



CONCRETE SCREW ANCHORS

ZINC PLATED FOR CONCRETE



Concrete Screw Anchors are a totally removable, medium duty, rotation setting, thread forming anchor, ideal for either temporary or permanent anchoring into substrates such as concrete, brick, hollow brick or block. The Concrete Screw-Anchor is particularly well suited to close-to-edge or close-to-anchor fixing as it does not expand and burst the surrounding substrate.

ICC Evaluation is for cracked and uncracked concrete substrates.



HEX HEAD

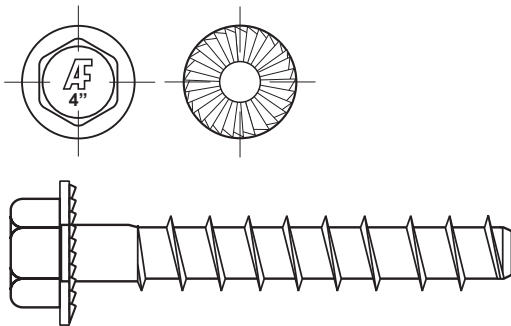
AVAILABILITY

- Zinc Clear Carbon Steel

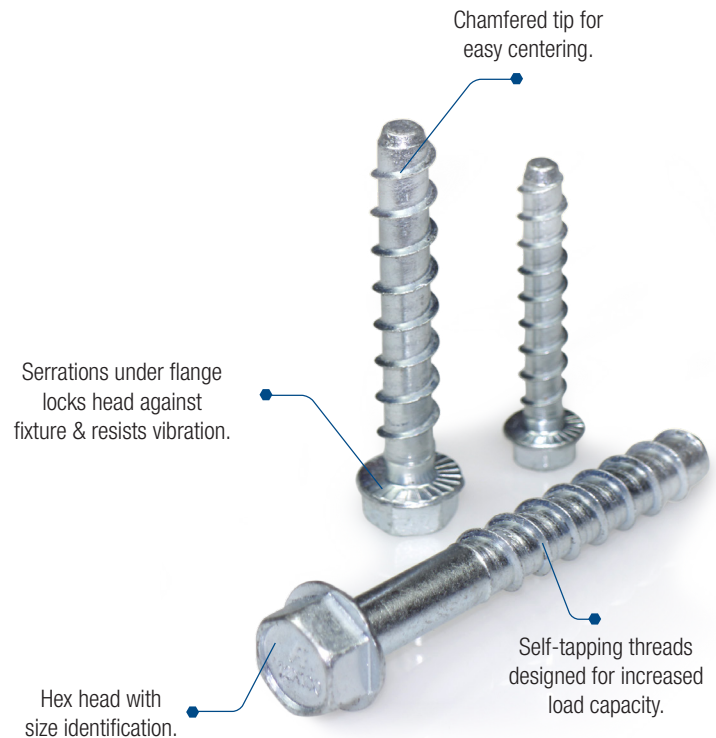
KEY BENEFITS

- Quick installation with a drill and drive method using a hex socket, ratchet or a torque controlled impact wrench.
- Unlike chemical anchoring or sleeved anchors, Concrete Screw-Anchors can be removed with ease leaving the hole clear of debris
- An increase in durability and reliability on installation of the Concrete Screw-Anchors, is a result of the dual-hardened body.
- The large self-tapping thread feature of this bolt is designed for fast advancing and high performance capacity as threads are formed in substrate material on installation.

PHYSICAL PROPERTIES



HEX HEAD WITH SIZE





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MATERIAL SPECIFICATIONS

Concrete Screw-Anchors are a fast installation and immediate loading, completely removable anchor. The dual-hardened body and the large diameter self tapping screw by nature makes this anchor ideal for high load applications.

