

**Steel Dropin** *Internally Threaded Expansion Anchor*

**PRODUCT DESCRIPTION**

The Steel Dropin is an all-steel, machine bolt anchor available in carbon steel and two types of stainless steel. It can be used in solid concrete, hard stone, and solid block base materials. A coil thread version for forming applications is also available.

**GENERAL APPLICATIONS AND USES**

- Suspending Conduit
- Cable Trays and Strut
- Pipe Supports
- Fire Sprinkler
- Concrete Formwork
- Suspended Lighting

**FEATURES AND BENEFITS**

- Internally threaded anchor for easy removability and service work
- Flanged (lipped) version installs flush for easy inspection and standard embedment
- Smooth wall dropin can be installed flush mounted or below the base material surface
- Optionally available with a knurled body
- Coil thread version accepts coil rod and typically used for concrete formwork applications

**TESTING, APPROVALS AND LISTINGS**

Tested in accordance with ASTM 488 and AC01 criteria  
 FM Global (Factory Mutual) - File No. J.I. OK4A9.AH (see ordering information)  
 Underwriters Laboratory (UL Listed) – File No. EX1289 (N) (see ordering information)  
 CalTrans listing for “Shell Mechanical Expansion Anchors”

**GUIDE SPECIFICATIONS**

**CSI Divisions:** 03151-Concrete Anchoring and 05090-Metal Fastenings. Dropin anchors shall be Steel Dropin as supplied by Powers Fasteners, Inc., Brewster, NY.

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**Smooth Wall Dropin**



**Flange (Lipped) Dropin**

**THREAD VERSION**

UNC Coarse Thread  
 Coil Thread

**ANCHOR MATERIALS**

Zinc Plated Carbon Steel  
 303 Stainless Steel  
 316 Stainless Steel

**ROD/ANCHOR SIZE RANGE (TYP.)**

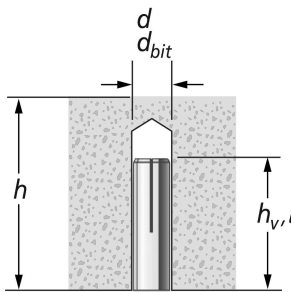
1/4" to 3/4" diameter UNC Coarse Thread  
 1/2" and 3/4" diameter Coil Thread

**SUITABLE BASE MATERIALS**

Normal-weight Concrete  
 Structural Lightweight Concrete  
 (uncracked base materials)

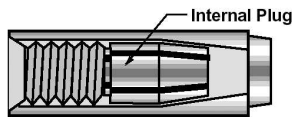
**INSTALLATION SPECIFICATIONS**

Anchor (Rod) Size	Rod/Anchor Diameter, $d$						
	1/4"	3/8"	1/2"	1/2" Coil Thread	5/8"	3/4"	3/4" Coil Thread
ANSI Drill Bit Size, $d_{bit}$ (in.)	3/8	1/2	5/8	5/8	7/8	1	1
Maximum Tightening Torque, $T_{max}$ (ft.-lbs.)	5	10	20	20	40	80	80
Thread Size (UNC)	1/4-20	3/8-16	1/2-13	1/2-6	5/8-11	3/4-10	3/4-4 1/2
Thread Depth (in.)	7/16	5/8	13/16	13/16	1 3/16	1 3/8	1 3/8
Flange Size (in.)	7/16	9/16	45/64	–	–	–	–
Anchor Length $l$ , $h_v$ (in.)	1	1 9/16	2	2	2 1/2	3 3/16	3 3/16



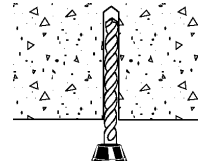
**Nomenclature**

- $d$  = Diameter of anchor
- $d_{bit}$  = Diameter of drill bit
- $h$  = Base material thickness.  
The minimum value of  $h$  should be  $1.5h_v$  or 3" min. (whichever is greater)
- $h_v$  = Minimum embedment depth
- $l$  = Overall length of anchor
- $T_{max}$  = Maximum tightening torque

