IXP™ ANCHOR *Torque-Controlled Adhesive Anchor*

TESTED TO MEET IBC® 2006

SIMPSON StrongTie ANCHOR SYSTEMS

The Simpson Strong-Tie® IXP™ anchor is a torque-controlled adhesive anchor that, when used with Simpson Strong-Tie® SET-XP™ epoxy, provides optimum performance in both cracked and uncracked concrete under a variety of adverse service conditions. The IXP anchor was rigorously tested according to ICC-ES AC308 and 2006 IBC requirements. The unique conical shape of the helix configuration enables the IXP anchor to mimic the follow-up expansion behavior of a torque-controlled expansion anchor when tension-zone cracks in the base material intersect the anchor location. In addition, the "tri-lobular" shape of the helix configuration functions as an anti-rotation feature that prevents the anchor from unscrewing during torquing, vibratory and seismic loading, and the normal open and closed cycling of tension zone cracks over the service life of the anchor.

FEATURES:

- Conical helix configuration provides follow-up expansion forces when cracks intersect the anchor
- Tri-lobular configuration prevents the anchor from unscrewing during torquing, vibratory and seismic loading, and open and closed cycling of cracks
- Installs like threaded rod: no special drill bits required
- Head stamped with ≠ sign for easy identification after installation

DESIGN EXAMPLE: See pages 29–30

INSTALLATION: See pages 31–32

CODES: ICC-ES pending. The load tables list values based upon results from the most recent testing and may not reflect those in current code reports. Where code jurisdictions apply, consult the current reports for applicable load values.

MATERIAL: ASTM A193, Grade B7

FINISH: Zinc plated

TEST CRITERIA: IXP™ anchors installed with SET-XP™ adhesive have been tested in accordance with ICC-ES's *Acceptance Criteria for Post–Installed Adhesive Anchors in Concrete (AC308)* for the following:

- Seismic and wind loading in cracked and uncracked concrete
- Static tension and shear loading in cracked and uncracked concrete
- Horizontal and overhead applications
- Long-term creep
- Static loading at elevated-temperatures
- Damp holes
- Freeze-thaw conditions
- Critical and minimum edge distance and spacing

SUGGESTED SPECIFICATION: Torque-controlled adhesive anchors shall be IXP™ anchors from Simpson Strong-Tie, Pleasanton, CA. The anchors have a conical and tri-lobular shaped helix configuration that is installed in concrete with the SET-XP™ Epoxy-Tie® adhesive from Simpson Strong-Tie, Pleasanton, CA. The anchor shall have been tested and qualified for performance in cracked concrete per ICC-ES AC308.

IXP™ Anchor
(Patent Pending)

ANCHOR DESIGNER ACI 318 Software Supported

IXP Product Data

Size (in.)	Model No.	Ctn Qty
⅜" x 6"	IXP37600	20
½" x 7½"	IXP50712	20
⅝" x 9¼"	IXP62914	10
¾" x 11"	IXP751100	5

- IMPORTANT -
SEE Pages 31–32 FOR INSTALLATION INSTRUCTIONS

IXP™ Anchor with SET-XP™ Epoxy Installation and Additional Data in Normal-Weight Concrete[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)			
			⅜	½	⅝	¾
Installation Information						
Drill Bit Diameter	d	in.	½	⅝	¾	⅞
Baseplate Clearance Hole Diameter	d_c	in.	0.438	0.563	0.688	0.875
Installation Torque	T_{inst}	ft-lb	30	60	100	160
Embed. Depth & Eff. Embed Depth	h_{nom} & h_{ef}	in.	3⅜	4⅞	6⅝	8⅜
Critical Edge Distance	c_{ac}	in.	5	7¼	10	12½
Minimum Edge Distance	c_{min}	in.	3⅜	4⅞	6⅝	8⅜
Minimum Spacing	s_{min}	in.	5	4⅞	6⅝	8⅜
Minimum Concrete Thickness	h_{min}	in.	6¾	9¾	13¼	16¾
Additional Data						
Anchor Category	category	-	1			
Yield Strength	f_{ya}	psi	105,000			
Tensile Strength	f_{uta}	psi	125,000			
Minimum Tensile Stress Area	A_{se}	in^2	0.0494	0.0886	0.1414	0.2064

1. The information presented in this table is to be used in conjunction with with the design criteria of ACI 318 Appendix D.

