SET-3G™ High-Strength Epoxy Adhesive

SET-3G is the latest innovation in epoxy anchoring adhesives with high design strength and proven performance. SET-3G is a 1:1 ratio, two-component, anchoring adhesive for concrete (cracked and uncracked). SET-3G installs and performs in a variety of environmental conditions and temperature extremes.

Features

- Exceptional performance — superior bond strengths permit ductile solutions in high seismic areas
- Design flexibility — improved sustained load performance at elevated temperature
- Jobsite versatility — can be specified for all base material conditions when in-service temperatures range from –40°F (–40°C) to 176°F (80°C)
- Recognized per ICC ES AC308 for post-installed rebar development and splice length design provisions
- Code listed for installation with the Speed Clean™ DXS, dustless drilling system without further hole cleaning

Product Information

Mix Ratio/Type	1:1 epoxy
Mixed Color	Gray
Base Materials	Concrete — cracked and uncracked
Base Material Conditions	Dry, water-saturated, water-filled
Anchor Type	Threaded rod or rebar
Substrate Installation Temperature	40°F (4°C) to 100°F (38°C)
In-Service Temperature Range	–40°F (–40°C) to 176°F (80°C)
Storage Temperature	45°F (7°C) and 90°F (32°C)
Shelf Life	24 months
Volatile Organic Compound (VOC)	2 g/L
Chemical Resistance	See pp. 268–269
Manufactured in the USA using global materials	

Test Criteria

SET-3G has been tested in accordance with ICC-ES AC308, ACI 355.4 and applicable ASTM test methods.

Code Reports, Standards and Compliance

Concrete — ICC-ES ESR-4057 (including post-installed rebar connections and City of LA); FL15730.
Masonry — coming 2021.
ASTM C881 and AASHTO M235 — Types I/IV and II/V, Grade 3, Class B&C.
UL Certification — CDPH Standard Method v1.2.
NSF/ANSI/CAN 61 (216 in.^{2} / 1,000 gal.).

SET-3G Adhesive

Installation Instructions

Installation instructions are located at the following locations: pp. 64–67; product packaging; or **strongtie.com/set3g**.

- Hole cleaning brushes are located on p. 68.

SET-3G Adhesive Cartridge System

Model No.	Capacity (ounces)	Cartridge Type	Carton Quantity	Dispensing Tool(s)	Mixing Nozzle[3]
SET3G10[1]	8.5	Coaxial	12	CDT10S	EMN22I
SET3G22-N[1]	22	Side-by-side	10	EDT22S, EDTA22P, EDTA22CKT	
SET3G56	56	Side-by-side	6	EDTA56P	

1. One EMN22I mixing nozzle and one extension are supplied with each cartridge.
2. Cartridge estimation guidelines are available at **strongtie.com/softwareandwebapplications/category**.
3. Use only Simpson Strong-Tie® mixing nozzles in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair SET-3G adhesive performance.
4. Use of rodless pneumatic tools to dispense single-tube, coaxial adhesive cartridges is prohibited.

SET-3G™ High-Strength Epoxy Adhesive

SET-3G Cure Schedule[1,2]

Concrete Temperature		Gel Time	Cure Time
(°F)	(°C)	(min.)	(hr.)
40	4	120	192
50	10	75	72
60	16	50	48
70	21	35	24
90	32	25	24
100	38	15	24

For SI: 1°F = (°C x 9/5) + 32.

1. For water-saturated concrete and water-filled holes, the cure times shall be doubled.
2. For installation of anchors in concrete where the temperature is below 70°F (21°C), the adhesive must be conditioned to a minimum temperature of 70°F (21°C).

