ALLFASTENERS.COM

WEDGE ANCHORS

ZINC, GALVANIZED & STAINLESS STEEL

CERTIFICATION | TECHNICAL DATA

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WEDGE ANCHORS

ZINC, GALVANIZED & STAINLESS STEEL

Wedge Anchors are a torque-controlled, wedge expansion anchor for heavy duty fastening applications where high pull out values in concrete are needed. The anchor and the hole diameter are the same, simplifying the anchor installation by placing the anchor through the existing hole in the material to be fastened. Used in fastening sheet metal, steel and aluminum angles, or wood to concrete. Due to its high resistance to vibratory loads, this anchor is ideal for installing machinery, hand rails, dock bumpers, storage racks, etc.

KEY BENEFITS

- Length ID stamped on visible end of each anchor
- Fully threaded for use in all applications, including varied material thickness. Eliminates subsurface obstruction problems.
- Nominal drill diameter is the same as anchor diameter, allowing anchor to be installed after setting of fixture
- Heavy duty applications
- Depth of holes can be over-drilled with no loss of load capacity
- Impact section is raised (dog-point) to prevent thread damage during installation
- Mechanical expansion action allows immediate load application

APPLICATIONS & USES

- Solid Concrete (Normal-Weight and Light-Weight)
- Grout-Filled Concrete Block
- Concrete-Filled Metal Deck
- Structural Anchorage
- Machinery, Hand rail, dock bumper installation
- Storage racking anchorage

MATERIAL SPECIFICATIONS

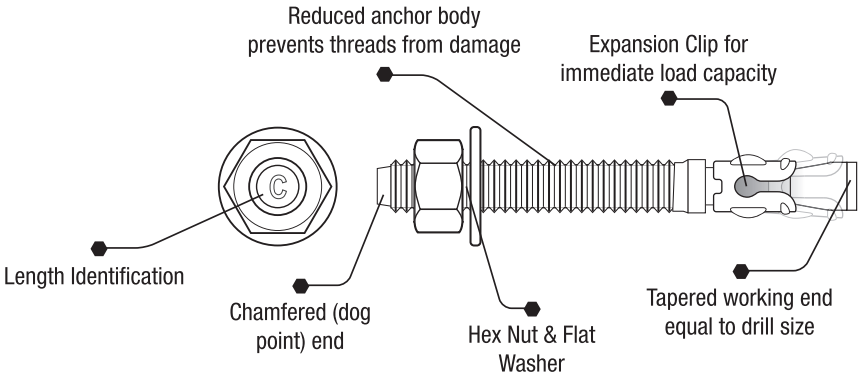


TABLE 1: MATERIAL SPECIFICATIONS OF WEDGE ANCHORS COMPONENTS

COMPONENTS	ZINC	HOT DIP GALVANIZED	304 STAINLESS STEEL	316 STAINLESS STEEL
Body	C1010 Carbon Steel	C1010 Carbon Steel	Type 304 Stainless Steel	Type 316 Stainless Steel
Expanding Clip	Carbon Steel	Type 304 Stainless Steel		
Hex Nut	ASTM A563 Grade A Carbon Steel	ASTM A563 Grade A Carbon Steel		
Flat Washer	Carbon Steel	Carbon Steel		
Plating/Finish	Electroplated Zinc Plating (Clear)	Hot Dip Galvanized		

