SIMPSON
Strong-Tie
ANCHOR SYSTEMS

In the Specs – On the Job – At Your Service™

NEW!

Introducing
Strong-Bolt™ 2
The Next Generation of Wedge Anchors

Cracked & Uncracked CONCRETE
IBC 2009
ICC-ES ESR-3037

A New Standard in Cracked-Concrete Wedge Anchors

While it installs like a standard wedge anchor, the Strong-Bolt™ 2 wedge anchor offers performance that is anything but standard. This innovative, new wedge anchor features a redesigned, tri-segmented clip made of a special high-strength alloy that enables it to outperform many other cracked-concrete wedge anchors, including the original Strong-Bolt™ anchor.

A Category 1 anchor as determined by ICC-ES acceptance criteria, the Strong-Bolt 2 anchor offers increased reliability in the most adverse conditions, including performance in cracked concrete under static and seismic loading. The Strong-Bolt 2 anchor is code-listed by ICC-ES ESR-3037 under the 2009 IBC requirements for post-installed anchors in cracked and uncracked concrete.

FEATURES:

- **Category 1 anchor classification:** Strong-Bolt™ 2 wedge anchor received classification as a Category 1 anchor, which is established by performance in reliability tests in accordance with ICC-ES's AC193 and ACI 355.2 test criteria. Category 1 is the highest attainable anchor category for reliability
- **Tri-segmented clip:** Each segment is able to adjust independently, increasing follow-up expansion should the hole increase in size as a result of a crack
- **Dual embossments on each clip segment:** Enable the clip to undercut into the concrete, thereby increasing follow-up expansion should a crack occur
- **The only ⅜"-diameter anchor solution for shallow embedment in cracked concrete:** Strong-Bolt 2 wedge anchor can be installed in concrete with a minimum thickness of 3¼", including concrete over metal decking
- **High-strength alloy clip on carbon-steel anchors:** This special alloy clip offers improved performance
- **Standard (ANSI) fractional anchor:** Fits most fixtures and installs with common drill bit sizes and tools
- **Installs like a standard wedge anchor:** No complicated installation procedure, no need for special bits or installation tools
- **Easy post-installation identification:** The head is stamped with Simpson Strong-Tie® "No-Equal" symbol and a letter for length identification
- **Type 316 stainless steel clip on stainless steel anchors:** In addition to superior corrosion resistance, a stainless steel clip offers "memory" that contributes to the anchor's performance if the hole increases in size because of a crack
- **Code listed:** Both carbon-steel and stainless-steel anchors are code-listed by ICC-ES ESR-3037

The proprietary design of the tri-segmented clip has dual undercutting embossments on each segment, which enable secondary or "follow-up" expansion if a crack forms and intersects the anchor location. This significantly increases the ability of the Strong-Bolt 2 wedge anchor to carry load if the hole expands as a result of the crack.

Ideal for a Wide Range of Applications


Cable Supports


Pipe Supports


Conveyors

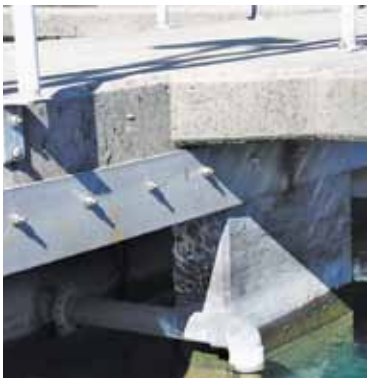

HVAC Ductwork

Now Available in ⅜" Diameters and Stainless Steel

Sized for mechanical, electrical and plumbing (MEP) applications

The Strong-Bolt™ 2 wedge anchor is ideal for MEP applications: hanging pipes, struts, equipment anchorage and other fixtures overhead. Now available in ⅜" diameter, it is also the anchor of choice for lightweight-concrete applications, including concrete over metal decking. This versatile anchor is the one product you need to handle all your applications calling for a ⅜" wedge anchor.