SET-3G Typical Properties

Property		Class B (40°–60°F)	Class C (>60°F)	Test Method
Consistency		Non-sag	Non-sag	ASTM C881
Bond Strength, Slant Shear	Hardened to Hardened Concrete, 2-Day Cure[1]	3,700 psi	3,300 psi	ASTM C882
	Hardened to Hardened Concrete, 14-Day Cure[1]	3,850 psi	3,350 psi	
	Fresh to Hardened Concrete, 14-Day Cure[2]	2,750 psi	2,750 psi	
Compressive Yield Strength, 7-Day Cure[2]		13,000 psi	15,350 psi	ASTM D695
Compressive Modulus, 7-Day Cure[2]		650,000 psi	992,000 psi	ASTM D695
Heat Deflection Temperature, 7-Day Cure[2]		147°F (64°C)		ASTM D648
Glass Transition Temperature, 7-Day Cure[2]		149°F (65°C)		ASTM E1356
Decomposition Temperature, 24-Hour Cure[2]		500°F (260°C)		ASTM E2550
Water Absorption, 24-Hours, 7-Day Cure[2]		0.13%		ASTM D570
Shore D Hardness, 24-Hour Cure[2]		84		ASTM D2240
Linear Coefficient of Shrinkage, 7-Day Cure[2]		0.002 in./in.		ASTM D2566
Coefficient of Thermal Expansion[2]		2.3 x 10^{-5} in./in.°F		ASTM C531

1. Material and curing conditions: Class B at 40° ± 2°F, Class C at 60° ± 2°F.
2. Material and curing conditions: 73° ± 2°F.

SET-3G Installation Information and Additional Data for Threaded Rod and Rebar[1]

IBC LW*

Characteristic	Symbol	Units	Nominal Anchor Diameter d_a (in.) / Rebar Size						
			⅜ / #3	½ / #4	⅝ / #5	¾ / #6	⅞ / #7	1 / #8	1¼ / #10
Installation Information									
Drill Bit Diameter for Threaded Rod	d_{hole}	in.	7/16	9/16	11/16	⅞	1	1⅛	1⅜
Drill Bit Diameter for Rebar	d_{hole}	in.	½	⅝	¾	⅞	1	1⅛	1⅜
Maximum Tightening Torque	T_{inst}	ft.-lb.	15	30	60	100	125	150	200
Minimum Embedment Depth	$h_{ef,\,min}$	in.	2⅜	2¾	3⅛	3½	3¾	4	5
Maximum Embedment Depth	$h_{ef,\,max}$	in.	7½	10	12½	15	17½	20	25
Minimum Concrete Thickness	h_{min}	in.	h_{ef} + 1¼		h_{ef} + 2d_{hole}				
Critical Edge Distance	c_{ac}	in.	See footnote 2						
Minimum Edge Distance	c_{min}	in.	1¾						2¾
Minimum Anchor Spacing	s_{min}	in.	1	2½	3				6

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 and ACI 318-11.
2. $c_{ac} = h_{ef}(\tau_{k,uncr}/1{,}160)^{0.4}$ x [3.1 – 0.7(h/h_{ef})], where:
   [h/h_{ef}] ≤ 2.4
   $\tau_{k,uncr}$ = the characteristic bond strength in uncracked concrete, given in the tables that follow ≤ k_{uncr} ((h_{ef} x f'_c)$^{0.5}$/(π x d_a))
   h = the member thickness (inches)
   h_{ef} = the embedment depth (inches)
   d_a = nominal anchor diameter

** See p. 12 for an explanation of the load table icons.*

SET-3G Tension Strength Design Data for Threaded Rod[1,8]