CARBON STEEL

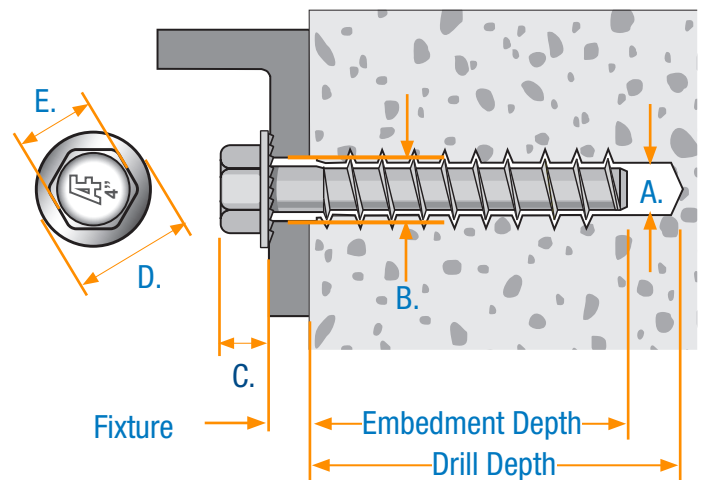
The Carbon Steel Concrete Screw-Anchors material composition consists of 10B21 carbon steel. The anchor's tip is dual hardened for the purpose of threading into concrete.

INSTALLATION SPECIFICATIONS

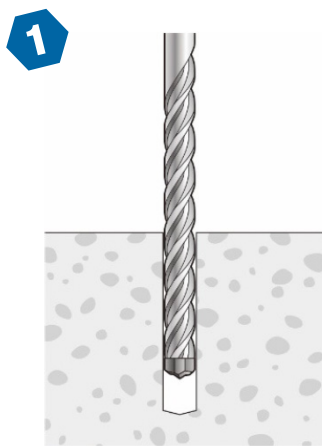
- A. Anchor/Drill \varnothing , inch.
- B. Clearance hole \varnothing in fixture, inch (major diameter).
- C. Flanged head height, inch.
- D. Washer \varnothing , inch.
- E. Wrench size, inch.

Table A1:

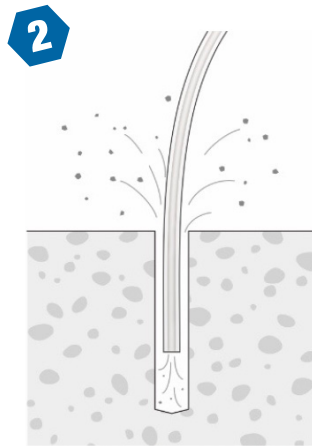
A.	B.	C.	D.	E.
1/4	3/8	9/32	9/16	7/16
3/8	1/2	3/8	3/4	9/16
1/2	5/8	1/2	1	3/4
5/8	3/4	9/16	1-1/8	15/16



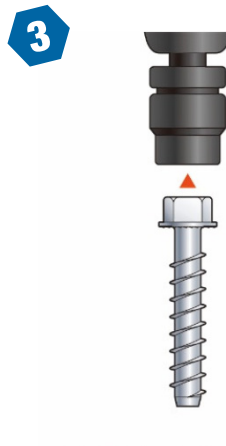
INSTALLATION GUIDE



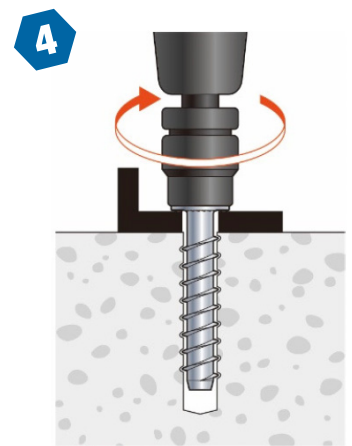
1. Drill a hole into the base material to the required depth using a drill bit that meets the requirements of ANSI B212.15.



2. Remove Dust and debris from the hole using a hand pump or compressed air.



3. Select a powered impact wrench or torque wrench, attach an appropriate sized hex socket to the wrench and mount the screw anchor head into the socket.



4. Drive the anchor through the fixture into the hole until the head of the anchor comes into contact with the fixture.



SETTING

BASE MATERIAL THICKNESS

When setting an anchor, there is a recommended minimum thickness of the solid base material. 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.