WEDGE ANCHORS

ZINC, GALVANIZED & STAINLESS STEEL

ORDERING INFORMATION

TABLE 2: MATERIAL SPECIFICATIONS OF WEDGE ANCHORS

DESCRIPTION	A four piece assembly consisting of (1) anchor bolt threaded at one end with a unified pitch, a shoulder at the opposite end which retains a free-spinning clip, (2) a clip with three lateral slits and projections designed to exert greater holding power the greater the load that is applied, (3) a hex nut, and (4) a flat washer.			
APPLICATIONS/ ADVANTAGES	These are heavy-duty, non-bottom bearing anchors of greater shear strength than other light and medium-duty expansion anchors. The design of the expansion clip assures full contact with the masonry. Wedge anchors withstand temperature fluctuations well. For best performance, minimum anchor spacing should be 10 hole diameters and minimum edge distance be 5 hole diameters.			
MATERIAL	CARBON STEEL		TYPE 304 STAINLESS	
	ANCHOR BODY	AISI 1018 - 12L14 or equivalent free-machining carbon steel	ANCHOR BODY	Type 304Cu (1/4" thru 3/4" diameters); Type 3-4 (7/8" thru 1-1/4" diameters & all lengths over 7")
	EXPANSION WEDGE	AISI C1008 - 1010 or equivalent carbon steel	EXPANSION WEDGE	Type 304 Stainless
	NUT	ASTM A-563 Grade A Carbon Steel	NUT	18-8 Stainless
	WASHER	Carbon Steel	WASHER	18-8 Stainless
ULTIMATE SHEAR STRENGTH	See average test values as listed in the tables on pages 8-9. **IMPORTANT:** The maximum working loads should not exceed 1/4 of the average ultimate values for a specific size.			
PLATING	Steel wedge anchors are typically zinc or mechanically galvanized plated.			

LENGTH IDENTIFICATION CODE

Length identification indicates overall length of anchor. Stamp is visible before and after installation.

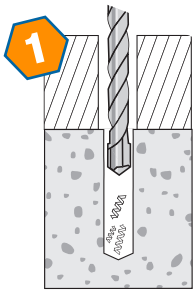
TABLE 3: LENGTH IDENTIFICATION CODE OF WEDGE ANCHORS

MARK	A	B	C	D	E	F	G	H	I	J	K	L	M
From	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"
Up To*	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"

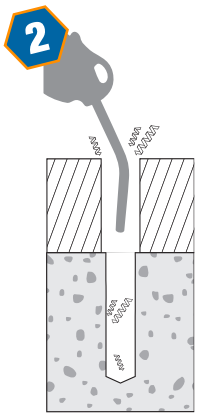
MARK	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
From	8"	8-1/2"	9"	9-1/2"	10"	11"	12"	13"	14"	15"	16"	17"	18"
Up To*	8-1/2"	9"	9-1/2"	10"	11"	12"	13"	14"	15"	16"	17"	18"	19"

* Up to but not including

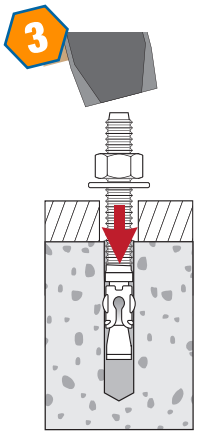
INSTALLATION INSTRUCTIONS



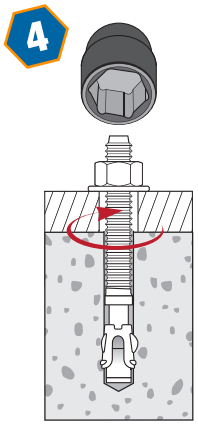
1. Using the proper drill bit size, drill a hole into the base material to the required depth. The tolerances of the drill bit used should meet the requirements of ANSI Standard B212.15.



2. Remove dust and debris from hole using a hand pump, compressed air or a vacuum to remove loose particles left from drilling

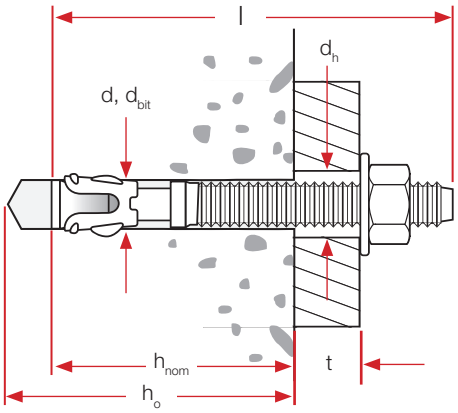


3. Remove dust and debris from hole using a hand pump, compressed air or a vacuum to remove loose particles left from drilling.



