTALLATION: Refer to the current *Wood Construction Connectors* catalog for General Notes and warranty information.

CODES: City of L.A. No. RR 25293.

Model No.	Ga.	Dimensions		Bolt Diameter
		W	L	
BP ½	³⁄₁₆	2	2	½
BP ⅝	¼	2½	2½	⅝
BP ¾	⁵⁄₁₆	2¾	2¾	¾
BP ⅞	⁵⁄₁₆	3	3	⅞
BP 1	⅜	3½	3½	1

BOLT DIAMETER + ¹⁄₁₆"

BP Bearing Plate

BP

Pressure-treated barrier may be required.

BPs Installed at Holdown Post Bolts

SSTB

City of Los Angeles RR Values
SDS Screws

The Simpson Strong-Drive® wood screw has a hex washer head for easy driving with a ⅜" hex head socket and a low speed drill. The built-in reamer and type 17 tip cuts a hole to allow installation without predrilling. Predrilling may be necessary depending on the type and moisture content of wood. Use ⁵⁄₃₂ drill bit.
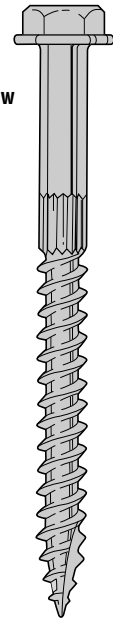
MATERIAL: 1022 Steel, SAE Grade 5.

FINISH: Yellow Zinc Dichromate. SDS¼x1½", 2", 2½" and 3" are available in HDG.

CODES: City of L.A. RR 25281.

≠ S3

Identification on all screw heads (SDS¼x3 shown)

SDS¼x3 Screw
U.S. Patent 6,109,850

Model No.	Description	Metric Equivalent (mm)	Finish[3]	Fasteners per Carton	Allowable Shear Loads[1] DF/SP (lbs)							
					1½" Wood to Wood		2½" Wood to Wood		10 to 22 Gauge		3 Gauge	
					(100)[6]	(133)[7]	(100)[6]	(133)[7]	(100)[6]	(133)[7]	(100)[6]	(133)[7]
SDS¼ x 1½	¼ x 1½" Wood screw	6.1 x 38	ZINC	1500	—	—	—	—	247	329	243	324
SDS¼ x 1¾	¼ x 1¾" Wood screw	6.1 x 44.5	ZINC	1400	—	—	—	—	292	389	291	388
SDS¼ x 2	¼ x 2" Wood screw	6.1 x 50.8	ZINC	1300	—	—	—	—	306	408	327	436
SDS¼ x 2½	¼ x 2½" Wood screw	6.1 x 63.5	ZINC	1100	176	235	—	—	306	408	327	436
SDS¼ x 3	¼ x 3" Wood screw	6.1 x 76.2	ZINC	950	228	304	—	—	306	408	327	436
SDS¼ x 3½	¼ x 3½" Wood screw	6.1 x 88.9	ZINC	900	228	304	193	257	306	408	327	436
SDS¼ x 4½	¼ x 4½" Wood screw	6.1 x 114.3	ZINC	800	272	363	250	333	306	408	327	436
SDS¼ x 6	¼ x 6" Wood screw	6.1 x 152.4	ZINC	600	272	363	310	413	306	408	327	436

1. Allowable loads are based on the 1997 NDS. Adjustments are made for use with metal side plates, $F_u = F_{es} = 45$ ksi. Allowable loads for gauges not indicated must be calculated according to the code. Contact Simpson Strong-Tie for more details.
2. Metric equivalents are listed by Diameter x Length.
3. Zinc = Yellow zinc dichromate.
4. Installs best with a low speed ½" drill with a ⅜" hex head driver.

5. Wood-to-wood applications are based on 1½" and 2½" DF-L/SP wood side member. For other wood species and thickness, reference LA RR 25281
6. Shear (100) values may be increased by the wood load duration factor, C_D, as permitted by the LABC.
7. The (133) values for wind or earthquake loading may not be increased any further than shown.

