Carbon-Steel Strong-Bolt 2 Installation Information¹

			Nominal Anchor Diameter, d _a (in.)											
Characteristic	Symbol	Units	1/44	3	⁄8 ⁵		1⁄25		5	⁄8 ⁵	3/	4 ⁵		15
	1			Instal	lation Inf	ormation			•		•		•	
Nominal Diameter	da	in.	1⁄4	3,	/8		1⁄2		5,	/8	3,	/4		1
Drill Bit Diameter	d	in.	1⁄4	3	3⁄8		1⁄2		5,	/8	3	/4		1
Baseplate Clearance Hole Diameter ²	d _c	in.	5⁄16	7⁄16			9⁄16		11,	/16	7,	/8	1	1⁄8
Installation Torque	T _{inst}	ft-lbf	4	3	30		60		g	0	1	50	2	30
Nominal Embedment Depth	h _{nom}	in.	1 3⁄4	1 7⁄8	21⁄8	2	3⁄4	37⁄8	3%	51⁄8	41⁄8	5¾	51⁄4	9¾
Effective Embedment Depth	h _{ef}	in.	1 1⁄2	1½	21⁄2	2	1⁄4	3%	2¾	41⁄2	3%	5	41⁄2	9
Minimum Hole Depth	h _{hole}	in.	1 7⁄8	2	3		3	41⁄8	3%	5%	43⁄8	6	5½	10
Minimum Overall Anchor Length	l _{anch}	in.	21⁄4	2¾	31⁄2	3	3/4	5½	41⁄2	6	5½	7	7	13
Critical Edge Distance	C _{ac}	in.	21⁄2	6½	6	6½	6½	7½	7½	9	9	8	18	13½
	C _{min}	in.	1 3⁄4	6		7	4	4	6	1/2	6	1/2		8
Minimum Edge Distance	for s ≥	in.		-	_	_	_	_	-	_	8	3	-	_
Minimum Crossing	s _{min}	in.	21⁄4	;	3	7	4	4		5	7			8
Minimum Spacing	for c ≥	in.	—	-		_	_	_	-		8	3	-	_
Minimum Concrete Thickness	h _{min}	in	31⁄4	31⁄4	41⁄2	41⁄2	5½	6	5½	71/8	6¾	8¾	8	13½
				A	dditional	Data								
Yield Strength	f _{ya}	psi	56,000	92,	000			85,000			70,	000	60,	,000
Tensile Strength	f _{uta}	psi	70,000			1	115,000				110	,000	78,	,000
Minimum Tensile and Shear Stress Area	A _{se}	in.2	0.0318	0.0514			0.105		0.166		0.270		0.472	
Axial Stiffness in Service Load Range — Cracked and Uncracked Concrete	β	lb./in.	73,700 ³	34,	820		63,570		91,	370	118	,840	299	,600

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17

or ACI 318-11 Appendix D.

2. The clearance must comply with applicable code requirements for the connected element.

The tabulated value of β for ¼"-diameter carbon steel Strong-Bolt 2 anchor is for installations in uncracked concrete only.
 The ¼"-diameter (6.4mm) anchor may be installed in top of uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in this table.

5. The %"- through 1"-diameter (9.5mm through 25.4mm) anchors may be installed in top of cracked and uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in this table.

Strong

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Stainless-Steel Strong-Bolt 2 Installation Information¹

Ohavaataviatia	Cumhal	Unite		Nominal Anchor Diameter, d _a (in.)										
Characteristic	Symbol	Units	1⁄44	3/	⁄8 ⁵		1⁄25		5/	8 ⁵	3/	4 ⁵		
	-		Installation Ir	nformatio	n									
Nominal Diameter	da	in.	1⁄4	3	/8		1⁄2		5	18	3	/4		
Drill Bit Diameter	d	in.	1⁄4		/8	1/2			5/8		3,	/4		
Baseplate Clearance Hole Diameter ²	d _c	in.	5/16 7/16			9⁄16		11/16		7,	/8			
Installation Torque	Tinst	ft-lbf	4	4 30			65		80		1:	50		
Nominal Embedment Depth	h _{nom}	in.	13⁄4	17⁄8	27⁄8	2¾	3	7⁄8	3%	51⁄8	41⁄8	5¾		
Effective Embedment Depth	h _{ef}	in.	1 1/2	1½	21⁄2	21⁄4	3	3⁄/8	2¾	41⁄2	3%	5		
Minimum Hole Depth	h _{hole}	in.	17⁄8	2	3	3	4	1⁄8	3%	5%	4%	6		
Minimum Overall Anchor Length	l _{anch}	in.	21⁄4	2¾ 3½		3¾	5	1⁄2	41⁄2	6	5½	7		
Critical Edge Distance	C _{ac}	in.	21⁄2	61⁄2 81⁄2		41⁄2	-	7	71⁄2	9	8	8		
	C _{min}	in.	1¾	(6	6½	5	4		1		5		
Minimum Edge Distance	for s ≥	in.	_	10		_	— 8		8					
	S _{min}	in.	21⁄4	;	3	8	5½	4	6	1/4	6	1/2		
Minimum Spacing	for c ≥	in.	_	1	0	_	— 8		5	1/2	-	_		
Minimum Concrete Thickness	h _{min}	in.	31⁄4	31⁄4	41⁄2	41⁄2	(6	5½	71/8	6¾	8¾		
		1	Additiona	al Data								1		
Yield Strength	f _{ya}	psi	96,000	80,	000		92,000		82,	000	68,	000		
Tensile Strength	f _{uta}	psi	120,000 100,000			115,000		108	,000	95,	000			
Minimum Tensile and Shear Stress Area	Ase	in.2	0.0255	0.0	514		0.105		0.166		0.2	270		
Axial Stiffness in Service Load Range — Cracked and Uncracked Concrete	β	lb./in.	54,430 ³ 29,150		150		54,900		61,	270	154	,290		

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D.

2. The clearance must comply with applicable code requirements for the connected element.

3. The tabulated value of β for ¼"-diameter stainless-steel Strong-Bolt 2 anchor is for installtions in uncracked concrete only.