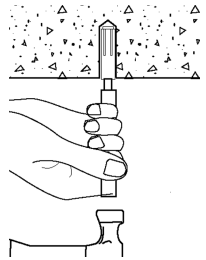


**Installation Procedure**

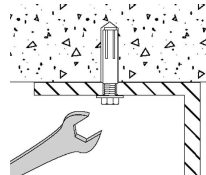
Drill a hole into the base material to the depth of embedment required. The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15. Do not over drill the hole unless the application calls for a subset anchor.



Blow the hole clean of dust and other materials. Insert the anchor into the hole and tap flush with surface. Using a Powers setting tool specifically, set the anchor by driving the tool with a sufficient number of hammer blows until the shoulder of the tool is seated against the anchor. Anchor will not hold allowable loads required if shoulder of Powers setting tool does not seat against anchor.



If using a fixture, position it, insert bolt and tighten. Most overhead applications utilize threaded rod. Minimum thread engagement should be at least one anchor diameter.



**MATERIAL SPECIFICATIONS**

Anchor Component	Carbon Steel	Type 303 Stainless Steel	Type 316 Stainless Steel
Anchor Body	AISI 1008	Type 303 Stainless Steel	Type 316 Stainless Steel
Plug	AISI 1018	Type 303 Stainless Steel	Type 316 Stainless Steel
Zinc Plating	ASTM B633, SC1, Type III (Fe/Zn 5)		

Stainless steel anchor components are passivated.

**PERFORMANCE DATA**

**Ultimate Load Capacities for Steel Dropin in Normal-Weight Concrete<sup>1,2,3</sup>**

Rod/Anchor Diameter <i>d</i> in. (mm)	Minimum Embedment Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )					
		2,000 psi (13.8 MPa)		4,000 psi (27.6 MPa)		6,000 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)	1 (25.4)	1,140 (5.1)	2,120 (9.5)	1,985 (8.9)	2,120 (9.5)	2,080 (9.4)	2,120 (9.5)
3/8 (9.5)	1 9/16 (39.7)	2,180 (9.8)	4,585 (20.6)	4,180 (18.8)	4,585 (20.6)	4,950 (22.3)	4,585 (20.6)
1/2 (12.7)	2 (50.8)	4,105 (18.5)	6,400 (28.8)	5,760 (25.9)	6,400 (28.8)	6,585 (29.6)	6,400 (28.8)
5/8 (15.9)	2 1/2 (63.5)	4,665 (21.0)	12,380 (55.7)	7,440 (33.5)	12,380 (55.7)	10,920 (49.1)	12,380 (55.7)
3/4 (19.1)	3 3/16 (81.0)	8,580 (38.6)	15,680 (70.6)	14,405 (64.8)	15,680 (70.6)	17,300 (77.9)	15,680 (70.6)

1. Tabulated load values are applicable to carbon and stainless steel anchors.
2. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 4.0 or greater to determine the allowable working load. 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.

**Allowable Load Capacities for Steel Dropin in Normal-Weight Concrete<sup>1,2,3</sup>**

Rod/Anchor Diameter <i>d</i> in. (mm)	Minimum Embedment Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )					
		2,000 psi (13.8 MPa)		4,000 psi (27.6 MPa)		6,000 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)	1 (25.4)	285 (1.3)	530 (2.4)	495 (2.2)	530 (2.4)	520 (2.3)	530 (2.4)
3/8 (9.5)	1 9/16 (39.7)	545 (2.5)	1,145 (5.2)	1,045 (4.7)	1,145 (5.2)	1,240 (5.6)	1,145 (5.2)
1/2 (12.7)	2 (50.8)	1,025 (4.6)	1,600 (7.2)	1,440 (6.5)	1,600 (7.2)	1,645 (7.4)	1,600 (7.2)
5/8 (15.9)	2 1/2 (63.5)	1,165 (5.2)	3,095 (13.9)	1,860 (8.4)	3,095 (13.9)	2,730 (12.3)	3,095 (13.9)
3/4 (19.1)	3 3/16 (81.0)	2,145 (9.7)	3,920 (17.6)	3,600 (16.2)	3,920 (17.6)	4,325 (19.5)	3,920 (17.6)

1. Tabulated load values are applicable to carbon and stainless steel anchors.
2. Allowable load capacities listed 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 allowable loads for intermediate compressive strengths.

