

**NEW!**

# High Performance, Down Cold



## AT-XP® Anchoring Adhesive for Cracked and Uncracked Concrete

The latest innovation from Simpson Strong-Tie, AT-XP® anchoring adhesive has been formulated for high-strength anchorage of threaded rod and rebar into concrete under a wide range of conditions. AT-XP adhesive dispenses easily in cold or warm environments with little to no odor, and when mixed properly is a teal color for easy post-installation identification.

Code-listed per IAPMO UES ER-263 in accordance with ICC-ES AC308 and IBC 2009 requirements for cracked and uncracked concrete in static or seismic conditions, AT-XP anchoring adhesive has demonstrated superior performance in reduced-temperature testing (14°F (-10°C)), has NSF/Standard 61 certification (43.2 in<sup>2</sup>/1000 gal), and is made in the USA.

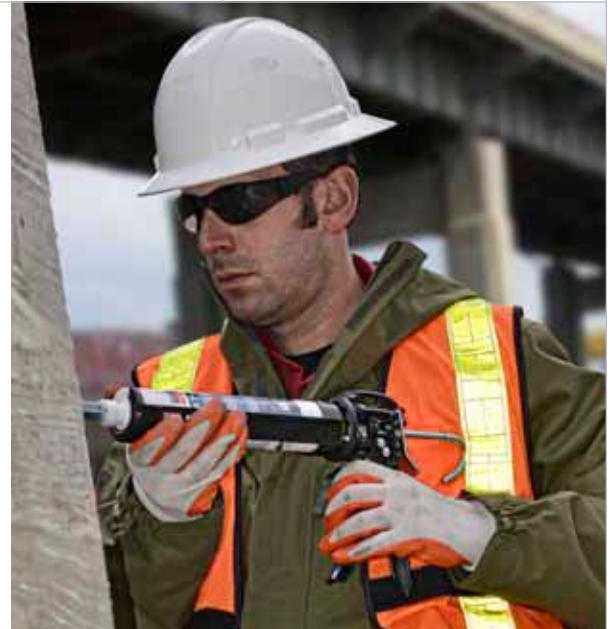
### Features:

- AT-XP adhesive has passed the demanding adverse-condition tests of ICC-ES AC308 pertaining to reduced temperature, elevated temperature and long-term creep
- Code-listed per IAPMO UES ER-263
- Can be used under static and seismic loading conditions in both cracked and uncracked concrete
- Low-odor formula dispenses easily at below-freezing temperatures without the need to warm cartridge
- Cures in substrate temperatures as low as 14°F in 24 hours or less
- Easiest hole-cleaning method – no power brushing needed
- When properly mixed, adhesive will be a teal color for easy identification
- Available in 9.4 oz., 12.5 oz. and 30 oz. cartridges for jobsite versatility

### Applications:

- Threaded rod anchoring into concrete
- Rebar doweling into concrete
- Suitable for horizontal, vertical and overhead applications

For installation instructions, visit [www.strongtie.com](http://www.strongtie.com) or our *Anchoring and Fastening Systems for Concrete and Masonry* catalog.



### AT-XP® Adhesive Cartridge System

Model No.	Capacity ounces (cubic in.)	Cartridge Type	Carton Qty.	Dispensing Tool	Mixing Nozzle
AT-XP10	9.4 (16.9)	coaxial	12	CDT10S	AMN19Q
AT-XP13	12.5 (22.5)	side-by-side	10	ADT813S	
AT-XP30	30 (54)	side-by-side	5	ADT30S, ADTA30P or ADT30CKT	

1. Cartridge estimation guides are available at [www.strongtie.com/apps](http://www.strongtie.com/apps).
2. Detailed information on dispensing tools, mixing nozzles and other adhesive accessories is available at [www.strongtie.com](http://www.strongtie.com).
3. Use only Simpson Strong-Tie® mixing nozzles in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair AT-XP adhesive performance.
4. One AMN19Q nozzle and one nozzle extension is supplied with each cartridge.

### Cure Schedule

Base Material Temperature		Gel Time (min.)	Cure Time (hrs.)
°F	°C		
14	-10	30	24
32	0	15	8
50	10	7	3
68	20	4	1
86	30	1.5	30 min.
100	38	1	20 min.

For water-saturated concrete (including damp or water-filled holes), the cure times must be doubled.