4. The ¼"-diameter (6.4mm) anchor may be installed in top of uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in this table.

5. The %"- through ¾"-diameter (9.5mm through 19.1mm) anchors may be installed in top of cracked and uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in this table.

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Strong

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Strong-Bolt® 2 Design Information - Concrete

Carbon Stool Strong Balt 9 Tancian Strongth Design Data

Carbon-Steel Strong-Bolt 2 Tens	sion Stre	ength	Design Data	I										
Oh and a bandadda	Ohl	11			I	Vominal	Anchor [Diamete	r, d _a (in.)					
Characteristic	Symbol	Units	1⁄48	3/	8 ⁹	1,	⁄2 ⁹	5,	⁄8 ⁹	3/	⁄4 ⁹	-	19	
Anchor Category	1, 2 or 3	—				1		•					2	
Nominal Embedment Depth	h _{nom}	in.	1 3⁄4	17⁄8	21⁄8	2¾	31⁄8	3%	51⁄8	41⁄8	5¾	51⁄4	9¾	
		Steel	Strength in Tensic	on (ACI 3	18 Secti	on D.5.1))							
Steel Strength in Tension	N _{sa}	lb.	2,225	5,6	600	12,	100	19,	070	29,	700	36,	36,815	
Strength Reduction Factor — Steel Failure ²	ϕ_{sa}	_				0.7	75					0.	.65	
	Conc	rete Bre	akout Strength in	Tension	(ACI 318	Section	D.5.2)10							
Effective Embedment Depth	h _{ef}	in.	1 1⁄2	1 1⁄2	21⁄2	21⁄4	3%	2¾	41⁄2	3¾	5	41⁄2	9	
Critical Edge Distance	C _{ac}	in.	21⁄2	6½	6	6½	7½	7½	9	9	8	18	13½	
Effectiveness Factor — Uncracked Concrete	k _{uncr}		24											
Effectiveness Factor — Cracked Concrete	k _{cr}	_	_7 17											
Modification Factor	$\Psi_{c,N}$	_	_7					1.	.00					
Strength Reduction Factor — Concrete Breakout Failure ³	ϕ_{cb}					0.6	65					0.	.55	
		Pullout	Strength in Tensio	on (ACI 3	18 Secti	on D.5.3)10							
Pullout Strength, Cracked Concrete $(f_c^{\prime} = 2,500 \text{ psi})$	N _{p,cr}	lb.	7	1,3005	2,7755	N/A ⁴	3,735⁵	N/A ⁴	6,9855	N/A ⁴	8,5005	7,7005	11,185	
Pullout Strength, Uncracked Concrete $(f_c^i = 2,500 \text{ psi})$	N _{p,uncr}	lb.	N/A ⁴	N/A ⁴	3,3405	3,6155	5,2555	N/A ⁴	9,0255	7,1155	8,8705	8,3605	9,6905	
Strength Reduction Factor — Pullout Failure ⁶	ϕ_p					0.6	65					0.	.55	
	Tensile	Strengt	h for Seismic App	lications	(ACI 31	8 Sectio	n D.3.3.)¹	0						
Tension Strength of Single Anchor for Seismic Loads ($f'_c = 2,500$ psi)	N _{p.eq}	lb.	7	1,3005	2,7755	N/A ⁴	3,7355	N/A4	6,9855	N/A ⁴	8,5005	7,7005	11,185	
Strength Reduction Factor — Pullout Failure ⁶	ϕ_{eq}	_				0.6	65					0.	.55	

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1. The information presented in this table must be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable, except as modified below.

2. The tabulated value of ϕ_{sa} applies when the load combinations of Section 1605.2.1 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ_{sa} must be determined in accordance with ACI 318-11 D.4.4.

3. The tabulated value of ϕ_{cb} applies when both the load combinations of Section 1605.2.1 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(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 318-14 17.3.3(c) or ACI 318-11 D.4.3(c) for Condition A are allowed. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318-11 D.4.4(c).

4. N/A (not applicable) denotes that pullout resistance does not need to be considered.

5. The characteristic pullout strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by (fr_c/2,500 psi)^{0.5}.

6. The tabulated value of φ_p or φ_{eq} applies when the load combinations of Section 1605.2.1 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-14 17.3.3.(c) or ACI 318-11 D.4.3(c) for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, appropriate value of φ must be determined in accordance with ACI 318-11 Section D.4.4(c).

7. The ¼"-diameter carbon steel Strong-Bolt 2 anchor installation in cracked concrete is beyond the scope of this table.

8. The 1/4"-diameter (6.4mm) anchor may be installed in top of uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in the table on p. 136.

9. The %"- through %"-diameter (9.5mm through 25.4mm) anchors may be installed in top of cracked and uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in the table on p. 136.