Great in corrosive environments



Strong-Bolt™ 2 anchor in type 316 stainless steel also offers optimum performance in both cracked and uncracked concrete, meeting 2009 IBC standards for post-installed anchors. This wedge anchor is ideal for corrosive environments, including construction in coastal areas, wastewater and sewage treatment facilities, food processing facilities, pulp and paper mills, and other high-exposure environments. ⅜" Strong-Bolt 2 wedge anchor in stainless steel will be available first quarter 2011.

Strong-Bolt™ 2 Anchor Product Data

Size (in.)	Carbon Steel Model No.	316 Stainless Steel Model No.	Drill Bit Dia. (in.)	Thread Length (in.)	Quantity	
					Box	Carton
⅜ X 2¾	STB2-37234	STB2-372346SS	⅜	1 5/16	50	250
⅜ X 3	STB2-37300	STB2-373006SS	⅜	1 9/16	50	250
⅜ X 3½	STB2-37312	STB2-373126SS	⅜	2 1/16	50	250
⅜ X 3¾	STB2-37334	STB2-373346SS	⅜	2 5/16	50	250
⅜ X 5	STB2-37500	STB2-375006SS	⅜	3 9/16	50	200
⅜ X 7	STB2-37700	STB2-377006SS	⅜	5 9/16	50	200
½ X 3¾	STB2-50334	•	½	2 1/16	25	125
½ X 4¼	STB2-50414	•	½	2 9/16	25	100
½ X 5½	STB2-50512	•	½	3 13/16	25	100
½ X 7	STB2-50700	•	½	5 5/16	25	100
½ X 8½	STB2-50812	•	½	6	25	50
½ X 10	STB2-50100	•	½	6	25	50
⅝ X 4½	STB2-62412	•	⅝	2 7/16	20	80
⅝ X 5	STB2-62500	•	⅝	2 15/16	20	80
⅝ X 6	STB2-62600	•	⅝	3 15/16	20	80
⅝ X 7	STB2-62700	•	⅝	4 15/16	20	80
⅝ X 8½	STB2-62812	•	⅝	6	20	40
⅝ X 10	STB2-62100	•	⅝	6	10	20

Note product availability as follows:
STB2 ⅜"- diameter in carbon steel, stainless steel: first quarter 2011
STB2 ½"- and ⅝"-diameter in carbon steel: second quarter 2011

Cable Tray

Warehouse Racking

Electrical Equipment

Seismic Bracing

Product Information

Material: Carbon-steel stud with alloy clip; stainless-steel stud with stainless-steel clip

Finish: Zinc-plated (carbon-steel)

CODES: ICC-ES ESR-3037 (carbon and stainless steel); cracked and uncracked concrete; 2009 IBC; City of Los Angeles – Pending; UL – Pending; State of Florida – Pending

TEST CRITERIA:
The Strong-Bolt™ 2 wedge anchor has been tested in accordance with ICC-ES's Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC 193) and ACI 355.2 for the following:

- Static tension and shear loading in cracked and uncracked concrete
- Seismic and wind loading in cracked and uncracked concrete
- Performance in cracked concrete
- Performance in lightweight concrete over metal deck

Material Specifications

Carbon Steel - Zinc Plated[1]			
Component Materials			
Anchor Body	**Nut**	**Washer**	**Clip**
Carbon Steel	Carbon Steel ASTM A 563, Grade A	Carbon Steel ASTM F844	Carbon Steel ASTM A 568

1. Zinc meets ASTM B 633, Class SC 1 (Fe / Zn 5), Type III.

Stainless Steel			
Component Materials			
Anchor Body	**Nut**	**Washer**	**Clip**
Type 316 Stainless Steel	Type 316 Stainless Steel	Type 316 Stainless Steel	Type 316 Stainless Steel

