

# Single™ Shell Expansion Anchor

## PRODUCT DESCRIPTION

The Single is a machine bolt anchor designed for use in concrete, block, brick, and stone. The Single consists of a pre-assembled set of expansion shields and an expander cone formed from zamac alloy. As the anchor is tightened, the wedge-shaped cone is drawn into the shields, compressing them against the base material. The Single is not recommended for use in overhead applications. Overhead applications are better served typically by an FM Global or UL listed anchor.

## GENERAL APPLICATIONS AND USES

- Floor and Wall Attachments
- General Purpose Anchoring

## FEATURES AND BENEFITS

- Readily accepts machine bolts
- Internally threaded anchor for easy removability and service work

## APPROVALS AND LISTINGS

Federal GSA Specification – Meets the proof load requirements of FF-S-325C, Group II, Type 2, Class 2, style 1 (superseded) and CID A-A 1923A, Type 2

## GUIDE SPECIFICATIONS

**CSI Divisions:** 03151-Concrete Anchoring and 05090-Metal Fastening.  
Expansion Anchors shall be Single anchors as supplied by Powers Fasteners, Inc., Brewster, NY.

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Single

## THREAD VERSION

UNC Thread

## ANCHOR MATERIALS

Zamac Alloy

## ROD/ANCHOR SIZE RANGE (TYP.)

1/4" to 3/4" diameter

## SUITABLE BASE MATERIALS

Normal-Weight Concrete

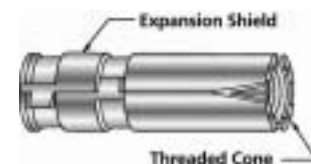
## INSTALLATION AND MATERIAL SPECIFICATIONS

### Installation Specifications

Dimension	Rod/Anchor Diameter, <i>d</i>					
	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
ANSI Drill Bit Size, <i>d<sub>bit</sub></i> (in.)	1/2	5/8	5/8	7/8	1	1 1/4
Max. Tightening Torque, <i>T<sub>max</sub></i> (ft.-lbs.)	5	7	10	20	30	40
Thread Size (UNC)	1/4-20	5/16-18	3/8-16	1/2-13	5/8-11	3/4-10
Thread Length In Cone (in.)	5/16	5/16	5/16	7/16	5/8	11/16
Overall Anchor Length (in.)	1 5/16	1 1/2	1 1/2	2 1/16	2 5/8	2 3/4

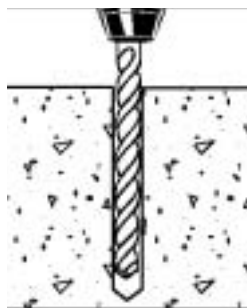
### Material Specifications

Anchor Component	Component Material
Anchor Shield	Zamac Alloy
Cone	Zamac Alloy



### Installation Guidelines

Drill a hole into the base material to the minimum depth required. The tolerances of the drill bit used should meet the requirements of ANSI Standard B212.15. Blow the hole clean of dust and other material.



Do not expand the anchor prior to installation. Insert anchor into the hole, threaded cone end first and tap it flush to the surface.



Position fixture, then insert bolt and tighten. The bolt must engage a minimum of 2/3 of the anchor threads.



**PERFORMANCE DATA**

**Ultimate Load Capacities for Single Shell Expansion Anchor in Normal-Weight Concrete<sup>1,2</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 3/8 (34.9)	885 (4.0)	1,585 (7.1)	2,000 (9.0)	1,620 (7.3)	2,310 (10.4)	1,910 (8.6)
5/16 (7.9)	1 5/8 (41.3)	1,380 (6.2)	2,045 (9.2)	2,100 (9.5)	2,375 (10.7)	2,460 (11.1)	2,535 (11.4)
3/8 (9.5)	1 5/8 (41.3)	1,660 (7.5)	3,590 (16.2)	2,900 (13.1)	3,795 (17.1)	3,370 (15.2)	5,375 (24.2)
1/2 (12.7)	2 1/2 (63.5)	2,990 (13.5)	5,345 (24.1)	4,900 (22.1)	6,155 (27.7)	5,100 (23.0)	9,900 (44.6)
5/8 (15.9)	2 3/4 (69.9)	4,950 (22.3)	10,710 (48.2)	8,200 (36.9)	11,410 (51.3)	8,830 (39.7)	12,870 (57.9)
3/4 (19.1)	2 7/8 (73.0)	6,415 (28.9)	14,560 (65.5)	10,600 (47.7)	17,775 (80.0)	11,040 (49.7)	19,310 (86.9)