IBC

Characteristic			Symbol	Units	Nominal Rod Diameter (in.)						
					⅜	½	⅝	¾	⅞	1	1¼
Steel Strength in Tension											
Minimum Tensile Stress Area			A_{se}	in.^{2}	0.078	0.142	0.226	0.334	0.462	0.606	0.969
Tension Resistance of Steel — ASTM F1554, Grade 36			N_{sa}	lb.	4,525	8,235	13,110	19,370	26,795	35,150	56,200
Tension Resistance of Steel — ASTM F1554, Grade 55					5,850	10,650	16,950	25,050	34,650	45,450	72,675
Tension Resistance of Steel — ASTM A193, Grade B7					9,750	17,750	28,250	41,750	57,750	75,750	121,125
Tension Resistance of Steel — Stainless Steel ASTM A193, Grade B8 and B8M (Types 304 and 316)					4,445	8,095	12,880	19,040	26,335	34,540	55,235
Tension Resistance of Steel — Stainless Steel ASTM F593 CW (Types 304 and 316)					7,800	14,200	22,600	28,390	39,270	51,510	82,365
Tension Resistance of Steel — Stainless Steel ASTM A193, Grade B6 (Type 410)					8,580	15,620	24,860	36,740	50,820	66,660	106,590
Strength Reduction Factor for Tension — Steel Failure			ϕ	—	0.75[5]						
Concrete Breakout Strength in Tension (2,500 psi ≤ f'$_C$ ≤ 8,000 psi)											
Effectiveness Factor for Cracked Concrete			$k_{c,cr}$	—	17						
Effectiveness Factor for Uncracked Concrete			$k_{c,uncr}$	—	24						
Strength Reduction Factor — Concrete Breakout Failure in Tension			ϕ	—	0.65[6]						
Bond Strength in Tension (2,500 psi ≤ f'$_C$ ≤ 8,000 psi)[7]											
Minimum Embedment			$h_{ef,min}$	in.	2⅜	2¾	3⅛	3½	3¾	4	5
Maximum Embedment			$h_{ef,max}$	in.	7½	10	12½	15	17½	20	25
Continuous Inspection	Temperature Range A[2,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,448	1,402	1,356	1,310	1,265	1,219	1,128
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	2,357	2,260	2,162	2,064	1,967	1,868	1,672
	Temperature Range B[3,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,201	1,163	1,125	1,087	1,050	1,012	936
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	1,957	1,876	1,795	1,713	1,632	1,551	1,388
	Anchor Category	Dry Concrete	—	—	1						
	Strength Reduction Factor	Dry Concrete	$\phi_{dry,ci}$	—	0.65[10]						
	Anchor Category	Water-Saturated Concrete, or Water-Filled Hole	—	—	3		2				
	Strength Reduction Factor	Water-Saturated Concrete, or Water-Filled Hole	$\phi_{wet,ci}$	—	0.45[10]		0.55[10]				
Periodic Inspection	Temperature Range A[2,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,346	1,304	1,356	1,310	1,265	1,219	1,128
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	2,192	2,102	2,162	2,064	1,967	1,868	1,672
	Temperature Range B[3,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,117	1,082	1,125	1087	1,050	1,012	936
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	1,820	1,744	1,795	1,713	1,632	1,551	1,388
	Anchor Category	Dry Concrete		—	2		1				
	Strength Reduction Factor	Dry Concrete	$\phi_{dry,pi}$	—	0.55[10]		0.65[10]				
	Anchor Category	Water-Saturated Concrete, or Water-Filled Hole	—	—	3						
	Strength Reduction Factor	Water-Saturated Concrete, or Water-Filled Hole	$\phi_{wet,pi}$	—	0.45[10]						
Reduction Factor for Seismic Tension			$\alpha_{N,seis}$[11]	—	1.0	0.9	1.0	1.0	1.0	1.0	1.0

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 and ACI 318-11.
2. Temperature Range A: Maximum short-term temperature = 160°F, maximum long-term temperature = 110°F.
3. Temperature Range B: Maximum short-term temperature = 176°F, maximum long-term temperature = 110°F.
4. Short-term concrete temperatures are those that occur over short intervals (diurnal cycling). Long-term temperatures are roughly constant over significant periods of time.
5. The tabulated value of ϕ applies when the load combinations of ACI 318-14 5.3 or ACI 318-11 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318-11 D.4.4 to determine the appropriate value of ϕ.
6. The tabulated value of ϕ applies when both the load combinations of ACI 318-14 5.3, or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 (c) or ACI 318-11 D.4.3 (c), as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318 D.4.4 (c) for Condition B to determine the appropriate value of ϕ.
7. Bond strength values shown are for normal-weight concrete having a compressive strength of f'$_C$ = 2,500 psi. For higher compressive strengths up to 8,000 psi, the tabulated characteristic bond strength may be increased by a factor of (f'$_C$/2,500)$^{0.35}$ for uncracked concrete and a factor of (f'$_C$/2,500)$^{0.24}$ for cracked concrete.
8. For lightweight concrete, the modification factor for bond strength shall be as given in ACI 318-14 17.2.6 or ACI 318-11 D.3.6, as applicable, where applicable.
9. Characteristic bond strength values are for sustained loads, including dead and live loads.
10. The tabulated value of ϕ applies when both the load combinations of ACI 318-14 5.3, or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 (c) or ACI 318-11 D.4.3 (c), as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318 D.4.4(c) for Condition B to determine the appropriate value of ϕ.
11. For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values must be multiplied by $\alpha_{N,seis}$.