4. Tighten the anchor with a torque wrench by applying the required installation torque, T_{inst}
Note: the threaded stud will draw up during tightening of the nut; the expansion wedge (clip) remains in original position.

INSTALLATION SPECIFICATIONS



l = overall anchor length
d = anchor diameter
d_{bit} = drill diameter
d_h = clearance hole diameter in fixture
h_{nom} = minimum embedment depth
h_{ef} = effective embedment depth
h_o = minimum hole depth
t = fixture thickness

The minimum base material thickness should be 1.5 h_{nom} or 3", whichever is greater.

For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 Nm.

TABLE 4: INSTALLATION SPECIFICATIONS OF WEDGE ANCHORS ZINC PLATED & HOT DIP GALVANIZED

CARBON STEEL - NOMINAL ANCHOR DIAMETER, d											
SETTING INFORMATION	1/4	3/8	1/2		5/8		3/4		7/8	1	1-1/4
Nominal Drill Diameter, d^{bit}	1/4	3/8	1/2		5/8		3/4		7/8	1	1-1/4
Fixture Clearance Hole Diameter, d_h	5/16	7/16	9/16		11/16		13/16		1	1-1/8	1-3/8
Nominal Embedment Depth, h_{nom}	1-3/4	2-3/8	2-1/4	3-5/8	3-1/2	4-3/8	4-1/4	5-5/8	5-1/8	5-1/4	7-1/4
Effective Embedment Depth, h_{ef}	1-1/2	2	2	2-3/4	3-1/8	4	3-3/4	5	4-1/2	4-1/2	6-1/2
Minimum Hole Depth, h_o	2	2-1/2	2-5/8	4	3-3/4	4-3/4	4-1/2	5-3/4	4-7/8	4-7/8	7-1/4
Minimum Anchor Length, l_{anch}	1-3/4	2-1/4	2-3/4		3-1/2		4-1/4		6	6	9
Torque Wrench Size	7/16	9/16	3/4		15/16		1-1/8		1-5/16	1-1/2	1-7/8
Installation Torque (ft-lb)	4	20	40		70		110		175	225	375

TABLE 5: INSTALLATION SPECIFICATIONS OF WEDGE ANCHORS TYPE 304 & 316 STAINLESS STEEL

STAINLESS STEEL - NOMINAL ANCHOR DIAMETER, d											
SETTING INFORMATION	1/4	3/8	1/2		5/8		3/4		7/8	1	1-1/4
Nominal Drill Diameter, d^{bit}	1/4	3/8	1/2		5/8		3/4		7/8	1	1-1/4
Fixture Clearance Hole Diameter, d_h	5/16	7/16	9/16		11/16		13/16		1	1-1/8	1-3/8
Nominal Embedment Depth, h_{nom}	1-3/4	2-3/8	2-1/4	3-5/8	3-1/2	4-3/8	4-1/4	5-5/8	5-1/8	4-1/4	7-1/4
Effective Embedment Depth, h_{ef}	1-1/2	2	2	2-3/4	3-1/8	4	3-3/4	5	4-1/2	4-1/2	6-1/2
Minimum Hole Depth, h_o	2	2-1/2	2-5/8	4	3-3/4	4-3/4	4-1/2	5-3/4	4-7/8	4-7/8	7-1/4
Minimum Anchor Length, l_{anch}	1-3/4	2-1/4	2 3/4		3-1/2		4-1/4		6	6	9
Torque Wrench Size	7/16	9/16	3/4		15/16		1-1/8		1-5/16	1-1/2	1-7/8
Installation Torque (ft-lb)	4	20	40		70		110		175	225	375

