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^2/1000 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* or our *Anchoring and Fastening Systems for Concrete and Masonry* catalog.

AT-XP10 | AT-XP13 (AT-XP30 similar) | AMN19Q

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***.
2. Detailed information on dispensing tools, mixing nozzles and other adhesive accessories is available at ***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[1]

Characteristic		Symbol	Units	Nominal Anchor Diameter (inch) / Rebar Size						
				⅜ / #3	½ / #4	⅝ / #5	¾ / #6	⅞ / #7	1 / #8	1-¼ / #10
Installation Information										
Drill Bit Diameter for Threaded Rod		d_{hole}	in.	7/16	9/16	11/16	13/16	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	10	20	30	45	60	80	125
Permitted Embedment Depth Range[2]	Minimum	h_{ef}	in.	2⅜	2¾	3⅛	3½	3¾	4	5
	Maximum	h_{ef}	in.	7½	10	12½	15	17½	20	25
Minimum Concrete Thickness		h_{min}	in.	$h_{ef} + 5d_o$						
Critical Edge Distance		c_{ac}	in.	3 x h_{ef}						
Minimum Edge Distance		c_{min}	in.	1¾						2¾
Minimum Anchor Spacing		s_{min}	in.	3						6

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308.
2. 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[1,11]

Characteristic			Symbol	Units	Nominal Anchor Diameter (inch)						
					⅜	½	⅝	¾	⅞	1	1¼
Steel Strength in Tension											
Threaded Rod	Minimum Tensile Stress Area		A_{se}	in²	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
	- 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[8]						
Concrete Breakout Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)											
Effectiveness Factor - Uncracked Concrete			k_{uncr}	-	24						
Effectiveness Factor - Cracked Concrete			k_{cr}		17						
Strength Reduction Factor - Breakout Failure			φ	-	0.65[10]						
Bond Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)											
Temp. Range 1 for Uncracked Concrete[2,4,5]	Characteristic Bond Strength[7]		$\tau_{k,uncr}$	psi	1,390	1,590	1,715	1,770	1,750	1,655	1,250
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	2⅜	2¾	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Temp. Range 1 for Cracked Concrete[2,4,5]	Characteristic Bond Strength[7,12,13,14]		$\tau_{k,cr}$	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	3	3	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Temp. Range 2 for Uncracked Concrete[3,4,5]	Characteristic Bond Strength[7]		$\tau_{k,uncr}$	psi	1,390	1,590	1,715	1,770	1,750	1,655	1,250
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	2⅜	2¾	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Temp. Range 2 for Cracked Concrete[3,4,5]	Characteristic Bond Strength[7,12,13,14]		$\tau_{k,cr}$	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	3	3	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Bond Strength in Tension - Bond Strength Reduction Factors for Continuous Special Inspection											
Strength Reduction Factor - Dry Concrete			φ_{dry}	-	0.65[9]					0.55[9]	
Strength Reduction Factor - Water-Saturated Concrete			φ_{sat}	-	0.45[9]						
Additional Factor for Water-Saturated Concrete			K_{sat}	-	0.54[6]		0.77[6]			0.96[6]	
Bond Strength in Tension - Bond Strength Reduction Factors for Periodic Special Inspection											
Strength Reduction Factor - Dry Concrete			φ_{dry}	-	0.55[9]					0.45[9]	
Strength Reduction Factor - Water-saturated Concrete			φ_{sat}	-	0.45[9]						
Additional Factor for Water-saturated Concrete			K_{sat}	-	0.46[6]		0.65[6]			0.81[6]	

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
2. Temperature Range 1: Maximum short-term temperature of 110°F. Maximum long-term temperature of 75°F.
3. Temperature Range 2: Maximum short-term temperature of 180°F. Maximum long-term temperature of 110°F.
4. Short-term concrete temperatures are those that occur over short intervals (diurnal cycling).
5. Long-term concrete temperatures are constant temperatures over a significant time period.
6. In water-saturated concrete, multiply $\tau_{k,uncr}$ and $\tau_{k,cr}$ by K_{sat}.
7. 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.
8. 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.
9. 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.
10. 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 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.
11. Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
12. For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for ½", ⅝", ¾" and 1" anchors must be multiplied by $\alpha_{N,seis} = 0.85$.
13. For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for 1-¼" anchors must be multiplied by $\alpha_{N,seis} = 0.75$.
14. For anchors installed in regions assigned to Seismic Design Category C, D, E or F, the bond strength values for ⅞" anchors must be multiplied by $\alpha_{N,seis} = 0.59$.