## Design Information

### Installation Information and Additional Data for Threaded Rod and Rebar in Normal-Weight Concrete<sup>1</sup>

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch) / Rebar Size							
			¾ / #3	½ / #4	⅝ / #5	¾ / #6	⅞ / #7	1 / #8	1-¼ / #10	
<b>Installation Information</b>										
Drill Bit Diameter for Threaded Rod	d <sub>hole</sub>	in.	7/16	9/16	11/16	13/16	1	1 1/8	1 3/8	
Drill Bit Diameter for Rebar	d <sub>hole</sub>	in.	1/2	5/8	3/4	7/8	1	1 1/8	1 3/8	
Maximum Tightening Torque	T <sub>inst</sub>	ft-lb	10	20	30	45	60	80	125	
Permitted Embedment Depth Range <sup>2</sup>	Minimum	h <sub>ef</sub>	2 3/8	2 3/4	3 1/8	3 1/2	3 3/4	4	5	
	Maximum	h <sub>ef</sub>	7 1/2	10	12 1/2	15	17 1/2	20	25	
Minimum Concrete Thickness	h <sub>min</sub>	in.	h <sub>ef</sub> + 5d <sub>o</sub>							
Critical Edge Distance	c <sub>ac</sub>	in.	3 x h <sub>ef</sub>							
Minimum Edge Distance	c <sub>min</sub>	in.	1 3/4							2 3/4
Minimum Anchor Spacing	s <sub>min</sub>	in.	3							6

- The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308.
- Minimum and maximum embedment depths are set so as to fit the ICC-ES AC308 design model.

### Tension Design Data for Threaded Rod in Normal-Weight Concrete<sup>1,11</sup>

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)							
			¾	½	⅝	¾	⅞	1	1 ¼	
<b>Steel Strength in Tension</b>										
Threaded Rod	Minimum Tensile Stress Area	A <sub>se</sub>	in <sup>2</sup>	0.078	0.142	0.226	0.334	0.462	0.606	0.969
	Tension Resistance of Steel: - ASTM F1554, Grade 36	N <sub>sa</sub>	lb.	4,525	8,235	13,110	19,370	26,795	35,150	56,200
	- ASTM A193, Grade B7			9,750	17,750	28,250	41,750	57,750	75,750	121,125
	- Type 410 Stainless (ASTM A193, Grade B6)			8,580	15,620	24,860	36,740	50,820	66,660	106,590
	- Type 304 and 316 Stainless (ASTM A193, Grade B8 & B8M)			4,445	8,095	12,880	19,040	26,335	34,540	55,235
Strength Reduction Factor - Steel Failure	φ	-	0.75 <sup>8</sup>							
<b>Concrete Breakout Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)</b>										
Effectiveness Factor - Uncracked Concrete	k <sub>uncr</sub>	-	24							
Effectiveness Factor - Cracked Concrete	k <sub>cr</sub>	-	17							
Strength Reduction Factor - Breakout Failure	φ	-	0.65 <sup>10</sup>							
<b>Bond Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)</b>										
Temp. Range 1 for Uncracked Concrete <sup>2,4,5</sup>	Characteristic Bond Strength <sup>7</sup>	τ <sub>k,uncr</sub>	psi	1,390	1,590	1,715	1,770	1,750	1,655	1,250
	Permitted Embedment Depth Range	Minimum	h <sub>ef</sub>	in.	2 3/8	2 3/4	3 1/8	3 1/2	3 3/4	4
Maximum		7 1/2			10	12 1/2	15	17 1/2	20	25
Temp. Range 1 for Cracked Concrete <sup>2,4,5</sup>	Characteristic Bond Strength <sup>7,12,13,14</sup>	τ <sub>k,cr</sub>	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	h <sub>ef</sub>	in.	3	3	3 1/2	3 1/2	3 3/4	4
Maximum		7 1/2			10	12 1/2	15	17 1/2	20	25
Temp. Range 2 for Uncracked Concrete <sup>3,4,5</sup>	Characteristic Bond Strength <sup>7</sup>	τ <sub>k,uncr</sub>	psi	1,390	1,590	1,715	1,770	1,750	1,655	1,250
	Permitted Embedment Depth Range	Minimum	h <sub>ef</sub>	in.	2 3/8	2 3/4	3 1/8	3 1/2	3 3/4	4
Maximum		7 1/2			10	12 1/2	15	17 1/2	20	25
Temp. Range 2 for Cracked Concrete <sup>3,4,5</sup>	Characteristic Bond Strength <sup>7,12,13,14</sup>	τ <sub>k,cr</sub>	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	h <sub>ef</sub>	in.	3	3	3 1/2	3 1/2	3 3/4	4
Maximum		7 1/2			10	12 1/2	15	17 1/2	20	25
<b>Bond Strength in Tension - Bond Strength Reduction Factors for Continuous Special Inspection</b>										
Strength Reduction Factor - Dry Concrete	φ <sub>dry</sub>	-	0.65 <sup>9</sup>							0.55 <sup>9</sup>
Strength Reduction Factor - Water-Saturated Concrete	φ <sub>sat</sub>	-	0.45 <sup>9</sup>							
Additional Factor for Water-Saturated Concrete	K <sub>sat</sub>	-	0.54 <sup>6</sup>		0.77 <sup>6</sup>			0.96 <sup>6</sup>		
<b>Bond Strength in Tension - Bond Strength Reduction Factors for Periodic Special Inspection</b>										
Strength Reduction Factor - Dry Concrete	φ <sub>dry</sub>	-	0.55 <sup>9</sup>							0.45 <sup>9</sup>
Strength Reduction Factor - Water-saturated Concrete	φ <sub>sat</sub>	-	0.45 <sup>9</sup>							
Additional Factor for Water-saturated Concrete	K <sub>sat</sub>	-	0.46 <sup>6</sup>		0.65 <sup>6</sup>			0.81 <sup>6</sup>		