City of Los Angeles Approved Wall Anchor Connector Allowable Loads for Concrete Tilt-Up and Masonry Wall Construction

SIMPSON
Strong-Tie

City of Los Angeles Approved Wall Anchor Connector Allowable Loads For Concrete and Masonry Wall Construction.

Model No.	Fasteners			Allowable Tension Loads for Single Holdowns	
	Anchor Bolt Dia.[4]	Stud Bolts	Stud Screws	Design per 2002 LABC Chapters 91 & 96	Design per 2002 LABC Chapter 16
HTT22	⅝	—	32-16d sinkers	1075	1795
HD2A	⅝	2 - ⅝	—	855	1425
HD5A	¾	2 - ¾	—	1065	1775
HD6A	⅞	2 - ⅞	—	1800 (1705 for 1½" Mbr.)	3000
HD8A	⅞	3 - ⅞	—	1745	2910
HD10A	⅞	4 - ⅞	—	1750	2915
HD14A	1	4 - 1	—	2210	3680
HD5	¾	2 - ¾	—	1470	2450
HD7	1⅛	3 - ⅞	—	2850 (2425 for 1½" Mbr.)	4750
HD9	1⅛	3 - 1	—	4950	8250
HD12	1⅛	4 - 1	—	4950	8250
HD15	1¼	5 - 1	—	5250	8750
PHD2	⅝	—	10-SDS¼x3	1450	2420
PHD2	⅝	—	10-SDS¼x2½	1450	2420
PHD2	⅝	—	10-SDS¼x1½	1450	2420
PHD5	⅝	—	14-SDS¼x3	1450	2420
PHD5	⅝	—	14-SDS¼x2½	1450	2420
PHD5	⅝	—	14-SDS¼x1½	1450	2420
PHD6	⅞	—	18-SDS¼x3	2445	4070
PHD6	⅞	—	18-SDS¼x2½	2445	4070
PHD6	⅞	—	18-SDS¼x1½	2445	3550
HDQ8	⅞	—	20-SDS¼x3	4235	7060

1. The allowable tabulated loads shall be checked against the allowable stress design anchorage force determined from LABC Chapter 91 or 96 or checked against the allowable stress design anchorage force, Fp(strength)/1.4, where Fp is determined from LABC Chapter 16. The ASD wall anchorage force does not need to be multiplied by the 1.7 steel demand increase factor in LABC Chapter 91 and 96 nor does Fp need to be multiplied by the 1.4 and 0.85 material specific modification factors as they have already been accounted for in the determination of the allowable tabulated loads.
2. Reference the City of Los Angeles Interdepartmental Correspondence on "Approved Anchors and Anchor Connectors Lists" dated 9-15-04 and the City of Los Angeles Information Bulletin P/BC 2001-71 "Wall Anchorage Assemblies to Flexible Diaphragms Revised Design Criteria (Chapter 16, Chapters 91 and 96)" revised 11-1-02.
3. Allowable load is limited by the lowest values of:
   (a) The average ultimate load tested on a steel jig with a load reduction of 5 (Chapter 91 and 96) or 3 x 1.4 (Chapter 16)
   (b) The average 1/8" deflection load on a steel test jig with a load reduction of 5 (Chapter 91 and 96) or 3 (Chapter 16)
   (c) Fastener in wood capacity in accordance with the 2002 Los Angeles City Building Code. All fastener calculations based on 2½" actual member thickness for design per Chapter 16 except the HD9, HD12, and HD15 which are based on a 3½" actual member thickness. All fastener calculations based on 1½" and 2½" actual member thickness for design per Chapter 91 or 96 except the HD9, HD12, and HD15 which are based on a 3½" actual member thickness.
4. Anchor bolt type, length, and embedment to be specified by the designer.
5. The wood member must be sized for the load carrying capacity.
6. Loads shall not be increased for short-term load duration nor the one-third stress increase.
7. All the allowable load values tabulated above are for single wall anchor connectors. Multiply the tabulated loads above by 2 for double wall anchor connector applications. If single wall anchor connectors are used, comply with LABC Section 1633.2.8.1 Item 2 regarding eccentricity.
8. Nails: 16d sinker = 0.148" dia. x 3¼"long. 0.148" dia. x 2½" long nail may be substituted with the same load capacity.

