

Blue Wedge® Zinc Plated Anchor Tech Sheet



Facts & Features

- Tested according to ACI 355.2-07 and AC193 (ICC ESR-5132)^{1,2}
- Qualified for static, wind, and seismic loading conditions (seismic design categories A and B)¹
- Code listed under IBC/IRC in accordance with ICC-ES AC193 & ACI 355.2-07 for uncracked concrete¹
- Installs using standard-sized ANSI tolerance drill bits
- Zinc plated steel anchor bolt, washer, and nut
- Stainless steel expansion clip

1. For 3/8", 1/2" & 5/8" diameters
2. 1/4" suitable for redundant applications

TorqueMaster Blue Wedge® Anchor



Applications

- Structural fastening in uncracked concrete in indoor conditions
- Formwork and fastening
- Anchoring racking and shelving
- Railings and handrails
- Sill plate attachment

Code Approvals/Listings^{1,2}

- 2012, 2009, and 2006 International Building Code® (IBC)
- 2012, 2009, and 2006 International Residential Code® (IRC)
- Miami Dade NOA # 10-0928.01

1. For 3/8", 1/2" & 5/8" diameters
2. 1/4" suitable for redundant applications



Coating Information

- Zinc plated carbon steel
- Stainless steel wedge clip

Blue Wedge® Zinc Plated Anchor Length Code Identification System

| Length ID marking on stud | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|----|----|----|----|----|
| Length of anchor min ≥ (in.) | 1 1/2 | 2 | 2 1/2 | 3 | 3 1/2 | 4 | 4 1/2 | 5 | 5 1/2 | 6 | 6 1/2 | 7 | 7 1/2 | 8 | 8 1/2 | 9 | 9 1/2 | 10 | 11 | 12 | 13 | 14 | 15 |
| Length of anchor max < (in.) | 2 | 2 1/2 | 3 | 3 1/2 | 4 | 4 1/2 | 5 | 5 1/2 | 6 | 6 1/2 | 7 | 7 1/2 | 8 | 8 1/2 | 9 | 9 1/2 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |



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Blue Wedge® Zinc Plated Anchor Product Data

| Size (in.) | SKU | Drill Bit Size (in.) | Wrench/Socket Size (in.) | Box Qty |
|-------------|-------|----------------------|--------------------------|---------|
| 1/4 x 1-3/4 | 51792 | 1/4" | 7/16" | 100 |
| 1/4 x 2-1/4 | 51793 | 1/4" | 7/16" | 100 |
| 1/4 x 3-1/4 | 51794 | 1/4" | 7/16" | 100 |
| 5/16 x 3 | 51795 | 5/16" | 1/2" | 50 |
| 3/8 x 2-1/4 | 51796 | 3/8" | 9/16" | 50 |
| 3/8 x 2-3/4 | 51797 | 3/8" | 9/16" | 50 |
| 3/8 x 3 | 51798 | 3/8" | 9/16" | 50 |
| 3/8 x 3-1/2 | 51799 | 3/8" | 9/16" | 50 |
| 3/8 x 3-3/4 | 51800 | 3/8" | 9/16" | 50 |
| 3/8 x 5 | 51801 | 3/8" | 9/16" | 50 |
| 1/2 x 2-3/4 | 51802 | 1/2" | 3/4" | 25 |
| 1/2 x 3-3/4 | 51803 | 1/2" | 3/4" | 25 |
| 1/2 x 4-1/4 | 51804 | 1/2" | 3/4" | 25 |
| 1/2 x 4-1/2 | 54913 | 1/2" | 3/4" | 25 |
| 1/2 x 5-1/2 | 51805 | 1/2" | 3/4" | 25 |
| 1/2 x 7 | 51806 | 1/2" | 3/4" | 25 |
| 1/2 x 8-1/2 | 51317 | 1/2" | 3/4" | 15 |
| 1/2 x 10 | 55226 | 1/2" | 3/4" | 15 |
| 5/8 x 3-1/2 | 51807 | 5/8" | 15/16" | 10 |
| 5/8 x 4-1/2 | 51809 | 5/8" | 15/16" | 10 |
| 5/8 x 5 | 51810 | 5/8" | 15/16" | 10 |
| 5/8 x 6 | 51811 | 5/8" | 15/16" | 10 |
| 5/8 x 7 | 51812 | 5/8" | 15/16" | 10 |
| 5/8 x 8-1/2 | 55227 | 5/8" | 15/16" | 10 |
| 5/8 x 10 | 55228 | 5/8" | 15/16" | 10 |
| 3/4 x 4-1/4 | 51813 | 3/4" | 1-1/8" | 10 |
| 3/4 x 4-3/4 | 51814 | 3/4" | 1-1/8" | 10 |
| 3/4 x 5-1/2 | 51815 | 3/4" | 1-1/8" | 10 |
| 3/4 x 6-1/4 | 51816 | 3/4" | 1-1/8" | 10 |
| 3/4 x 7 | 51817 | 3/4" | 1-1/8" | 10 |
| 3/4 x 8-1/2 | 55229 | 3/4" | 1-1/8" | 10 |
| 3/4 x 10 | 55230 | 3/4" | 1-1/8" | 10 |



