GENERAL INFORMATION

SPIKE®

Pin Anchor

PRODUCT DESCRIPTION

The Spike is a, one-piece, vibration resistant anchor for use in concrete block or stone. Several head styles, including tamperproof versions, and anchor materials are available. The Spike anchor is formed with an "s" shaped configuration at the working end of the anchor to create an expansion mechanism. Since the anchor is pre-formed, there is no secondary tightening operation required which greatly reduces the overall cost of an anchor installation.

GENERAL APPLICATIONS AND USES

- Tamperproof applications
- Cable trays and strut
- Available in corrosion resistance stainless steel for exterior applications
- Pipe hanging
- Metal track attachments
- Concrete formwork

FEATURES AND BENEFITS

+ Pre-expanded anchor design allows for easy installation
+ Mushroom and flat head Spike anchors are tamper-proof
+ Forming Spike, which is removable, can be used for temporary installations
+ Pipe and tie-wire Spike is a simple to install alternative to direct fastening (e.g. powder actuated)

APPROVALS AND LISTINGS

- Tested in accordance with ASTM E488 and AC01 criteria

GUIDE SPECIFICATIONS

CSI Divisions: 03 16 00 - Concrete Anchors, 04 05 19.16 - Masonry Anchors and 05 05 19 - Post-Installed Concrete Anchors. Pre-expanded anchors shall be Spike as supplied by DEWALT, Towson, MD. Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

MATERIAL SPECIFICATIONS

Carbon Steel (Mushroom Head, Flat Head, Pipe, Tie-Wire and Forming Spike)

Anchor Component	Component Material
Anchor Body	AISI 1038 Carbon Steel
Zinc Plating	ASTM B633, SC1, Type III (Fe/Zn5)

Stainless Steel (Mushroom Head)

Anchor Component	Component Material
Anchor Body	Type 316L Stainless Steel

SECTION CONTENTS

MUSHROOM HEAD SPIKE

FLAT HEAD SPIKE

PIPE SPIKE

TIE-WIRE SPIKE

FORMING SPIKE

HEAD STYLE

- Mushroom Head
- Flat Head
- Pipe (Coupler Head)
- Tie-Wire
- Forming

ANCHOR MATERIALS

- Zinc Plated Carbon Steel
- Type 316 Stainless Steel

ANCHOR SIZE RANGE (TYP.)

- 3/16" diameter through 1/2" diameters

SUITABLE BASE MATERIALS

- Normal-Weight Concrete
- Lightweight Concrete
- Grouted Concrete Masonry (CMU)

INSTALLATION SPECIFICATIONS

Mushroom Head Carbon Steel Spike

Dimension	Nominal Anchor Size, d			
	3/16"	1/4"	3/8"	1/2"
ANSI Drill Bit Size (in.)	3/16	1/4	3/8	1/2
Fixture Clearance Hole (in.)	1/4	5/16	7/16	9/16
Head Height (in.)	7/64	7/64	7/32	1/4
Head Size, O.D. (in.)	7/16	1/2	3/4	1

Mushroom Head Stainless Steel Spike

Dimension	Nominal Anchor Size, d		
	3/16"	1/4"	3/8"
ANSI Drill Bit Size (in.)	3/16	1/4	3/8
Fixture Clearance Hole (in.)	1/4	5/16	7/16
Head Height (in.)	7/64	7/64	7/32
Head Size, O.D. (in.)	7/16	1/2	3/4

Flat Head Spike (80°– 82° Head)

Dimension	Nominal Anchor Size, d	
	3/16"	1/4"
ANSI Drill Bit Size (in.)	3/16	1/4
Fixture Clearance Hole (in.)	1/4	5/16
Head Height (in.)	7/64	9/64
Head Size, O.D. (in.)	3/8	1/2

Pipe Spike

Dimension	Nominal Anchor Size, d	
	1/4"	3/8"
ANSI Drill Bit Size (in.)	3/16	1/4
UNC Thread Size	1/4-20	3/8-16
Head Height (in.)	1/2	5/8
Head Size, O.D. (in.)	13/32	35/64

Tie-Wire Spike

Dimension	Nominal Anchor Size, d	
	3/16"	1/4"
ANSI Drill Bit Size (in.)	3/16	1/4
Tie-Wire Hole (in.)	3/16	9/32
Head Height (in.)	37/64	41/64
Head Width (in.)	9/64 x 7/16	3/16 x 9/16

Forming Spike

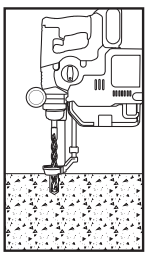
Dimension	Nominal Anchor Size, d	
	3/16"	1/4"
ANSI Drill Bit Size (in.)	3/16	1/4
Fixture Clearance Hole (in.)	1/4	5/16
Head Height (in.)	9/16	9/16
Head Size, O.D. (in.)	13/32	1/2

INSTALLATION INSTRUCTIONS

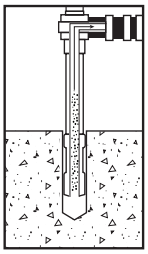
Mushroom/Flat Head Version

Using the proper diameter bit, drill a hole into the base material to a depth of at least one anchor diameter deeper than the embedment required.