1. 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.  
2. Linear interpolation may be used to determine ultimate loads for intermediate compressive strengths.

**Allowable Load Capacities for Single Shell Expansion Anchor 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 3/8 (34.9)	220 (1.0)	395 (1.8)	500 (2.3)	405 (1.8)	580 (2.6)	480 (2.2)
5/16 (7.9)	1 5/8 (41.3)	345 (1.6)	510 (2.3)	525 (2.4)	595 (2.7)	615 (2.8)	635 (2.9)
3/8 (9.5)	1 5/8 (41.3)	415 (1.9)	900 (4.1)	725 (3.3)	950 (4.3)	845 (3.8)	1,345 (6.1)
1/2 (12.7)	2 1/2 (63.5)	750 (3.4)	1,335 (6.0)	1,225 (5.5)	1,540 (6.9)	1,275 (5.7)	2,475 (11.1)
5/8 (15.9)	2 3/4 (69.9)	1,240 (5.6)	2,680 (12.1)	2,050 (9.2)	2,855 (12.8)	2,210 (9.9)	3,220 (14.5)
3/4 (19.1)	2 7/8 (73.0)	1,605 (7.2)	3,640 (16.4)	2,650 (11.9)	4,445 (20.0)	2,760 (12.4)	4,830 (21.7)

1. Allowable load capacities listed are calculated using an applied safety factor of 4.0.  
2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.  
3. Critical and minimum spacing and edge distances as well as reduction factors for intermediate spacing and edge distances are listed in the Design Criteria section.

**DESIGN CRITERIA**

**Combined Loading**

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

$$\left(\frac{N_u}{N_n}\right) + \left(\frac{V_u}{V_n}\right) \leq 1$$

Where: *N<sub>u</sub>* = Applied Service Tension Load  
*N<sub>n</sub>* = Allowable Tension Load  
*V<sub>u</sub>* = Applied Service Shear Load  
*V<sub>n</sub>* = Allowable Shear Load

**Load Adjustment Factors for Spacing and Edge Distances**

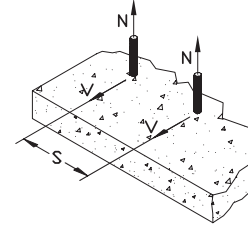
Anchor Installed in Normal-Weight Concrete					
Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing ( <i>s</i> )	Tension and Shear	<i>s<sub>cr</sub></i> = 10 <i>d</i>	<i>F<sub>N</sub></i> = <i>F<sub>V</sub></i> = 1.0	<i>s<sub>min</sub></i> = 5 <i>d</i>	<i>F<sub>N</sub></i> = <i>F<sub>V</sub></i> = 0.50
Edge Distance ( <i>c</i> )	Tension	<i>c<sub>cr</sub></i> = 12 <i>d</i>	<i>F<sub>N</sub></i> = 1.0	<i>c<sub>min</sub></i> = 8 <i>d</i>	<i>F<sub>N</sub></i> = 0.80
	Shear	<i>c<sub>cr</sub></i> = 12 <i>d</i>	<i>F<sub>V</sub></i> = 1.0	<i>c<sub>min</sub></i> = 8 <i>d</i>	<i>F<sub>V</sub></i> = 0.50