IXP™ Anchor with SET-XP™ Epoxy Tension Design Data in Normal-Weight Concrete[1,10]

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)			
			⅜	½	⅝	¾
Embedment Depth	h_{nom}	in.	3⅜	4⅞	6⅝	8⅜
Steel Strength in Tension						
Nominal Steel Strength in Tension	N_{sa}[7]	lb.	6,175	11,075	17,675	25,800
Strength Reduction Factor - Steel Failure	ϕ	-	0.75[2]			
Concrete Breakout Strength in Tension[6]						
Effective Embedment Depth	h_{ef}	in.	3⅜	4⅞	6⅝	8⅜
Critical Edge Distance[4]	c_{ac}	in.	5	7¼	10	12½
Effectiveness Factor - Uncracked Concrete	k_{uncr}	-	24			
Effectiveness Factor - Cracked Concrete	k_{cr}	-	17			
Ratio of k_{uncr}/k_{cr}	$\Psi_{c,N}$	-	1.41			
Strength Reduction Factor - Concrete Breakout Failure	ϕ	-	0.65[5]			
Pullout Strength in Tension (2,500 ≤ f'c ≤ 8,000 psi)						
Nominal Pullout Strength - Cracked Concrete	$N_{pn,cr}$	lb.	-[3]			
Nominal Pullout Strength - Uncracked Concrete	$N_{pn,uncr}$	lb.	-[3]			
Strength Reduction Factor - Pullout Failure	ϕ	-	-[3]			
Pullout Strength in Tension for Seismic Applications (2,500 ≤ f'c ≤ 8,000 psi)						
Tension Resistance - Seismic Loads	N_{eq}	lb.	-[3]			
Strength Reduction Factor - Pullout Failure	ϕ	-	-[3]			

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D, except as modified below and is valid for 2,500 psi ≤ f'c ≤ 8,000 psi.
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 D4.5 to determine the appropriate value of ϕ. IXP anchors are considered ductile steel elements.
3. Pullout strength is not reported since steel failure controls.
4. The modification factor $\Psi_{cp,N} = 1.0$ for cracked concrete. Otherwise, the modification factor for uncracked concrete without supplementary reinforcement to control splitting is either: (1) $\Psi_{cp,N} = 1.0$ if $c_{a,min} \geq c_{ac}$ or (2) $\Psi_{cp,N} = \frac{c_{a,min}}{c_{ac}} \geq \frac{1.5h_{ef}}{c_{ac}}$ if $c_{a,min} < c_{ac}$. The modification factor, $\Psi_{cp,N}$ is applied to the nominal concrete breakout strength, N_{cb} or N_{cbg}.
5. 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.
6. Sand-lightweight concrete and all-lightweight concrete are beyond the scope of this table.
7. For anchors installed overhead and subjected to tension resulting from sustained loading, multiply ϕN_n by 0.75.
8. Maximum short-term temperature is 180°. Maximum long-term temperature is 75°.
9. Short-term concrete temperatures are those that occur over short intervals (diurnal cycling).
10. Long-term concrete temperature are constant temperatures over a significant time period.

*See page 10 for an explanation of the load table icons

IXP™ Anchor with SET-XP™ Epoxy Shear Design Data in Normal-Weight Concrete[1,8]

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)			
			⅜	½	⅝	¾
Embedment Depth	h_{nom}	in.	3⅜	4⅞	6⅝	8⅜
Steel Strength in Shear						
Nominal Steel Strength in Shear	V_{sa}	lb.	4,370	10,450	15,515	22,445
Strength Reduction Factor - Steel Failure	ϕ	-	0.65[2]			
Concrete Breakout Strength in Shear[5]						
Outside Diameter	d_o	in.	0.375	0.500	0.625	0.750
Load Bearing Length of Anchor in Shear	ℓ_e	in.	3	4	5	6
Strength Reduction Factor - Concrete Breakout Failure	ϕ	-	0.70[3]			
Concrete Pryout Strength in Shear						
Coefficient for Pryout Strength	k_{cp}	-	2.0			
Strength Reduction Factor - Concrete Pryout Failure	ϕ	-	0.70[4]			
Steel Strength in Shear for Seismic Applications						
Nominal Steel Strength in Shear for Seismic Loads	V_{eq}	lb.	3,500	8,360	12,415	17,960
Strength Reduction Factor - Steel Failure	ϕ	-	0.65[2]			

1. The information presented in this table is to be used in conjunction with with the design criteria of ACI 318, appendix D, except as modified below and is valid for 2,500 psi ≤ f'c ≤ 8,000 psi.
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 D4.5 to determine the appropriate value of ϕ. IXP anchors are considered ductile steel elements.
3. 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.
4. 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.
5. Sand-lightweight concrete and all-lightweight concrete are beyond the scope of this table.
6. Maximum short-term temperature is 180°. Maximum long-term temperature is 75°.
7. Short-term concrete temperatures are those that occur over short intervals (diurnal cycling).
8. Long-term concrete temperature are constant temperatures over a significant time period.