tainless-Steel Strong-Bolt 2 Tension Stre		Joigin E			Nomina	I Anchor	Diameter	: d _a (in.)				
Characteristic	Symbol	Units	1/410	3/	/1 ¹¹	1/			/ ¹¹	3,	411	
Anchor Category	1, 2 or 3		/4	/	8	1				17		
Nominal Embedment Depth	h _{nom}	in.	1¾	17/8	21/8	23⁄4	37⁄8	3%	51/8	41/8	5¾	
			nsion (ACI 318 Se			2.74	078	078	078	170	074	
Steel Strength in Tension	N _{sa}	lb.	3,060	1	140	12,	075	17.	930	25.	650	
Strength Reduction Factor — Steel Failure ²	ϕ_{sa}		,	,			75					
Concre		t Strengt	h in Tension (ACI	318 Sect	ion D.5.2)12						
Effective Embedment Depth	h _{ef}	in.	1½	1 1/2	21⁄2	21⁄4	33⁄8	2¾	41⁄2	3%	5	
Critical Edge Distance	C _{ac}	in.	21/2	6½	81⁄2	41⁄2	7	71⁄2	9	8	8	
Effectiveness Factor — Uncracked Concrete	k _{uncr}		- 24									
Effectiveness Factor — Cracked Concrete	k _{cr}		9				1	7				
Modification Factor	$\psi_{c,N}$	$\nu_{c,N}$ — — 9 1.00										
Strength Reduction Factor — Concrete Breakout Failure ³	ϕ_{cb}	_		1		0.	65					
Pullout Strength in Tension (ACI 318 Section D.5.3) ¹²												
Pullout Strength, Cracked Concrete ($f'_c = 2,500$ psi)	N _{p,cr}	lb.	9	1,720 ⁶	3,145 ⁶	2,5605	4,3055	N/A ⁴	6,545 ⁷	N/A ⁴	8,230	
Pullout Strength, Uncracked Concrete ($f'_c = 2,500$ psi)	N _{p,uncr}	lb.	1,9257	N/A ⁴	4,770 ⁶	3,2305	4,4955	N/A ⁴	7,6155	7,725 ⁷	9,62	
Strength Reduction Factor — Pullout Failure ⁸	ϕ_p											
Tensile S	Strength for	Seismic	Applications (ACI	318 Sec	tion D.3.	3.) ¹²						
Tension Strength of Single Anchor for Seismic Loads ($f'_c = 2,500$ psi)	N _{p.eq}	lb.	9	1,7206	2,8306	2,5605	4,3055	N/A ⁴	6,5457	N/A ⁴	8,230	
Strength Reduction Factor — Pullout Failure ⁸	ϕ_{eq}	—				0.	65					
The information presented in this table must be used in Appendix D, as applicable, except as modified below. The tabulated value of ϕ_{sa} applies when the load combinations of ACI 3 accordance with ACI 318-11 D.4.4. The tabulated value of ϕ_{cb} applies when both the load Section 9.2 are used and the requirements of ACI 318-supplementary reinforcement is not provided. For insta described in ACI 318-11 D.4.3 (c) or ACI 318-11 D.4.3 (used, the appropriate value of ϕ_{cb} must be determined N/A (not applicable) denotes that pullout resistance do The characteristic pullout strength for greater concrete The tabulated value of ϕ_{p} or ϕ_{eq} applies when the load Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (c) or ACI 318-11 0.3	inations of 3 18-11 App combination 14 17.3.3(d llations whe 3(c) for Com- in accorda es not need compressiv c	Section 1 endix C a hs of Sector or ACI 3 recomplication A a noce with 7 I to be co- ve strengt ve strengt ve strengt ve strengt ve strengt na cocorda n a cocorda kked norm nickness 3 nay be ins	605.2.1 of the IBG re used, the appre- tion 1605.2.1 of the 318-11 D.4.3(c) fc ying supplementa re allowed. If the I ACI 318-11 D.4.4 ns shall be increa hs shall be increa hs shall be increa tion 1605.2.1 of t 318-11 D.4.3(c) f ance with ACI 31% concrete is beyon al-weight and sa specified in the ta talled in top of creating	C, ACI 31 opriate va he IBC, A or Conditi ry reinfor oad com (c). sed by m sed by m he IBC, A or Condit 8-11 Sec nd the so nd-lightw ble on p. acked an	8-14 Sec alue of ϕ_s (CI 318-1 on B are cement of binations autiplying nultiplying nultiplying ACI 318-1 ion B are tion D.4. cope of the reight cor 136. d uncrac	tion 5.3 a must be 4 Section met. Cor an be ve of ACI 3 the tabu the tabu the tabu the tabu 4 Section met. If the 4(c). is table. ncrete over ked norm	or ACI 31 e determi n 5.3 or A ndition B rified, the 18-11 Ap lar value lar value lar value ar value ar solue or profile solutions anal-weigh	8-11 ned in ACI 318 applies v ϕ_{cb} fact pendix (by (f'_c/2, by (f'_c/2, by (f'_c/2, ACI 318 ombinati steel dec t and sai	vhere ors 2 are 500 psi) ⁰ 500 psi) ⁰ 500 psi) ⁰ 11 ons of AC :k, nd-lightw	. ³ . .4 . CI 318-1 ⁻	I	

Strong-Tie

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Strong-Bolt® 2 Design Information - Concrete

SIMPSON Strong-Tie

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Carbon-Steel Strong-Bolt 2 Shear Strength Design Data¹

Carbon-Steel Strong-Bolt 2		strong	lin Booigin Ba										
Characteristic	Symbol	Units				Nomina	I Anchor	Diamete	r, d _a (in.)				
	Symbol	Units	1⁄4 ⁶	3/	/8 ⁷	1/	2 ⁷	5	⁄8 ⁷	3/	4 ⁷	1	
Anchor Category	1, 2 or 3	—				1	1					2	2
Nominal Embedment Depth	h _{nom}	in.	1¾	1%	21⁄8	2¾	37⁄8	3%	51/8	41⁄8	5¾	51⁄4	9¾
			Steel Strength in	Shear (A	CI 318 S	ection D.(6.1)				<u>.</u>		
Steel Strength in Shear	V _{sa}	lb.	965	1,8	300	7,2	235	11,	035	14,	480	15,0)20
Strength Reduction Factor — Steel Failure ²	$\phi_{_{SA}}$	_				0.0	65			1		0.60	
		Concre	ete Breakout Strer	ngth in Sl	near (ACI	318 Sect	tion D.6.2	<u>2)</u> 8				1	
Outside Diameter	da	in.	0.25	0.25 0.375 0.500 0.625 0.750							1.00		
Load-Bearing Length of Anchor in Shear	le	in.	1.500	1.500	2.500	2.250	3.375	2.750	4.500	3.375	5.000	4.500	8.000
Strength Reduction Factor — Concrete Breakout Failure ²	ϕ_{cb}						0.	70					
	I	Cond	crete Pryout Streng	gth in Sh	ear (ACI :	318 Secti	on D.6.3)						
Coefficient for Pryout Strength	К _{ср}		1.0		2.0	1.0				2.0			
Effective Embedment Depth	h _{ef}	in.	1 1⁄2	1½	21⁄2	21⁄4	3%	2¾	41⁄2	3%	5	41⁄2	9
Strength Reduction Factor — Concrete Pryout Failure ⁴	ϕ_{cp}					1	0.	70	1	1			
	Ste	eel Stren	gth in Shear for Se	eismic Ap	plication	s(ACI 318	3 Section	D.3.3.)					
Shear Strength of Single Anchor for Seismic Loads ($f'_c = 2,500$ psi)	V _{sa.eq}	lb.	5	<u> </u>								15,0)20
Strength Reduction Factor — Steel Failure ²	ϕ_{sa}					0.0	65					0.6	60

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 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, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of φ_{sa} must be determined in accordance with ACI 318 D.4.4.