**Ultimate Load Capacities for Steel Dropin in Structural Lightweight Concrete<sup>1,2,3</sup>**

Rod/Anchor Diameter <i>d</i> in. (mm)	Minimum Embedment Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )					
		2,000 psi (13.8 MPa)		4,000 psi (27.6 MPa)		6,000 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)	1 (25.4)	1,060 (4.8)	1,920 (8.6)	1,360 (6.1)	1,920 (8.6)	1,660 (7.5)	1,920 (8.6)
3/8 (9.5)	1 9/16 (39.7)	3,040 (13.7)	4,120 (18.5)	3,780 (17.0)	4,120 (18.5)	4,520 (20.3)	4,120 (18.5)
1/2 (12.7)	2 (50.8)	4,240 (19.1)	5,680 (25.6)	4,840 (21.8)	5,680 (25.6)	5,460 (24.6)	5,680 (25.6)
5/8 (15.9)	2 1/2 (63.5)	6,860 (30.9)	9,640 (43.4)	7,840 (35.3)	9,640 (43.4)	8,840 (39.8)	9,640 (43.4)
3/4 (19.1)	3 3/16 (81.0)	10,280 (46.3)	16,460 (74.1)	11,700 (52.7)	16,460 (74.1)	13,120 (59.0)	16,460 (74.1)

1. Tabulated load values are applicable to carbon and stainless steel anchors.
2. The values listed above are ultimate load capacities which should be reduced by a minimum safety factor of 4.0 or greater to determine the allowable working load. 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.

**PERFORMANCE DATA**

**Allowable Load Capacities for Steel Dropin in Structural Lightweight Concrete<sup>1,2,3</sup>**

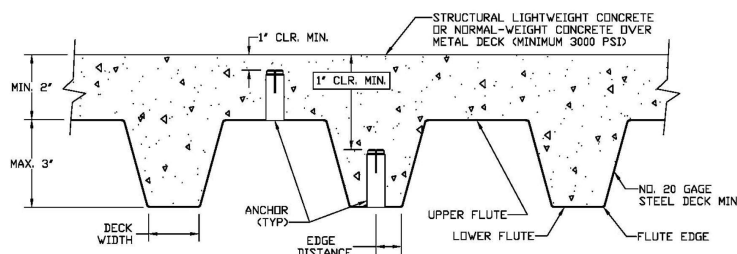
Rod/Anchor Diameter <i>d</i> in. (mm)	Minimum Embedment Depth <i>h<sub>v</sub></i> in. (mm)	Minimum Concrete Compressive Strength ( <i>f'<sub>c</sub></i> )					
		3,000 psi (20.7 MPa)		4,000 psi (27.6 MPa)		5,000 psi (34.5 MPa)	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	1 (25.4)	265 (1.2)	480 (2.2)	340 (1.5)	480 (2.2)	415 (1.9)	480 (2.2)
3/8 (9.5)	1 9/16 (39.7)	760 (3.4)	1,030 (4.6)	945 (4.3)	1,030 (4.6)	1,130 (5.1)	1,030 (4.6)
1/2 (12.7)	2 (50.8)	1,060 (4.8)	1,420 (6.4)	1,210 (5.4)	1,420 (6.4)	1,365 (6.1)	1,420 (6.4)
5/8 (15.9)	2 1/2 (63.5)	1,715 (7.7)	2,410 (10.8)	1,960 (8.8)	2,410 (10.8)	2,210 (9.9)	2,410 (10.8)
3/4 (19.1)	3 3/16 (81.0)	2,570 (11.6)	4,115 (18.5)	2,925 (13.2)	4,115 (18.5)	3,280 (14.8)	4,115 (18.5)

1. Tabulated load values are applicable to carbon and stainless steel anchors.
2. Allowable load capacities listed 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 allowable loads for intermediate compressive strengths.