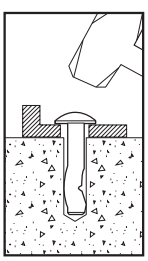
The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15



Remove dust and debris from the hole during drilling (e.g. dust extractor) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling.



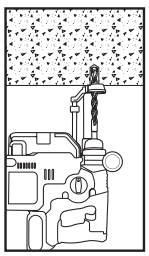
Drive the anchor through the fixture into the anchor hole until the head is firmly seated against the fixture. Be sure the anchor is driven to the required embedment depth.



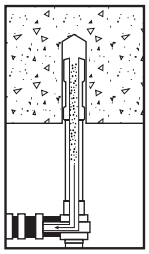
Pipe Spike Version

Using the proper diameter bit, drill a hole into the base material to a depth of at least one anchor diameter deeper than the embedment required.

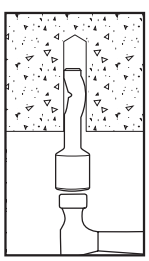
The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15



Remove dust and debris from the hole during drilling (e.g. dust extractor) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling.



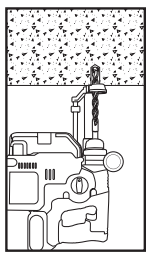
Drive the anchor into the hole until the head is firmly seated against the base material. Be sure the anchor is driven to the required embedment depth.



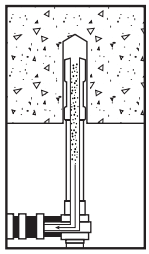
Tie-Wire Version

Using the proper diameter bit, drill a hole into the base material to a depth of at least one anchor diameter deeper than the embedment required.

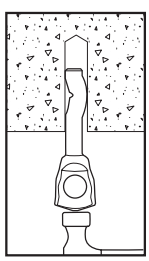
The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15



Remove dust and debris from the hole during drilling (e.g. dust extractor) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling.



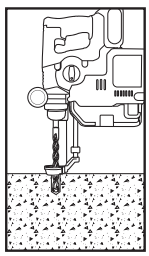
Drive the anchor into the hole until the head is firmly seated against the base material. Be sure the anchor is driven to the required embedment depth.



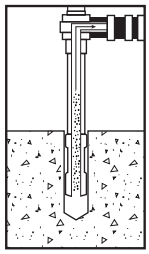
Forming Spike Version

Using the proper diameter bit, drill a hole into the base material to a depth of at least one anchor diameter deeper than the embedment required.

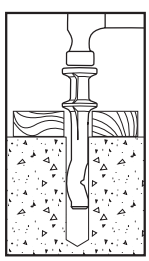
The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15



Remove dust and debris from the hole during drilling (e.g. dust extractor) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling.



Drive the anchor through the fixture into the anchor hole until the head is firmly seated against the fixture. Be sure the anchor is driven to the required embedment depth.



PERFORMANCE DATA

Ultimate Load Capacities for Carbon Steel Spike in Normal-Weight Concrete[1,2]

Anchor Diameter d in. (mm)	Minimum Embedment Depth 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)
3/16 (4.8)	7/8 (22.2)	520 (2.3)	1,080 (4.9)	560 (2.5)	1,270 (5.7)	660 (2.9)	1,310 (5.9)	690 (3.1)	1,350 (6.1)
	1 (25.4)	540 (2.4)	1,230 (5.5)	620 (2.8)	1,725 (7.8)	780 (3.5)	1,860 (8.4)	795 (3.5)	1,860 (8.4)
	1-1/4 (31.8)	780 (3.5)	1,800 (8.1)	900 (4.0)	2,000 (9.0)	1,060 (4.7)	2,155 (9.7)	1,120 (5.0)	2,310 (10.4)
1/4 (6.4)	1 (25.4)	620 (2.8)	1,585 (7.1)	775 (3.4)	1,965 (8.8)	835 (3.7)	2,160 (9.7)	885 (3.9)	2,360 (10.6)
	1-1/4 (31.8)	830 (3.7)	1,815 (8.2)	1,100 (4.9)	2,020 (9.1)	1,210 (5.4)	2,220 (10.0)	1,320 (5.9)	2,585 (11.6)
3/8 (9.5)	1-3/4 (44.5)	1,785 (8.0)	3,645 (16.4)	2,120 (9.5)	4,480 (20.2)	2,630 (11.8)	5,025 (22.6)	2,875 (12.9)	5,075 (22.8)
1/2 (12.7)	2-1/2 (63.5)	3,215 (14.5)	5,345 (24.1)	3,620 (16.3)	8,460 (38.1)	4,015 (18.1)	10,320 (46.4)	4,410 (19.8)	10,860 (48.9)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.