3. The tabulated value of ϕ_{cb} applies when both the load combinations of Section 1605.2.1 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(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 318-14 17.3.3(c) or ACI 318-11 D.4.3(c) for Condition A are allowed. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318-11 D.4.4(c).

4. The tabulated value of ϕ_{cp} applies when both the load combinations of IBC Section 1605.2, ACI 318-14 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c) for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, appropriate value of ϕ_{cp} must be determined in accordance with ACI 318-11 Section D.4.4(c).

5. The ¼"-diameter carbon steel Strong-Bolt 2 anchor installation in cracked concrete is beyond the scope of this table.

6. The ¼"-diameter (6.4mm) anchor may be installed in top of uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in the table on p. 136.

7. The %"- through 1"-diameter (9.5mm through 25.4mm) anchors may be installed in top of cracked and uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in the table on p. 136.

Strength Reduction Factor — Concrete Pryout Failure⁴

Shear Strength of Single Anchor for Seismic Loads $(f'_c = 2,500 \text{ psi})$	V _{sa.eq}	lb.	5	3,085	6,100	6,745	10,760	13,620
Strength Reduction Factor — Steel Failure ²	ϕ_{sa}	_			0.65			

Steel Strength in Shear for Seismic Applications (ACI 318 Section D.3.3.)

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 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, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ_{sa} must be determined in accordance with ACI 318 D.4.4.

3. The tabulated value of ϕ_{cb} applies when both the load combinations of Section 1605.2.1 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(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 318-14 17.3.3(c) or ACI 318-11 D.4.3(c) for Condition A are allowed. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318-11 D.4.4(c).

4. The tabulated value of ϕ_{cp} applies when both the load combinations of IBC Section 1605.2, ACI 318-14 5.3 or ACI 318-11 Section 9.2 are used and the requirements of ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c) for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, appropriate value of ϕ_{cp} must be determined in accordance with ACI 318-11 Section D.4.4(c).

5. The ¼"-diameter stainless-steel Strong-Bolt 2 anchor installation in cracked concrete is beyond the scope of this table.

6. The ¼"-diameter (6.4mm) anchor may be installed in top of uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in the table on p. 136.

7. The %"- through 4/"-diameter (9.5mm through 19.1mm) anchors may be installed in top of cracked and uncracked normal-weight and sand-lightweight concrete over profile steel deck, where concrete thickness above upper flute meets the minimum thickness specified in the table on p. 136.

Simpson Stro	ong-Tie	[®] Anchoring,	Fastenin	ng and Resto	ration Syster	ms for Concret	e and Masor	nry
•••						~		

Stainless-Steel Strong-Bolt 2 Shear Strength Design Data¹

Characteristic

Anchor Category

Nominal Embedment Depth

Steel Strength in Shear

Outside Diameter

Strength Reduction Factor — Steel Failure²

Load Bearing Length of Anchor in Shear

Coefficient for Pryout Strength

Effective Embedment Depth

Strength Reduction Factor — Concrete Breakout Failure³

Strong-Bolt[®] **2** Design Information — Concrete

Units

in.

lb.

in.

in.

in.

1⁄46

1¾

1,605

0.250

1.500

1.0

11/2

Steel Strength in Shear (ACI 318 Section D.6.1)

Concrete Breakout Strength in Shear (ACI 318 Section D.6.2)8

Concrete Pryout Strength in Shear (ACI 318 Section D.6.3)

3⁄87

3,085

0.375

2.500

2.0

21/2

1.500

11/2

21/8

1 7⁄8

Symbol

1, 2 or 3

hnom

Vsa

 ϕ_{sa}

da

 ℓ_e

 ϕ_{cb}

*k*_{cp}

h_{ef}

 ϕ_{cn}

* See p. 13 for an explanation of the load table icons.

1	1

3⁄47

15,045

0.750

5.000

5

3.375

3%

5¾

41⁄8

IBC LW

5/87

51/8

10,760

0.625

4.500

2.0

41/2

3%

6,745

2.750

23/4

Nominal Anchor Diameter, da (in.)

1/27

1

7,245

0.65

0.500

0.70

3.375

33%

0.70

2.250

1.0

21/4

31/8

2¾

Carbon-Steel Strong-Bolt 2 Information for Installation in the Topside of Concrete-Filled Profile Steel Deck Floor and Roof Assemblies^{1,2,3,4}



IBC

Design Information	Cumbol	Units	Nominal	Anchor Diam	eter (in.)
Design mormation	Symbol	Units	3,	/8	1⁄2
Nominal Embedment Depth	h _{nom}	in.	1	7⁄8	2¾
Effective Embedment Depth	h _{ef}	in.	1	1/2	21⁄4
Minimum Concrete Thickness ⁵	h _{min,deck}	in.	21⁄2	31⁄4	31⁄4
Critical Edge Distance	C _{ac,deck,top}	in.	43⁄4	4	4
Minimum Edge Distance	Cmin, deck, top	in.	43⁄4 41⁄2		4¾
Minimum Spacing	S _{min,deck,top}	in.	7	6½	8

For SI: 1 inch = 25.4mm; 1 lbf = 4.45N

- 1. Installation must comply with the table on p. 136 and Figure 1 below.
- 2. Design capacity shall be based on calculations according to values in the tables on pp. 138 and 140.