Strong-Bolt™ 2 Installation Information[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter (in.)									
			Carbon Steel								Stainless Steel	
			⅜		½			⅝			⅜	
Installation Information												
Nominal Diameter	d_a[3]	in.	⅜		½			⅝			⅜	
Drill Bit Diameter	d	in.	⅜		½			⅝			⅜	
Baseplate Clearance Hole Diameter[2]	d_c	in. (mm)	7/16 (11.1)		9/16 (14.3)			11/16 (17.5)			7/16 (11.1)	
Installation Torque	T_{inst}	ft-lbf (N-m)	30 (40.7)		60 (81.3)			90 (122.0)			30 (40.7)	
Nominal Embedment Depth[5]	h_{nom}	in. (mm)	2 (51)	2⅞ (73)	2¾ (70)		3⅞ (98)	3⅜ (86)	5⅛ (130)		2 (51)	2⅞ (73)
Effective Embedment Depth	h_{ef}	in. (mm)	1⅝ (41)	2½ (64)	2¼ (57)		3⅜ (86)	2¾ (70)	4½ (114)		1⅝ (41)	2½ (64)
Minimum Overall Anchor Length	ℓ_{anch}	in. (mm)	2¾ (70)	3½ (89)	3¾ (95)		5½ (140)	4½ (114)	6 (152)		2¾ (70)	3½ (89)
Critical Edge Distance	c_{ac}	in. (mm)	6½ (165)	6 (152)	6½ (165)	6½ (165)	7½ (191)	7½ (191)	9 (229)		6½ (165)	8½ (216)
Minimum Edge Distance	c_{min}	in. (mm)	6 (152)		7 (178)	4 (102)	4 (102)	6½ (165)			6 (152)	
	for $s \geq$	in. (mm)	— —		— —	— —	— —	— —			10 (254)	
Minimum Spacing	s_{min}	in. (mm)	3 (76)		7 (178)	4 (102)	4 (102)	5 (127)			3 (76)	
	for $c \geq$	in. (mm)	— —		— —	— —	— —	— —			10 (254)	
Minimum Concrete Thickness	h_{min}	in. (mm)	3¼ (83)	4½ (114)	4½ (114)	5½ (140)	6 (152)	5½ (140)	7⅞ (200)		3¼ (83)	4½ (114)
Additional Data												
Yield Strength	f_{ya}	psi (MPa)	92,000 (634)		85,000 (586)						80,000 (552)	
Tensile Strength	f_{uta}[4]	psi (MPa)	115,000 (793)								100,000 (689)	
Minimum Tensile and Shear Stress Area	A_{se}	in² (mm²)	0.0514 (33)		0.105 (68)			0.166 (107)			0.0514 (33)	
Axial Stiffness in Service Load Range – Cracked and Uncracked Concrete	β	lb./in (N/mm)	34,820 (6,098)		63,570 (11,133)			91,370 (16,001)			29,150 (5,105)	

For **SI**: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m, 1 psi = 6.89 Pa, 1 in² = 645 mm², 1 lbf/in = 0.175 N/mm.

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D.
2. The clearance must comply with applicable code requirements for the connected element.
3. For the 2006 IBC, d_o replaces d_a.
4. For the 2003 IBC, f_{ut} replaces f_{uta}.
5. Drilled hole depth to be greater than or equal to nominal embedment depth.