Allowable Load Capacities for Carbon Steel Spike in Normal-Weight Concrete[1,2,3]

Anchor Diameter d in. (mm)	Minimum Embedment Depth 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)
3/16 (4.8)	7/8 (22.2)	130 (0.6)	270 (1.2)	140 (0.6)	320 (1.4)	165 (0.7)	330 (1.5)	170 (0.8)	340 (1.5)
	1 (25.4)	135 (0.6)	310 (1.4)	155 (0.7)	430 (1.9)	195 (0.9)	465 (2.1)	200 (0.9)	465 (2.1)
	1-1/4 (31.8)	195 (0.9)	450 (2.0)	225 (1.0)	500 (2.3)	265 (1.2)	540 (2.4)	280 (1.2)	580 (2.6)
1/4 (6.4)	1 (25.4)	155 (0.7)	395 (1.8)	195 (0.9)	490 (2.2)	210 (0.9)	540 (2.4)	220 (1.0)	590 (2.7)
	1-1/4 (31.8)	210 (0.9)	455 (2.0)	275 (1.2)	505 (2.3)	300 (1.3)	555 (2.5)	330 (1.5)	645 (2.9)
3/8 (9.5)	1-3/4 (44.5)	445 (2.0)	910 (4.1)	530 (2.4)	1,120 (5.0)	660 (3.0)	1,255 (5.6)	720 (3.2)	1,270 (5.7)
1/2 (12.7)	2-1/2 (63.5)	805 (3.6)	1,335 (6.0)	905 (4.1)	2,115 (9.5)	1,005 (4.5)	2,580 (11.6)	1,105 (5.0)	2,715 (12.2)

1. Allowable load capacities are calculated using an applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.
3. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances. Allowable load capacities are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.

Ultimate Load Capacities for Stainless Steel Spike in Normal-Weight Concrete[1,2]

Anchor Diameter d in. (mm)	Minimum Embedment Depth 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)
3/16 (4.8)	7/8 (22.2)	490 (2.2)	920 (4.1)	560 (2.5)	1,155 (5.2)	660 (2.9)	1,220 (5.5)	690 (3.1)	1,290 (5.8)
	1 (25.4)	500 (2.3)	1,175 (5.3)	620 (2.8)	1,650 (7.4)	780 (3.5)	1,740 (7.8)	795 (3.5)	1,830 (8.2)
	1-1/4 (31.8)	740 (3.3)	1,735 (7.8)	900 (4.0)	1,930 (8.7)	1,060 (4.7)	2,040 (9.2)	1,120 (5.0)	2,150 (9.7)
1/4 (6.4)	1 (25.4)	620 (2.8)	1,565 (7.0)	775 (3.4)	1,845 (8.3)	835 (3.7)	2,095 (9.4)	885 (3.9)	2,250 (10.1)
	1-1/4 (31.8)	795 (3.6)	1,765 (7.9)	1,080 (4.9)	1,965 (8.8)	1,175 (5.2)	2,145 (9.7)	1,280 (5.7)	2,325 (10.5)
3/8 (9.5)	1-3/4 (44.5)	1,575 (7.1)	3,155 (14.2)	1,990 (9.0)	3,880 (17.5)	2,420 (10.9)	4,150 (18.7)	2,570 (11.6)	4,425 (19.9)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.

Allowable Load Capacities for Stainless Steel Spike in Normal-Weight Concrete[1,2,3]

Anchor Diameter d in. (mm)	Minimum Embedment Depth 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)
3/16 (4.8)	7/8 (22.2)	125 (0.6)	230 (1.0)	140 (0.6)	290 (1.3)	165 (0.7)	305 (1.4)	170 (0.8)	325 (1.5)
	1 (25.4)	125 (0.6)	295 (1.3)	155 (0.7)	415 (1.9)	195 (0.9)	435 (2.0)	200 (0.9)	460 (2.1)
	1-1/4 (31.8)	185 (0.8)	435 (2.0)	225 (1.0)	485 (2.2)	265 (1.2)	510 (2.3)	280 (1.7)	540 (2.4)
1/4 (6.4)	1 (25.4)	155 (0.7)	390 (1.8)	195 (0.9)	460 (2.1)	210 (0.9)	525 (2.4)	220 (1.0)	565 (2.5)
	1-1/4 (31.8)	200 (0.9)	440 (2.0)	270 (1.2)	490 (2.2)	295 (1.3)	535 (2.4)	320 (1.4)	580 (2.6)
3/8 (9.5)	1-3/4 (44.5)	395 (1.8)	790 (3.6)	500 (2.3)	970 (4.4)	605 (2.7)	1,040 (4.7)	645 (2.9)	1,105 (5.0)

1. Allowable load capacities are calculated using an applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.
3. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances. Allowable load capacities are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.

Ultimate Load Capacities for Carbon Steel Pipe Spike in Normal-Weight Concrete[1,2]

Anchor Diameter d in. (mm)	Drill Bit Diameter in.	Minimum Embedment Depth 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)
1/4 (6.4)	3/16	1-1/4 (31.8)	780 (3.5)	975 (4.4)	1,260 (5.7)	975 (4.4)	1,260 (5.7)	975 (4.4)	1,260 (5.7)	975 (4.4)
3/8 (9.5)	1/4	1-3/4 (44.5)	1,100 (5.0)	1,815 (8.2)	1,660 (7.5)	2,020 (9.1)	2,000 (9.0)	2,100 (9.5)	2,000 (9.0)	2,180 (9.8)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.

