

# Epoxy Anchoring and Adhesive Applications



## REFERENCE GUIDE RGC0109

This Reference Guide is a supporting resource for epoxy anchoring products and applications. Refer to the Technical Data Sheet of the appropriate anchoring epoxy for suitable substrates, substrate preparation and product application. The following tables are a general resource for anchoring installations.

MAPEI does not provide support for determining placement or design of anchoring systems. Refer to ACI 349 "Code for

Nuclear Safety-Related Concrete Structures" and/or involve a suitably qualified engineer for design and placement of anchoring systems.

Per NTSB safety recommendations, the use of adhesive anchors is prohibited in sustained overhead load anchoring applications.

### Allowable Anchor Spacing and Edge Distance\*

		Full Anchor Capacity Critical Distance (Ccr)	Reduced Anchor Capacity Distance (Cmin)	Reduction Factor
Spacing Between Anchors		24 D	8 D	0.90
Edge Distance:	Tension loads	12 D	See the following chart	See the following chart
	Shear loads – threaded rod	12 D	4 D	0.21
	Shear loads – smooth dowels	12 D	4 D	0.21
	Shear loads – rebar	16 D	4 D	0.15

### Allowable Shear Values for Threaded Rod in Concrete at 2,000 psi (13,8 MPa)\*

			Allowable Steel Strength – lbs. (kg)		
Anchor Diameter – in. (mm)	Bit Diameter – in. (mm)	Embedment – in. (mm)	A36/A307	A193 B7	300 Series Stainless
#3 – 3/8 (10)	7/16 (11)	3-3/8 (86)	1,080 (490)	2,345 (1 064)	1,870 (848)
#4 – 1/2 (12)	9/16 (14)	4-1/2 (114)	1,930 (875)	4,170 (1 891)	3,330 (1 510)
#5 – 5/8 (16)	3/4 (19)	5-5/8 (143)	3,030 (1 374)	6,520 (2 957)	5,220 (2 367)
#6 – 3/4 (19)	7/8 (22)	6-3/4 (171)	4,360 (1 978)	9,390 (4 259)	6,390 (2 898)
#7 – 7/8 (22)	1 (25)	7-7/8 (200)	5,930 (2 690)	12,780 (5 797)	8,680 (3 937)
#8 – 1 (25)	1-1/8 (29)	9 (229)	7,740 (3 511)	16,690 (7 570)	11,340 (5 144)
#10 – 1-1/4 (32)	1-3/8 (35)	11-1/4 (286)	12,100 (5 488)	26,070 (11 825)	17,730 (8 042)

### Edge Distance for Tension Values for Anchors in Concrete\*

Stud Size – in. (mm)	Minimum Edge Distance (C min) – in. (mm)	Reduction Factor
#3 – 3/8 (10)	1-1/2 (37)	0.70
#4 – 1/2 (12)	1-3/4 (44)	0.66
#5 – 5/8 (16)	1-3/4 (44)	0.70
#6 – 3/4 (19)	1-3/4 (44)	0.70
#7 – 7/8 (22)	3-1/2 (87)	0.70
#8 – 1 (25)	4 (100)	0.70
#10 – 1-1/4 (32)	5 (125)	0.70