SIMPSON

Strong-Tie

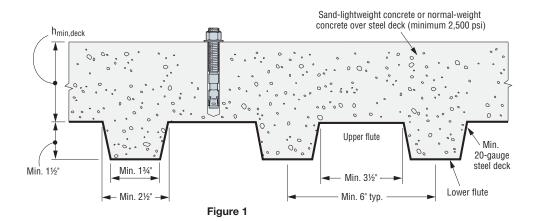
- 3. Minimum flute depth (distance from top of flute to bottom of flute) is 1 1/2".
- 4. Steel deck thickness shall be a minimum 20 gauge.
- 5. Minimum concrete thickness ($h_{min,deck}$) refers to concrete thickness above upper flute.

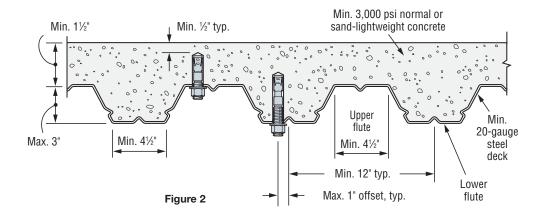
Stainless-Steel Strong-Bolt 2 Information for
nstallation in the Topside of Concrete-Filled Profile
Steel Deck Floor and Roof Assemblies ^{1,2,3,4}

Decian Information	Cumbol	Unito	Nominal Anchor Diameter (in.)						
Design Information	Symbol	Units	3,	1⁄2					
Nominal Embedment Depth	h _{nom}	in.	1	7⁄8	23⁄4				
Effective Embedment Depth	h _{ef}	in.	1	21⁄4					
Minimum Concrete Thickness ⁵	h _{min,deck}	in.	21⁄2	31⁄4	31⁄4				
Critical Edge Distance	C _{ac,deck,top}	in.	43⁄4	4	4				
Minimum Edge Distance	Cmin, deck, top	in.	4	3⁄4	6				
Minimum Spacing	S _{min,deck,top}	in.	6	8					

For SI: 1 inch = 25.4mm; 1 lbf = 4.45N

- 1. Installation must comply with the table on p. 137 and Figure 1 below.
- 2. Design capacity shall be based on calculations according to values in the tables on pp. 139 and 141.
- 3. Minimum flute depth (distance from top of flute to bottom of flute) is 11/2".
- 4. Steel deck thickness shall be a minimum 20 gauge.
- Minimum concrete thickness (*h_{min,deck}*) refers to concrete thickness above upper flute.





142

Carbon-Steel Strong-Bolt 2 Tension and Shear Strength Design Data for the Soffit of Concrete over Profile Steel Deck Floor and Roof Assemblies^{1,2,6,8,9}

						Nominal A	nchor Dia	meter (in.))		
Characteristic	Symbol Units		Carbon Steel								
Glaracteristic	Symbol	Units		Uppei	r Flute						
			3⁄8		1⁄2		5⁄8		3⁄4	3⁄8	1⁄2
Nominal Embedment Depth	h _{nom}	in.	2	33⁄8	2¾	4 1⁄2	33⁄8	5%	41⁄8	2	2¾
Effective Embedment Depth	h _{ef}	in.	1 %	3	21⁄4	4	23⁄4	5	33⁄8	1 %	21⁄4
Installation Torque	T _{inst}	ftlbf.	3	0	6	0	9	0	150	30	60
Pullout Strength, concrete on metal deck (cracked) ^{3,4}	N _{p,deck,cr}	lb.	1,040 ⁷	2,6157	2,0407	2,730 ⁷	2,615 ⁷	4,9907	2,815 ⁷	1,340 ⁷	3,7857
Pullout Strength, concrete on metal deck (uncracked) ^{3,4}	N _{p,deck,uncr}	lb.	1,765 ⁷	3,150 ⁷	2,580 ⁷	3,840 ⁷	3,685 ⁷	6,565 ⁷	3,8007	2,275 ⁷	4,7957
Pullout Strength, concrete on metal deck (seismic) ^{3,4}	N _{p,deck,eq}	lb.	1,040 ⁷	2,615 ⁷	2,0407	2,730 ⁷	2,615 ⁷	4,9907	2,815 ⁷	1,340 ⁷	3,7857
Steel Strength in Shear, concrete on metal deck5	V _{sa,deck}	lb.	1,595	3,490	2,135	4,580	2,640	7,000	4,535	3,545	5,920
Steel Strength in Shear, concrete on metal deck (seismic) ${}^{\scriptscriptstyle 5}$	V _{sa,deck,eq}	lb.	1,595	3,490	1,920	4,120	2,375	6,300	3,690	3,545	5,330

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, except as modified below.

- 2. Profile steel deck must comply with the configuration in Figure 2 on the previous page, and have a minimum base-steel thickness of 0.035 inch (20 gauge). Steel must comply with ASTM A 653/A 653M SS Grade 33 with minimum yield strength of 33,000 psi. Concrete compressive strength shall be 3,000 psi minimum.
- 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 318-14 Section 17.4.3.2 or ACI 318-11 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,or} shall be substituted for N_{p,or}. Where analysis indicates no cracking at service loads, the normal pullout strength in

uncracked concrete $N_{p,deck,uncr}$ shall be substituted for $N_{p,uncr}$. For seismic loads, $N_{p,deck,eq}$ shall be substituted for N_p .

5. In accordance with ACI 318-14 Section 17.5.1.2(C) or ACI 318-11 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_{sa}, deck shall be substituted for V_{sa}. For seismic loads, V_{sa}, deck, eq shall be substituted for V_{sa}.

- The minimum anchor spacing along the flute must be the greater of 3.0h_{ef} 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 $(f_c / 3,000 \text{ psi})^{0.5}$.
- 8. Concrete shall be normal-weight or structural sand-lightweight concrete having a minimum specified compressive strength, f[']_O of 3,000 psi.
- 9. Minimum distance to edge of panel is 2h_{ef}.