Allowable Load Capacities for Carbon Steel Pipe Spike in Normal-Weight Concrete[1,2,3]

Anchor Diameter d in. (mm)	Drill Bit Diameter in.	Minimum Embedment Depth 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)
1/4 (6.4)	3/16	1-1/4 (31.8)	195 (0.9)	245 (1.1)	315 (1.4)	245 (1.1)	315 (1.4)	245 (1.1)	315 (1.4)	245 (1.1)
3/8 (9.5)	1/4	1-3/4 (44.5)	275 (1.2)	455 (2.0)	415 (1.9)	505 (2.3)	500 (2.3)	525 (2.4)	500 (2.3)	545 (2.5)

1. Allowable load capacities are calculated using an applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.
3. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances. Allowable load capacities are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.

Ultimate Load Capacities for Carbon Steel Tie-Wire Spike in Normal-Weight Concrete[1,2]

Anchor Diameter d in. (mm)	Minimum Embedment Depth in. (mm)	Minimum Concrete Compressive Strength (f'c)					
		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)
3/16 (4.8)	1-1/8 (28.6)	975 (4.4)	950 (4.3)	1,050 (4.7)	950 (4.3)	1,120 (5.0)	950 (4.3)
1/4 (6.4)	1-1/8 (28.6)	1,075 (4.8)	1,310 (5.9)	1,150 (5.2)	1,310 (5.9)	1,230 (5.5)	1,310 (5.9)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.

Allowable Load Capacities for Carbon Steel Tie-Wire Spike in Normal-Weight Concrete[1,2,3]

Anchor Diameter d in. (mm)	Minimum Embedment Depth , in. (mm)	Minimum Concrete Compressive Strength (f'c)					
		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)
3/16 (4.8)	1-1/8 (28.6)	245 (1.1)	240 (1.1)	265 (1.2)	240 (1.1)	280 (1.3)	240 (1.1)
1/4 (6.4)	1-1/8 (28.6)	270 (1.2)	330 (1.5)	290 (1.3)	330 (1.5)	310 (1.4)	330 (1.5)

1. Allowable load capacities are calculated using an applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.
3. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances. Allowable load capacities are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.

Ultimate Load Capacities for Carbon Steel Forming Spike in Normal-Weight Concrete[1,2]

Anchor Diameter d in. (mm)	Minimum Embedment Depth 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)
3/16 (4.8)	1-1/4 (31.8)	780 (3.5)	1,800 (8.1)	1,000 (4.5)	2,000 (9.0)	1,260 (5.7)	2,155 (9.7)	1,260 (5.7)	2,310 (10.4)
1/4 (6.4)	1-1/4 (31.8)	830 (3.7)	1,815 (8.2)	1,200 (5.4)	2,020 (9.1)	1,410 (6.3)	2,220 (10.0)	1,410 (6.3)	2,585 (11.6)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.

Allowable Load Capacities for Carbon Steel Forming Spike in Normal-Weight Concrete[1,2,3]

Anchor Diameter d in. (mm)	Minimum Embedment Depth 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)
3/16 (4.8)	1-1/4 (31.8)	195 (0.9)	450 (2.0)	250 (1.1)	500 (2.3)	315 (1.4)	540 (2.4)	315 (1.4)	580 (2.6)
1/4 (6.4)	1-1/4 (31.8)	210 (0.9)	455 (2.0)	300 (1.4)	505 (2.3)	355 (1.6)	555 (2.5)	355 (1.6)	645 (2.9)

1. Allowable load capacities are calculated using an applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.
3. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances. Allowable load capacities are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.

Ultimate Load Capacities for Spike in Lightweight Concrete[1,2,3]

Anchor Diameter d in. (mm)	Minimum Embedment Depth in. (mm)	Minimum Concrete Compressive Strength (f'c)					
		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)
3/16 (4.8)	1-1/8 (28.6)	440 (2.0)	1,280 (5.8)	400 (1.8)	1,280 (5.8)	380 (1.7)	1,280 (5.8)
1/4 (6.4)	1-1/8 (28.6)	480 (2.2)	1,720 (7.7)	440 (2.0)	1,720 (7.7)	400 (1.8)	1,720 (7.7)
3/8 (9.5)	1-3/4 (44.5)	1,140 (5.1)	3,000 (13.5)	960 (4.3)	3,000 (13.5)	800 (3.6)	3,000 (13.5)
1/2 (12.7)	2-1/2 (63.5)	1,860 (8.4)	6,440 (29.0)	1,860 (8.4)	6,440 (29.0)	1,860 (8.4)	6,440 (29.0)

1. Tabulated load values are applicable to carbon and stainless steel anchors.
2. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
3. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety or overhead.

Allowable Load Capacities for Spike in Lightweight Concrete[1,2,3,4]

Anchor Diameter d in. (mm)	Minimum Embedment Depth in. (mm)	Minimum Concrete Compressive Strength (f'c)					
		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)
3/16 (4.8)	1-1/8 (28.6)	110 (0.5)	320 (1.4)	100 (0.5)	320 (1.4)	95 (0.4)	320 (1.4)
1/4 (6.4)	1-1/8 (28.6)	120 (0.5)	430 (1.9)	110 (0.5)	430 (1.9)	100 (0.5)	430 (1.9)
3/8 (9.5)	1-3/4 (44.5)	285 (1.3)	750 (3.4)	240 (1.1)	750 (3.4)	200 (0.9)	750 (3.4)
1/2 (12.7)	2-1/2 (63.5)	465 (2.1)	1,610 (7.2)	465 (2.1)	1,610 (7.2)	465 (2.1)	1,610 (7.2)

1. Tabulated load values are applicable to carbon and stainless steel anchors.
2. Allowable load capacities are calculated using an applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
3. Linear interpolation may be used to determine ultimate loads for intermediate compressive strengths.
4. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances. Allowable load capacities are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances.