**DESIGN CRITERIA**

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

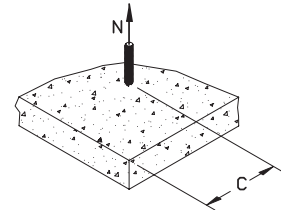
Spacing, Tension ( $F_N$ ) & Shear ( $F_V$ )							
Dia. (in.)	1/4	5/16	3/8	1/2	5/8	3/4	
$S_{cr}$ (in.)	2	3 1/8	3 3/4	5	6 1/4	7 1/2	
$S_{min}$ (in.)	1 1/4	1 9/16	1 7/8	2 1/2	3 1/8	3 3/4	
Spacing, $s$ (inches)	1 1/4	0.50					
	1 9/16	0.63	0.50				
	1 7/8	0.75	0.60	0.50			
	2 1/2	1.00	0.80	0.67	0.50		
	3 1/8		1.00	0.83	0.63	0.50	
	3 3/4			1.00	0.75	0.60	0.50
	5				1.00	0.80	0.67
	6 1/4					1.00	0.83
	7 1/2						1.00

Notes: For anchors loaded in tension and shear, the critical spacing ( $S_{cr}$ ) is equal to 10 anchor diameters ( $10d$ ) at which the anchor achieves 100% of load. Minimum spacing ( $S_{min}$ ) is equal to 5 anchor diameters ( $5d$ ) at which the anchor achieves 50% of load.



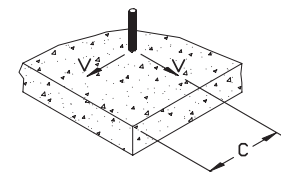
Edge Distance, Tension ( $F_N$ )							
Dia. (in.)	1/4	5/16	3/8	1/2	5/8	3/4	
$C_{cr}$ (in.)	3	3 3/4	4 1/2	6	7 1/2	9	
$C_{min}$ (in.)	2	2 1/2	3	4	5	6	
Edge Distance, $c$ (inches)	2	0.80					
	2 1/2	0.90	0.80				
	3	1.00	0.88	0.80			
	3 3/4		1.00	0.90			
	4			0.93	0.80		
	4 1/2			1.00	0.85		
	5				0.90	0.80	
	6				1.00	0.88	0.80
	7 1/2					1.00	0.90
9						1.00	

Notes: For anchors loaded in tension, the critical edge distance ( $C_{cr}$ ) is equal to 12 anchor diameters ( $12d$ ) at which the anchor achieves 100% of load. Minimum edge distance ( $C_{min}$ ) is equal to 8 anchor diameters ( $8d$ ) at which the anchor achieves 80% of load.



Edge Distance, Shear ( $F_V$ )							
Dia. (in.)	1/4	5/16	3/8	1/2	5/8	3/4	
$C_{cr}$ (in.)	3	3 3/4	4 1/2	6	7 1/2	9	
$C_{min}$ (in.)	2	2 1/2	3	4	5	6	
Edge Distance, $c$ (inches)	2	0.50					
	2 1/2	0.75	0.50				
	3	1.00	0.70	0.50			
	3 3/4		1.00	0.75			
	4			0.83	0.50		
	4 1/2			1.00	0.63		
	5				0.75	0.50	
	6				1.00	0.70	0.50
	7 1/2					1.00	0.75
9						1.00	

Notes: For anchors loaded in shear, the critical edge distance ( $C_{cr}$ ) is equal to 12 anchor diameters ( $12d$ ) at which the anchor achieves 100% of load. Minimum edge distance ( $C_{min}$ ) is equal to 8 anchor diameters ( $8d$ ) at which the anchor achieves 50% of load.



**ORDERING INFORMATION**

**Single Shell Expansion Anchor**

Cat. No.	Rod/Anchor Dia.	Drill Diameter	Min. Hole Depth	Std. Box	Std. Carton	Wt./100
9650	1/4"	1/2"	1 3/8"	50	250	3 3/4
9655	5/16"	5/8"	1 5/8"	50	250	5 1/2
9665	3/8"	5/8"	1 5/8"	50	250	5 1/4
9675	1/2"	7/8"	2 1/2"	25	125	15 1/4
9685	5/8"	1"	2 3/4"	25	125	24
9695	3/4"	1 1/4"	2 7/8"	10	100	43