- The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
- Temperature Range 1: Maximum short-term temperature of 110°F. Maximum long-term temperature of 75°F.
- Temperature Range 2: Maximum short-term temperature of 180°F. Maximum long-term temperature of 110°F.
- Short-term concrete temperatures are those that occur over short intervals (diurnal cycling).
- Long-term concrete temperatures are constant temperatures over a significant time period.
- In water-saturated concrete, multiply τ<sub>k,uncr</sub> and τ<sub>k,cr</sub> by K<sub>sat</sub>.
- For anchors installed in overhead and subjected to tension resulting from sustained loading, multiply the value calculated for N<sub>a</sub> according to ICC-ES AC308 by 0.75.
- The value of φ applies when the load combinations of ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of φ.
- The value of φ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of φ.
- The value of φ applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition A are met, refer to Section D4.4 to determine the appropriate value of φ. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of φ.
- Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
- For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for 1/2", 3/8", 3/4" and 1" anchors must be multiplied by α<sub>N,seis</sub> = 0.85.
- For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for 1-1/4" anchors must be multiplied by α<sub>N,seis</sub> = 0.75.
- For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for 3/8" anchors must be multiplied by α<sub>N,seis</sub> = 0.59.

## Design Information

### Tension Design Data for Rebar in Normal-Weight Concrete<sup>1,11</sup>

Characteristic		Symbol	Units	Rebar Size							
				#3	#4	#5	#6	#7	#8	#10	
<b>Steel Strength in Tension</b>											
Rebar	Minimum Tensile Stress Area	$A_{se}$	in <sup>2</sup>	0.11	0.2	0.31	0.44	0.6	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	114,000	
	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 - Steel Failure	$\phi$	-	0.65 <sup>8</sup>							
<b>Concrete Breakout Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)</b>											
Effectiveness Factor - Uncracked Concrete		$k_{uncr}$	-	24							
Effectiveness Factor - Cracked Concrete		$k_{cr}$	-	17							
Strength Reduction Factor - Breakout Failure		$\phi$	-	0.65 <sup>10</sup>							
<b>Bond Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)</b>											
Temp. Range 1 for Uncracked Concrete <sup>2,4,5</sup>	Characteristic Bond Strength <sup>7</sup>		$\tau_{k,uncr}$	psi	1,355	1,365	1,355	1,330	1,280	1,215	1,025
	Permitted Embedment Depth Range	Minimum	$h_{ef}$	in.	2 $\frac{3}{8}$	2 $\frac{3}{4}$	3 $\frac{1}{8}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4	5
		Maximum			7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	15	17 $\frac{1}{2}$	20	25
Temp. Range 1 for Cracked Concrete <sup>2,4,5</sup>	Characteristic Bond Strength <sup>7,12,13,14</sup>		$\tau_{k,cr}$	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	$h_{ef}$	in.	3	3	3 $\frac{1}{8}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4	5
		Maximum			7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	15	17 $\frac{1}{2}$	20	25