TECHNICAL DATA

TABLE 6: ULTIMATE LOAD CAPACITIES FOR WEDGE ANCHOR (ALL FINISHES) IN NORMAL WEIGHT CONCRETE

ANCHOR DIAMETER (in.)	EMBEDMENT DEPTH (in.)	MINIMUM CONCRETE COMPRESSIVE STRENGTH (f'c)	
		3500 psi	
		TENSION (lbs.)	SHEAR (lbs.)
1/4	1-1/8	3005	1655
	2	3205	1655
3/8	1-5/8	4735	3785
	2-3/8	5045	3785
	2-5/8	5190	3785
	3-1/8	5115	3785
	3-3/8	5270	3785
1/2	1-7/8	5315	6410
	3-1/4	5960	6410
	6-1/2	9680	6410
5/8	2-3/4	8460	8315
	3-7/8	10230	8315
	4-3/8	12890	8315
	6-3/8	14760	8315
3/4	3-1/2	12725	16985
	4	13255	16985
	4-3/4	13865	16985
	5-1/2	17240	16985
7/8	3-7/8	16354	20234
	5-3/4	18250	20234
	8-3/4	16850	20234
1	4-1/2	18250	27605
	7-1/2	26726	27605
	10	30491	27605
1-1/4	5-1/2	22971	42690
	7	27845	42690
	10	34788	42690

TECHNICAL DATA

TABLE 7: ALLOWABLE LOAD CAPACITIES FOR WEDGE ANCHOR (ALL FINISHES) IN NORMAL WEIGHT CONCRETE

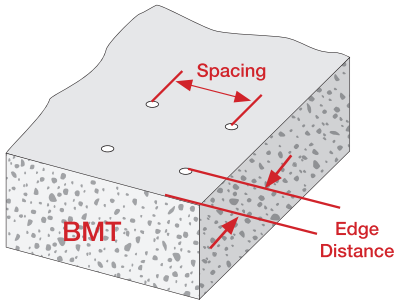
ANCHOR DIAMETER (in.)	EMBEDMENT DEPTH (in.)	MINIMUM CONCRETE COMPRESSIVE STRENGTH (f'c)	
		3500 psi	
		TENSION (lbs.)	SHEAR (lbs.)
1/4	1-1/8	751	414
	2	801	414
3/8	1-5/8	1184	946
	2-3/8	1261	946
	2-5/8	1298	946
	3-1/8	1279	946
	3-3/8	1318	946
1/2	1-7/8	1329	1603
	3-1/4	1490	1603
	6-1/2	2420	1603
5/8	2-3/4	2115	2079
	3-7/8	2558	2079
	4-3/8	3223	2079
	6-3/8	3690	2079
3/4	3-1/2	3181	4246
	4	3314	4246
	4-3/4	3466	4246
	5-1/2	4310	4246
7/8	3-7/8	4089	5059
	5-3/4	4563	5059
	8-3/4	4213	5059
1	4-1/2	4563	6901
	7-1/2	6682	6901
	10	7623	6901
1-1/4	5-1/2	5743	10673
	7	6961	10673
	10	8697	10673

SETTING - BASE MATERIAL THICKNESS (BMT)

There is a recommended minimum thickness of the solid base material that the anchor can be set in. The minimum is based on 1.5 times of the calculated embedment to be used. Eg. an anchor to be installed to a depth of 4", the base material should be 6" deep.

Embedment - a pre-determined depth to obtain the required load capacity. Equal to or greater than the minimum embedment allowance.

Drill Depth - is the required embedment depth into the substrate plus a cavity allowance approximately 1.5 times the anchor diameter.



SETTING - SPACING

The anchor diameter is equal to the drill diameter which eliminates the need for hole plotting or layout. As the anchor can be spaced using the fixture the maximum load in tension or shear can be achieved by spacing anchors 10 times the selected diameter.