Ultimate and Allowable Load Capacities for Spike Anchors in Concrete Over Steel Deck[1,2]

Anchor Diameter d in. (mm)	Minimum Embedment Depth in. (mm)	Lightweight Concrete Over Steel Deck f´c ≥ 3,000 psi (20.7 MPa) Minimum 1-1/2" Wide Deck, 20 Gage Minimum			
		Ultimate Load		Allowable Load	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	1-1/4 (31.8)	560 (2.5)	2,000 (9.0)	140 (0.6)	500 (2.3)
1/4 (6.4)	1-1/4 (31.8)	560 (2.5)	2,000 (9.0)	140 (0.6)	500 (2.3)
3/8 (9.5)	1-3/4 (44.5)	600 (2.7)	2,620 (11.8)	150 (0.7)	655 (2.9)
1/2 (12.7)	2-1/2 (63.5)	1,120 (5.0)	3,020 (13.6)	280 (1.3)	755 (3.4)

1. Tabulated load values are for carbon steel and stainless steel anchors installed in sand-lightweight concrete over steel deck. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Allowable load capacities are calculated using a safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
3. Spacing distances shall be in accordance with the spacing table for lightweight concrete.
4. Anchors are permitted to be installed in the lower or upper flute of the steel deck provided the proper installation procedures are maintained. Minimum flute edge distance is 7/8-inch.

Ultimate and Allowable Load Capacities for Spike in Grouted Concrete Masonry[1,2,3,4]

Anchor Diameter d in. (mm)	Minimum Embedment Depth in. (mm)	f´m ≥ 1,500 psi (10.4 MPa) Minimum 6" Wide CMU							
		Ultimate Load				Allowable Load			
		Carbon Steel Spike		Stainless Steel Spike		Carbon Steel Spike		Stainless Steel Spike	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
3/16 (4.8)	7/8 (22.2)	280 (1.3)	540 (2.4)	280 (1.3)	540 (2.4)	55 (0.2)	110 (0.5)	55 (0.2)	110 (0.5)
	1 (25.4)	410 (1.8)	590 (2.7)	310 (1.4)	590 (2.7)	80 (0.4)	120 (0.5)	60 (0.3)	120 (0.5)
	1-1/4 (31.8)	740 (3.3)	1,090 (4.9)	730 (3.3)	1,980 (8.9)	150 (0.7)	420 (1.9)	145 (0.7)	395 (1.8)
1/4 (6.4)	1 (25.4)	670 (3.0)	1,840 (8.3)	645 (2.9)	1,620 (7.3)	135 (0.6)	370 (1.7)	130 (0.6)	325 (1.5)
	1-1/4 (31.8)	800 (3.6)	2,100 (9.5)	770 (3.5)	1,890 (8.5)	160 (0.7)	420 (1.9)	155 (0.7)	380 (1.7)

1. Tabulated load values are for anchors installed in minimum 6-inch wide, minimum Grade N, Type II, medium-weight or normal-weight concrete masonry units conforming to ASTM C 90. Mortar must be minimum Type N. Masonry cells may be grouted. Masonry compressive strength must be at the specified minimum at the time of installation (f'm ≥ 1,500 psi)
2. Allowable load capacities listed are calculated using and applied safety factor of 5.0. Consideration of safety factors of 10 or higher may be necessary depending upon the application such as life safety, and in sustained tensile loading applications.
3. Linear interpolation may be used to determine allowable load capacities for intermediate embedments.
4. The tabulated values are for anchors installed at a minimum spacing and edge distance of 16 anchor diameters.

DESIGN CRITERIA

Combined Loading

For anchors loaded in both shear and tension, the combination of loads should be proportioned as follows:

$$\left(\frac{Nu}{Nn}\right) + \left(\frac{Vu}{Vn}\right) \leq 1$$

Where: N_u = Applied Service Tension Load; N_n = Allowable Tension Load; V_u = Applied Service Shear Load; V_n = Allowable Shear Load

LOAD ADJUSTMENT FACTORS FOR SPACING AND EDGE DISTANCES[1]

Anchor Installed in Normal-Weight Concrete

Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 2.0h_v$	$F_{NS} = F_{VS} = 1.0$	$s_{min} = h_v$	$F_{NS} = F_{VS} = 0.50$
Edge Distance (c)	Tension	$c_{cr} = 14d$	$F_{NC} = 1.0$	$c_{min} = 5d$	$F_{NC} = 0.80$
	Shear	$c_{cr} = 14d$	$F_{VC} = 1.0$	$c_{min} = 5d$	$F_{VC} = 0.50$

Anchor Installed in Lightweight Concrete

Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 3.0h_v$	$F_{NS} = F_{VS} = 1.0$	$s_{min} = 1.5h_v$	$F_{NS} = F_{VS} = 0.50$
Edge Distance (c)	Tension	$c_{cr} = 14d$	$F_{NC} = 1.0$	$c_{min} = 7d$	$F_{NC} = 0.80$
	Shear	$c_{cr} = 14d$	$F_{VC} = 1.0$	$c_{min} = 7d$	$F_{VC} = 0.50$

1. Allowable load values found in the performance data tables are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances. Linear interpolation is allowed for intermediate anchor spacing and edge distances between critical and minimum distances. When an anchor is affected by both reduced spacing and edge distance, the spacing and edge reduction factors must be combined (multiplied). Multiple reduction factors for anchor spacing and edge distance may be required depending on the anchor group configuration.

DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)

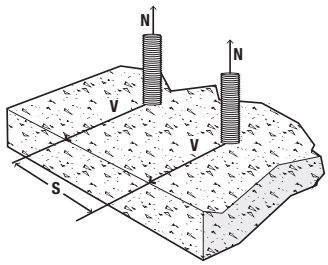
LOAD ADJUSTMENT FACTORS FOR NORMAL-WEIGHT CONCRETE

Spacing, Tension (F_{NS}) & Shear (F_{VS})

Dia. (in.)		3/16			1/4			3/8	1/2
h_v (in.)		7/8	1	1-1/4	7/8	1	1-1/4	2-1/2	2-3/4
s_{cr} (in.)		1-3/4	2	2-1/2	1-3/4	2	2-1/2	5	5-1/2
s_{min} (in.)		7/8	1	1-1/4	7/8	1	1-1/4	2-1/2	2-3/4
Distance (inches)	7/8	0.50	-	-	0.50	-	-	-	-
	1	0.57	0.50	-	0.57	0.50	-	-	-
	1-1/4	0.71	0.63	0.50	0.71	0.63	0.50	-	-
	1-1/2	0.86	0.75	0.60	0.86	0.75	0.60	-	-
	1-3/4	1.00	0.88	0.70	1.00	0.88	0.70	-	-
	2	1.00	1.00	0.80	1.00	1.00	0.80	-	-
	2-1/2	1.00	1.00	1.00	1.00	1.00	1.00	0.50	-
	2-3/4	1.00	1.00	1.00	1.00	1.00	1.00	0.55	0.50
	3	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.55
	4	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.73
	5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91
	5-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Notes: For anchors loaded in tension and shear, the critical spacing (s_{cr}) is equal to 2 embedment depths ($2h_v$) at which the anchor achieves 100% of load.

Minimum spacing (s_{min}) is equal to 1 embedment depth (h_v) at which the anchor achieves 50% of load.

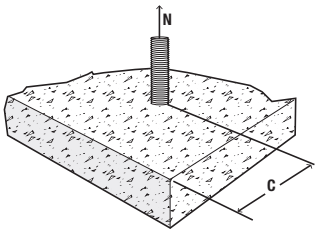


Edge Distance, Tension (F_{NC})

Dia. (in.)		3/16	1/4	3/8	1/2
c_{cr} (in.)		2-5/8	3-1/2	5-1/4	7
c_{min} (in.)		1	1-1/4	1-7/8	2-1/2
Distance (inches)	1	0.50	-	-	-
	1-1/4	0.59	0.50	-	-
	1-7/8	0.78	0.64	0.50	-
	2	0.81	0.67	0.52	-
	2-1/2	0.96	0.78	0.59	0.50
	2-5/8	1.00	0.81	0.61	0.51
	3	1.00	0.89	0.67	0.56
	3-1/2	1.00	1.00	0.74	0.61
	4	1.00	1.00	0.81	0.67
	5	1.00	1.00	0.96	0.78
	5-1/4	1.00	1.00	1.00	0.81
	6	1.00	1.00	1.00	0.89
	7	1.00	1.00	1.00	1.00

Notes: For anchors loaded in tension, the critical edge distance (c_{cr}) is equal to 14 anchor diameters (14d) at which the anchor achieves 100% of load.

Minimum edge distance (c_{min}) is equal to 5 anchor diameters (5d) at which the anchor achieves 50% of load.

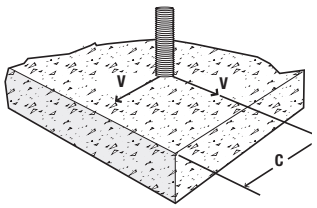


Edge Distance, Shear (F_{VC})

Dia. (in.)		3/16	1/4	3/8	1/2
c_{cr} (in.)		2-5/8	3-1/2	5-1/4	7
c_{min} (in.)		1	1-1/4	1-7/8	2-1/2
Distance (inches)	1	0.25	-	-	-
	1-1/4	0.39	0.25	-	-
	1-7/8	0.67	0.46	0.25	-
	2	0.72	0.50	0.28	-
	2-1/2	0.94	0.67	0.39	0.25
	2-5/8	1.00	0.71	0.42	0.27
	3	1.00	0.83	0.50	0.33
	3-1/2	1.00	1.00	0.61	0.42
	4	1.00	1.00	0.72	0.50
	5	1.00	1.00	0.94	0.67
	5-1/4	1.00	1.00	1.00	0.71
	6	1.00	1.00	1.00	0.83
	7	1.00	1.00	1.00	1.00

Notes: For anchors loaded in shear, the critical edge distance (c_{cr}) is equal to 14 anchor diameters (14d) at which the anchor achieves 100% of load.