HD7 Horizontal Installation
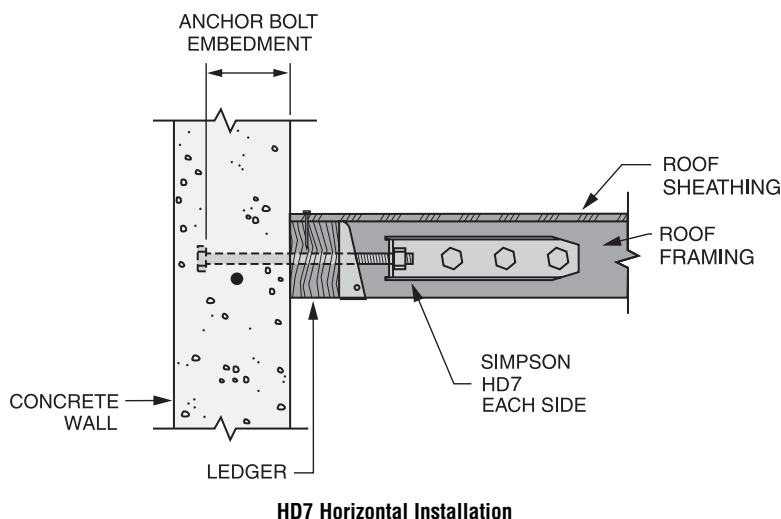
City of Los Angeles Approved Adhesive Anchors for Concrete Tilt-Up and Masonry Wall Construction

SIMPSON
Strong-Tie
®

Adhesive Anchor Loads are based on the City of L.A. Interdepartmental Correspondence on Approved Anchors and Anchor Connectors for Tilt-up Construction (dated 9-15-04).

Adhesive Anchor Loads for Concrete Tilt-Up[1,2,3,11,12,13,14]

| Model No.	Anchor Bolt Dia. (in.)	SET, AT Min. Embed Depth (in.)	ET Min. Embed Depth (in.)	Min. Edge Dist.[10] (in)	Min. Purlin Thick. (in.)	Chapters 91 & 96 Single HD Max. Allowable Load (lbs.)	Chapter 16 Single HD Max. Allowable Load (lbs.)	SET Single Anchor 2000 psi[15] Conc. (lbs.)	SET Single Anchor 4000 psi[15] Conc. (lbs.)	AT Single Anchor 2000 psi Conc. (lbs.)	ET Single Anchor 2500 psi Conc. (lbs.)
HTT22	⅝	4½	5	3¾	3x	1075	1795	2540	2540	1905	2100
HD2A	⅝	4½	5	3¾	3x	855	1425	2540	2540	1905	2100
HD5A	¾	5	6¾	5⅛	3x	1065	1775	3840	3840	2935	3520
HD6A	⅞	6	7½	5⅞	3x	1800	3000	3535	3535	2700	2550
HD8A	⅞	6	7½	5⅞	3x	1745	2910	3535	3535	2700	2550
HD10A	⅞	6	7½	5⅞	3x	1750	2915	3535	3535	2700	2550
HD14A	1	7	8¼	6¾	3x	2210	2680	4220	5400	4170	3430
HD5	¾	5	6¾	5⅛	3x	1470	2450	3840	3840	2935	3520
HD7	1⅛	7	8¼	6¾	3x	2850	4750	4180	5355	4140	3430
HD9	1⅛	7	8¼	6¾	3x	4950	8250	4180	5355	4140	3430
HD12	1⅛	7	8¼	6¾	3x	4950	8250	4180	5355	4140	3430
HD15	1¼	9	8¼	8½	4x	5250	8750	5630	5630	6155	3430
PHD2	⅝	4½	5	3¾	3x	1450	2420	2540	2540	1905	2100
PHD5	⅝	4½	5	3¾	3x	1450	2420	2540	2540	1905	2100
PHD6	⅞	6	7½	5⅞	3x	2445	4070	3535	3535	2700	2550
HDQ8	⅞	6	7½	5⅞	2-2x, 4x	4235	7060	3535	3535	2700	2550

See footnotes below.

