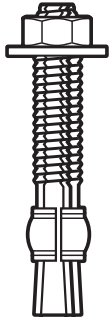


Trubolt Wedge



SPECIFIED FOR ANCHORAGE INTO CONCRETE

Wedge anchors feature a type stainless steel split expansion ring and a threaded stud bolt body and integral cone expander, nut and washer. Anchor bodies are made of plated carbon steel, hot-dipped galvanized carbon steel, type 304 stainless steel or type 316 stainless steel as identified in the drawings or other notations.

The exposed end of the anchor is stamped to identify anchor length. Stampings should be preserved during installation for

any subsequent embedment verification.

Use carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994 to install anchors.

Anchors are tested to ASTM E488 criteria and listed by ICC-ES. Anchors are listed by the following agencies as required by the local building code: UL, FM, City of Los Angeles, California State Fire Marshal and Caltrans.

APPROVALS/LISTINGS

Trubolt® Wedge Anchors

ICC Evaluation Service, Inc. # ESR-2251 (formerly ICBO # ER-1372)

- Category 1 performance rating
- 2003 IBC and 2006 IBC compliant
- Meets ACI 318 ductility requirements
- Tested in accordance with ACI 355.2 and ICC-ES AC193
- Listed for use in seismic zones A & B

Underwriters Laboratories

Factory Mutual

City of Los Angeles - #RR2748

California State Fire Marshal

Caltrans

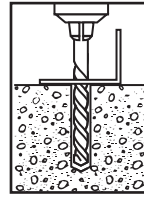
Meets or exceeds U.S. Government G.S.A. Specification A-A-1923A Type 4 (formerly GSA: FF-S-325 Group II, Type 4, Class 1)

Trubolt+® Seismic Wedge Anchors

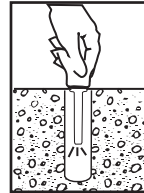
ICC Evaluation Service, Inc. # ESR-2427

- Category 1 performance rating
- 2003 IBC and 2006 IBC compliant
- Meets ACI 318 ductility requirements
- Tested in accordance with ACI 355.2 and ICC-ES AC193
- Listed for use in seismic zones A, B, C, D, E, & F

INSTALLATION STEPS



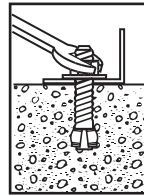
1. Select a carbide drill bit with a diameter equal to the anchor diameter. Drill hole to any depth exceeding the desired embedment. See chart for minimum recommended embedment.



2. Clean hole or continue drilling additional depth to accommodate drill fines.



3. Assemble washer and nut, leaving nut flush with end of anchor to protect threads. Drive anchor through material to be fastened until washer is flush to surface of material.



4. Expand anchor by tightening nut 3-5 turns past the hand tight position, or to the specified torque requirement.

LENGTH INDICATION CODE *

CODE	LENGTH OF ANCHOR	CODE	LENGTH OF ANCHOR
A	1-1/2 < 2 (38.1 < 50.8)	K	6-1/2 < 7 (165.1 < 177.8)
B	2 < 2-1/2 (50.8 < 63.5)	L	7 < 7-1/2 (177.8 < 190.5)
C	2-1/2 < 3 (63.5 < 76.2)	M	7-1/2 < 8 (190.5 < 203.2)
D	3 < 3-1/2 (76.2 < 88.9)	N	8 < 8-1/2 (203.2 < 215.9)
E	3-1/2 < 4 (88.9 < 101.6)	O	8-1/2 < 9 (215.9 < 228.6)
F	4 < 4-1/2 (101.6 < 114.3)	P	9 < 9-1/2 (228.6 < 241.3)
G	4-1/2 < 5 (114.3 < 127.0)	Q	9-1/2 < 10 (241.3 < 254.0)
H	5 < 5-1/2 (127.0 < 139.7)	R	10 < 11 (254.0 < 279.4)
I	5-1/2 < 6 (139.7 < 152.4)	S	11 < 12 (279.4 < 304.8)
J	6 < 6-1/2 (152.4 < 165.1)	T	12 < 13 (304.8 < 330.2)

*Located on top of anchor for easy inspection.