Performance Data

Strong-Bolt™ 2 Tension Strength Design Data[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter (in.)							
			Carbon Steel						Stainless Steel	
			⅜		½		⅝		⅜	
Anchor Category	1, 2 or 3	—	1						1	
Nominal Embedment Depth	h_{nom}	in. (mm)	2 (51)	2 7⁄8 (73)	2 ¾ (70)	3 7⁄8 (98)	3 ⅜ (86)	5 ⅛ (130)	2 (51)	2 7⁄8 (73)
Steel Strength in Tension (ACI 318 Section D.5.1)										
Steel Strength in Tension	N_{sa}	lb (kN)	5,600 (24.9)		12,100 (53.8)		19,070 (84.8)		5,140 (22.9)	
Strength Reduction Factor – Steel Failure[2]	ϕ_{sa}	—	0.75						0.75	
Concrete Breakout Strength in Tension (ACI 318 Section D.5.2)										
Effective Embedment Depth	h_{ef}	in. (mm)	1 ⅝ (41)	2 ½ (64)	2 ¼ (57)	3 ⅜ (86)	2 ¾ (70)	4 ½ (114)	1 ⅝ (41)	2 ½ (64)
Critical Edge Distance	c_{ac}	in. (mm)	6 ½ (165)	6 (152)	6 ½ (165)	7 ½ (191)	7 ½ (191)	9 (229)	6 ½ (165)	8 ½ (216)
Effectiveness Factor – Uncracked Concrete	k_{uncr}	—	24		24		24		24	
Effectiveness Factor – Cracked Concrete	k_{cr}	—	17		17		17		17	
Modification Factor	$\psi_{c,N}$[8]	—	1.00		1.00		1.00		1.00	
Strength Reduction Factor – Concrete Breakout Failure[3]	ϕ_{cb}	—	0.65						0.65	
Pull-Out Strength in Tension (ACI 318 Section D.5.3)										
Pull-Out Strength Cracked Concrete (f'_c = 2500 psi)	$N_{p,cr}$	lb (kN)	1,300[5] (5.8)[5]	2,775[5] (12.3)[5]	N/A[4]	3,735[5] (16.6)[5]	N/A[4]	6,895[5] (30.7)[5]	1,720[6] (7.7)[6]	3,145[6] (14.0)[6]
Pull-Out Strength Uncracked Concrete (f'_c = 2500 psi)	$N_{p,uncr}$	lb (kN)	N/A[4]	3,340[5] (14.9)[5]	3,615[5] (16.1)[5]	5,255[5] (23.4)[5]	N/A[4]	9,025[5] (40.1)[5]	N/A[4]	4,770[6] (21.2)[6]
Strength Reduction Factor – Pullout Failure[7]	ϕ_p	—	0.65						0.65	
Tensile Strength for Seismic Applications (ACI Section D.3.3.3)										
Tension Strength of Single Anchor for Seismic Loads (f'_c = 2500 psi)	$N_{p,eq}$	lb (kN)	1,300[5] (5.8)[5]	2,775[5] (12.3)[5]	N/A[4]	3,735[5] (16.6)[5]	N/A[4]	6,895[5] (30.7)[5]	1,720[6] (7.7)[6]	2,830[6] (12.6)[6]
Strength Reduction Factor – Pullout Failure[7]	ϕ_{eq}	—	0.65						0.65	

For **SI**: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318 Appendix D, except as modified below.
2. The tabulated value of ϕ_{sa} applies when the load combinations of Section 1605.2.1 of the IBC, or ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{sa} must be determined in accordance with ACI 318 D.4.5. Strong-Bolt™ 2 anchors are ductile steel elements as defined in ACI 318 D.1.
3. The tabulated value of ϕ_{cb} applies when both the load combinations of Section 1605.2.1 of the IBC, or ACI 318 Section 9.2 are used and the requirements of ACI 318 Section D.4.4(c) for Condition B are met. Condition B applies where supplementary reinforcement is not provided. For installations where complying supplementary reinforcement can be verified, the ϕ_{cb} factors described in ACI 318 D.4.4 for Condition A are allowed. If the load combinations of ACI 318 Section 9.2 are used and the requirements of ACI 318 Section D.4.4 for Condition A are met, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318 D.4.4(c). If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318 D.4.5(c).
4. N/A (Not Applicable) denotes that pullout resistance does not need to be considered.
5. The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f'_c / 2{,}500 \text{ psi})^{0.5}$ or $(f'_c / 17.2 \text{ MPa})^{0.5}$.
6. The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f'_c / 2{,}500 \text{ psi})^{0.3}$ or $(f'_c / 17.2 \text{ MPa})^{0.3}$.
7. The tabulated value of ϕ_p or ϕ_{eq} applies when the load combinations of Section 1605.2.1 of the IBC, or ACI 318 Section 9.2 are used and the requirements of ACI 318 D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, appropriate value of ϕ must be determined in accordance with ACI 318 Section D.4.5(c).
8. For the 2003 IBC, Ψ_3 replaces $\Psi_{c,N}$.

