

PERFORMANCE DATA

Ultimate Load Capacities for Powder Actuated Fasteners in Normal-Weight Concrete¹

Pin Description	Minimum Embedment Depth h_v in. (mm)	Minimum Concrete Compressive Strength (f'_c)							
		2,000 psi (13.8 MPa)		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		5,000 psi (34.5 MPa)	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
Ballistic Point Pin (0.150" Shank)	5/8 (15.9)	370 (1.7)	590 (2.7)	610 (2.7)	810 (3.6)	610 (2.7)	800 (3.6)	590 (2.7)	780 (3.5)
	3/4 (19.1)	480 (2.2)	770 (3.5)	660 (3.0)	940 (4.2)	680 (3.1)	980 (4.4)	700 (3.2)	1,020 (4.6)
Ballistic Point Pin (0.181"/0.150" Shank)	1 (25.4)	690 (3.1)	1,130 (5.1)	770 (3.5)	1,200 (5.4)	820 (3.7)	1,350 (6.1)	870 (3.9)	1,500 (6.8)
	1 1/4 (31.8)	810 (3.6)	1,460 (6.6)	1,130 (5.1)	1,490 (6.7)	1,380 (6.2)	1,680 (7.6)	1,620 (7.3)	1,890 (8.5)
	1 1/2 (38.1)	920 (4.1)	1,780 (8.0)	1,490 (6.7)	1,780 (8.0)	1,930 (8.7)	2,020 (9.1)	2,370 (10.7)	2,250 (10.1)
.300" Head Drive Pin 8mm Head Drive Pin 1/4"-20 Threaded Stud (0.145" Shank)	5/8 (15.9)	370 (1.7)	590 (2.7)	610 (2.7)	810 (3.6)	610 (2.7)	800 (3.6)	590 (2.7)	780 (3.5)
	3/4 (19.1)	480 (2.2)	770 (3.5)	660 (3.0)	940 (4.2)	680 (3.1)	980 (4.4)	700 (3.2)	1,020 (4.6)
	1 (25.4)	690 (3.1)	1,130 (5.1)	770 (3.5)	1,200 (5.4)	820 (3.7)	1,350 (6.1)	870 (3.9)	1,500 (6.8)
	1 1/4 (31.8)	810 (3.6)	1,460 (6.6)	1,130 (5.1)	1,490 (6.7)	1,380 (6.2)	1,680 (7.6)	1,620 (7.3)	1,890 (8.5)
	1 1/2 (38.1)	920 (4.1)	1,780 (8.0)	1,490 (6.7)	1,780 (8.0)	1,930 (8.7)	2,020 (9.1)	2,370 (10.7)	2,250 (10.1)
3/8" Head Drive Pin (0.172" Shank)	1 1/4 (31.8)	930 (4.2)	1,780 (8.0)	1,160 (5.2)	2,120 (9.5)	1,310 (5.9)	2,120 (9.5)	1,600 (7.2)	2,120 (9.5)
	1 1/2 (38.1)	1,470 (6.6)	2,540 (11.4)	2,040 (9.2)	2,540 (11.4)	2,040 (9.2)	2,540 (11.4)	2,040 (9.2)	2,540 (11.4)
10mm Head Drive Pin (0.177" Shank)	3/4 (19.1)	-	-	525 (2.4)	725 (3.3)	540 (2.4)	740 (3.3)	550 (2.5)	750 (3.4)
	1 (25.4)	-	-	875 (3.9)	925 (4.2)	890 (4.0)	940 (4.2)	900 (4.1)	950 (4.3)
	1 1/4 (31.8)	-	-	1,225 (5.5)	1,125 (5.1)	1,225 (5.5)	1,125 (5.1)	1,225 (5.5)	1,125 (5.1)
3/8"-16 Threaded Stud (0.205" Shank)	1 (25.4)	770 (3.5)	1,250 (5.6)	990 (4.5)	1,320 (5.9)	1,300 (5.9)	1,700 (7.7)	1,300 (5.9)	1,700 (7.7)
	1 1/4 (31.8)	1,340 (6.0)	2,090 (9.4)	1,340 (6.0)	2,170 (9.8)	1,690 (7.6)	2,560 (11.5)	1,690 (7.6)	2,560 (11.5)
	1 3/8 (34.9)	1,840 (8.3)	2,210 (9.9)	2,190 (9.9)	2,590 (11.7)	2,340 (10.5)	3,150 (14.2)	2,340 (10.5)	3,150 (14.2)
Ceiling Clips – Standard (0.145" Shank)	3/4 (19.1)	320 (1.4)	600 (2.7)	500 (2.3)	600 (2.7)	525 (2.4)	975 (4.4)	540 (2.4)	1,170 (5.3)
	1 (25.4)	410 (1.8)	960 (4.3)	670 (3.0)	990 (4.5)	700 (3.2)	1,180 (5.3)	720 (3.2)	1,280 (5.8)
Ceiling Clips – Economy (0.145" Shank)	3/4 (19.1)	250 (1.1)	610 (2.7)	330 (1.5)	760 (3.4)	520 (2.3)	1,030 (4.6)	570 (2.6)	1,170 (5.3)
	1 (25.4)	440 (2.0)	960 (4.3)	440 (2.0)	1,190 (5.4)	690 (3.1)	1,195 (5.4)	820 (3.7)	1,200 (5.4)
Ballistic Point Ceiling Clip – (0.181"/0.150" Shank)	-	-	-	500 (2.3)	200 (0.9)	-	-	-	-
Ceiling Clips – LADD Pin (0.152" Shank)	1 1/8 (28.6)	630 (2.8)	810 (3.6)	750 (3.4)	1,100 (5.0)	955 (4.3)	1,225 (5.5)	1,060 (4.8)	1,290 (5.8)