SPACING

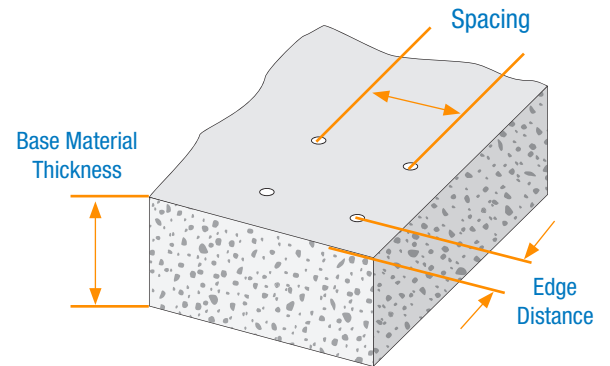
Anchor spacing should be determined by 10 times the selected anchor diameter to obtain the maximum load in tension or shear. This spacing can be reduced but the load value should also be reduced. The recommended minimum spacing is 5 times the selected anchor diameter, which will have a load rating reduced to 50%.

EDGE DISTANCE

Shall be determined by 10 times the selected anchor diameter to obtain the maximum load in tension or shear. The recommended minimum edge distance is 3 times the selected anchor diameter.

In tension – reducing the edge distance to the minimum, the load value will reduce by 30%.

In shear – reducing the edge distance to the minimum, the load value will reduce by 85%.





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PERFORMANCE DATA

SAH-Z Screw Anchor With Hex Washer Head Installation Parameters¹

Characteristics	Symbol	Unit	Nominal Anchor Diameter														
			1/4"		3/8"		1/2"		5/8"		3/4"						
Drill Bit Diameter	d_o	in (mm)	1/4 (6.4)		3/8 (9.5)		1/2 (12.7)		5/8 (15.9)		3/4 (19.1)						
Nominal Embedment Depth	h_{nom}	in (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	2-1/4 (57)	3 (76)	4-1/4 (108)	3-1/4 (83)	4 (102)	5 (137)	5-1/2 (140)	4 (102)	5-1/2 (140)	6-1/4 (159)
Effective Embedment Depth	h_{ef}	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)	2.62 (66.5)	1.66 (42.1)	2.30 (58.3)	3.37 (85.5)	2.54 (64.6)	3.19 (80.9)	3.99 (101.3)	4.42 (112.3)	3.14 (79.8)	4.41 (112.1)	5.05 (128.3)
Minimum Hole Depth	h_{hole}	in (mm)	2 (51)	2-7/8 (73)	2 (51)	2-7/8 (73)	3-5/8 (92)	2-5/8 (67)	3-3/8 (86)	4-5/8 (117)	3-5/8 (92)	4-1/2 (114)	5-3/8 (137)	6 (152)	4-1/2 (114)	6 (152)	6-3/4 (171)
Fixture Hole Diameter	d_r	in (mm)	3/8 (9.5)		1/2 (12.7)		5/8 (15.9)		3/4 (19.1)		7/8 (22.2)						
Maximum Installation Torque ²	$T_{inst,max}$	ft.lb (Nm)	21 (29)		N/A		N/A		N/A		103 (140)						
Maximum Impact Wrench Torque Rating	$T_{impact,max}$	ft.lb (Nm)	135 (185)		135 (185)		260 (350)		260 (350)		440 (600)						
Minimum Concrete Thickness	h_{min}	in (mm)	3-5/8 (91)	4-1/2 (114)	3-5/8 (91)	4-1/2 (114)	5-1/4 (133)	4-1/4 (107)	5 (126)	6-1/4 (158)	5-1/4 (133)	6 (152)	7 (177)	7-1/2 (190)	6 (152)	7-1/2 (190)	8-1/4 (209)
Critical Edge Distance	c_{ac}	in (mm)	1.5 h_{ef}														
Minimum Edge Distance (c_{min})	c_{min}	in (mm)	1-3/4 (44)														
Minimum Spacing (s_{min})	s_{min}	in (mm)	3 (76)														
Wrench Socket Size	-	in	7/16		9/16		3/4		15/16		1-1/8						

- The tabulated data is to be used in conjunction with the design criteria given in ACI 318 (-19 and -14) Chapter 17 or ACI 318-11 Appendix D, as applicable.
- N/A - Manual torque wrench installation not evaluated.