Performance Data

Strong-Bolt™ 2 Shear Strength Design Data[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter (in.)							
			Carbon Steel						Stainless Steel	
			⅜		½		⅝		⅜	
Anchor Category	1, 2 or 3	—	1						1	
Nominal Embedment Depth	h_{nom}	in. (mm)	2 (51)	2⅞ (73)	2¾ (70)	3⅞ (98)	3⅜ (86)	5⅛ (130)	2 (51)	2⅞ (73)
Steel Strength in Shear (ACI 318 Section D.6.1)										
Steel Strength in Shear	V_{sa}	lb (kN)	1,800 (8.0)		7,235 (32.2)		11,035 (49.1)		3,085 (13.7)	
Strength Reduction Factor – Steel Failure[2]	ϕ_{sa}	—	0.65						0.65	
Concrete Breakout Strength in Shear (ACI 318 Section D.6.2)										
Outside Diameter	d_a[5]	in. (mm)	0.375 (9.5)		0.500 (12.7)		0.625 (15.9)		0.375 (9.5)	
Load Bearing Length of Anchor in Shear	ℓ_e	in. (mm)	1.625 (41)	2.500 (64)	2.250 (57)	3.375 (86)	2.750 (70)	4.500 (114)	1.625 (41)	2.500 (64)
Strength Reduction Factor – Concrete Breakout Failure[3]	ϕ_{cb}	—	0.70						0.70	
Concrete Pryout Strength in Shear (ACI 318 Section D.6.3)										
Coefficient for Pryout Strength	k_{cp}	—	1.0	2.0	1.0	2.0	2.0		1.0	2.0
Effective Embedment Depth	h_{ef}	in. (mm)	1⅝ (41)	2½ (64)	2¼ (57)	3⅜ (86)	2¾ (70)	4½ (114)	1⅝ (41)	2½ (64)
Strength Reduction Factor – Concrete Pryout Failure[4]	ϕ_{cp}	—	0.70						0.70	
Steel Strength in Shear for Seismic Applications (ACI 318 Section D.3.3.3)										
Shear Strength of Single Anchor for Seismic Loads (f'_c = 2500 psi)	V_{eq}	lb (kN)	1,800 (8.0)		6,510 (29.0)		9,930 (44.2)		3,085 (13.7)	
Strength Reduction Factor – Steel Failure[2]	ϕ_{sa}	—	0.65						0.65	

For **SI**: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318 Appendix D, except as modified below.
2. The tabulated value of ϕ_{sa} applies when the load combinations of Section 1605.2.1 of the IBC, or ACI 318 Section 9.2 are used and the requirements of ACI 318 D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{sa} must be determined in accordance with ACI 318 D.4.5. Strong-Bolt™ 2 anchors are ductile steel elements as defined in ACI 318 D.1.
3. The tabulated value of ϕ_{cb} applies when both the load combinations of Section 1605.2.1 of the IBC, or ACI 318 Section 9.2 are used and the requirements of ACI 318 Section D.4.4(c) for Condition B are met. Condition B applies where supplementary reinforcement is not provided. For installations where complying supplementary reinforcement can be verified, the ϕ_{cb} factors described in ACI 318 Section D.4.4 for Condition A are allowed. If the load combinations of ACI 318 Section 9.2 are used and the requirements of ACI 318 Section D.4.4 for Condition A are met, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318 Section D.4.4(c). If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318 Section D.4.5(c).
4. The tabulated value of ϕ_{cp} applies when both the load combinations of IBC Section 1605.2.1 or ACI 318 Section 9.2 are used and the requirements of ACI 318 D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{cp} must be determined in accordance with ACI 318 D.4.5(c).
5. For the 2006 IBC, d_o replaces d_a.