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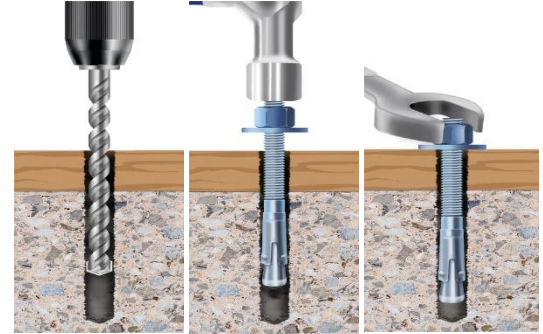


Blue Wedge® Zinc Plated Anchor Tech Sheet



Blue Wedge® Zinc Plated Anchor Installation Instructions

- DRILL** hole in concrete using a hammer drill. Use TorqueMaster SDS+ drill bits and an SDS+ hammer drill for best results. The hole must be at least 1/4" deeper than the length of the anchor.
- CLEAN** hole of debris and dust using a vacuum or compressed air.
- ASSEMBLE** the nut & washer onto the Blue Wedge® Anchor and tap anchor through the part being fastened and into the pre-drilled hole.
- TIGHTEN** the nut to the torque specified below using a wrench or socket & ratchet.



| Nominal Anchor Diameter | 1/4" | 3/8" | 1/2" | 5/8" | 3/4" |
|-------------------------|------|--------------------|--------------------|--------------------|------|
| Socket Size | | 9/16 | 3/4 | 15/16 | |
| Drill Bit Size | 1/4" | 3/8" | 1/2" | 5/8" | 3/4" |
| Installation Torque | - | 20 ft-lbf (27 N-m) | 40 ft-lbf (84 N-m) | 60 ft-lbf (81 N-m) | |

Blue Wedge® Zinc Plated Anchor Installation Parameters

| Characteristic | Symbol | Unit | Nominal Anchor Diameter (inch) | | |
|---|------------------------------|--------------|--------------------------------|----------------|-----------------|
| | | | 3/8 | 1/2 | 5/8 |
| Nominal Diameter | d_a (d_a) ³ | in. (mm) | 3/8 (9.5) | 1/2 (12.7) | 5/8 (15.9) |
| Drill Bit Diameter | d_{bit} | in. (mm) | 3/8 (9.5) | 1/2 (12.7) | 5/8 (15.9) |
| Minimum Hole Depth | h_{hole} | in. (mm) | 2 7/8 (73) | 2 7/8 (73) | 3 3/4 (95) |
| Minimum Base Plate Clearance Hole Diameter ² | d_c | in. (mm) | 7/16 (11.1) | 9/16 (14.6) | 11/16 (17.5) |
| Installation Torque | T_{inst} | ft-lbf (N-m) | 20 (27) | 40 (54) | 60 (81) |
| Nominal Embedment Depth | h_{nom} | in. (mm) | 2 7/16 (62) | 2 9/16 (65) | 3 3/8 (86) |
| Effective Embedment Depth | h_{ef} | in. (mm) | 2 (51) | 2 (51) | 2 3/4 (70) |
| Minimum Edge Distance | C_{min} | in. (mm) | 2 (51) | 2 1/2 (64) | 2 1/4 (57) |
| Minimum Anchor Spacing | S_{min} | in. (mm) | 2 7/8 (73) | 3 (76) | 5 1/4 (133) |
| Minimum Concrete Thickness | H_{min} | in. (mm) | 4 (102) | 5 (127) | 5 (127) |