Temp. Range 2 for Uncracked Concrete <sup>3,4,5</sup>	Characteristic Bond Strength <sup>7</sup>		$\tau_{k,uncr}$	psi	1,355	1,365	1,355	1,330	1,280	1,215	1,025
	Permitted Embedment Depth Range	Minimum	$h_{ef}$	in.	2 $\frac{3}{8}$	2 $\frac{3}{4}$	3 $\frac{1}{8}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4	5
		Maximum			7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	15	17 $\frac{1}{2}$	20	25
Temp. Range 2 for Cracked Concrete <sup>3,4,5</sup>	Characteristic Bond Strength <sup>7,12,13,14</sup>		$\tau_{k,cr}$	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	$h_{ef}$	in.	3	3	3 $\frac{1}{8}$	3 $\frac{1}{2}$	3 $\frac{3}{4}$	4	5
		Maximum			7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	15	17 $\frac{1}{2}$	20	25
<b>Bond Strength in Tension - Bond Strength Reduction Factors for Continuous Special Inspection</b>											
Strength Reduction Factor - Dry Concrete		$\phi_{dry}$	-	0.65 <sup>9</sup>					0.55 <sup>9</sup>		
Strength Reduction Factor - Water-Saturated Concrete		$\phi_{sat}$	-	0.45 <sup>9</sup>							
Additional Factor for Water-Saturated Concrete		$K_{sat}$	-	0.54 <sup>6</sup>		0.77 <sup>6</sup>			0.96 <sup>6</sup>		
<b>Bond Strength in Tension - Bond Strength Reduction Factors for Periodic Special Inspection</b>											
Strength Reduction Factor - Dry Concrete		$\phi_{dry}$	-	0.55 <sup>9</sup>					0.45 <sup>9</sup>		
Strength Reduction Factor - Water-Saturated Concrete		$\phi_{sat}$	-	0.45 <sup>9</sup>							
Additional Factor for Water-Saturated Concrete		$K_{sat}$	-	0.46 <sup>6</sup>		0.65 <sup>6</sup>			0.81 <sup>6</sup>		

- The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
- Temperature Range 1: Maximum short-term temperature of 110°F. Maximum long-term temperature of 75°F.
- Temperature Range 2: Maximum short-term temperature of 180°F. Maximum long-term temperature of 110°F.
- Short-term concrete temperatures are those that occur over short intervals (diurnal cycling).
- Long-term concrete temperatures are constant temperatures over a significant time period.
- In water-saturated concrete, multiply  $\tau_{k,uncr}$  and  $\tau_{k,cr}$  by  $K_{sat}$ .
- For anchors installed in overhead and subjected to tension resulting from sustained loading, multiply the value calculated for  $N_a$  according to ICC-ES AC308 by 0.75.
- The value of  $\phi$  applies when the load combinations of ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of  $\phi$ .
- The value of  $\phi$  applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of  $\phi$ .
- The value of  $\phi$  applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of  $\phi$ .
- The value of  $\phi$  applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D4.5 to determine the appropriate value of  $\phi$ .
- Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
- For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for #4, #5, #6 and #8 rebar anchors must be multiplied by  $\alpha_{N,seis} = 0.85$ .
- For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for #10 rebar anchors must be multiplied by  $\alpha_{N,seis} = 0.75$ .
- For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for #7 rebar anchors must be multiplied by  $\alpha_{N,seis} = 0.59$ .