Minimum edge distance (c_{min}) is equal to 5 anchor diameters (5d) at which the anchor achieves 25% of load.



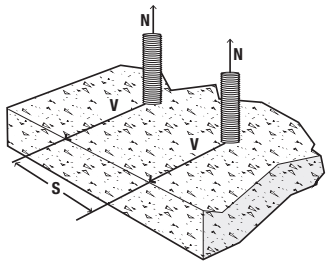
LOAD ADJUSTMENT FACTORS FOR LIGHTWEIGHT CONCRETE

Spacing, Tension (F_{NS}) & Shear (F_{VS})

Dia. (in.)		3/16			1/4			3/8	1/2
h_v (in.)		7/8	1	1-1/4	7/8	1	1-1/4	2-1/2	2-3/4
s_{cr} (in.)		2-5/8	3	3-3/4	2-5/8	3	3-3/4	7-1/2	8-1/4
s_{min} (in.)		1-3/8	1-1/2	1-7/8	1-3/8	1-1/2	1-7/8	3-3/4	4-1/8
Distance (inches)	1-3/8	0.50	-	-	0.50	-	-	-	-
	1-1/2	0.57	0.50	-	0.57	0.50	-	-	-
	1-7/8	0.71	0.63	0.50	0.71	0.63	0.50	-	-
	1-1/2	0.57	0.50	0.40	0.57	0.50	0.40	-	-
	2-5/8	1.00	0.88	0.70	1.00	0.88	0.70	-	-
	3	1.00	1.00	0.80	1.00	1.00	0.80	-	-
	3-3/4	1.00	1.00	1.00	1.00	1.00	1.00	0.50	-
	4	1.00	1.00	1.00	1.00	1.00	1.00	0.53	-
	4-1/8	1.00	1.00	1.00	1.00	1.00	1.00	0.55	0.50
	5	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.61
	6	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.73
	7	1.00	1.00	1.00	1.00	1.00	1.00	0.93	0.85
	7-1/2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91
	8-1/4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Notes: For anchors loaded in tension and shear, the critical spacing (s_{cr}) is equal to 3 embedment depths ($3h_v$) at which the anchor achieves 100% of load.

Minimum spacing (s_{min}) is equal to 1.5 embedment depth ($1.5h_v$) at which the anchor achieves 50% of load.

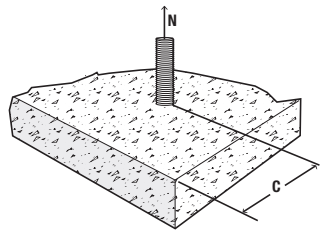


Edge Distance, Tension (F_{NC})

Dia. (in.)		3/16	1/4	3/8	1/2
c_{cr} (in.)		2-5/8	3-1/2	5-1/4	7
c_{min} (in.)		1-3/8	1-3/4	2-5/8	3-1/2
Distance (inches)	1-3/8	0.50	-	-	-
	1-3/4	0.67	0.50	-	-
	2	0.76	0.57	-	-
	2-5/8	1.00	0.75	0.50	-
	3	1.00	0.86	0.57	-
	3-1/2	1.00	1.00	0.67	0.50
	4	1.00	1.00	0.76	0.57
	5	1.00	1.00	0.95	0.71
	5-1/4	1.00	1.00	1.00	0.75
	6	1.00	1.00	1.00	0.86
	7	1.00	1.00	1.00	1.00

Notes: For anchors loaded in tension, the critical edge distance (c_{cr}) is equal to 14 anchor diameters (14d) at which the anchor achieves 100% of load.

Minimum edge distance (c_{min}) is equal to 7 anchor diameters (7d) at which the anchor achieves 50% of load.

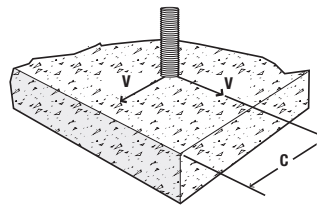


Edge Distance, Shear (F_{VC})

Dia. (in.)		3/16	1/4	3/8	1/2
c_{cr} (in.)		2-5/8	3-1/2	5-1/4	7
c_{min} (in.)		1-3/8	1-3/4	2-5/8	3-1/2
Distance (inches)	1-3/8	0.40	-	-	-
	1-3/4	0.60	0.40	-	-
	2	0.71	0.49	-	-
	2-5/8	1.00	0.70	0.40	-
	3	1.00	0.83	0.49	-
	3-1/2	1.00	1.00	0.60	0.40
	4	1.00	1.00	0.71	0.49
	5	1.00	1.00	0.94	0.66
	5-1/4	1.00	1.00	1.00	0.70
	6	1.00	1.00	1.00	0.83
	7	1.00	1.00	1.00	1.00

Notes: For anchors loaded in shear, the critical edge distance (c_{cr}) is equal to 14 anchor diameters (14d) at which the anchor achieves 100% of load.