This spacing can be reduced but the load value should also be reduced, see table below.

TABLE 8: ANCHOR SPACING OF WEDGE ANCHORS

ANCHOR SPACING						
LOAD CAPACITY	10 X D	9 X D	8 X D	7 X D	6 X D	5 X D
Reduce by	100%	10%	20%	30%	40%	50%
Reduction Factor	1.00	0.90	0.80	0.70	0.60	0.50

SETTING - EDGE DISTANCE FOR TENSION

Should be determined by 12 times the selected anchor diameter to obtain the maximum load in tension. The recommended minimum spacing is 5 times the selected anchor diameter.

In tension – reducing the edge distance to the minimum, the load value will reduce by 20%.

TABLE 9: EDGE DISTANCE IN TENSION ONLY OF WEDGE ANCHORS

EDGE DISTANCE IN TENSION ONLY								
LOAD CAPACITY	12 X D	11 X D	10 X D	9 X D	8 X D	7 X D	6 X D	5 X D
Reduce by	100%	3%	6%	9%	11%	14%	17%	20%
Reduction Factor	1.00	0.97	0.94	0.91	0.89	0.86	0.83	0.80

SETTING - EDGE DISTANCE FOR SHEAR

Should be determined by 12 times the selected anchor diameter to obtain the maximum load in shear. The recommended minimum spacing is 5 times the selected anchor diameter.

In shear – reducing the edge distance to the minimum, the load value will reduce by 50%.

TABLE 10: EDGE DISTANCE IN SHEAR ONLY OF WEDGE ANCHORS

EDGE DISTANCE IN SHEAR ONLY								
LOAD CAPACITY	12 X D	11 X D	10 X D	9 X D	8 X D	7 X D	6 X D	5 X D
Reduce by	100%	7%	14%	21%	29%	36%	43%	50%
Reduction Factor	1.00	0.93	0.86	0.79	0.71	0.84	0.57	0.50

ORDERING INFORMATION

TABLE 11: ORDERING INFORMATION WEDGE ANCHORS ZINC PLATED

PART NUMBER	ANCHOR* X O.A.L. (in.)	MIN. EMBEDMENT (in.)	THREAD LENGTH (in.)	WASHER O.D. ø (in.)	HEX NUT A/F (in.)	QTY/BOX	QTY/CASE
1WAZ14134	1/4 x 1-3/4	1-1/8	5/8	5/8	1/2	100	1000
1WAZ14214	1/4 x 2-1/4		1-1/8			100	800
1WAZ14314	1/4 x 3-1/4		2-1/8			100	500
1WAZ38214	3/8 x 2-1/4	1-1/2	7/8	13/16	11/16	50	400
1WAZ38234	3/8 x 2-3/4		1-3/8			50	250
1WAZ38300	3/8 x 3		1-5/8			50	250
1WAZ38312	3/8 x 3-1/2		2-1/8			50	250
1WAZ38334	3/8 x 3-3/4		2-3/8			50	250
1WAZ38500	3/8 x 5		3-5/8			50	250
1WAZ12234	1/2 x 2-3/4	1-7/8	1-1/8	1-1/16	7/8	50	200
1WAZ12334	1/2 x 3-3/4		1-3/4			50	200
1WAZ12414	1/2 x 4-1/4		2-5/8			50	200
1WAZ12412	1/2 x 4-1/2		2-7/8			50	200
1WAZ12512	1/2 x 5-1/2		3-7/8			50	150
1WAZ12700	1/2 x 7		5-3/8			25	100
1WAZ12812	1/2 x 8-1/2		6-7/8			25	100
1WAZ58312	5/8 x 3-1/2	2-1/2	1-1/2	1-5/16	1-1/16	25	100
1WAZ58412	5/8 x 4-1/2		2-1/2			25	100
1WAZ58500	5/8 x 5		3			25	100
1WAZ58600	5/8 x 6		4			25	75
1WAZ58700	5/8 x 7		5			25	75
1WAZ58812	5/8 x 8-1/2		6-1/2			10	40
1WAZ58100	5/8 x 10		8			10	40
1WAZ34414	3/4 x 4-1/4	2-7/8	1-3/4	1-1/2	1-1/4	20	60
1WAZ34434	3/4 x 4-3/4		2-1/4			20	60
1WAZ34512	3/4 x 5-1/2		3			20	60
1WAZ34614	3/4 x 6-1/4		3-3/4			20	60
1WAZ34700	3/4 x 7		4-1/2			10	40
1WAZ34812	3/4 x 8-1/2		6			10	40
1WAZ78600	7/8 x 6	3-7/8	2-1/4	1-3/4	1-7/16	5	30
1WAZ78800	7/8 x 8		2-1/4			5	25
1WAZ78100	7/8 x 10		2-1/4			5	20
1WAZ78120	7/8 x 12		2-1/4			5	20
1WAZ10600	1 x 6	4-1/2	2-1/4	2	1-5/8	5	30
1WAZ10900	1 x 9		2-1/4			5	20
1WAZ10120	1 x 12		2-1/4			5	20