Adhesive Anchor Loads for Masonry Wall Construction[1,2,3,6,7,8,9,11,12,13,14]

Model No.	Anchor Bolt Dia. (in.)	SET Min. Embed Depth (in.)	Min. Edge Dist.[10] (in)	Min. Purlin Thick. (in.)	Chapters 91 & 96 Single HD Max. Allowable Load (lbs.)	Chapter 16 Single HD Max. Allowable Load (lbs.)	SET[4,5] Single Anchor in Grout-Filled CMU, f'm = 1500 psi (lbs.)
HTT22	⅝	5	12	6x	1075	1795	1510
HD2A	⅝	5	12	6x	855	1425	1510
HD5A	¾	5	12	4x	1065	1775	1510
HD6A	⅞	5	12	6x	1800	3000	1510
HD8A	⅞	5	12	6x	1745	2910	1510
HD10A	⅞	5	12	6x	1750	2915	1510
HD14A	1	5	12	4x	2210	2680	1510
HD5	¾	5	12	4x	1470	2450	1510
HD7	1⅛	5	12	4x	2850	4750	1510
HD9	1⅛	5	12	4x	4950	8250	1510
HD12	1⅛	5	12	4x	4950	8250	1510
HD15	1¼	5	12	4x	5250	8750	1510
PHD2	⅝	5	12	6x	1450	2420	1510
PHD5	⅝	5	12	6x	1450	2420	1510
PHD6	⅞	5	12	6x	2445	4070	1510
HDQ8	⅞	5	12	6x	4235	7060	1510

1. Allowable load must be the lesser of the single holdown allowable load or the single adhesive anchor allowable load.
2. Threaded rod anchor material shall be minimum ASTM A307.
3. Values listed are for single HD and single adhesive anchor installations. When holdowns are installed in pairs. The controlling allowable load may be doubled.
4. When using a ⅝" diameter anchor bolt, the edge distance may be increased to 20" with a corresponding allowable load increase to 1640 lbs.
5. When using a ¾" diameter (or larger) anchor bolt, the edge distance may be increased to 27" in combination with an increase in embedment to 6¾" with a corresponding allowable load increase to 2225 lbs.
6. Anchors are permitted to be installed at any location in the face of the fully grouted masonry wall construction (cell, web, head joint, bed joint, etc.).
7. Embedment depth is measured from the outside face of the masonry.

8. Anchors are limited to one per masonry cell.
9. Tabulated load values are for anchors installed in fully grouted masonry construction wall construction, consisting of Grade N, Type II, lightweight, medium-weight, or normal-weight, closed-end, concrete masonry units (CMU) conforming to ASTM C 90 or UBC Standard 21-4. Masonry shall be fully grouted with coarse grout having a minimum compressive strength of 2,000 psi, and complying with IBC Section 2103.10 or UBC Section 2103.4. Mortar shall comply with IBC Section 2103.7, or UBC Section 2103.3 and UBC Standard 21-15; and have a minimum compressive strength of 1,500 psi. The specified compressive strength of masonry, f'm, at 28 days shall be a minimum of 1,500 psi.
10. Reference SET, AT, and ET City of LA Research Reports 25279, 25459, and 25185, respectfully, for allowable load adjustment factors when minimum edge distances are less than shown in the table.
11. Allowable maximum holdown device and adhesive loads are based on the LABDS Inter-Departmental Correspondence entitled "Approved Anchors and Anchor Connectors lists for New Construction or Repair or Retrofit of Tilt-Up Wall and Masonry Wall Buildings" dated 9-15-04 and have been increased 33% where allowed with no further increase permitted.
12. Special inspection is required by reinforced concrete, steel, or reinforced masonry deputy inspector with controlled activity in drilled in anchor bolts.
13. See drill bit diameter chart on page 9 for SET, AT and ET.
14. Reference current City of LA Research Reports for all limitations and restrictions for holdown devices and adhesives. Limitations and restrictions include, but are not limited to, fire resistive construction, vibratory or impact loads, temperature sensitivity, special inspection, cure time, wood fasteners and wood member design.
15. Linear interpolation may be used between the 2000 psi and 4000 psi allowable load values for SET.