For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m.

1. The information presented in this table must be used in conjunction with the design requirements of ACI 318-19 Chapter 17.

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

3. The notation in parentheses is for the 2006 IBC



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Blue Wedge® Zinc Plated Anchor Tech Sheet



Blue Wedge® Zinc Plated Anchor Tension Strength Design Information¹

| Characteristic | Symbol | Unit | Nominal Anchor Diameter (inch) | | |
|--|-----------------------|---------------------------------------|--------------------------------|---------------------|-------------------|
| | | | 3/8 | 1/2 | 5/8 |
| Anchor Category | 1, 2 or 3 | - | 1 | 1 | 1 |
| Nominal Embedment Depth | h_{nom} | in. (mm) | 2 7/16 (62) | 2 9/16 (65) | 3 3/8 (86) |
| Steel Strength in Tension (ACI 318 D.5.1) | | | | | |
| Specified Yield Strength | f_{ya} | psi (N/mm ²) | 84,000 (579) | 84,000 (579) | 84,000 (579) |
| Specified Tensile Strength | f_{uta} | psi (N/mm ²) | 90,000 (620) | 88,000 (606) | 90,000 (620) |
| Effective Tensile Stress Area | $A_{se,N} (A_{se})^7$ | in ² (mm ²) | 0.056 (36) | 0.109 (70) | 0.173 (112) |
| Tension Resistance of Steel | N_{sa} | lbf (kN) | 5,040 (22.3) | 9,592 (42.4) | 15,570 (69.2) |
| Strength Reduction Factor-Steel Failure ² | ϕ_{sa} | - | 0.75 | | |
| Concrete Breakout Strength in Tension (ACI 318 D.5.2) | | | | | |
| Effective Embedment Depth | h_{ef} | in. (mm) | 2 (51) | 2 (51) | 2 3/4 (70) |
| Critical Edge Distance | c_{ac} | in. (mm) | 4 1/2 (114) | 4 7/8 (124) | 7 1/2 (191) |
| Effectiveness Factor – Uncracked Concrete | k_{uncr} | - | 24 (10) | 30 (12.5) | 30 (12.5) |
| Strength Reduction Factor-Concrete Breakout Failure ³ | ϕ_{cb} | - | 0.65 | | |
| Pull-out Strength in Tension (ACI 318 D.5.3) | | | | | |
| Pull-out Resistance in Uncracked Concrete ($f'_c=2,500$ psi) ⁵ | $N_{pn,uncr}$ | lbf (kN) | 3,027 (13.5) | NA ⁴ | NA ⁴ |
| Strength Reduction Factor-Pullout Failure ⁶ | ϕ_p | - | 0.65 | | |
| Axial Stiffness | | | | | |
| Axial Stiffness | β | lb/in (N/mm) | 24,888 (4,335) | 102,421 (17,924) | 49,341 (8,635) |

For SI: 1 inch = 25.4mm, 1lbf = 4.45N, 1lb/in = 0.175N/mm, 1psi = 0.00689 MPa = 0.00689 N/mm², 1 in² = 645 mm², 1lb/in = 0.175 N/mm.