Stainless-Steel Strong-Bolt 2 Tension and Shear Strength Design Data for the Soffit of Concrete over Profile Steel Deck Floor and Roof Assemblies^{1,2,6,10,11}

			Stainless Steel								
Characteristic	Symbol	Units	Lower Flute							Upper Flute	
			3,	/8	1	/2	5,	/8	3⁄4	3⁄8	1⁄2
Nominal Embedment Depth	h _{nom}	in.	2	3%	2¾	41⁄2	33⁄8	5%	41⁄8	2	2¾
Effective Embedment Depth	h _{ef}	in.	1 5⁄8	3	21⁄4	4	23⁄4	5	33⁄8	1 5⁄8	21⁄4
Installation Torque	T _{inst}	ftlbf.	3	0	65 80 15		150	30	65		
Pullout Strength, concrete on metal deck (cracked) ³	N _{p,deck,cr}	lb.	1,230 ⁸	2,605 ⁸	1,990 ⁷	2,5507	1,750 ⁹	4,020 ⁹	3,0307	1,550 ⁸	2,0557
Pullout Strength, concrete on metal deck (uncracked) ³	N _{p,deck,uncr}	lb.	1,580 ⁸	3,950 ⁸	2,4757	2,6607	2,470 ⁷	5,0007	4,275 ⁹	1,990 ⁸	2,560 ⁷
Pullout Strength, concrete on metal deck (seismic) ⁵	N _{p,deck,eq}	lb.	1,230 ⁸	2,345 ⁸	1,990 ⁷	2,5507	1,750 ⁹	4,020 ⁹	3,0307	1,550 ⁸	2,0557
Steel Strength in Shear, concrete on metal deck ⁴	V _{sa,deck}	lb.	2,285	3,085	3,430	4,680	3,235	5,430	6,135	3,085	5,955
Steel Strength in Shear, concrete on metal deck (seismic) ⁵	V _{sa,deck,eq}	lb.	2,285	3,085	2,400	3,275	3,235	5,430	5,520	3,085	4,170

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, except as modified below.

- Profile steel deck must comply with the configuration in Figure 2 on the previous page, and have a minimum base-steel thickness of 0.035 inch (20 gauge). Steel must comply with ASTM A 653/A 653M SS Grade 33 with minimum yield strength of 33,000 psi. Concrete compressive strength shall be 3,000 psi minimum.
- 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 318-14 Section 17.4.3.2 or ACI 318-11 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}. For seismic loads, N_{p,deck,eg} shall be substituted for N_p.
- 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_{sa}, deck shall be substituted for V_{sa}. For seismic loads, V_{sa}, deck,eq shall be substituted for V_{sa}.
 6. The minimum anchor spacing along the flute must be the greater of 3.0h_{ef} or 1.5 times the flute width.
 - 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}.

5. In accordance with ACI 318-14 Section 17.5.1.2(C) or ACI 318-11

- 8. The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f_c / 3,000 \text{ ps})^{0.3}$.
- 9. The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f_c / 3,000 \text{ ps})^{0.4}$.
- 10. Concrete shall be normal-weight or structural sand-lightweight concrete having a minimum specified compressive strength, f'_c, of 3,000 psi.
- 11. Minimum distance to edge of panel is 2h_{ef}.

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Carbon-Steel Strong-Bolt 2 Anchor Tension and Shear Strength Design Data for the Soffit of Concrete over Profile Steel Deck, Floor and Roof Assemblies^{1,2,6,8,9}

			Carbon Steel Nominal Anchor Diameter (in.)							
Characteristic	Symbol	Units	Installed in Lower Flute							
			3	/8	1,	/2	5,	/8		
Nominal Embedment Depth	h _{nom}	in.	2	3%	2¾	41⁄2	3%	5%		
Effective Embedment Depth	h _{ef}	in.	1%	3	21⁄4	4	2¾	5		
Minimum Hole Depth	h _{hole}	in.	21⁄8	31⁄2	3	43⁄4	3%	5%		
Minimum Concrete Thickness	h _{min,deck}	in.	2	2	2	31⁄4	2	31⁄4		
Installation Torque	T _{inst}	ftlbf.	3	0	60		90			
Pullout Strength, concrete on metal deck (cracked) ^{3,4,7}	N _{p,deck,cr}	lb.	1,295	2,705	2,585	4,385	3,015	5,120		
Pullout Strength, concrete on metal deck (uncracked)3.4.7	N _{p,deck,uncr}	lb.	2,195	3,260	3,270	6,165	4,250	6,735		
Pullout Strength, concrete on metal deck (seismic) ^{3,4,7}	N _{p,deck,eq}	lb.	1,295	2,705	2,585	4,385	3,015	5,120		
Steel Strength in Shear, concrete on metal deck ⁵	V _{sa,deck}	lb.	1,535	3,420	2,785	5,950	3,395	6,745		
Steel Strength in Shear, concrete on metal deck (seismic) ⁵	V _{sa,deck,eq}	lb.	1,535	3,420	2,505	5,350	3,055	6,070		

1. The information presented in this table must be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, except as modified below.

 Profile steel deck must comply with the configuration in Figure 3 below, and have a minimum base-steel thickness of 0.035 inch (20 gauge). Steel must comply with ASTM A 653/A 653M SS Grade 50 with minimum yield strength of 50,000 psi. 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.

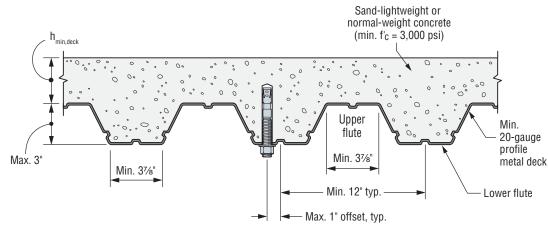
4. In accordance with ACI 318-14 Section 17.4.3.2 or ACI 318-11 Section D.5.3.2, the nominal pullout strength in cracked concrete for anchors installed in the soffit of sand-lightweight or normal-weight concrete over metal deck floor and rood assemblies N_{p,deck-cr} shall be substituted for N_{p,cr}. 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}. For seismic loads, N_{p,deck,eq} shall be substituted for N_p.