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1. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load.

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Ultimate Load Capacities for Powder Actuated Fasteners in Lightweight Concrete^{1,2,3}

Pin Description	Minimum Embedment Depth h_v in. (mm)	Minimum Concrete Compressive Strength (f'_c)							
		3,000 psi (20.7 MPa)				3,500 psi (24.2 MPa)			
		Lightweight Concrete		Over 20 Gage Deck		Lightweight Concrete		Over 20 Gage Deck	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
Ballistic Point Pin (0.150" Shank)	3/4 (19.1)	560 (2.5)	600 (2.7)	350 (1.6)	1,310 (5.9)	600 (2.7)	650 (2.9)	380 (1.7)	1,410 (6.3)
Ballistic Point Pin (0.181"/0.150" Shank)	1 (25.4)	570 (2.6)	1,000 (4.5)	550 (2.5)	1,350 (6.1)	610 (2.7)	1,080 (4.9)	590 (2.7)	1,460 (6.6)
	1 1/4 (31.8)	810 (3.6)	1,220 (5.5)	700 (3.2)	1,380 (6.2)	870 (3.9)	1,320 (5.9)	760 (3.4)	1,490 (6.7)
	1 1/2 (38.1)	1,040 (4.7)	1,440 (6.5)	840 (3.8)	1,400 (6.3)	1,120 (5.0)	1,560 (7.0)	920 (4.1)	1,510 (6.8)
.300" Head Drive Pin	3/4 (19.1)	560 (2.5)	600 (2.7)	350 (1.6)	1,310 (5.9)	600 (2.7)	650 (2.9)	380 (1.7)	1,410 (6.3)
8mm Head Drive Pin 1/4"-20 Threaded Stud (0.145" Shank)	1 (25.4)	570 (2.6)	1,000 (4.5)	550 (2.5)	1,350 (6.1)	610 (2.7)	1,080 (4.9)	590 (2.7)	1,460 (6.6)
	1 1/4 (31.8)	810 (3.6)	1,220 (5.5)	700 (3.2)	1,380 (6.2)	870 (3.9)	1,320 (5.9)	760 (3.4)	1,490 (6.7)
	1 1/2 (38.1)	1,040 (4.7)	1,440 (6.5)	840 (3.8)	1,400 (6.3)	1,120 (5.0)	1,560 (7.0)	920 (4.1)	1,510 (6.8)
	3/8" Head Drive Pin (0.172" Shank)	1 1/4 (31.8)	650 (2.9)	1,540 (6.9)	620 (2.8)	1,830 (8.2)	700 (3.2)	1,660 (7.5)	670 (3.0)
10mm Head Drive Pin (0.177" Shank)	1 1/2 (38.1)	1,210 (5.4)	1,620 (7.3)	860 (3.9)	1,930 (8.7)	1,310 (5.9)	1,750 (7.9)	930 (4.2)	2,090 (9.4)
	1 1/4 (31.8)	1,150 (5.2)	1,200 (5.4)	875 (3.9)	1,475 (6.6)	-	-	-	-
	1 3/8 (34.9)	1,575 (7.1)	1,575 (7.1)	1,025 (4.6)	1,575 (7.1)	-	-	-	-
	1 1/2 (38.1)	1,850 (8.3)	1,850 (8.3)	1,175 (5.3)	1,700 (7.7)	-	-	-	-