** See p. 12 for an explanation of the load table icons.*

SET-3G™ Design Information — Concrete

SET-3G Tension Strength Design Data for Rebar[1,8]

IBC

Characteristic			Symbol	Units	Rebar Size						
					#3	#4	#5	#6	#7	#8	#10
Steel Strength in Tension											
Minimum Tensile Stress Area			A_{se}	in.^{2}	0.11	0.20	0.31	0.44	0.60	0.79	1.27
Tension Resistance of Steel — Rebar (ASTM A615 Grade 60)			N_{sa}	lb.	9,900	18,000	27,900	39,600	54,000	71,100	114,300
Tension Resistance of Steel — Rebar (ASTM A706 Grade 60)					8,800	16,000	24,800	35,200	48,000	63,200	101,600
Strength Reduction Factor for Tension — Steel Failure			ϕ	—	0.75[5]						
Concrete Breakout Strength in Tension (2,500 psi ≤ f'$_c$ ≤ 8,000 psi)											
Effectiveness Factor for Cracked Concrete			$k_{c,cr}$	—	17						
Effectiveness Factor for Uncracked Concrete			$k_{c,uncr}$	—	24						
Strength Reduction Factor — Concrete Breakout Failure in Tension			ϕ	—	0.65[6]						
Bond Strength in Tension (2,500 psi ≤ f'$_c$ ≤ 8,000 psi)[7]											
Minimum Embedment			$h_{ef,min}$	in.	2⅜	2¾	3⅛	3½	3¾	4	5
Maximum Embedment			$h_{ef,max}$	in.	7½	10	12½	15	17½	20	25
Continuous Inspection	Temperature Range A[2,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,448	1,402	1,356	1,310	1,265	1,219	1,128
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	2,269	2,145	2,022	1,898	1,774	1,651	1,403
	Temperature Range B[3,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,201	1,163	1,125	1,087	1,050	1,012	936
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	1,883	1,781	1,678	1,575	1,473	1,370	1,165
	Anchor Category	Dry Concrete	—	—	1						
	Strength Reduction Factor	Dry Concrete	$\phi_{dry,ci}$	—	0.65[10]						
	Anchor Category	Water-Saturated Concrete, or Water-Filled Hole	—	—	3		2				
	Strength Reduction Factor	Water-Saturated Concrete, or Water-Filled Hole	$\phi_{wet,ci}$	—	0.45[10]		0.55[10]				
Periodic Inspection	Temperature Range A[2,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,346	1,304	1,356	1,310	1,265	1,219	1,128
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	2,110	1,995	2,022	1,898	1,774	1,651	1,403
	Temperature Range B[3,4]	Characteristic Bond Strength in Cracked Concrete[9]	$\tau_{k,cr}$	psi	1,117	1,082	1,125	1,087	1,050	1,012	936
		Characteristic Bond Strength in Uncracked Concrete[9]	$\tau_{k,uncr}$	psi	1,751	1,656	1,678	1,575	1,473	1,370	1,165
	Anchor Category	Dry Concrete	—	—	2		1				
	Strength Reduction Factor	Dry Concrete	$\phi_{dry,pi}$	—	0.55[10]		0.65[10]				
	Anchor Category	Water-Saturated Concrete, or Water-Filled Hole	—	—	3						
	Strength Reduction Factor	Water-Saturated Concrete, or Water-Filled Hole	$\phi_{wet,pi}$	—	0.45[10]						
Reduction Factor for Seismic Tension			$\alpha_{N,seis}$[11]	—	1.0	1.0	1.0	1.0	1.0	1.0	1.0