Length Identification Head Marks on Strong-Bolt™ 2 Anchors (corresponds to length of anchor – inches)

Mark	Units	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
From	in.	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	11	12	13	14	15	16	17	18
Up To But Not Including	in.	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	11	12	13	14	15	16	17	18	19

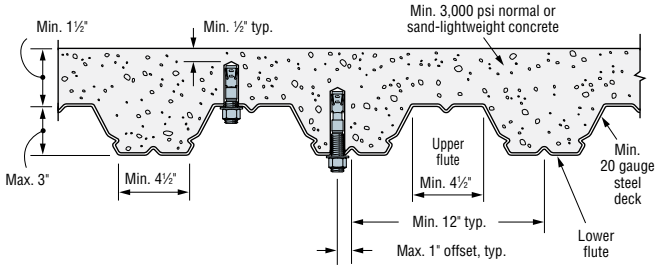
Performance Data

Strong-Bolt™ 2 Tension and Shear Strength Design Data for the Soffit of Concrete Over Profile Steel Deck, Floor and Roof Assemblies[1,2,6,9]

Characteristic	Symbol	Units	Nominal Anchor Diameter (in.)										
			Carbon Steel								Stainless Steel		
			Lower Flute						Upper Flute		Lower Flute		Upper Flute
			⅜		½		⅝		⅜	½	⅜		⅜
Nominal Embedment Depth	h_{nom}	in. (mm)	2 (51)	3⅜ (86)	2¾ (70)	4½ (114)	3⅜ (86)	5⅛ (143)	2 (51)	2¾ (70)	2 (51)	3⅜ (86)	2 (51)
Effective Embedment Depth	h_{ef}	in. (mm)	1⅝ (41)	3 (76)	2¼ (57)	4 (102)	2¾ (70)	5 (127)	1⅝ (41)	2¼ (57)	1⅝ (41)	3 (76)	1⅝ (41)
Installation Torque	T_{inst}	ft-lbf (N-m)	30 (40.7)		60 (81.3)		90 (122.0)		30 (40.7)	60 (81.3)	30 (40.7)		30 (40.7)
Pullout Strength, concrete on metal deck (cracked)[3,4]	$N_{p,deck,cr}$	lb (kN)	1,250[7] (5.6)[7]	2,230[7] (9.9)[7]	2,040[7] (9.1)[7]	2,730[7] (12.1)[7]	2,615[7] (11.6)[7]	4,990[7] (22.2)[7]	1,610[7] (7.2)[7]	3,785[7] (16.8)[7]	1,120[8] (5.0)[8]	2,795[8] (12.4)[8]	1,410[8] (6.3)[8]
Pullout Strength, concrete on metal deck (uncracked)[3,4]	$N_{p,deck,uncr}$	lb (kN)	1,765[7] (7.9)[7]	3,150[7] (14.0)[7]	2,580[7] (11.5)[7]	3,840[7] (17.1)[7]	3,685[7] (16.4)[7]	6,565[7] (29.2)[7]	2,275[7] (10.1)[7]	4,795[7] (21.3)[7]	1,580[8] (7.0)[8]	3,950[8] (17.6)[8]	1,990[8] (8.9)[8]
Steel Strength in Shear, concrete on metal deck[5]	$V_{st.deck}$	lb (kN)	1,595 (7.1)	3,490 (15.5)	2,135 (9.5)	4,580 (20.4)	2,640 (11.7)	7,000 (31.1)	4,060 (18.1)	5,920 (26.3)	2,285 (10.2)	3,785 (16.8)	3,830 (17.0)

For **SI**: 1 inch = 25.4 mm, 1 lbf = 4.45 N.

