

**GENERAL INFORMATION**

**SMART DI™**

Internally Threaded Expansion Anchor

**PRODUCT DESCRIPTION**

The Smart DI is an all-steel, machine bolt anchor available in carbon steel. It can be used in solid concrete, hard stone, and solid block base materials. The Smart DI is specifically designed to be easier to fully set into the base material during installation as a benefit to the user.

**GENERAL APPLICATIONS AND USES**

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

**FEATURES AND BENEFITS**

- + Installs with reduced effort compared to traditional drop in style anchors
- + Can be installed using the manual setting tool or Smart DI system with a hammer-drill
- + Setting indicator makes identification of properly set anchors easy (when installed using the smart tool and smart bit)
- + Internally threaded anchor for easy bolt removability and service work

**TESTING, APPROVALS AND LISTINGS**

- FM Global (Factory Mutual) - File No. 3059197 (3/8" and 1/2" diameters)
- Underwriters Laboratory (UL Listed) – File No. EX1289 (N) (3/8" and 1/2" diameters)

**GUIDE SPECIFICATIONS**

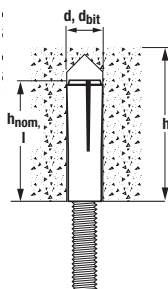
CSI Divisions: 03 16 00 - Concrete Anchors and 05 05 19 - Post-Installed Concrete Anchors. Dropin anchors shall be Smart DI as supplied by DEWALT, Towson, MD. Anchors shall be installed in accordance with published instructions and the Authority Having Jurisdiction.

**MATERIAL SPECIFICATIONS**

Anchor component	Specification
Anchor Body	AISI 1008
Plug	AISI 1008
Zinc Plating	ASTM B 633, SC1 Type III (Fe/Zn 5)

**INSTALLATION SPECIFICATIONS**

Anchor (Rod) Size	1/4"	3/8"	1/2"
Nominal Outside Diameter, d (in.)	0.375	0.500	0.625
ANSI Drill Bit Size, d <sub>bit</sub> (in.)	3/8	1/2	5/8
Maximum Tightening Torque, T <sub>max</sub> (ft.-lbs.)	5	10	20
Thread Size (UNC)	1/4-20	3/8-16	1/2-13
Thread Depth (in.)	7/16	5/8	13/16
Anchor Length, l (in.)			
Embedment, h <sub>v</sub> (in.)	1	1-9/16	2
Hole Depth, h <sub>o</sub> (in.)			



**Nomenclature**

- d = Diameter of anchor
- d<sub>bit</sub> = Diameter of drill bit
- h = Base material thickness. The value of h is 3" min. except for 1/2" size where minimum value of h is 4" min.
- h<sub>nom</sub> = Minimum embedment depth
- l = Overall length of anchor

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SMART DI (DROP-IN)

**THREAD VERSION**

UNC Coarse Thread

**ANCHOR MATERIALS**

- Zinc Plated Carbon Steel

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

- 1/4 through 1/2" diameters

**SUITABLE BASE MATERIALS**

- Normal-Weight Concrete
- Lightweight Concrete

**SMART DI DROP-IN WITH EXPANSION INDICATOR**



Anchor prior to installation



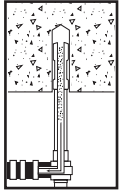
When properly set with Smart DI tool (system installation tool), anchor indicator will leave blue paint in recessed cavities. Note: Blue does not have to be removed from all four top surfaces to be fully set.

**INSTALLATION INSTRUCTIONS**

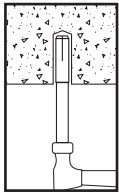
**Manual Installation**



1. Using the proper drill bit size, 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. Use any ANSI Standard carbide drill bit.



2. Remove dust and debris from the hole during drilling (e.g. dust extractor, hollow bit) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling. Insert the anchor into the hole and, if necessary tap flush with surface.

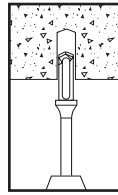


3. Using a DEWALT manual setting tool specifically, set the anchor by driving the tool with a sufficient number of hammer blows until the shoulder of the tool is seated against the anchor. Anchor will not hold allowable loads required if shoulder of DEWALT manual setting tool does not seat against anchor. Proper manual installation may not remove blue indicator paint.