The published length is the overall length of the anchor. Allow for fixture thickness plus one anchor diameter for the nut and washer thickness when selecting a length.
Minimum Length Requirement must be > the minimum Embedment Depth + Fixture thickness (incl. shims & spacers) + Anchor diameter

*Drill diameter O.A.L is Overall Length

ORDERING INFORMATION

TABLE 12: ORDERING INFORMATION WEDGE ANCHORS HOT DIP GALVANIZED

PART NUMBER	ANCHOR* X O.A.L. (in.)	MIN. EMBEDMENT (in.)	THREAD LENGTH (in.)	WASHER O.D. ø (in.)	HEX NUT A/F (in.)	QTY/BOX	QTY/CASE
1WAG14134	1/4 x 1-3/4	1-1/8	5/8	5/8	1/2	100	1000
1WAG14214	1/4 x 2-1/4		1-1/8			100	800
1WAG14314	1/4 x 3-1/4		2-1/8			100	500
1WAG38214	3/8 x 2-1/4	1-1/2	7/8	13/16	11/16	50	400
1WAG38234	3/8 x 2-3/4		1-3/8			50	250
1WAG38300	3/8 x 3		1-5/8			50	250
1WAG38312	3/8 x 3-1/2		2-1/8			50	250
1WAG38334	3/8 x 3-3/4		2-3/8			50	250
1WAG38500	3/8 x 5		3-5/8			50	250
1WAG12234	1/2 x 2-3/4	1-7/8	1-1/8	1-1/16	7/8	50	200
1WAG12334	1/2 x 3-3/4		1-3/4			50	200
1WAG12414	1/2 x 4-1/4		2-5/8			50	200
1WAG12412	1/2 x 4-1/2		2-7/8			50	200
1WAG12512	1/2 x 5-1/2		3-7/8			50	150
1WAG12700	1/2 x 7		5-3/8			25	100
1WAG12812	1/2 x 8-1/2		6-7/8			25	100
1WAG58312	5/8 x 3-1/2	2-1/2	1-1/2	1-5/16	1-1/16	25	100
1WAG58412	5/8 x 4-1/2		2-1/2			25	100
1WAG58500	5/8 x 5		3			25	100
1WAG58600	5/8 x 6		4			25	75
1WAG58700	5/8 x 7		5			25	75
1WAG58812	5/8 x 8-1/2		6-1/2			10	40
1WAG58100	5/8 x 10		8			10	40
1WAG34414	3/4 x 4-1/4	2-7/8	1-3/4	1-1/2	1-1/4	20	60
1WAG34434	3/4 x 4-3/4		2-1/4			20	60
1WAG34512	3/4 x 5-1/2		3			20	60
1WAG34614	3/4 x 6-1/4		3-3/4			20	60
1WAG34700	3/4 x 7		4-1/2			10	40
1WAG34812	3/4 x 8-1/2		6			10	40
1WAG78600	7/8 x 6	3-7/8	2-1/4	1-3/4	1-7/16	5	30
1WAG78800	7/8 x 8		2-1/4			5	25
1WAG78100	7/8 x 10		2-1/4			5	20
1WAG78120	7/8 x 12		2-1/4			5	20
1WAG10600	1 x 6	4-1/2	2-1/4	2	1-5/8	5	30
1WAG10900	1 x 9		2-1/4			5	20
1WAG10120	1 x 12		2-1/4			5	20