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318 Appendix D, except as modified below.
2. Profile steel deck must comply with the configuration in the figure below, and have a minimum base-steel thickness of 0.035 inch (0.889 mm) [20 gauge]. Steel must comply with ASTM A 653/A 653M SS Grade 33 with minimum yield strength of 38,000 psi (262 Mpa). Concrete compressive strength shall be 3,000 psi minimum.
3. For anchors installed in the soffit of sand-lightweight or normal-weight concrete over metal deck floor and roof assemblies, calculation of the concrete breakout strength may be omitted.
4. In accordance with ACI 318 Section D.5.3.2, the nominal pullout strength in cracked concrete for anchors installed in the soffit of sand-lightweight or normal-weight concrete over metal deck floor and rood assemblies $N_{p,deck,cr}$ shall be substituted for $N_{p,cr}$. Where analysis indicates no cracking at service loads, the normal pullout strength in uncracked concrete $N_{p,deck,uncr}$ shall be substituted for $N_{p,uncr}$.
5. In accordance with ACI 318 Section D.6.1.2(c), the shear strength for anchors installed in the soffit of sand-lightweight or normal-weight concrete over metal deck floor and rood assemblies $V_{st,deck}$ shall be substituted for V_{sa}.
6. The minimum anchor spacing along the flute must be the greater of 3.0_{hef} or 1.5 times the flute width.
7. The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f'_c/3{,}000\ psi)^{0.5}$ or $(f'_c/20.7\ MPa)^{0.5}$.
8. The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f'_c / 3{,}000\ psi)^{0.3}$ or $(f'_c / 20.7\ MPa)^{0.3}$.
9. Minimum distance to edge of panel is 2_{hef}.



Example: Strong-Bolt™ 2 Allowable Stress Design Tension Values for Illustrative Purposes[1,2,3,4,5,6,7,8,9]

Nominal Anchor Diameter (in.)	Nominal Embedment Depth, h_{nom} (in.)	Effective Embedment Depth, h_{ef} (in.)	Allowable Tension Load, fN_n/a (lbs.)
Carbon Steel			
⅜	2	1⅝	1,090
	2⅞	2½	1,465
½	2¾	2¼	1,585
	3⅞	3⅜	2,305*
⅝	3⅜	2¾	2,400
	5⅛	4½	3,965
Stainless Steel			
⅜	2	1⅝	1,090
	2⅞	2½	2,080

Design Assumptions:
1. Single anchor.
2. Tension load only.
3. Concrete determined to remain uncracked for the life of the anchorage.
4. Load combinations taken from ACI 318 Section 9.2 (no seismic loading).
5. 30% Dead Load (D) and 70% Live Load (L); Controlling load combination is 1.2D + 1.6L. Calculation of a based on weighted average: $\alpha = 1.2D + 1.6L = 1.2(0.3) + 1.6(0.7) = 1.48$.
6. Normal weight concrete with $f'_c = 2{,}500$ psi.
7. $c_{a1} = c_{a2} \geq c_{ac}$
8. Concrete thickness, $h \geq h_{min}$
9. Values are for Condition B (supplementary reinforcement in accordance with ACI 318 D.4.4 is not provided.)

*Illustrative Procedure (reference Strong-Bolt™ 2 Tension Strength Design Data Table): Strong-Bolt™ 2, ½"-diameter with an effective embedment depth, h_{ef} = 3 ⅜".

Step 1: Calculate steel strength in tension in accordance with ACI 318 D.5.1; $\phi_{sa}N_{sa}$ = 0.75 x 12,100 = 9,075 lbs.

Step 2: Calculate concrete breakout strength in tension in accordance with ACI 318 D.5.2; $\phi_{cb}N_{cb}$ = 0.65 x 7,440 = 4,836 lbs.

Step 3: Calculate pullout strength in tension in accordance with ACI 318 D.5.3; $\phi_p N_{p,uncr}$ = 0.65 x 5,255 = 3,416 lbs.