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 and ACI 318-11.
2. Temperature Range A: Maximum short-term temperature = 160°F, maximum long-term temperature = 110°F.
3. Temperature Range B: Maximum short-term temperature = 176°F, maximum long-term temperature = 110°F.
4. Short-term concrete temperatures are those that occur over short intervals (diurnal cycling). Long-term temperatures are roughly constant over significant periods of time.
5. The tabulated value of ϕ applies when the load combinations of ACI 318-14 5.3 or ACI 318-11 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318-11 D.4.4 to determine the appropriate value of ϕ.
6. The tabulated value of ϕ applies when both the load combinations of ACI 318-14 5.3, or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 (c) or ACI 318-11 D.4.3 (c), as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318 D.4.4(c) for Condition B to determine the appropriate value of ϕ.
7. Bond strength values shown are for normal-weight concrete having a compressive strength of f'$_c$ = 2,500 psi. For higher compressive strengths up to 8,000 psi, the tabulated characteristic bond strength may be increased by a factor of (f'$_c$/2,500)$^{0.36}$ for uncracked concrete and a factor of (f'$_c$/2,500)$^{0.25}$ for cracked concrete.
8. For lightweight concrete, the modification factor for bond strength shall be as given in ACI 318-14 17.2.6 or ACI 318-11 D.3.6, as applicable, where applicable.
9. Characteristic bond strength values are for sustained loads, including dead and live loads.
10. The tabulated value of ϕ applies when both the load combinations of ACI 318-14 5.3, or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 (c) or ACI 318-11 D.4.3 (c), as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318 D.4.4(c) for Condition B to determine the appropriate value of ϕ.
11. For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values must be multiplied by $\alpha_{N,seis}$.

** See p. 12 for an explanation of the load table icons.*

SET-3G Shear Strength Design Data for Threaded Rod[1]

Characteristic	Symbol	Units	Nominal Rod Diameter (in.)						
			⅜	½	⅝	¾	⅞	1	1¼
Steel Strength in Shear									
Minimum Shear Stress Area	A_{se}	in.^{2}	0.078	0.142	0.226	0.334	0.462	0.606	0.969
Shear Resistance of Steel — ASTM F1554, Grade 36	V_{sa}	lb.	2,715	4,940	7,865	11,625	16,080	21,090	33,720
Shear Resistance of Steel — ASTM F1554, Grade 55			3,510	6,390	10,170	15,030	20,790	27,270	43,605
Shear Resistance of Steel — ASTM A193, Grade B7			5,850	10,650	16,950	25,050	34,650	45,450	72,675
Reduction factor for Seismic Shear — Carbon Streel	$\alpha_{V,seis}$[4]	—	0.75					1.0	
Shear Resistance of Steel — Stainless Steel ASTM A193, Grade B8 and B8M (Types 304 and 316)	V_{sa}	lb.	2,665	4,855	7,730	11,425	15,800	20,725	33,140
Shear Resistance of Steel — Stainless Steel ASTM F593 CW (Types 304 and 316)			4,680	8,520	13,560	17,035	23,560	30,905	49,420
Shear Resistance of Steel — Stainless Steel ASTM A193, Grade B6 (Type 410)			5,150	9,370	14,915	22,040	30,490	40,000	63,955
Reduction factor for Seismic Shear — Stainless Steel	$\alpha_{V,seis}$[4]	—	0.80		0.75			1.0	
Strength Reduction Factor for Shear — Steel Failure	ϕ	—	0.65[2]						
Concrete Breakout Strength in Shear									
Outside Diameter of Anchor	d_a	in.	0.375	0.5	0.625	0.75	0.875	1	1.25
Load-Bearing Length of Anchor in Shear	l_e	in.	Min. of h_{ef} and 8 times anchor diameter						
Strength Reduction Factor for Shear — Breakout Failure	ϕ	—	0.70[3]						
Concrete Pryout Strength in Shear/									
Coefficient for Pryout Strength	k_{cp}	in.	1.0 for $h_{ef} < 2.50$"; 2.0 for $h_{ef} \geq 2.50$"						
Strength Reduction Factor for Shear — Breakout Failure	ϕ	—	0.70[3]						