The published length is the overall length of the anchor. Allow for fixture thickness plus one anchor diameter for the nut and washer thickness when selecting a length.
Minimum Length Requirement must be > the minimum Embedment Depth + Fixture thickness (incl. shims & spacers) + Anchor diameter

*Drill diameter O.A.L is Overall Length

ORDERING INFORMATION

TABLE 13: ORDERING INFORMATION WEDGE ANCHORS 304 STAINLESS STEEL

PART NUMBER	ANCHOR* X O.A.L. (in.)	MIN. EMBEDMENT (in.)	THREAD LENGTH (in.)	WASHER O.D. ø (in.)	HEX NUT A/F (in.)	QTY/BOX	QTY/CASE
1WAS214134	1/4 x 1-3/4	1-1/8	5/8	5/8	1/2	100	1000
1WAS214214	1/4 x 2-1/4		1-1/8			100	800
1WAS214314	1/4 x 3-1/4		2-1/8			100	500
1WAS238214	3/8 x 2-1/4	1-1/2	7/8	13/16	11/16	50	400
1WAS238234	3/8 x 2-3/4		1-3/8			50	250
1WAS238300	3/8 x 3		1-5/8			50	250
1WAS238312	3/8 x 3-1/2		2-1/8			50	250
1WAS238334	3/8 x 3-3/4		2-3/8			50	250
1WAS238500	3/8 x 5		3-5/8			50	250
1WAS212234	1/2 x 2-3/4	1-7/8	1-1/8	1-1/16	7/8	50	200
1WAS212334	1/2 x 3-3/4		1-3/4			50	200
1WAS212414	1/2 x 4-1/4		2-5/8			50	200
1WAS212412	1/2 x 4-1/2		2-7/8			50	200
1WAS212512	1/2 x 5-1/2		3-7/8			50	150
1WAS212700	1/2 x 7		5-3/8			25	100
1WAS212812	1/2 x 8-1/2		6-7/8			25	100
1WAS258312	5/8 x 3-1/2	2-1/2	1-1/2	1-5/16	1-1/16	25	100
1WAS258412	5/8 x 4-1/2		2-1/2			25	100
1WAS258500	5/8 x 5		3			25	100
1WAS258600	5/8 x 6		4			25	75
1WAS258700	5/8 x 7		5			25	75
1WAS258812	5/8 x 8-1/2		6-1/2			10	40
1WAS258100	5/8 x 10		8			10	40
1WAS234414	3/4 x 4-1/4	2-7/8	1-3/4	1-1/2	1-1/4	20	60
1WAS234434	3/4 x 4-3/4		2-1/4			20	60
1WAS234512	3/4 x 5-1/2		3			20	60
1WAS234614	3/4 x 6-1/4		3-3/4			20	60
1WAS234700	3/4 x 7		4-1/2			10	40
1WAS234812	3/4 x 8-1/2		6			10	40
1WAS278600	7/8 x 6	3-7/8	2-1/4	1-3/4	1-7/16	5	30
1WAS278800	7/8 x 8		2-1/4			5	25
1WAS278100	7/8 x 10		2-1/4			5	20
1WAS278120	7/8 x 12		2-1/4			5	20
1WAS210600	1 x 6	4-1/2	2-1/4	2	1-5/8	5	30
1WAS210900	1 x 9		2-1/4			5	20
1WAS210120	1 x 12		2-1/4			5	20