3/8"-16 Threaded Stud (0.205" Shank)	1 5/8 (41.3)	2,400 (10.8)	2,325 (10.5)	1,325 (6.0)	1,800 (8.1)	-	-	-	-
	1 (25.4)	910 (4.1)	1,250 (5.6)	530 (2.4)	1,310 (5.9)	980 (4.4)	1,350 (6.1)	570 (2.6)	1,420 (6.4)
	1 1/4 (31.8)	1,350 (6.1)	2,110 (9.5)	670 (3.0)	1,810 (8.1)	1,460 (6.6)	2,280 (10.3)	720 (3.2)	1,960 (8.8)
Ceiling Clips – Standard (0.145" Shank)	3/4 (19.1)	410 (1.8)	440 (2.0)	270 (1.2)	980 (4.4)	440 (2.0)	480 (2.2)	300 (1.4)	1,060 (4.8)
	1 (25.4)	480 (2.2)	790 (3.6)	360 (1.6)	980 (4.4)	520 (2.3)	850 (3.8)	390 (1.8)	1,060 (4.8)
Ceiling Clips – Economy (0.145" Shank)	3/4 (19.1)	280 (1.3)	440 (2.0)	270 (1.2)	1,060 (4.8)	300 (1.4)	480 (2.2)	300 (1.4)	1,140 (5.1)
	1 (25.4)	420 (1.9)	940 (4.2)	460 (2.1)	1,060 (4.8)	460 (2.1)	1,020 (4.6)	500 (2.3)	1,140 (5.1)
Ballistic Point Ceiling Clip – (0.181"/0.150" Shank)	-	-	-	625 (2.8)	1,050 (4.7)	-	-	-	-
Ceiling Clips – LADD Pin (0.152" Shank)	1 1/8 (28.6)	730 (3.3)	1,130 (5.1)	440 (2.0)	1,000 (4.5)	790 (3.6)	1,220 (5.5)	480 (2.2)	1,080 (4.9)

1. For the 10mm Head drive pin, the shear load listed is perpendicular to the flute. The shear value parallel to the flute is 2,025 lbs. (9.1 kN).
 2. For the Ballistic Point ceiling clip the shear listed is perpendicular to the flute. The shear value parallel to the flute is 1,125 lbs. (5.1 kN).
 3. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load.

Ultimate Load Capacities for Powder Actuated Fasteners used to Install Sill Plates onto Normal-Weight Concrete¹

Pin Description	Minimum Embedment Depth h_v in. (mm)	Minimum Concrete Compressive Strength		
		$f'_c \geq 2,000$ psi (13.8 MPa)		
		Tension	Shear	
		lbs. (kN)	Perpen. to Concrete lbs. (kN)	Parallel to Concrete lbs. (kN)
Ballistic Point Pin (0.181"/0.150" Shank)	1 1/2 (38.1)	1,010 (4.5)	1,060 (4.8)	1,200 (5.4)
.300"/8mm Head Drive Pin or 1/4"-20 Threaded Stud (0.145" Shank)	1 1/2 (38.1)	1,010 (4.5)	1,060 (4.8)	1,200 (5.4)
3/8" Head Drive Pin (0.172" Shank)	1 1/2 (38.1)	940 (4.2)	960 (4.3)	1,150 (5.2)

1. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load.