Trubolt Wedge Anchors Ultimate Tension and Shear Values (Lbs/kN) in Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	f'c = 2000 PSI (13.8 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 6000 PSI (41.4 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	8 (10.8)	1-1/8 (28.6)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	1,180 (5.2)	1,400 (6.2)	1,780 (7.9)	1,400 (6.2)	1,900 (8.5)	1,400 (6.2)
		1-15/16 (49.2)		2,100 (9.3)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
		2-1/8 (54.0)		2,260 (10.1)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)		1,680 (7.5)	2,320 (10.3)	2,240 (10.0)	2,620 (11.7)	2,840 (12.6)	3,160 (14.1)
		3 (76.2)		3,480 (15.5)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
		4 (101.6)		4,800 (21.4)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		4,660 (20.7)	4,760 (21.2)	5,100 (22.7)	4,760 (21.2)	7,040 (31.3)	7,040 (31.3)
		4-1/8 (104.8)		4,660 (20.7)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
		6 (152.4)		5,340 (23.8)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
5/8 (15.9)	90 (122.0)	2-3/4 (69.9)		6,580 (29.3)	7,120 (31.7)	7,180 (31.9)	7,120 (31.7)	9,720 (43.2)	9,616 (42.8)
		5-1/8 (130.2)		6,580 (29.3)	9,600 (42.7)	14,920 (66.4)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
		7-1/2 (190.5)		7,060 (31.4)	9,600 (42.7)	15,020 (66.8)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
3/4 (19.1)	175 (237.3)	3-1/4 (82.6)	7,120 (31.7)	10,120 (45.0)	10,840 (48.2)	13,720 (61.0)	13,300 (59.2)	15,980 (71.1)	
		6-5/8 (168.3)	10,980 (48.8)	20,320 (90.4)	17,700 (78.7)	23,740 (105.6)	20,260 (90.1)	23,740 (105.6)	
		10 (254.0)	10,980 (48.8)	20,320 (90.4)	17,880 (79.5)	23,740 (105.6)	23,580 (104.9)	23,740 (105.6)	
7/8 (22.2)	250 (339.0)	3-3/4 (95.3)	9,520 (42.3)	13,160 (58.5)	14,740 (65.6)	16,580 (73.8)	17,420 (77.5)	19,160 (85.2)	
		6-1/4 (158.8)	14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)	
		8 (203.2)	14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)	
1 (25.4)	300 (406.7)	4-1/2 (114.3)	13,940 (62.0)	16,080 (71.5)	20,180 (89.8)	22,820 (101.5)	21,180 (94.2)	24,480 (108.9)	
		7-3/8 (187.3)	14,600 (64.9)	28,680 (127.6)	23,980 (106.7)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)	
		9-1/2 (241.3)	18,700 (83.2)	28,680 (127.6)	26,540 (118.1)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)	

- * Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.
- * For Tie-Wire Wedge Anchor, TW-1400, use tension data from 1/4" diameter with 1-1/8" embedment.
- * For continuous extreme low temperature applications, use stainless steel.

Trubolt Wedge Anchors Ultimate Tension and Shear Values (Lbs/kN) in Lightweight Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	LIGHTWEIGHT CONCRETE f'c = 3000 PSI (20.7 MPa)		LOWER FLUTE OF STEEL DECK WITH LIGHTWEIGHT CONCRETE FILL f'c = 3000 PSI (20.7 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2,120 (9.4)	3,720 (16.5)	1,900 (8.5)	3,160 (14.1)
		3 (76.2)		2,940 (13.1)	4,240 (18.9)	2,840 (12.6)	4,000 (17.8)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		3,600 (16.0)	7,040 (31.3)	3,400 (15.1)	5,380 (23.9)
		3 (76.2)		4,720 (21.0)	6,620 (29.4)	4,480 (19.9)	6,620 (29.4)
		4 (101.6)		-----	6,920 (30.8)	4,800 (21.4)	6,440 (28.6)
5/8 (15.9)	90 (122.0)	3 (76.2)		6,000 (26.7)	9,240 (41.1)	4,720 (21.0)	5,500 (24.5)
		5 (127.0)		5,960 (26.5)	9,280 (41.3)	6,580 (29.3)	9,140 (40.7)
3/4 (19.1)	175 (237.3)	3-1/4 (82.6)		7,160 (31.9)	12,600 (56.0)	5,840 (26.0)	8,880 (39.5)
		5-1/4 (133.4)		8,900 (39.6)	15,920 (70.8)	7,040 (31.3)	-----

- * Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

Trubolt Wedge Anchors Recommended Spacing and Edge Distance Requirements for Shear Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .60 In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .20 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING BETWEEN ANCHORS In. (mm)
1/4 (6.4)	1-1/8 (28.6)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8)	1-5/16 (33.3)	-- --	3-15/16 (100.0)	2 (50.8)
	1-15/16 (49.2)		1 (25.4)	-- --	3-7/8 (98.4)	1-15/16 (49.2)	
3/8 (9.5)	1-1/2 (38.1)		2-5/8 (66.7)	1-3/4 (44.5)	-- --	5-1/4 (133.4)	2-5/8 (66.7)
	3 (76.2)		3-3/4 (95.3)	3 (76.2)	1-1/2 (38.1)	6 (152.4)	3-7/8 (76.2)
1/2 (12.7)	2-1/4 (57.2)		3-15/16 (100.0)	2-9/16 (65.1)	-- --	7-7/8 (200.0)	3-15/16 (100.0)
	4-1/8 (104.8)		5-3/16 (131.8)	3-1/8 (79.4)	1-9/16 (39.7)	6-3/16 (157.2)	3-1/8 (79.4)
5/8 (15.9)	2-3/4 (69.9)		4-13/16 (122.2)	3-1/8 (79.4)	-- --	9-5/8 (244.5)	4-13/16 (122.2)
	5-1/8 (130.2)		6-7/16 (163.5)	3-7/8 (98.4)	1-15/16 (49.2)	7-11/16 (215.3)	3-7/8 (98.4)
3/4 (19.1)	3-1/4 (82.6)		5-11/16 (144.5)	3-3/4 (95.3)	-- --	11-3/8 (288.9)	5-11/16 (144.5)
	6-5/8 (168.3)		6-5/16 (160.3)	5 (127.0)	2-1/2 (63.5)	9-15/16 (252.4)	5 (127.0)
7/8 (22.2)	3-3/4 (95.3)		6-9/16 (166.7)	4-5/16 (109.5)	-- --	13-1/8 (333.4)	6-9/16 (166.7)
	6-1/4 (158.8)		8-1/2 (215.9)	6-1/4 (158.8)	3-1/8 (79.4)	12-1/2 (317.5)	6-1/4 (158.8)
1 (25.4)	4-1/4 (108.0)	7-7/8 (200.0)	5-1/8 (130.2)	-- --	15-3/4 (400.1)	7-7/8 (200.0)	
	7-3/8 (187.3)	10-1/16 (255.6)	7-3/8 (187.3)	3-11/16 (93.7)	14-3/4 (374.7)	7-3/8 (187.3)	

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

Trubolt Wedge Anchors Recommended Spacing and Edge Distance Requirements for Tension Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .65 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING AT WHICH THE LOAD FACTOR APPLIED = .70 In. (mm)
1/4 (6.4)	1-1/8 (28.6)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8)	1 (25.4)	3-15/16 (100.0)	2 (50.8)
	1-15/16 (49.2)		1 (25.4)	3-7/8 (98.4)	1-15/16 (49.2)	
	2-1/8 (54.0)		13/16 (20.6)	3-3/16 (81.0)	1-5/8 (41.3)	
3/8 (9.5)	1-1/2 (38.1)		2-5/8 (66.7)	1-5/16 (33.3)	5-1/4 (133.4)	2-5/8 (66.7)
	3 (76.2)		3 (76.2)	1-1/2 (38.1)	6 (152.4)	3 (76.2)
	4 (101.6)		3 (76.2)	1-1/2 (38.1)	6 (152.4)	3 (76.2)
1/2 (12.7)	2-1/4 (57.2)		3-15/16 (100.0)	2 (50.8)	7-7/8 (200.0)	3-15/16 (100.0)
	4-1/8 (104.8)		3-1/8 (79.4)	1-9/16 (39.7)	6-3/16 (157.2)	3-1/8 (79.4)
	6 (152.4)		4-1/2 (114.3)	2-1/4 (57.2)	9 (228.6)	4-1/2 (114.3)
5/8 (15.9)	2-3/4 (69.9)		4-13/16 (122.2)	2-7/16 (61.9)	9-5/8 (244.5)	4-13/16 (122.2)
	5-1/8 (130.2)		3-7/8 (98.4)	1-15/16 (49.2)	7-1/16 (195.3)	3-7/8 (98.4)
	7-1/2 (190.5)		5-5/8 (142.9)	2-13/16 (71.4)	11-1/4 (285.8)	5-5/8 (142.9)
3/4 (19.1)	3-1/4 (82.6)	5-11/16 (144.5)	2-7/8 (73.0)	11-3/8 (288.9)	5-11/16 (144.5)	
	6-5/8 (168.3)	5 (127.0)	2-1/2 (63.5)	9-15/16 (252.4)	5 (127.0)	
	10 (254.0)	7-1/2 (190.5)	3-3/4 (95.3)	15 (381.0)	7-1/2 (190.5)	
7/8 (22.2)	3-3/4 (95.3)	6-9/16 (166.7)	3-5/16 (84.1)	13-1/8 (333.4)	6-9/16 (166.7)	
	6-1/4 (158.8)	6-1/4 (158.8)	3-1/8 (79.4)	12-1/2 (317.5)	6-1/4 (158.8)	
	8 (203.2)	6 (152.4)	3 (76.2)	12 (304.8)	6 (152.4)	
1 (25.4)	4-1/2 (114.3)	7-7/8 (200.0)	3-15/16 (100.0)	15-3/4 (400.1)	7-7/8 (200.0)	
	7-3/8 (187.3)	7-3/8 (187.3)	3-11/16 (93.7)	14-3/4 (374.7)	7-3/8 (187.3)	
	9-1/2 (241.3)	7-1/8 (181.0)	3-9/16 (90.5)	14-1/4 (362.0)	7-1/8 (181.0)	

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

Combined Shear and Tension Loading—for Trubolt Anchors

Allowable loads for anchors subjected to combined shear and tension forces are determined by the following equation:

$$(P_s/P_t)^{5/3} + (V_s/V_t)^{5/3} \leq 1$$

P_s = Applied tension load

V_s = Applied shear load

P_t = Allowable tension load

V_t = Allowable shear load