5. In accordance with ACI 318-14 Section 17.5.1.2(c) or ACI 318-11, the shear strength for anchors installed in the soffit of sand-lightweight or normal-weight concrete over metal deck floor and rood assemblies V_{sa}, deck shall be substituted for V_{sa}. For seismic loads, V_{sa}, deck, eq shall be substituted for V_{sa}.

6. The minimum anchor spacing along the flute must be the greater of $3.0h_{ef}$ 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}.

Concrete shall be normal-weight or structural sand-lightweight concrete having a minimum specified compressive strength, fⁱ_c, of 3,000 psi.
 Minimum distance to edge of panel is 2h_{ef}.





144

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Carbon-Steel Strong-Bolt 2 Tension and Shear Loads in 8" Lightweight, Medium-Weight and Normal-Weight Grout-Filled CMU

Size	Drill Bit	Min. Embed.	Install. Torque	Critical			Tensio	n Load	Shear	Load
in.	Dia.	Depth	ftlb.	Edge Dist.	End Dist.	Spacing	Ultimate	Allowable	Ultimate	Allowable
(mm)	(in.)	in. (mm)	(N-m)	in. (mm)	in. (mm)	in. (mm)	Ib. (kN)	Ib. (kN)	Ib. (kN)	Ib. (kN)
			Anchor	Installed in the	e Face of the CN	/IU Wall (See Fi	gure 1)			
1⁄4	1⁄4	1¾	4	12	12	8	1,150	230	1,500	300
(6.4)		(45)	(5.4)	(305)	(305)	(203)	(5.1)	(1.0)	(6.7)	(1.3)
3%8	3⁄8	25%	20	12	12	8	2,185	435	3,875	775
(9.5)		(67)	(27.1)	(305)	(305)	(203)	(9.7)	(1.9)	(17.2)	(3.4)
½	1⁄2	31⁄2	35	12	12	8	2,645	530	5,055	1,010
(12.7)		(89)	(47.5)	(305)	(305)	(203)	(11.8)	(2.4)	(22.5)	(4.5)
5%8	5⁄8	43%	55	20	20	8	4,460	890	8,815	1,765
(15.9)		(111)	(74.6)	(508)	(508)	(203)	(19.8)	(4.0)	(39.2)	(7.9)
3⁄4	3⁄4	51⁄4	100	20	20	8	5,240	1,050	12,450	2,490
(19.1)		(133)	(135.6)	(508)	(508)	(203)	(23.3)	(4.7)	(55.4)	(11.1)

1. The tabulated allowable loads are based on a safety factor of 5.0 for installation under the IBC and IRC.

2. Listed loads may be applied to installations on the face of the CMU wall at least 11/4" away from headjoints.

3. Values for 8"-wide concrete masonry units (CMU) with a minimum

specified compressive strength of masonry, $\mathrm{f'}_{\mathit{m}}$, at 28 days is 1,500 psi. 4. Embedment depth is measured from the outside face of the concrete masonry unit.

- 5. Tension and shear loads may be combined using the parabolic interaction equation $(n = \frac{5}{3})$
- 6. Refer to allowable load adjustment factors for edge distance and spacing on p. 146.
- 7. Allowable loads may be increased 331/3% for short-term loading due to wind forces or seismic forces where permitted by code.

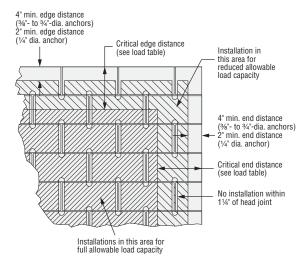


Figure 1

Carbon-Steel Strong-Bolt 2 Tension and Shear Loads in

IBC 8" Lightweight, Medium-weight and Normal-Weight Grout-Filled CMU Shear Load Shear Load Min. **Tension Load** Install. Min. Critical Critical Perp. To Edge Parallel To Edge Embed Edge. Dist. End Dist. Spacing Torque Depth. ft.-İb. Ultimate Allowable Ultimate Allowable Ultimate Allowable in. (N-m) (mm) (mm) (mm) (mm)lb. (kN) lb. (kN) lb. (kN) lb. (kN) lb. (kN) lb. (kN) Anchor Installed in Cell Opening or Web (Top of Wall) (See Figure 2)

1⁄2 (12.7)	1⁄2	3½ (89)	35 (47.5)	1 ¾ (45)	12 (305)	8 (203)	2,080 (9.3)	415 (1.8)	1,165 (5.2)	235 (1.0)	3,360 (14.9)	670 (3.0)
5% (15.9)	5⁄8	4% (111)	55 (74.6)	1 ¾ (45)	12 (305)	8 (203)	3,200 (14.2)	640 (2.8)	1,370 (6.1)	275 (1.2)	3,845 (17.1)	770 (3.4)

1. The tabulated allowable loads are based on a safety factor of 5.0 for installation under the IBC and IRC.

2. Values for 8"-wide concrete masonry units (CMU) with a minimum specified compressive strength of masonry, f'm, at 28 days is 1,500 psi.

3. Tension and shear loads may be combined using the parabolic interaction equation $(n = \frac{5}{3})$

4. Refer to allowable load adjustment factors for edge distance and spacing on p. 146.

5. Allowable loads may be increased 331/3% for short-term loading due to wind forces or seismic forces where permitted by code.

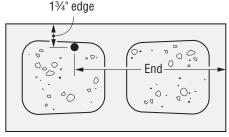


Figure 2

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Size

(mm)

Drill Bit

Dia.

in.

IBC

Strong-Bolt® 2 Design Information — Masonry



Carbon-Steel Strong-Bolt 2 Allowable Load Adjustment Factors for Face-of-Wall Installation in 8" Grout-Filled CMU: Edge Distance and Spacing, Tension and Shear Loads

How to use these charts:

- 1. The following tables are for reduced edge distance and spacing.
- 2. Locate the anchor size to be used for either a tension and/or shear load application.
- 3. Locate the embedment (E) at which the anchor is to be installed.
- Locate the edge distance (c_{act}) or spacing (s_{act}) at which the anchor is to be installed.