Step 4: The controlling value from Steps 1, 2, and 3 above in accordance with ACI 318 D.4.1.2; ϕN_n = 3,416 lbs.

Step 5: Divide the controlling value by the conversion factor a as determined in footnote 5; $T_{allowable,ASD} = \phi N_n/\alpha$ = 3,416 / 1.48 = 2,305 lbs.

The edge distance, spacing and member thickness requirements in the Strong-Bolt™ 2 Installation Information Table apply to a single anchor and anchor groups.

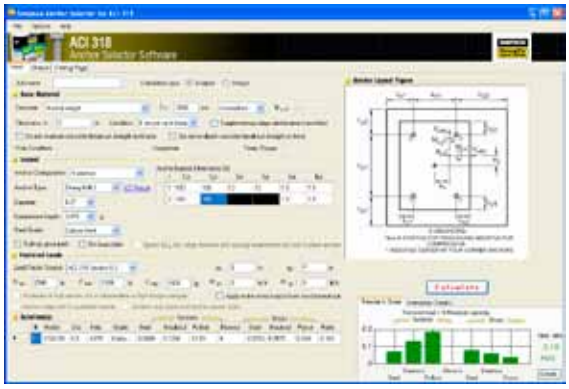
Anchor Selector™ Software ACI 318

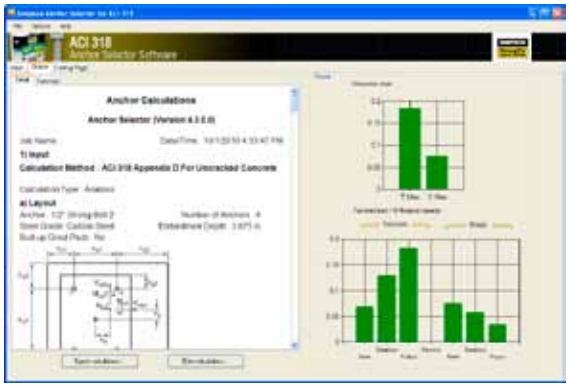
Anchor Selector™ Software for ACI 318
Anchor Selector Software for ACI 318 analyzes and offers anchor solutions using the ACI 318, Appendix D strength design methodology (or CAN/CSA A23.3 Annex D limit states design methodology). It provides cracked- and uncracked-concrete anchor solutions for many Simpson Strong-Tie Anchor Systems® mechanical and adhesive anchors.

With its easy-to-use graphical interface, Anchor Selector Software for ACI 318 eliminates the need for tedious calculations by hand that would otherwise be necessary to determine cracked concrete anchor solutions.

Features/Benefits

- Free download
- Quick and accurate analysis or design of anchor solutions results in increased productivity by eliminating the need to conduct time consuming calculations
- Graphical User Interface is intuitive and easy to use
- Includes prequalified post-installed mechanical and adhesive anchor solutions for cracked and/or uncracked concrete
- Includes a variety of concrete base material configurations
- Concrete Types
  - Normal weight concrete
  - Lightweight concrete
  - Normal weight concrete over metal deck
  - Sand-lightweight concrete over metal deck
- Includes cast-in-place anchor solutions
- Single and multiple anchor layouts provide solutions for multiple design applications
- Determines proper anchor solutions in situations where tension and shear forces will be acting simultaneously
- Capability to save input and results allows the designer to save data for later use. Additionally, input files can be easily modified to create new analysis/ design cases.
- Ability to save and print detailed calculations allows for verification of results
- Capability to resolve bi-axial bending moments imposed from attached member into anchor forces
- Auto update feature allows notification and download of the latest version of the software as updates become available





To download this free software, go to **www.simpsonanchors.com/software/as-aci318**.

This flier is effective until January 31, 2012, and reflects information available as of October 1, 2010. This information is updated periodically and should not be relied upon after January 31, 2012; contact Simpson Strong-Tie for current information and limited warranty or see www.simpsonanchors.com.

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