- The information presented in this table must be used in conjunction with the design requirements of ACI 318 Appendix D.
- The tabulated value of ϕ_{sa} applies when the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{sa} must be determined in accordance with ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4). The anchors are ductile steel elements as defined in ACI 318 D.1.
- The tabulated value of ϕ_{cb} applies when both the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition B are satisfied. If the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition A are satisfied, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4). If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 and -05 D.4.5).
- As described in Section 4.1.4 of this report, N/A (Not Applicable) denotes that pullout resistance is not critical and does not need to be considered.
- The characteristic pull-out resistance for greater than 2,500 psi concrete compressive strengths may be increased by multiplying the tabular value by $(f'_c / 2,500)^{0.5}$.
- The tabulated value of ϕ_p applies if the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_p must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 and -05 D.4.5), Condition B.
- The notation in parenthesis is for the 2006 IBC.



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Blue Wedge® Zinc Plated Anchor Tech Sheet



Blue Wedge® Zinc Plated Anchor Shear Strength Design Information¹

| Characteristic | Symbol | Units | Nominal Anchor Diameter | | |
|--|----------------------|---------------------------------------|-------------------------|------------------|------------------|
| | | | 3/8 | 1/2 | 5/8 |
| Anchor Category | 1, 2 or 3 | - | 1 | 1 | 1 |
| Nominal Embedment Depth | h_{nom} | in. (mm) | 2 7/16 (62) | 2 9/16 (65) | 3 3/8 (86) |
| Steel Strength in Shear (ACI 318 D.6.1) | | | | | |
| Specified Yield Strength for Shear | f_{ya} | psi (N/mm ²) | 84,000 (579) | 84,000 (579) | 84,000 (579) |
| Specified Tensile Strength for Shear | f_{uta} | psi (N/mm ²) | 90,000 (620) | 88,000 (606) | 90,000 (606) |
| Effective Shear Stress Area | $A_{se,v}(A_{se})^4$ | in ² (mm ²) | 0.0775 (50) | 0.142 (92) | 0.226 (146) |
| Shear Resistance of Steel | N_{sa} | lbf (kN) | 3,244 (14.4) | 5,453 (24.23) | 10,188 (45.3) |
| Strength Reduction Factor-Steel Failure ² | ϕ_{sa} | - | 0.65 | | |
| Concrete Breakout Strength in Shear (ACI 318 D.6.2) | | | | | |
| Nominal Diameter | d_o | in. (mm) | 3/8 (9.5) | 1/2 (12.7) | 5/8 (15.9) |
| Load Bearing Length of Anchor in Shear | l_e | in. (mm) | 2 (51) | 2 (51) | 2 3/4 (70) |
| Strength Reduction Factor-Concrete Breakout Failure ³ | ϕ_{cb} | - | 0.70 | | |
| Concrete Pryout Strength in Shear (ACI 318 D.6.3) | | | | | |
| Coefficient for Pryout Strength | k_{cp} | - | 1 | 1 | 1 |
| Strength Reduction Factor-Concrete Pryout Failure ⁵ | ϕ_{cp} | - | 0.7 | 0.7 | 0.7 |

For SI: 1 inch = 25.4mm, 1lbf = 4.45N, 1psi = 0.00689 MPa = 0.00689 N/mm², 1 in² = 645 mm².

- The information presented in this table must be used in conjunction with the design criteria of ACI 318 Appendix D.
- The tabulated value of ϕ_{sa} applies when the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{sa} must be determined in accordance with ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4). The anchors are ductile steel elements as defined in ACI 318 D.1.
- The tabulated value ϕ_{cb} applies when both the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition B are satisfied. If the load combinations of Section 1605.2.1 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4) for Condition A are satisfied, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318-11 D.4.3 (ACI 318-08 and -05 D.4.4). If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{cb} must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 and -05 D.4.5).
- The notation in parenthesis is for the 2006 IBC
- The tabulated value of ϕ_{cp} applies if the load combinations of Section 1605.2 of the IBC or ACI 318 Section 9.2 are used. If the load combinations of ACI 318 Appendix C are used, the appropriate value of ϕ_{cp} must be determined in accordance with ACI 318-11 D.4.4 (ACI 318-08 and -05 D.4.5), Condition B.



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