**Ultimate and Allowable Load Capacities for Steel Dropin Installed Through Metal Deck into Structural Lightweight Concrete<sup>1,2,3,4,5</sup>**

Rod/Anchor Diameter <i>d</i> in. (mm)	Minimum Embedment Depth <i>h<sub>v</sub></i> in. (mm)	Lightweight Concrete over minimum 20 Gage Metal Deck, <i>f'<sub>c</sub></i> ≥ 3,000 (20.7 MPa)							
		Minimum 1-1/2" Wide Deck				Minimum 4-1/2" Wide Deck			
		Ultimate Load		Allowable Load		Ultimate Load		Allowable Load	
		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)	1 (25.4)	400 (1.8)	2,040 (9.2)	100 (0.4)	510 (2.3)	760 (3.4)	2,040 (9.2)	190 (0.8)	510 (2.3)
3/8 (9.5)	1 9/16 (39.7)	600 (2.7)	2,760 (12.3)	150 (0.7)	690 (3.1)	960 (4.3)	2,760 (12.3)	240 (1.1)	690 (3.1)
1/2 (12.7)	2 (50.8)	-	-	-	-	2,740 (12.3)	5,560 (25.0)	685 (3.1)	1,390 (6.3)

1. The values listed above are ultimate and allowable load capacities for carbon steel anchors installed in sand-lightweight concrete.
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. Tabulated load values are for anchors installed in the center of the flute. Spacing distances shall be in accordance with the spacing table for lightweight concrete listed in the Design Criteria.
4. Flute edge distance equals one-half the minimum deck width.
5. Anchors are permitted to be installed in the lower or upper flute of the metal deck provided the proper installation procedures are maintained.



(b)

**DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)**

**Combined Loading**

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

$$\left(\frac{N_u}{N_n}\right)^{\frac{5}{3}} + \left(\frac{V_u}{V_n}\right)^{\frac{5}{3}} \leq 1 \quad \text{or} \quad \left(\frac{N_u}{N_n}\right) + \left(\frac{V_u}{V_n}\right) \leq 1$$

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**

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	$s_{cr} = 3.0h_v$	$F_{N_S} = F_{V_S} = 1.0$	$s_{min} = 1.5h_v$	$F_{N_S} = F_{V_S} = 0.50$
Edge Distance ( $c$ )	Tension	$c_{cr} = 14d$	$F_{N_C} = 1.0$	$c_{min} = 7d$	$F_{N_C} = 0.90$
	Shear	$c_{cr} = 14d$	$F_{V_C} = 1.0$	$c_{min} = 7d$	$F_{V_C} = 0.50$

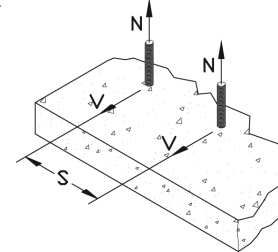
Anchor Installed in Lightweight Concrete					
Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing ( $s$ )	Tension and Shear	$s_{cr} = 3.0h_v$	$F_{N_S} = F_{V_S} = 1.0$	$s_{min} = 1.5h_v$	$F_{N_S} = F_{V_S} = 0.50$
Edge Distance ( $c$ )	Tension	$c_{cr} = 14d$	$F_{N_C} = 1.0$	$c_{min} = 7d$	$F_{N_C} = 0.80$
	Shear	$c_{cr} = 14d$	$F_{V_C} = 1.0$	$c_{min} = 7d$	$F_{V_C} = 0.50$

**DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)**

**Load Adjustment Factors for Normal-Weight and Lightweight Concrete**

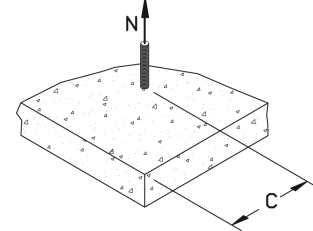
Spacing, Tension ( $F_{NS}$ ) & Shear ( $F_{VS}$ )						
Dia. (in.)	1/4	3/8	1/2	5/8	3/4	
$h_V$ (in.)	1	1 1/2	2	2 1/2	3	
$S_{cr}$ (in.)	3	4 1/2	6	7 1/2	9	
$S_{min}$ (in.)	1 1/2	2 1/4	3	3 3/4	4 1/2	
Spacing, $s$ (inches)	1 1/2	0.50				
	2 1/4	0.75	0.50			
	3	1.00	0.67	0.50		
	3 3/4		0.83	0.63	0.50	
	4		0.89	0.67	0.53	
	4 1/2		1.000	0.75	0.60	0.50
	5			0.83	0.67	0.56
	6			1.00	0.80	0.67
	7 1/2				1.00	0.83
9					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 depths ( $1.5h_V$ ) at which the anchor achieves 50% of load.



Edge Distance, Tension ( $F_{NC}$ ) (Normal-Weight concrete only)						
Dia. (in.)	1/4	3/8	1/2	5/8	3/4	
$C_{cr}$ (in.)	3 1/2	5 1/4	7	8 3/4	10 1/2	
$C_{min}$ (in.)	1 3/4	2 5/8	3 1/2	4 3/8	5 1/4	
Edge Distance, $c$ (inches)	1 3/4	0.90				
	2	0.91				
	2 5/8	0.95	0.90			
	3	0.97	0.91			
	3 1/2	1.00	0.93	0.90		
	4 3/8		0.97	0.93	0.90	
	5 1/4		1.00	0.95	0.92	0.90
	6			0.97	0.94	0.91
	7			1.00	0.96	0.93
	8				0.98	0.95
	8 3/4				1.00	0.97
10 1/2					1.00	

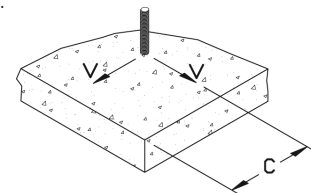
Notes: For anchors loaded in tension, the critical edge distance ( $C_{cr}$ ) is equal to 14 anchor diameters ( $14d$ ) at which the anchor achieves 100% of load. Minimum edge distance ( $C_{min}$ ) is equal to 7 anchor diameters ( $7d$ ) at which the anchor achieves 90% of load for normal-weight concrete and 80% of load for lightweight concrete.



Edge Distance, Tension ( $F_{NC}$ ) (Lightweight concrete only)						
Dia. (in.)	1/4	3/8	1/2	5/8	3/4	
$C_{cr}$ (in.)	3 1/2	5 1/4	7	8 3/4	10 1/2	
$C_{min}$ (in.)	1 3/4	2 5/8	3 1/2	4 3/8	5 1/4	
Edge Distance, $c$ (inches)	1 3/4	0.80				
	2	0.83				
	2 5/8	0.90	0.80			
	3	0.94	0.83			
	3 1/2	1.00	0.87	0.80		
	4 3/8		0.93	0.85	0.80	
	5 1/4		1.00	0.90	0.84	0.80
	6			0.94	0.87	0.83
	7			1.00	0.92	0.87
	8				0.97	0.90
	8 3/4				1.00	0.93
10 1/2					1.00	