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 and ACI 318-11.
2. The tabulated value of ϕ applies when the load combinations of ACI 318-14 5.3 or ACI 318-11 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318-11 D.4.4 to determine the appropriate value of ϕ.
3. The tabulated value of ϕ applies when both the load combinations of ACI 318-14 5.3, or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 (c) or ACI 318-11 D.4.3 (c), as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318 D.4.4 (c) for Condition B to determine the appropriate value of ϕ.
4. The values of V_{sa} are applicable for both cracked concrete and uncracked concrete. For anchors installed in regions assigned to Seismic Design Category C, D, E or F, V_{sa} must be multiplied by α_{Vseis} for the corresponding anchor steel type.

** See p. 12 for an explanation of the load table icons.*

SET-3G™ Design Information — Concrete

SET-3G Shear Strength Design Data for Rebar[1]

Characteristic	Symbol	Units	Nominal Rod Diameter (in.)						
			#3	#4	#5	#6	#7	#8	#10
Steel Strength in Shear									
Minimum Shear Stress Area	A_{se}	in.^{2}	0.110	0.200	0.310	0.440	0.600	0.790	1.270
Shear Resistance of Steel — Rebar (ASTM A615 Grade 60)	V_{sa}	lb.	5,940	10,800	16,740	23,760	32,400	42,660	68,580
Shear Resistance of Steel — Rebar (ASTM A706 Grade 60)			5,280	9,600	14,880	21,120	28,800	37,920	60,960
Reduction Factor for Seismic Shear — Rebar (ASTM A615 Grade 60)	$\alpha_{V,seis}$[4]	—	0.60					0.8	
Reduction Factor for Seismic Shear — Rebar (ASTM A706 Grade 60)			0.60					0.8	
Strength Reduction Factor for Shear — Steel Failure	ϕ	—	0.65[2]						
Concrete Breakout Strength in Shear									
Outside Diameter of Anchor	d_a	in.	0.375	0.5	0.625	0.75	0.875	1	1.25
Load-Bearing Length of Anchor in Shear	l_e	in.	Min. of h_{ef} and 8 times anchor diameter						
Strength Reduction Factor for Shear — Breakout Failure	ϕ	—	0.70[3]						
Concrete Pryout Strength in Shear									
Coefficient for Pryout Strength	k_{cp}	in.	1.0 for $h_{ef} < 2.50$"; 2.0 for $h_{ef} \geq 2.50$"						
Strength Reduction Factor for Shear — Breakout Failure	ϕ	—	0.70[3]						

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 and ACI 318-11.
2. The tabulated value of ϕ applies when the load combinations of ACI 318-14 5.3 or ACI 318-11 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318-11 D.4.4 to determine the appropriate value of ϕ.
3. The tabulated value of ϕ applies when both the load combinations of ACI 318-14 5.3 or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 (c) or ACI 318-11 D.4.3 (c), as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, refer to ACI 318 D.4.4 (c) for Condition B to determine the appropriate value of ϕ.
4. The values of V_{sa} are applicable for both cracked concrete and uncracked concrete. For anchors installed in regions assigned to Seismic Design Category C, D, E or F, V_{sa} must be multiplied by α_{Vseis} for the corresponding anchor steel type.

For additional load tables, visit **strongtie.com/set3g**.