Design Information

Tension Design Data for Rebar in Normal-Weight Concrete[1,11]

Characteristic			Symbol	Units	Rebar Size #3	#4	#5	#6	#7	#8	#10
Steel Strength in Tension											
Rebar	Minimum Tensile Stress Area		A_{se}	in^2	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		φ	-	0.65[8]						
Concrete Breakout Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)											
Effectiveness Factor - Uncracked Concrete			k_{uncr}	-	24						
Effectiveness Factor - Cracked Concrete			k_{cr}		17						
Strength Reduction Factor - Breakout Failure			φ	-	0.65[10]						
Bond Strength in Tension (2,500 psi ≤ f'c ≤ 8,000 psi)											
Temp. Range 1 for Uncracked Concrete[2,4,5]	Characteristic Bond Strength[7]		$\tau_{k,uncr}$	psi	1,355	1,365	1,355	1,330	1,280	1,215	1,025
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	2⅜	2¾	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Temp. Range 1 for Cracked Concrete[2,4,5]	Characteristic Bond Strength[7,12,13,14]		$\tau_{k,cr}$	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	3	3	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Temp. Range 2 for Uncracked Concrete[3,4,5]	Characteristic Bond Strength[7]		$\tau_{k,uncr}$	psi	1,355	1,365	1,355	1,330	1,280	1,215	1,025
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	2⅜	2¾	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Temp. Range 2 for Cracked Concrete[3,4,5]	Characteristic Bond Strength[7,12,13,14]		$\tau_{k,cr}$	psi	1,085	1,035	980	950	815	800	700
	Permitted Embedment Depth Range	Minimum	h_{ef}	in.	3	3	3⅛	3½	3¾	4	5
		Maximum			7½	10	12½	15	17½	20	25
Bond Strength in Tension - Bond Strength Reduction Factors for Continuous Special Inspection											
Strength Reduction Factor - Dry Concrete			φ_{dry}	-	0.65[9]					0.55[9]	
Strength Reduction Factor - Water-Saturated Concrete			φ_{sat}	-	0.45[9]						
Additional Factor for Water-Saturated Concrete			K_{sat}	-	0.54[6]		0.77[6]			0.96[6]	
Bond Strength in Tension - Bond Strength Reduction Factors for Periodic Special Inspection											
Strength Reduction Factor - Dry Concrete			φ_{dry}	-	0.55[9]					0.45[9]	
Strength Reduction Factor - Water-Saturated Concrete			φ_{sat}	-	0.45[9]						
Additional Factor for Water-Saturated Concrete			K_{sat}	-	0.46[6]		0.65[6]			0.81[6]	

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
2. Temperature Range 1: Maximum short-term temperature of 110°F. Maximum long-term temperature of 75°F.
3. Temperature Range 2: Maximum short-term temperature of 180°F. Maximum long-term temperature of 110°F.
4. Short-term concrete temperatures are those that occur over short intervals (diurnal cycling).
5. Long-term concrete temperatures are constant temperatures over a significant time period.
6. In water-saturated concrete, multiply $\tau_{k,uncr}$ and $\tau_{k,cr}$ by K_{sat}.
7. 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.
8. 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.
9. 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.
10. 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 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.
11. Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
12. 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 $\alpha_{N,seis} = 0.85$.
13. 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 $\alpha_{N,seis} = 0.75$.
14. 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 $\alpha_{N,seis} = 0.59$.

SIMPSON Strong-Tie®

Design Information

Shear Design Data for Threaded Rod in Normal-Weight Concrete[1,5]

Characteristic		Symbol	Units	Nominal Anchor Diameter (inch)						
				⅜	½	⅝	¾	⅞	1	1¼
Steel Strength in Shear										
Threaded Rod	Minimum Shear Stress Area	A_{se}	in²	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	φ	-	0.65[2]						
Concrete Breakout Strength in Shear										
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		φ	-	0.70[3]						
Concrete Pryout Strength in Shear										
Coefficient for Pryout Strength		k_{cp}	-	2.0						
Strength Reduction Factor - Pryout Failure		φ	-	0.70[4]						

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
2. 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 D.4.5 to determine the appropriate value of φ.
3. The value of φ 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 φ. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of φ.
4. The value of φ 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 φ.
5. Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
6. 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[1,5]

Characteristic		Symbol	Units	Rebar Size						
				#3	#4	#5	#6	#7	#8	#10
Steel Strength in Shear										
Rebar	Minimum Shear Stress Area	A_{se}	in²	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	φ		0.60[2]						
Concrete Breakout Strength in Shear										
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		φ	-	0.70[3]						
Concrete Pryout Strength in Shear										
Coefficient for Pryout Strength		k_{cp}	-	2.0						
Strength Reduction Factor - Pryout Failure		φ	-	0.70[4]						

1. The information presented in this table is to be used in conjunction with the design criteria of ICC-ES AC308, except as modified below.
2. 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 D.4.5 to determine the appropriate value of φ.
3. The value of φ 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 φ. If the load combinations of ACI 318 Appendix C are used, refer to Section D.4.5 to determine the appropriate value of φ.
4. The value of φ 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 φ.
5. Sand-lightweight and all-lightweight concrete are beyond the scope of this table.
6. 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 $\alpha_{\varsigma,seis}$ 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.

800-999-5099
www.strongtie.com