Horizontal PHD Installation Plan View
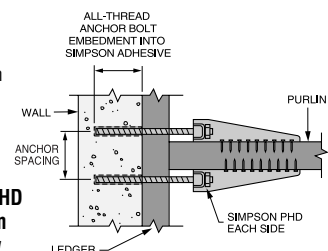
City of Los Angeles PCT Purlin Cross Tie Allowable Loads for Concrete Tilt-Up and Masonry Wall Construction

SIMPSON Strong-Tie®

FEATURES:
- Designed using a section that works in both tension and compression.
- Tube section helps with drilling alignment, through the purlin.
- Offset angle to allow drilling access through glulam.

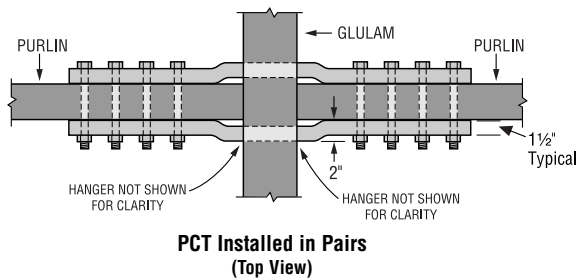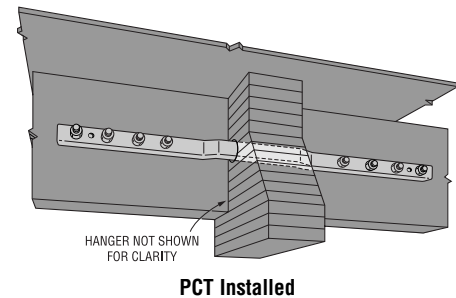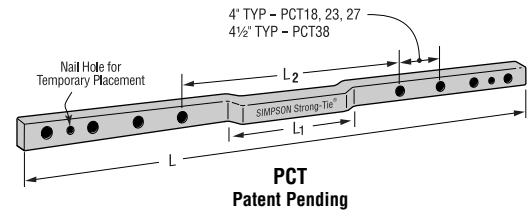**MATERIAL:** 1½" square tube steel ASTM A500 Grade B.

FINISH: Galvanized.

INSTALLATION:
- Use all specified fasteners. Refer to the current *Wood Construction Connector* catalog for General Notes and warranty information.
- PCT18 and 23 are sized to span a maximum hanger seat depth *("B" dimension)* of 4".
  PCT27 and 38 are sized to span a maximum hanger seat depth *("B" dimension)* of 6".
- 2½" or a 2⁹⁄₁₆" diameter hole required.
- Install in pairs.

OPTIONS: Contact the factory for other lengths.

CODES: City of L.A. RR 25540.

4" TYP – PCT18, 23, 27
4½" TYP – PCT38

Nail Hole for Temporary Placement

PCT
Patent Pending

HANGER NOT SHOWN FOR CLARITY

PCT Installed

PURLIN — GLULAM — PURLIN

1½" Typical

2"

HANGER NOT SHOWN FOR CLARITY

PCT Installed in Pairs
(Top View)