## Design Information

### Shear Design Data for Threaded Rod in Normal-Weight Concrete<sup>1,5</sup>

Characteristic		Symbol	Units	Nominal Anchor Diameter (inch)						
				3/8	1/2	5/8	3/4	7/8	1	1 1/4
<b>Steel Strength in Shear</b>										
Threaded Rod	Minimum Shear Stress Area	$A_{se}$	in <sup>2</sup>	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.	2,260	4,940	7,865	11,625	16,080	21,090	33,720
	- ASTM A193, Grade B7			4,875	10,650	16,950	25,050	34,650	45,450	72,675
	- Type 410 Stainless (ASTM A193, Grade B6)			4,290	9,370	14,910	22,040	30,490	40,000	63,955
	- Type 304 and 316 Stainless (ASTM A193, Grade B8 & B8M)			2,225	4,855	7,730	11,420	15,800	20,725	33,140
	Reduction for Seismic Shear - ASTM F1554, Grade 36	$\alpha_{V,seis}^6$	-	0.85						
	Reduction for Seismic Shear - ASTM A193, Grade B7			0.85						
	Reduction for Seismic Shear - Type 410 Stainless (ASTM A193, Grade B6)			0.85	0.75					0.85
	Reduction for Seismic Shear - Type 304 and 316 Stainless (ASTM A193, Grade B8 & B8M)			0.85	0.75					0.85
Strength Reduction Factor - Steel Failure	$\phi$	-	0.65 <sup>2</sup>							
<b>Concrete Breakout Strength in Shear</b>										
Outside Diameter of Anchor	$d_o$	in.	0.375	0.5	0.625	0.75	0.875	1	1.25	
Load Bearing Length of Anchor in Shear	$l_e$	in.	$h_{ef}$							
Strength Reduction Factor - Breakout Failure	$\phi$	-	0.70 <sup>3</sup>							
<b>Concrete Pryout Strength in Shear</b>										
Coefficient for Pryout Strength	$k_{cp}$	-	2.0							
Strength Reduction Factor - Pryout Failure	$\phi$	-	0.70 <sup>4</sup>							

- The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
- The value of  $\phi$  applies when the load combinations of ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of  $\phi$ .
- The value of  $\phi$  applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4 (c) for Condition A are met, refer to Section D.4.4 to determine the appropriate value of  $\phi$ . If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of  $\phi$ .
- The value of  $\phi$  applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of  $\phi$ .
- Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
- 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  $\alpha_{V,seis}$  for the corresponding anchor steel type.

### Shear Design Data for Rebar in Normal-Weight Concrete<sup>1,5</sup>

Characteristic		Symbol	Units	Rebar Size						
				#3	#4	#5	#6	#7	#8	#10
<b>Steel Strength in Shear</b>										
Rebar	Minimum Shear Stress Area	$A_{se}$	in <sup>2</sup>	0.11	0.2	0.31	0.44	0.6	0.79	1.27
	Shear Resistance of Steel - Rebar (ASTM A615 Grade 60)	$V_{sa}$	lb.	4,950	10,800	16,740	23,760	32,400	42,660	68,580
	Shear Resistance of Steel - Rebar (ASTM A706 Grade 60)			4,400	9,600	14,880	21,120	28,800	37,920	60,960
	Reduction for Seismic Shear - Rebar (ASTM A615 Grade 60)	$\alpha_{V,seis}^6$	-	0.56				0.80		
	Reduction for Seismic Shear - Rebar (ASTM A706 Grade 60)			0.56				0.80		
	Strength Reduction Factor - Steel Failure	$\phi$	-	0.60 <sup>2</sup>						
<b>Concrete Breakout Strength in Shear</b>										
Outside Diameter of Anchor	$d_o$	in.	0.375	0.5	0.625	0.75	0.875	1	1.25	
Load Bearing Length of Anchor in Shear	$l_e$	in.	$h_{ef}$							
Strength Reduction Factor - Breakout Failure	$\phi$	-	0.70 <sup>3</sup>							
<b>Concrete Pryout Strength in Shear</b>										
Coefficient for Pryout Strength	$k_{cp}$	-	2.0							
Strength Reduction Factor - Pryout Failure	$\phi$	-	0.70 <sup>4</sup>							

- The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
- The value of  $\phi$  applies when the load combinations of ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of  $\phi$ .
- The value of  $\phi$  applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4 (c) for Condition A are met, refer to Section D.4.4 to determine the appropriate value of  $\phi$ . If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of  $\phi$ .
- The value of  $\phi$  applies when both the load combinations of ACI 318 Section 9.2 are used and the requirements of Section D.4.4(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of  $\phi$ .
- Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
- 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  $\alpha_{V,seis}$  for the corresponding anchor steel type.

This flier is effective until December 31, 2014, and reflects information available as of December 1, 2012. This information is updated periodically and should not be relied upon after December 31, 2014; contact Simpson Strong-Tie for current information and limited warranty or see [www.strongtie.com](http://www.strongtie.com).

800-999-5099  
www.strongtie.com