Anchor Designer™ Software for ACI 318, ETAG and CSA

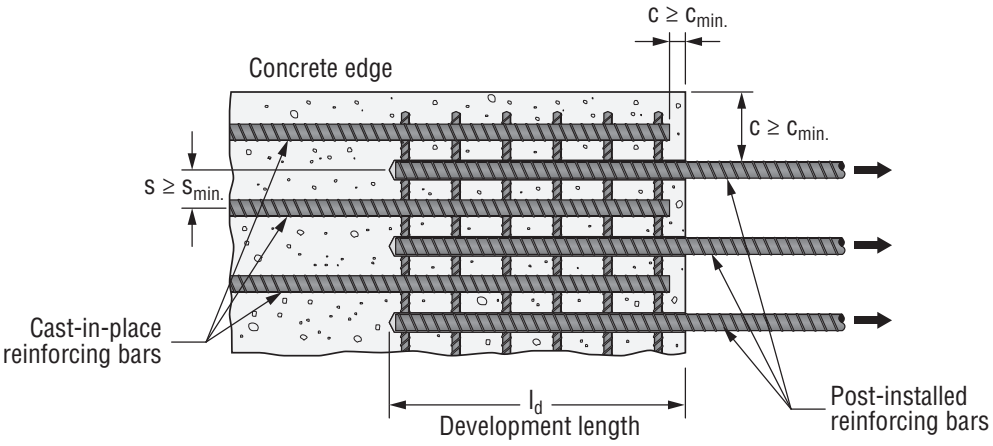
Simpson Strong-Tie® Anchor Designer software accurately analyzes existing design or suggests anchor solutions based on user-defined design elements in cracked and uncracked concrete conditions.

** See p. 12 for an explanation of the load table icons.*

SET-3G™ Design Information — Concrete

SET-3G is code listed under IBC/IRC for cracked and uncracked concrete per ICC-ES ESR-4057.

In March 2020, the evaluation report was updated for SET-3G to be an equivalent to cast-in-place reinforcing bars governed by ACI 318 and IBC Chapter 19.



SET-3G Development Length for Rebar Dowel

IBC

Rebar Size	Drill Bit Diameter (in.)	Clear Cover, in. (mm)	Development Length, in. (mm)				
			f'c = 2,500 psi (17.2 MPa) Concrete	f'c = 3,000 psi (20.7 MPa) Concrete	f'c = 4,000 psi (27.6 MPa) Concrete	f'c = 6,000 psi (41.4 MPa) Concrete	f'c = 8,000 psi (55.2 MPa) Concrete
#3	½	1.125 (29)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)
#4	⅝	1.125 (29)	14.4 (366)	14 (356)	12 (305)	12 (305)	12 (305)
#5	¾	1.125 (29)	18 (457)	17 (432)	14.2 (361)	12 (305)	12 (305)
#6	⅞	1.125 (29)	21.6 (549)	20 (508)	17.1 (434)	14 (356)	13 (330)
#7	1	2.30 (58)	31.5 (800)	29 (737)	25 (635)	21 (533)	18 (457)
#8	1⅛	2.30 (58)	36 (914)	33 (838)	28.5 (724)	24 (610)	21 (533)
#9	1⅜	2.30 (58)	40.5 (1,029)	38 (965)	32 (813)	27 (686)	23 (584)
#10	1⅜	2.30 (58)	45 (1,143)	42 (1,067)	35.6 (904)	30 (762)	26 (660)
#11	1¾	2.30 (58)	51 (1,295)	47 (1,194)	41 (1,041)	33 (838)	29 (737)

1. Tabulated development lengths are for static, wind and seismic load cases in Seismic Design Category A and B. Development lengths in Seismic Design Category C through F must comply with ACI 318-14 Chapter 18 or ACI 318-11 Chapter 21, as applicable.
2. Rebar is assumed to be ASTM A615 Grade 60 or A706 (f_y = 60,000 psi). For rebar with a higher yield strength, multiply tabulated values by f_y/60,000 psi.
3. Concrete is assumed to be normal-weight concrete. For lightweight concrete, multiply tabulated values by 1.33.
4. Tabulated values assume bottom cover less that 12" cast below rebars (Ψ_1 = 1.0).
5. Uncoated rebar must be used.
6. The value of K_{tr} is assumed to be 0. Refer to ACI318-14 Section 25.4.2.3 or ACI 318-11 Section 12.2.3.

* See p. 12 for an explanation of the load table icons.