### Shear and Tension Values for Reinforcing Steel\*\*

			Tension Ultimate Bond Strength – lbs. (kg)			Allowable Shear Strength, Tension or Shear – lbs. (kg)	
Anchor Diameter – in. (mm)	Bit Diameter – in. (mm)	Embedment – in. (mm)	Concrete Strength (f'c) 2,500 psi (17,2 MPa)	Concrete Strength (f'c) 4,000 psi (27,6 MPa)	Concrete Strength (f'c) 5,500 psi (37,9 MPa)	Grade 40	Grade 60
#3 – 3/8 (10)	1/2 (12)	3-3/8 (86)	7,080 (3 211)	9,050 (4 105)	11,020 (4 999)	2,200 (998)	2,640 (1 197)
#4 – 1/2 (12)	5/8 (16)	4-1/2 (114)	12,300 (5 579)	14,730 (6 681)	17,160 (7 784)	4,000 (1 814)	4,800 (2 177)
#5 – 5/8 (16)	3/4 (19)	5-5/8 (143)	16,000 (7 257)	18,810 (8 532)	21,620 (9 807)	6,200 (2 812)	7,440 (3 375)
#6 – 3/4 (19)	1 (25)	6-3/4 (171)	39,035 (17 706)			8,800 (3 992)	10,560 (4 790)
#7 – 7/8 (22)	1-1/8 (29)	7-7/8 (200)	36,740 (16 665)			12,000 (5 443)	14,400 (6 532)
#8 – 1 (25)	1-1/4 (32)	9 (229)	42,670 (19 355)			15,600 (7 076)	18,720 (8 491)

## Ultimate Tension Values for Threaded Rod in Concrete\*\*

			Ultimate Bond Strength in Concrete Strength (f'c) – lbs. (kg)				Allowable Steel Strength – lbs. (kg)		
Anchor Diameter – in. (mm)	Bit Diameter – in. (mm)	Embedment – in. (mm)	2,500 psi (17,2 MPa)	3,000 psi (20,7 MPa)	4,000 psi (27,6 MPa)	5,500 psi (37,9 MPa)	A36/A307	A193 B7	300 Series Stainless
#3 – 3/8 (10)	7/16 (11)	1-11/16 (43)		5,450 (2 472)			2,100 (953)	4,550 (2 064)	3,630 (1 647)
#3 – 3/8 (10)	7/16 (11)	3-3/8 (86)	7,300 (3 311)		8,250 (3 742)	9,200 (4 173)	2,110 (957)	4,550 (2 064)	3,630 (1 647)
#3 – 3/8 (10)	9/16 (14)	3-3/8 (86)	9,560 (4 336)				2,110 (957)	4,550 (2 064)	3,630 (1 647)
#3 – 3/8 (10)	7/16 (11)	5-5/8 (143)	10,980 (4 980)		11,360 (5 153)	11,740 (5 325)	2,110 (957)	4,550 (2 064)	3,630 (1 647)
#4 – 1/2 (12)	9/16 (14)	2-1/4 (57)		7,495 (3 400)			3,750 (1 701)	8,100 (3 674)	6,470 (2 935)
#4 – 1/2 (12)	9/16 (14)	4-1/2 (114)	10,540 (4 781)		11,730 (5 320)	12,920 (5 860)	3,750 (1 701)	8,100 (3 674)	6,470 (2 935)
#4 – 1/2 (12)	11/16 (17)	4-1/2 (114)	14,640 (6 641)				3,750 (1 701)	8,100 (3 674)	6,470 (2 935)
#4 – 1/2 (12)	9/16 (14)	7-1/2 (190)	14,660 (6 650)		17,010 (7 716)	19,360 (8 782)	3,750 (1 701)	8,100 (3 674)	6,470 (2 935)
#5 – 5/8 (16)	3/4 (19)	2-13/16 (71)		13,665 (6 198)			5,870 (2 663)	12,655 (5 740)	10,130 (4 595)
#5 – 5/8 (16)	3/4 (19)	5-5/8 (143)	14,800 (6 713)		18,870 (8 559)	22,940 (10 405)	5,870 (2 663)	12,655 (5 740)	10,130 (4 595)
#5 – 5/8 (16)	7/8 (22)	5-5/8 (143)	23,340 (10 587)				5,870 (2 663)	12,655 (5 740)	10,130 (4 595)
#5 – 5/8 (16)	3/4 (19)	9-3/8 (238)	21,560 (9 779)		26,260 (11 911)	30,960 (14 043)	5,870 (2 663)	12,655 (5 740)	10,130 (4 595)
#6 – 3/4 (19)	7/8 (22)	3-3/8 (86)		17,825 (8 085)			8,460 (3 837)	18,220 (8 264)	12,400 (5 625)
#6 – 3/4 (19)	7/8 (22)	6-3/4 (171)	22,380 (9 779)		25,870 (11 734)	29,360 (13 317)	8,460 (3 837)	18,220 (8 264)	12,400 (5 625)
#6 – 3/4 (19)	1 (25)	6-3/4 (171)	29,850 (13 540)				8,460 (3 837)	18,220 (8 264)	12,400 (5 625)
#6 – 3/4 (19)	7/8 (22)	11-1/4 (286)	30,320 (13 753)		34,340 (15 576)	38,360 (17 400)	8,460 (3 837)	18,220 (8 264)	12,400 (5 625)
#7 – 7/8 (22)	1 (25)	3-15/16 (100)		21,390 (9 702)			11,500 (5 216)	24,800 (11 249)	16,860 (7 648)
#7 – 7/8 (22)	1 (25)	7-7/8 (200)	43,280 (19 631)				11,500 (5 216)	24,800 (11 249)	16,860 (7 648)
#8 – 1 (25)	1-1/8 (29)	4-1/2 (114)		27,419 (12 437)			15,020 (6 813)	32,400 (14 696)	22,020 (9 988)
#8 – 1 (25)	1-1/8 (29)	9 (229)	55,650 (25 242)				15,020 (6 813)	32,400 (14 696)	22,020 (9 988)
#10 – 1-1/4 (32)	1-3/8 (35)	11-1/4 (286)	77,860 (35 317)				23,480 (10 650)	50,610 (22 956)	34,420 (15 612)