Model No.	Dimensions (in)			Total Length (in)	Fasteners	Allowable Load Per Pair of PCTs						
	L	L₁	L₂			Steel Tension	Steel Compression	Bolts (Double Shear) Length of Bolt in Purlin[4] - DF/SP				
								3⅛"	3½"	5⅛"	5½"	6¾"
Wall Anchorage Design per LABC Chapter 16												
PCT18	44¾	14	17¾	44¾	8–⅝" MB	24,665	19,165	14,365	15,925	15,925	15,910	15,875
PCT23	52¾	14	17¾	52¾	10–⅝" MB	24,665	19,165	17,620	17,620	17,620	17,620	17,620
PCT27	66¾	19½	23½	66⅝	12–⅝" MB	39,665	28,665	20,715	23,090	23,670	23,690	23,545
PCT38	71⅝	19½	23½	71⅝	12–¾" MB	35,365	26,030	20,715	24,255	25,535	25,535	25,535
Wall Anchorage Design per LABC Chapter 91 and 96												
PCT18	44¾	14	17¾	44¾	8–⅝" MB	14,800	11,500	10,775	10,900	10,900	10,900	10,900
PCT23	52¾	14	17¾	52¾	10–⅝" MB	14,800	11,500	10,900	10,900	10,900	10,900	10,900
PCT27	66¾	19½	23½	66⅝	12–⅝" MB	23,800	17,200	15,535	17,315	17,660	17,660	17,660
PCT38	71⅝	19½	23½	71⅝	12–¾" MB	21,220	15,620	15,320	15,320	15,320	15,320	15,320

1. Loads shall not be increased for short-term load duration nor the one-third stress increase.
2. Install PCT purlin crossties in pairs.
3. Minimum bolt length is: Purlin width + 3"(PCT) + 1"(nut).
4. Allowable loads for bolts assume a purlin with a minimum depth of 10½".
5. Engineer of Record is responsible for evaluating the glulam.
6. The allowable tabulated loads shall be checked against the allowable stress design anchorage force determined from LABC Chapter 91 or 96 or checked against the allowable stress design anchorage force, Fp*(strength)*/1.4, where Fp is determined from LABC Chapter 16. The ASD wall anchorage force does not need to be multiplied by the 1.7 steel demand increase factor in LABC Chapter 91 and 96 nor does Fp need to be multiplied by the 1.4 and 0.85 material specific modification factors as they have already been accounted for in the determination of the allowable tabulated loads.

7. Reference the City of Los Angeles Interdepartmental Correspondence on "Approved Anchors and Anchor Connectors Lists" dated 9-15-04 and the City of Los Angeles Information Bulletin P/BC 2001-71 "Wall Anchorage Assemblies to Flexible Diaphragms Revised Design Criteria *(Chapter 16, Chapters 91 and 96)*" revised 11-1-02.
8. Allowable load is limited by the lowest values of (1) average ultimate load on steel jig divided by a factor of 5 *(Chapters 91 and 96)* or 3 x 1.4 *(Chapter 16)*, (2) average ⅛" deflection load divided by a factor of 5 *(Chapters 91 and 96)* or 3 *(Chapter 16)*, and (3) fastener in wood capacity in accordance with the 2002 LABCode.
9. The wood member must be sized for the load carrying capacity.

City of Los Angeles RR Values
Design Example for Wall Anchorage

SIMPSON
Strong-Tie
®

Example for Design per LABC Chapter 16 using this Technical Bulletin.

Determine Fp (strength) for a ***tilt-up concrete*** building designed per ***Chapter 16***
of the 2002 Los Angeles City Building Code. Then divide the wall anchorage
design force, Fp(strength), by 1.4 to convert to allowable stress design (ASD).
Use Fp(strength) = 8000 lbs for this example.

Design force: **Fp** = 8000 lbs / 1.4 = 5714 lbs

1) ***Pre-Manufactured Anchor Connector Check:***

From List 1 of the LADBS Engineering Research memo, dated September 15, 2004,
the allowable capacity of a Simpson Strong-Tie PHD6 with SDS¼x1½" screws
used in the wall anchorage assembly is 3550 lbs. Use one **PHD6** SDS¼x1½"
screws each side of 4x purlin for concentric anchorage.