The published length is the overall length of the anchor. Allow for fixture thickness plus one anchor diameter for the nut and washer thickness when selecting a length.
Minimum Length Requirement must be > the minimum Embedment Depth + Fixture thickness (incl. shims & spacers) + Anchor diameter

*Drill diameter O.A.L is Overall Length

ORDERING INFORMATION

TABLE 14: ORDERING INFORMATION WEDGE ANCHORS 316 STAINLESS STEEL

PART NUMBER	ANCHOR* X O.A.L. (in.)	MIN. EMBEDMENT (in.)	THREAD LENGTH (in.)	WASHER O.D. ø (in.)	HEX NUT A/F (in.)	QTY/BOX	QTY/CASE
1WAS414134	1/4 x 1-3/4	1-1/8	5/8	5/8	1/2	100	1000
1WAS414214	1/4 x 2-1/4		1-1/8			100	800
1WAS414314	1/4 x 3-1/4		2-1/8			100	500
1WAS438214	3/8 x 2-1/4	1-1/2	7/8	13/16	11/16	50	400
1WAS438234	3/8 x 2-3/4		1-3/8			50	250
1WAS438300	3/8 x 3		1-5/8			50	250
1WAS438312	3/8 x 3-1/2		2-1/8			50	250
1WAS438334	3/8 x 3-3/4		2-3/8			50	250
1WAS438500	3/8 x 5		3-5/8			50	250
1WAS412234	1/2 x 2-3/4	1-7/8	1-1/8	1-1/16	7/8	50	200
1WAS412334	1/2 x 3-3/4		1-3/4			50	200
1WAS412414	1/2 x 4-1/4		2-5/8			50	200
1WAS412412	1/2 x 4-1/2		2-7/8			50	200
1WAS412512	1/2 x 5-1/2		3-7/8			50	150
1WAS412700	1/2 x 7		5-3/8			25	100
1WAS412812	1/2 x 8-1/2		6-7/8			25	100
1WAS458312	5/8 x 3-1/2	2-1/2	1-1/2	1-5/16	1-1/16	25	100
1WAS458412	5/8 x 4-1/2		2-1/2			25	100
1WAS458500	5/8 x 5		3			25	100
1WAS458600	5/8 x 6		4			25	75
1WAS458700	5/8 x 7		5			25	75
1WAS458812	5/8 x 8-1/2		6-1/2			10	40
1WAS458100	5/8 x 10		8			10	40
1WAS434414	3/4 x 4-1/4	2-7/8	1-3/4	1-1/2	1-1/4	20	60
1WAS434434	3/4 x 4-3/4		2-1/4			20	60
1WAS434512	3/4 x 5-1/2		3			20	60
1WAS434614	3/4 x 6-1/4		3-3/4			20	60
1WAS434700	3/4 x 7		4-1/2			10	40
1WAS434812	3/4 x 8-1/2		6			10	40
1WAS478600	7/8 x 6	3-7/8	2-1/4	1-3/4	1-7/16	5	30
1WAS478800	7/8 x 8		2-1/4			5	25
1WAS478100	7/8 x 10		2-1/4			5	20
1WAS478120	7/8 x 12		2-1/4			5	20
1WAS410600	1 x 6	4-1/2	2-1/4	2	1-5/8	5	30
1WAS410900	1 x 9		2-1/4			5	20
1WAS410120	1 x 12		2-1/4			5	20

The published length is the overall length of the anchor. Allow for fixture thickness plus one anchor diameter for the nut and washer thickness when selecting a length.
Minimum Length Requirement must be > the minimum Embedment Depth + Fixture thickness (incl. shims & spacers) + Anchor diameter

*Drill diameter O.A.L is Overall Length