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Ultimate Load Capacities for Powder Actuated Fasteners in Masonry^{1,2}

Pin Description	Minimum Embed. Depth h_v in. (mm)	Hollow CMU				Grout-filled Concrete Masonry			
		Cell		Mortar Joint		Cell		Mortar Joint	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
Ballistic Point Pin (0.181"/0.150" Shank)	1 (25.4)	320 (1.4)	740 (3.3)	-	-	570 (2.6)	900 (4.1)	510 (2.3)	960 (4.3)
.300"/8mm Head Drive Pin or 1/4"-20 Threaded Stud (0.145" Shank)	1 (25.4)	320 (1.4)	740 (3.3)	-	-	570 (2.6)	900 (4.1)	510 (2.3)	960 (4.3)
3/8" Head Drive Pin (0.172" Shank)	1 (25.4)	-	-	-	-	740 (3.3)	850 (3.8)	-	-
3/8"-16 Threaded Stud (0.205" Shank)	1 (25.4)	160 (0.7)	670 (3.0)	-	-	860 (3.9)	1,460 (6.6)	1,060 (4.8)	1,030 (4.6)

1. Successful fastening to the face shell of Hollow CMU is typically done with the lightest powder load level.
2. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load.

Ultimate Load Capacities for Powder Actuated Fasteners in ASTM A 36 Steel¹

Pin Description	Shank Type	Nominal Steel Thickness									
		1/8"		3/16"		1/4"		3/8"		1/2"	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
Ballistic Point Pin (0.150" Shank)	Smooth	590 (2.7)	2,090 (9.4)	910 (4.1)	3,030 (13.6)	1,310 (5.9)	3,030 (13.6)	2,410 (10.8)	2,620 (11.8)	-	-
.300" Head Drive Pin 8mm Head Drive Pin (0.145" Shank)	Knurled	1,100 (5.0)	990 (4.5)	1,630 (7.3)	1,370 (6.2)	2,160 (9.7)	1,750 (7.9)	2,160 (9.7)	1,750 (7.9)	-	-
	Smooth	590 (2.7)	2,090 (9.4)	910 (4.1)	3,030 (13.6)	1,310 (5.9)	3,030 (13.6)	2,410 (10.8)	2,620 (11.8)	-	-
1/4"-20 Threaded Stud (0.145" Shank)	Knurled	1,100 (5.0)	2,230 (10.0)	1,630 (7.3)	2,770 (12.5)	2,160 (9.7)	3,300 (14.9)	2,560 (11.5)	3,760 (16.9)	-	-
3/8" Head Drive Pin (0.172" Shank)	Smooth	950 (4.3)	2,700 (12.2)	1,490 (6.7)	3,700 (16.7)	1,820 (8.2)	3,890 (17.5)	3,020 (13.6)	4,230 (19.0)	-	-
10mm Head Drive Pin (0.177" Shank)	Smooth	-	-	850 (3.8)	4,150 (18.7)	1,300 (5.9)	4,150 (18.7)	1,900 (8.6)	4,400 (19.8)	3,675 (16.5)	4,075 (18.3)
3/8"-16 Threaded Stud (0.205" Shank)	Knurled	1,120 (5.0)	2,770 (12.5)	2,700 (12.2)	5,460 (24.6)	3,730 (16.8)	8,090 (36.4)	-	-	-	-
Ceiling Clips – Standard (0.145" Shank)	Smooth	1,030 (4.6)	1,190 (5.4)	1,090 (4.9)	1,190 (5.4)	1,090 (4.9)	1,190 (5.4)	1,090 (4.9)	1,190 (5.4)	-	-
Ceiling Clips – Economy (0.145" Shank)	Smooth	950 (4.3)	1,290 (5.8)	1,090 (4.9)	1,290 (5.8)	1,090 (4.9)	1,290 (5.8)	1,090 (4.9)	1,290 (5.8)	-	-
Ceiling Clips – LADD Pin (0.152" Shank)	Smooth	1,180 (5.3)	1,200 (5.4)	1,180 (5.3)	1,200 (5.4)	1,180 (5.3)	1,200 (5.4)	1,180 (5.3)	1,200 (5.4)	-	-

1. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load.