Allowable capacity = **P** = 3550 lbs x 2 PHD6's with SDS¼x1½" = <u>7100 lbs</u>   > 5714 lbs OK

Plan View

2A) ***Anchor Bolt in Concrete Wall Check per LABC 1923.1 (ASD):***

One **⅞" diameter A.B.** for each PHD6 each side of 4x purlin

The required embedment, edge distance, and spacing as shown in LABC Table 19-D:

Required ⅞" diameter anchor embedment for full capacity = 6"

Required ⅞" diameter anchor edge distance for full capacity = 5¼"

Required ⅞" diameter anchor spacing for full capacity = 10½"

Assume for this example that A.B. embedment and edge distances meet the
requirements for full capacity.

Actual spacing between PHD6 ⅞" diameter anchors = (1.375"*2) + 3.5" = 6.25".

6.25" < 10.50" therefore reduce ⅞" diameter anchor allowable Table 19-D capacity.

Reduced A.B. allowable tension load = 2550 lbs x (6.25/10.5) x 1.33 = 2024 lbs

f'c = 3000 psi, Special inspection required for concrete placement (LABC 1701.5
Item1). No special inspection for bolts in concrete (LABC 1701.5 Item 2)

Pt = 2024 lbs x (2) - [⅞" diameter anchors] = 4048 lbs < 5714 lbs NG

TRY

2B) ***Anchor Bolt in Concrete Wall Check per LABC 1923.2 (Strength Design):***

One **⅞" diameter A.B.** for each PHD6 each side of 4x purlin

No special inspection, therefore, Fp = 2 x 8 kips = 16.0 kips

Actual spacing between PHD6 ⅞" diameter anchors = (1.375"*2) + 3.5" = 6.25"

For ⅞" bolts with hex heads, the width across the flats is 1⁵⁄₁₆"(1.313"), and Ap is
computed as follows.

Ap=Area of 2 Half Circles + Rectangular Area Between Anchors (Reference Drawing)
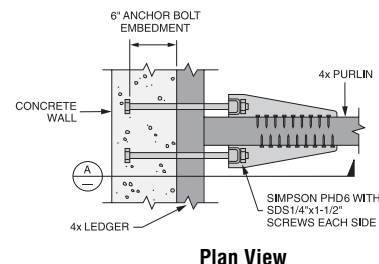
$Ap=(\pi/4)[(2*6")+1.313"]^2 + 6.25"[(2*6")+1.313"]=222$ in.^{2}

$\phi=0.65$ (Ref. 1923.3.2 exception regarding use of $\phi=0.85$), $\lambda=1.0$, f'c = 3000 psi
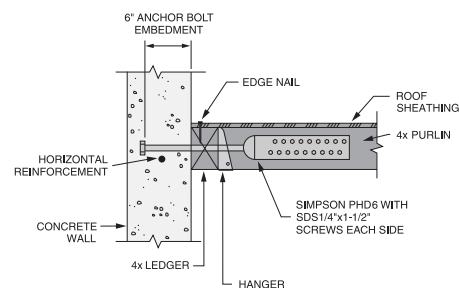
$\phi=Pc = \phi\lambda 4Ap\sqrt{fc'}$

$\phi=Pc = (0.65)(1.0)(4)(222in.^2)\sqrt{3000} / 1000 = $ <u>31.7 kips</u> > Fp = 16.0 kips OK

$\phi=Pss = 0.90\ Abf_{ut} = (0.90)(0.60\ in.^2)(60000)(2\ Bolts)/1000 = $ <u>64.9 kips</u> > Fp = 16.0 kips OK

Therefore, (2) Simpson Strong-Tie PHD6's with ⅞" dia. anchor bolt embedded 6" are adequate.

$$\frac{(\pi d^2/4)}{2} \quad \begin{matrix}(\text{Bolt Spa.})\text{x} \\ (2\text{xEmbed+} \\ \text{Head Width})\end{matrix} \quad \frac{(\pi d^2/4)}{2}$$

Drawing of Ap