Edge or End Distance Tension (f_c)

			```	0/		
Dia.	1⁄4	3⁄8	1/2	5⁄8	3⁄4	IBC
Ε	1 3⁄4	25⁄8	31/2	43⁄8	51⁄4	
C _{cr}	12	12	12	20	20	
C _{min}	2	4	4	4	4	201202
f _{cmin}	1.00	1.00	1.00	1.00	0.97	( <u></u> _
	1.00					
	1.00	1.00	1.00	1.00	0.97	
	1.00	1.00	1.00	1.00	0.97	
	1.00	1.00	1.00	1.00	0.98	155.54 State
	1.00	1.00	1.00	1.00	0.98	
	1.00	1.00	1.00	1.00	0.99	
				1.00	0.99	
				1.00	0.99	
				1.00	1.00	
				1.00	1.00	
	E C _{cr} C _{min}	E         1¾           C _{cr} 12           C _{min} 2           f _{cmin} 1.00           1.00         1.00           1.00         1.00           1.00         1.00           1.00         1.00           1.00         1.00           1.00         1.00	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$

### Spacing Tension (f_s)

**Mechanical** Anchors

Dia. 1/4 3/8 1/2 5/8 3/4	IBC
E 134 25% 31/2 43% 51/4	
$S_{act}$ $S_{cr}$ 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
(III.) $S_{min}$ 4 4 4 4 4	81 82
f _{smin} 1.00 1.00 0.93 0.86 0.80	
4 1.00 1.00 0.93 0.86 0.80 L	
6 1.00 1.00 0.97 0.93 0.90 F	<u>n n</u>
8 1.00 1.00 1.00 1.00 1.00	1 <del>4 - 1</del>

- 5. The load adjustment factor ( $f_{\rm c}$  or  $f_{\rm s})$  is the intersection of the row and column.
- 6. Multiply the allowable load by the applicable load adjustment factor.
- 7. Reduction factors for multiple edges or spacings are multiplied together.

Edge (	or End	Distar	ice Sh	ear (f _c )			
	Dia.	1⁄4	3⁄8	1/2	5⁄8	3⁄4	IBC
	Ε	13⁄4	25⁄8	31/2	43⁄8	51⁄4	
c _{act} (in.)	C _{cr}	12	12	12	20	20	-
()	C _{min}	2	4	4	4	4	20122
	f _{cmin}	0.88	0.71	0.60	0.36	0.28	[
2		0.88					
4		0.90	0.71	0.60	0.36	0.28	
6		0.93	0.78	0.70	0.44	0.37	
8		0.95	0.86	0.80	0.52	0.46	100000000
10		0.98	0.93	0.90	0.60	0.55	
12		1.00	1.00	1.00	0.68	0.64	
14					0.76	0.73	
16					0.84	0.82	
18					0.92	0.91	
20					1.00	1.00	

#### Spacing Shear (f_s)

opuoli	ig ono						<b></b>
	Dia.	1⁄4	3⁄8	1/2	5⁄8	3⁄4	IBC
	Ε	1¾	2%	31⁄2	43%	51⁄4	
Sact	S _{cr}	8	8	8	8	8	•
(in.)	S _{min}	4	4	4	4	4	257 252
	f _{smin}	1.00	1.00	1.00	1.00	1.00	
4		1.00	1.00	1.00	1.00	1.00	
6		1.00	1.00	1.00	1.00	1.00	<u>n n</u>
8		1.00	1.00	1.00	1.00	1.00	<u>/∢→\</u>

Load Adjustment Factors for Carbon-Steel Strong-Bolt 2 Wedge Anchors in Top-of-Wall Installation in 8" Grout-Filled CMU: Edge Distance and Spacing, Tension and Shear Loads

### End Distance

Iensio	n (f _c )			
	Dia.	1/2	5⁄8	IBC
	Ε	31⁄2	43%	
s _{act} (in.)	C _{cr}	12	12	
()	C _{min}	4	4	23 23
	f _{cmin}	1.00	1.00	(*** <b>*</b> *
4		1.00	1.00	
6		1.00	1.00	
8		1.00	1.00	(+-+)
10		1.00	1.00	
12		1.00	1.00	

Spacir	ng Tens	sion (f _s	)	
	Dia.	1⁄2	5⁄8	IBC
	Ε	31⁄2	43%8	
s _{act} (in.)	S _{cr}	8	8	
()	S _{min}	4	4	
	f _{cmin}	0.93	0.86	
4		0.93	0.86	
6		0.97	0.93	n-r
8		1.00	1.00	/↔ N

* See p. 13 for an explanation of the load table icons.

горы	laicula		ige (ic)	
	Dia.	1⁄2	5⁄8	IBC
	Ε	31⁄2	43⁄8	
C _{act} (in.)	C _{cr}	12	12	•
()	C _{min}	4	4	201 202
	f _{cmin}	0.90	0.83	
4		0.90	0.83	
6		0.93	0.87	
8		0.95	0.92	
10		0.98	0.96	
12		1.00	1.00	

Spacing Shear
Perpendicular
or Dorollol to Edga (

or Para		Eage	(I _S )	
s _{act} (in.)	Dia.	1⁄2	5⁄8	IBC
	Ε	31⁄2	43%8	
	S _{cr}	8	8	•
	S _{min}	4	4	201 202
	f _{cmin}	1.00	1.00	
4		1.00	1.00	
6		1.00	1.00	
8		1.00	1.00	<i>i</i> <del>∢ →</del> \

### End Distance

Shear	Paralle	el to Ec	lge (t _c )	
c _{act} (in.)	Dia.	1⁄2	5⁄8	<b>IBC</b>
	Ε	31⁄2	43%	
	C _{cr}	12	12	•
	C _{min}	4	4	22
	f _{cmin}	0.53	0.50	
4		0.53	0.50	
6		0.65	0.63	
8		0.77	0.75	
10		0.88	0.88	
12		1.00	1.00	

146