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PERFORMANCE DATA

SAH-Z Screw Anchor With Hex Washer Head Installation Parameters¹

Characteristics	Symbol	Unit	Nominal Anchor Diameter														
			1/4"		3/8"		1/2"		5/8"			3/4"					
Nominal Embedment Depth	h_{nom}	in (mm)	1-5/8 (41)	2-1/2 (64)	1-5/8 (41)	2-1/2 (64)	3-1/4 (83)	2-1/4 (57)	3 (76)	4-1/4 (108)	3-1/4 (83)	4 (102)	5 (137)	5-1/2 (140)	4 (102)	5-1/2 (140)	6-1/4 (159)
Effective Embedment Depth	h_{ef}	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)	2.62 (66.5)	1.66 (42.1)	2.30 (58.3)	3.37 (85.5)	2.54 (64.6)	3.19 (80.9)	3.99 (101.3)	4.42 (112.3)	3.14 (79.8)	4.41 (112.1)	5.05 (128.3)
Anchor Category	1, 2 or 3	-	3	2	1	1	1	2	2	2	1	1	1	1	2	2	2
Steel Strength in Tension & Shear																	
Minimum Specified Ultimate Strength	f_{uta}	psi (N/mm ²)	101,525 (700)				113,130 (780)				113,130 (780)			113,130 (780)			
Minimum Specified Yield Strength	f_y	psi (N/mm ²)	81,220 (560)				90,505 (624)				90,505 (624)			90,505 (624)			
Effective Stress Area (Screw Anchor Body)	A_{se}	in ² (mm ²)	0.0453 (29.2)				0.1020 (65.8)				0.1827 (117.9)			0.2888 (186.3)			
Steel Strength in Tension	N_{sa}	lb (kN)	4,585 (20.4)				11,535 (51.3)				20,680 (92.0)			32,665 (145.3)			
Strength Reduction Factor for Steel Failure in Tension	Φ_{sa}	-	0.65														
Steel Strength in Shear	V_{sa}	lb (kN)	1,350 (6.0)				3,150 (14.0)				6,745 (30.0)			10,115 (45.0)			
Steel Strength in Shear, Seismic	$V_{sa,eq}$	lb (kN)	1,125 (5.0)				1,800 (8.0)				3,730 (16.6)			6,880 (30.6)			
Strength Reduction Factor for Steel Failure in Shear	Φ_{sa}	-	0.60														
Pullout Strength in Tension³																	
Pullout Strength in Uncracked Concrete	$N_{p,unscr}$	lb (kN)	N/A	4,025 (17.9)	1,395 (6.2)	2,990 (13.3)	N/A	N/A	4,115 (18.3)	7,485 (33.3)	N/A	6,585 (29.3)	8,320 (37.0)	N/A	N/A	N/A	N/A
Pullout Strength in Cracked Concrete	$N_{p,cr}$	lb (kN)	605 (2.7)	1,080 (4.8)	720 (3.2)	1,755 (7.8)	2,630 (11.7)	1,350 (6.0)	2,790 (12.4)	5,195 (23.1)	3,125 (13.9)	4,045 (18.0)	5,195 (23.1)	5,825 (25.9)	4,405 (19.6)	7,330 (32.6)	8,790 (39.1)
Pullout Strength in Cracked Concrete, Seismic	$N_{p,eq}$	lb (kN)	605 (2.7)	1,080 (4.8)	720 (3.2)	1,755 (7.8)	2,630 (11.7)	1,350 (6.0)	2,790 (12.4)	4,720 (21.0)	2,920 (13.0)	4,045 (18.0)	5,015 (22.3)	5,825 (25.9)	4,405 (19.6)	7,330 (32.6)	8,790 (39.1)
Normalization Exponent, Uncracked Concrete	n	-	0.50				0.50				0.50			0.50			
Normalization Exponent, Cracked Concrete	n	-	0.40				0.50				0.50			0.40			
Strength Reduction Factor for Pullout Strength in Tension	Φ_p	-	0.45	0.55	0.65	0.65	0.65	0.55	0.55	0.55	0.65	0.65	0.65	0.65	0.55	0.55	0.55