## Shear and Tension Values for Smooth Dowels\*\*

			Ultimate Bond Strength – lbs. (kg)		Allowable Steel Strength – lbs. (kg)	
			Tension	Shear	Tension	Shear
Dowel Diameter – in. (mm)	Bit Diameter – in. (mm)	Embedment – in. (mm)	3,000 psi (20,7 MPa)	2,500 psi (17,2 MPa)	3,000 psi (20,7 MPa)	2,500 psi (17,2 MPa)
#4 – 1/2 (12)	9/16 (14)	4-1/2 (114)	6,040 (2 740)	8,560 (3 883)	3,750 (1 701)	1,930 (875)
#5 – 5/8 (16)	3/4 (19)	5-5/8 (143)	6,760 (3 066)	13,140 (5 960)	5,880 (2 667)	3,030 (1 374)
#6 – 3/4 (19)	7/8 (22)	6-3/4 (171)	12,000 (5 443)	18,920 (8 582)	8,460 (3 837)	4,360 (1 978)
#7 – 7/8 (22)	1 (25)	7-7/8 (200)	14,220 (6 450)	25,720 (11 666)	11,500 (5 216)	5,930 (2 690)
#8 – 1 (25)	1-1/8 (29)	9 (229)	23,280 (10 560)	33,600 (15 241)	15,020 (6 813)	7,740 (3 511)

- \* 1. The listed values are the minimum distances required to obtain the load values in the tables above. D = anchor diameter. When adjacent anchors are different sizes or embedments, use the largest value for D.
2. The listed values are the minimum distances at which the anchor can be installed when load values are adjusted in accordance with reduction factors.
3. Load values in the table are multiplied by the reduction factor when anchors are installed at the minimum spacing listed. Use linear interpolation for spacing between critical and minimum distances. Multiple reduction factors for more than one spacing or edge distance are calculated separately and multiplied.

- \*\* 1. The tabulated shear and tension values are for anchors installed in normal-weight concrete, having reached the designated ultimate compressive strength at the time of installation. Linear interpolation may be used for concrete strengths between those listed.
2. Spacing and edge distance shall be in accordance with appropriate table.
3. Allowable load must be the lesser of the allowable steel strength and that allowable bond strength. Typically, allowable bond strength is equal to the ultimate bond strength divided by the safety factor of 4.
4. Allowable loads may be increased by 33-1/3% for short-term loading due to earthquakes or wind.
5. *Planibond AE* is recognized for installation in water-filled or moist holes, for use in locations subject to severe exterior weathering conditions, and for resisting tension and shear loads due to earthquake and wind.