Ultimate Load Capacities for Powder Actuated Fasteners in ASTM A 572 Steel¹

Pin Description	Shank Type	Nominal Steel Thickness									
		1/8"		3/16"		1/4"		3/8"		1/2"	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
10mm Head Drive Pin (0.177" Shank)	Smooth	1,275 (5.7)	3,850 (17.3)	-	-	1,800 (8.3)	3,900 (17.6)	2,275 (10.2)	4,250 (19.1)	-	-

1. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load.

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Ultimate Tension and Shear Load Capacities for 10mm Powder-Actuated Fasteners Installed in ASTM A 36 Steel Through Wood Members^{1,2}

Fastener Description	Shank Diameter in.	1/2-Inch Thick Steel		3/4-Inch Thick Steel		3/8-Inch Thick Steel	
		Structural Plywood		Structural Plywood		Nominal 2"x4" Douglas Fire Element	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
10mm Head Drive pin	0.177"	1,600 (7.2)	3,220 (14.5)	3,800 (17.1)	2,640 (11.9)	3,340 (15.0)	2,700 (12.2)

1. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 5.0 or greater to determine the allowable working load.
 2. Allowable capacities for wood members connected to the substrate must be investigated in accordance with accepted design criteria.

Ultimate and Allowable Tensile Pullover Capacities for Light Steel Framing with Powder-Actuated Fasteners^{1,2,3}

Pin Description	Head/Shank Diameter	Minimum Thickness of Sheet Steel or Framing Member									
		16 Gage		18 Gage		20 Gage		22 Gage		25 Gage	
		Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)
8mm Top Hat Pin	0.315"/0.145"	2,650 (11.9)	530 (2.4)	2,470 (11.1)	495 (2.2)	1,210 (5.4)	240 (1.1)	895 (4.0)	180 (0.8)	580 (2.6)	115 (0.5)
8mm Pin without Washer	0.315"/0.145"	-	-	1,470 (6.6)	295 (1.3)	1,050 (4.7)	210 (0.9)	730 (3.3)	145 (0.7)	415 (1.9)	85 (0.4)
8mm Pin with 1" Washer	0.315"/0.145"	-	-	1,575 (7.1)	310 (1.4)	1,185 (5.3)	235 (1.1)	990 (4.5)	200 (0.9)	795 (3.6)	160 (0.7)
.300" Pin with 7/8" washer	0.300"/0.145"	-	-	-	-	790 (3.6)	160 (0.7)	645 (2.9)	130 (0.6)	500 (2.3)	100 (0.5)
10mm Pin without Washer	0.390"/0.177"	2,330 (10.5)	465 (2.1)	1,750 (7.9)	350 (1.6)	1,185 (5.3)	235 (1.1)	890 (4.0)	180 (0.8)	590 (2.7)	120 (0.5)

1. Tabulated allowable pullover load values were tested in accordance with ICC-ES AC70 and are based on an applied safety factor of 5.0.
 2. Allowable pullover capacities of sheet steel or framing member should be compared to the fastener tensile load capacities in concrete, steel and masonry to determine the controlling resistance load.
 3. For pins with washer assemblies, the washer thickness is 14 gage minimum.

Approvals and Listings

International Code Council, Evaluation Service (ICC-ES) ER-5330
 City of Los Angeles (COLA) Research Report LARR-25304
 Factory Mutual Research Corporation (FM Approvals) – File No. J.I. 3002070 for 3/8" Threaded Studs

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