Minimum edge distance (c_{min}) is equal to 7 anchor diameters (7d) at which the anchor achieves 40% of load.



ORDERING INFORMATION

Mushroom Head Spike (Tamperproof)

Carbon Steel Cat. No.	Stainless Steel Cat. No.	Anchor Size	Drill Diameter	Min. Embed.	Std. Box	Std. Carton	Wt./100
5502	6602	3/16" x 1"	3/16"	7/8"	100	1,000	1-1/4
5503	6603	3/16" x 1-1/4"	3/16"	7/8"	100	1,000	1-1/2
5504	6604	3/16" x 1-1/2"	3/16"	1-1/4"	100	1,000	1-3/4
5506	6606	3/16" x 2"	3/16"	1-1/4"	100	1,000	2
5508	-	3/16" x 2-1/2"	3/16"	1-1/4"	100	600	2
5510	-	3/16" x 3"	3/16"	1-1/4"	100	600	2-1/2
5511	-	3/16" x 3-1/2"	3/16"	1-1/4"	100	600	3-1/2
5512	-	3/16" x 4"	3/16"	1-1/4"	100	600	4
5522	-	1/4" x 1"	1/4"	7/8"	100	1,000	1-1/2
5523	6623	1/4" x 1-1/4"	1/4"	1"	100	1,000	2-1/4
5524	6624	1/4" x 1-1/2"	1/4"	1-1/4"	100	1,000	2-1/2
5526	6626	1/4" x 2"	1/4"	1-1/4"	100	600	3
5528	6628	1/4" x 2-1/2"	1/4"	1-1/4"	100	600	4
5530	6630	1/4" x 3"	1/4"	1-1/4"	100	600	4-1/2
5531	-	1/4" x 3-1/2"	1/4"	1-1/4"	100	600	4-1/2
5532	-	1/4" x 4"	1/4"	1-1/4"	100	600	5-1/2
5546	6646	3/8" x 2"	3/8"	1-3/4"	25	250	7-1/2
5548	6648	3/8" x 2-1/2"	3/8"	1-3/4"	25	150	9
5550	6650	3/8" x 3"	3/8"	1-3/4"	25	150	10
5551	-	3/8" x 3-1/2"	3/8"	1-3/4"	25	150	11
5552	-	3/8" x 4"	3/8"	1-3/4"	25	150	11
5554	-	3/8" x 5"	3/8"	1-3/4"	25	150	11
5556	-	3/8" x 6"	3/8"	1-3/4"	25	125	11
5569	-	1/2" x 2-3/4"	1/2"	2-1/2"	50	200	13
5571	-	1/2" x 3-1/2"	1/2"	2-1/2"	50	150	13
5572	-	1/2" x 4"	1/2"	2-1/2"	25	125	13
5574	-	1/2" x 5"	1/2"	2-1/2"	25	125	13
5577	-	1/2" x 6-1/2"	1/2"	2-1/2"	25	100	13

The published length is measured from below the head to the end of the anchor.

Flat Head Carbon Steel Spike (Tamperproof)

Cat. No.	Anchor Size	Drill Diameter	Min. Embed.	Std. Box	Std. Carton	Wt./100
5608	3/16"x 2-1/2"	3/16"	1-1/4"	100	600	2
5610	3/16" x 3"	3/16"	1-1/4"	100	600	2-1/2
5612	3/16" x 4"	3/16"	1-1/4"	100	600	4
5624	1/4" x 1-1/2"	1/4"	1-1/4"	100	1,000	2-1/2
5626	1/4" x 2"	1/4"	1-1/4"	100	600	3
5628	1/4" x 2-1/2"	1/4"	1-1/4"	100	600	3-3/4
5630	1/4" x 3"	1/4"	1-1/4"	100	600	4-1/2
5631	1/4" x 3-1/2"	1/4"	1-1/4"	100	600	5
5632	1/4" x 4"	1/4"	1-1/4"	100	500	5-3/4

The published length is the overall length of the anchor.

Pipe Spike

Cat.No.	Anchor Size	Drill Diameter	Min. Embed.	Std. Box	Std. Carton	Wt./100
3755	1/4"	3/16"	1-1/4"	100	600	4
3758	3/8"	1/4"	1-3/4"	50	300	6

Designed for rod hanging.

Tie-Wire Spike

Catalog Number	Anchor Size	Drill Diameter	Minimum Embed.	Tie Wire Hole Size	Standard Box	Standard Carton	Wt./100
3756	3/16"	3/16"	1-1/8"	3/16"	100	600	2
3759	1/4"	1/4"	1-1/8"	9/32"	100	600	2-1/2

Designed for suspended ceilings.

Forming Spike

Cat. No.	Anchor Size	Drill Diameter	Min. Embed.	Std. Box	Std. Carton	Wt./100
3795	3/16" x 1-1/2"	3/16"	1-1/4"	100	600	2-1/2
3796	3/16" x 2"	3/16"	1-1/4"	100	600	3
3797	3/16" x 2-3/4"	3/16"	1-1/4"	100	600	4
3794	1/4" x 2-3/4"	1/4"	1-1/4"	100	500	5

Designed for concrete forming. The published length is measured from below the head to the end of the anchor.