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PERFORMANCE DATA

SAH-Z Screw Anchor With Hex Washer Head Installation Parameters¹

Characteristics	Symbol	Unit	Nominal Anchor Diameter														
			1/4"		3/8"		1/2"		5/8"		3/4"						
Concrete Breakout Strength in Tension																	
Effective Embedment	h_{er}	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)	2.62 (66.5)	1.66 (42.1)	2.30 (58.3)	3.37 (85.5)	2.54 (64.6)	3.19 (80.9)	3.99 (101.3)	4.42 (112.3)	3.14 (79.8)	4.41 (112.1)	5.05 (128.3)
Effectiveness Factor for Uncracked Concrete	k_{uncr}	in-lb (SI)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	24 (10.0)	27 (11.3)	24 (10.0)	24 (10.0)
Effectiveness Factor for Cracked Concrete	k_{cr}	in-lb (SI)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	17 (7.1)	24 (10.0)	21 (8.8)	21 (8.8)
Strength Reduction Factor for Concrete Breakout Strength in Tension	Φ_{cb}	-	0.45	0.55	0.65	0.65	0.65	0.55	0.55	0.55	0.65	0.65	0.65	0.65	0.55	0.55	0.55
Axial Stiffness in Service Load Range in Uncracked Concrete	β_{uncr}	lb/inch x 10^5 (N/mm)	2.719 (48)	1.928 (34)	6.240 (109)	4.502 (79)	3.670 (64)	8.809 (154)	7.079 (124)	5.649 (99)	10.377 (182)	9.099 (159)	8.080 (1411)	7.684 (135)	13.204 (231)	11.075 (194)	10.410 (182)
COV for β_{uncr}	v	%	38														
Axial Stiffness in Service Load Range in Cracked Concrete	β_{cr}	lb/inch x 10^5 (N/mm)	1.451 (25)	1.100 (19)	3.318 (58)	2.563 (45)	2.179 (38)	4.887 (86)	4.120 (72)	3.487 (61)	6.134 (107)	5.568 (98)	5.117 (90)	4.941 (86.5)	8.063 (141)	7.119 (125)	6.825 (120)
COV for β_{cr}	v	%	48														
Concrete Breakout Strength in Shear																	
Nominal Diameter	d_o^2	in (mm)	0.250 (6.4)		0.375 (9.5)		0.500 (12.7)		0.625 (15.9)		0.750 (19.1)						
Load Bearing Length of Anchor	l_e	in (mm)	1.24 (31.6)	2.01 (51.1)	1.21 (30.8)	1.98 (50.3)	2.62 (66.5)	1.66 (42.1)	2.30 (58.3)	3.37 (85.5)	2.54 (64.6)	3.19 (80.9)	3.99 (101.3)	4.42 (112.3)	3.14 (79.8)	4.41 (112.1)	5.05 (128.3)
Reduction Factor of Concrete Breakout Strength in Shear	Φ_{cb}	-	0.70														
Concrete Pryout Strength in Shear																	
Coefficient for Pryout Strength	k_{cp}	-	1.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Reduction Factor for Pryout Strength in Shear	Φ_{ep}	-	0.70														

1. The tabulated data is to be used in conjunction with the design criteria given in ACI 318 (-19 and -14) Chapter 17 or ACI 318-11 Appendix D, as applicable.
 2. The strength reduction factor applies when the load combination from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of f must be determined in accordance with ACI 318-11 D.4.5.

**CONCRETE SCREW ANCHORS**

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ICC ESR-5217

PERFORMANCE DATAExample SAH-Z Screw Anchor With Hex Washer Head Allowable Stress Design Values For Illustrative Purposes^{1,2,3,4,5,6,7,8,9,10}

Nominal Anchor Diameter d_o (inch)	Nominal Embedment Depth h_{nom} (inch)	Allowable Tension Load $T_{allowable,ASD}$ (lb)
1/4	1-5/8	504
1/4	2-1/2	1,271
3/8	1-5/8	613
3/8	2-1/2	1,313
3/8	3-1/4	2,235
1/2	2-1/4	954
1/2	3	1,529
1/2	4-1/4	2,759
5/8	3-1/4	2,133
5/8	4	2,892
5/8	5	3,654
5/8	5-1/2	4,897
3/4	4	2,791
3/4	5-1/2	4,130
3/4	6-1/2	5,061