Edge Distance, Shear ( $F_{VD}$ )						
Dia. (in.)	1/4	3/8	1/2	5/8	3/4	
$C_{cr}$ (in.)	3 1/2	5 1/4	7	8 3/4	10 1/2	
$C_{min}$ (in.)	1 3/4	2 5/8	3 1/2	4 3/8	5 1/4	
Edge Distance, $c$ (inches)	1 3/4	0.50				
	2	0.57				
	2 5/8	0.75	0.50			
	3	0.86	0.57			
	3 1/2	1.00	0.67	0.50		
	4 3/8		0.83	0.63	0.50	
	5		0.95	0.71	0.57	
	5 1/4		1.00	0.75	0.60	0.50
	6			0.86	0.69	0.57
	7			1.00	0.80	0.67
	8				0.91	0.76
	8 3/4				1.00	0.83
	10					0.95
10 1/2					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 50% of load.



**ORDERING INFORMATION**

**Carbon Steel Smooth Wall Dropin**

Cat. No.	Rod/Anchor Size	Overall Length	Thread Depth	Std. Box	Std. Carton	Wt./100	FM or UL
6304	1/4"	1"	7/16"	100	1,000	2	-
6306	3/8"	1 9/16"	5/8"	50	500	6	FM/UL
6308	1/2"	2"	13/16"	50	250	12	FM/UL
6320	5/8"	2 1/2"	1 3/16"	25	125	32	FM/UL
6312	3/4"	3 3/16"	1 3/8"	10	50	48	FM/UL



**Carbon Steel Knurled Wall Dropin**

Cat. No.	Rod/Anchor Size	Overall Length	Thread Depth	Std. Box	Std. Carton	Wt./100	FM or UL
6340	1/4"	1"	7/16"	100	1,000	2	-
6342	3/8"	1 9/16"	5/8"	50	500	6	-
6344	1/2"	2"	13/16"	50	250	12	-

**Carbon Steel Flanged Dropin (Lipped)**

Cat. No.	Rod/Anchor Size	Overall Length	Thread Depth	Std. Box	Std. Carton	Wt./100	FM or UL
6324	1/4"	1"	7/16"	100	1,000	2	-
6326	3/8"	1 9/16"	5/8"	50	500	6	FM/UL
6328	1/2"	2"	13/16"	50	250	12	FM/UL



**Type 303 Stainless Steel Dropin**

Cat. No.	Rod/Anchor Size	Overall Length	Thread Depth	Std. Box	Std. Carton	Wt./100	FM or UL
6204	1/4"	1"	7/16"	100	1,000	2	-
6206	3/8"	1 9/16"	5/8"	50	500	6	FM/UL
6208	1/2"	2"	13/16"	50	250	12	FM/UL
6210	5/8"	2 1/2"	1 3/16"	25	125	32	FM/UL
6212	3/4"	3 3/16"	1 3/8"	10	50	48	FM/UL



**Type 316 Stainless Steel Dropin**

Cat. No.	Rod/Anchor Size	Overall Length	Thread Depth	Std. Box	Std. Carton	Wt./100	FM or UL
6224	1/4"	1"	7/16"	100	1,000	2	-
6226	3/8"	1 9/16"	5/8"	50	500	6	FM/UL
6228	1/2"	2"	13/16"	50	250	12	FM/UL
6230	5/8"	2 1/2"	1 3/16"	25	125	32	FM/UL
6232	3/4"	3 3/16"	1 3/8"	10	50	48	FM/UL



**Carbon Steel Coil Thread Dropin**

Cat. No.	Rod/Anchor Size	Overall Length	Thread Depth	Std. Box	Std. Carton	Wt./100	FM or UL
6330	1/2"	2"	13/16"	50	250	12	-
6332	3/4"	3 3/16"	1 3/8"	10	50	48	-



**Setting Tools for Steel Dropin**

Cat. No.	6305	6307	6309	6311	6313
Rod/Anchor Size	1/4"	3/8"	1/2"	5/8"	3/4"
Pin Length	39/64"	61/64"	1 3/16"	1 5/16"	1 61/64"