1. Single anchor
2. Single tension loading only
3. Concrete determined to remain uncracked for the life of the anchorage.
4. Load combinations taken from ACI 318 (-19 or -14) Section 5.3 or ACI 318-11 Section 9.2, as applicable with no seismic loading.
5. 30% Dead Load (D) and 70% Live Load (L), controlling load combination 1.2 D + 1.6L.
6. Calculation of the weighted average of $a = 1.2 \times 0.3 + 1.6 \times 0.7 = 1.48$
7. Nominal weight concrete, $f'_c = 2,500$ psi.
8. $C_{a1} = C_{a2} \geq C_{ac}$
9. Concrete thickness $h \geq h_{min}$
10. Values are for Condition B (supplementary reinforcement in accordance with ACI 318 (-19 or -14) 17.3.3 or ACI 318-11 D.4.3 is not provided)



CONCRETE SCREW ANCHORS

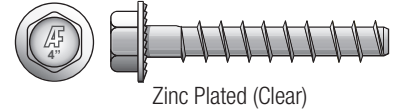
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ORDERING INFORMATION

ZINC PLATED

CONCRETE SCREW ANCHOR - HEX FLANGE HEAD



Part #	Anchor* x Length (in)	Min. Embedment(in)	Max Fixture Thickness (in)	Clearance Hole Ø (in)	Wrench Size (in)
1SAHZ14134	1/4 x 1-3/4	1	3/4	3/8	7/16
1SAHZ14214	1/4 x 2-1/4	1	1-1/4	3/8	7/16
1SAHZ38212	3/8 x 2-1/2	1-1/2	1	1/2	9/16
1SAHZ38300	3/8 x 3	1-1/2	1-3/8	1/2	9/16
1SAHZ38400	3/8 x 4	1-1/2	2-3/8	1/2	9/16
1SAHZ12300	1/2 x 3	2	1	5/8	3/4
1SAHZ12400	1/2 x 4	2	2	5/8	3/4
1SAHZ12500	1/2 x 5	2	3	5/8	3/4
1SAHZ12600	1/2 x 6	2	4	5/8	3/4
1SAHZ58400	5/8 x 4	2-1/2	1-1/2	3/4	15/16
1SAHZ58600	5/8 x 6	2-1/2	3-1/2	3/4	15/16

*Drill Diameter

RECOMMENDED INSTALL TOOLS

Bosch® 18V High Torque Impact Wrench with Pin Detent with (2) FatPack Batteries (4.0Ah)

Bosch Power Tools deliver stronger performance and lasting reliability. The Bosch HTH181-01 high torque impact wrench offers a heavy duty all-metal motor, impact hammer and anvil system, made to hold up in tough environments. It comes with (2) FatPack Lithium-Ion advanced technology batteries that combines Electronic Cell Protection, a unique battery pack design and customized electronics to deliver optimal battery life and performance. Bosch 18V Batteries equipped with Coolpack Technology. This will provide better performance from your tools in extreme heats and frigid temperatures.



Part #	Type
9HTH181-01	Pin Detent



RECOMMENDED SOCKETS

Bosch® 1/2-Square Drive Socket - Impact Ready

Impact tough deep well socket engineered for high torque. Forged steel reduces breakage. Absorbs torque peaks to reduce stress. Hardened core increases socket strength, reduces fractures. Engineered to meet ISO standards.



Part #	Socket Size
5BS27273	3/8
5BS27274	7/16
5BS27275	1/2
5BS27276	9/16
5BS27279	5/8
5BS27280	11/16
5BS27281	3/4
5BS27282	13/16
5BS27283	7/8
5BS27284	15/16

TRADE APPLICATION

	CARPENTER	CONSTRUCTION	RACKING INSTALLER	CONCRETE FORMWORKER
Bottom plates	✓			
Awnings		✓		
Pallet racking			✓	
Formwork support				✓
Flooring	✓			
Shelving			✓	
Bracing	✓		✓	
Railings / Balustrade / Safety Barriers		✓		✓
Machinery			✓	
Curtain Wall		✓		



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TRADE APPLICATION CONTINUED