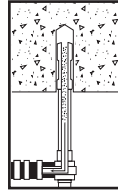


4. If using a fixture, position it, insert bolt and tighten so as not to exceed the maximum tightening torque. Most overhead applications utilize threaded rod. Minimum thread engagement should be at least one anchor diameter.

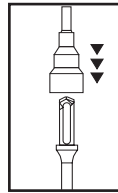
**Smart DI System Installation**



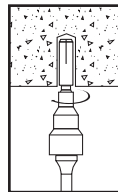
1. Using the proper drill bit size, drill a hole into the base material to the depth of embedment required using the appropriate DEWALT DI Stop Drill Bit. The tolerances of the drill bit used must meet the requirements of ANSI Standard B212.15. Standard installation with a DI Stop Drill Bit may result in the anchor being slightly subset from the surface. Minimum published embedment depths must be achieved by using the shoulder of the DI Stop Drill Bit as a guide.



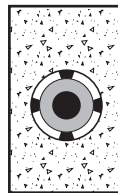
2. Remove dust and debris from the hole during drilling (e.g. dust extractor, hollow bit) or following drilling (e.g. suction, forced air) to extract loose particles created by drilling. Insert the anchor into the hole and, if necessary, tap flush with the surface.



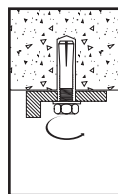
3. Slide the appropriate DEWALT DI Setting Tool over the DI Stop Drill Bit used to drill the hole and twist counterclockwise to lock the setting tool onto the bit. If tool does not fit snug onto bit it may be necessary to replace the internal rubber spring plug in the tool (see ordering information). Replacement kit sold separately.



4. Once attached, insert the tip of the setting tool into the Smart DI anchor and drive the internal plug fully using the rotation with hammer mode of the SDS+ drill (see table below for suggested tools).



5. For proper installation, the shoulder of the setting tool must come briefly in full contact with the Smart DI resulting in the blue indicator paint being removed from the raised top of the anchor. The paint will remain in the recessed portion of the top indicating full expansion.



6. If using a fixture, position it, insert the bolt and tighten so as not to exceed the maximum tightening torque. Most overhead applications utilize threaded rod. Minimum thread engagement should be at least one anchor diameter.

**Recommended SDS+ Rotary Hammer Drill Specification for Smart DI Anchor with Smart DI System Installation**

Diameter	Concrete Compressive Strength (psi)	Rated Tool Impact Energy Suggested Range* (ft-lbs)	Recommended Rotary Hammer Tool Part Number
1/4"	2,500	1.3 - 2.6	DCH133M2, DCH273P2
	6,500	2.0 - 3.5	
3/8"	2,500	1.3 - 4.0	DCH263R2, DCH293R2
	6,500	2.1 - 4.0	
1/2"	2,500	2.0 - 4.0	DCH263R2, DCH293R2
	6,500	2.5 - 4.0	

\* Local concrete conditions and rotary hammer impact efficiency vary greatly. Please verify that the tool impact energy is sufficient to fully set the internal plug of the Smart DI prior to using the system.

**PERFORMANCE DATA**

**Ultimate and Allowable Load Capacities for Smart DI Anchor in Normal-Weight Concrete<sup>1,2,3,4,5</sup>**

Nom. Anchor Dia. d in.	Min. Embed. Depth in. (mm)	Minimum Concrete Compressive Strength - f'c (psi)															
		2,500				3,000				4,000				6,000			
		Tension		Shear		Tension		Shear		Tension		Shear		Tension		Shear	
		Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)	Ultimate lbs. (kN)	Allowable lbs. (kN)
1/4	1 (25)	1,300 (5.8)	325 (1.4)	2,495 (11.1)	625 (2.8)	1,390 (6.2)	350 (1.6)	2,510 (11.2)	630 (2.8)	1,565 (7.0)	390 (1.7)	2,550 (11.3)	640 (2.8)	1,910 (8.5)	480 (2.1)	2,620 (11.7)	655 (2.9)
3/8	1-9/16 (40)	1,985 (8.6)	495 (2.2)	4,160 (18.5)	1,040 (4.6)	2,275 (10.1)	570 (2.5)	4,360 (19.4)	1,090 (4.6)	2,850 (12.7)	715 (3.2)	4,755 (21.2)	1,190 (5.3)	4,000 (17.5)	1,000 (4.4)	5,550 (24.7)	1,390 (5.2)
1/2	2 (51)	3,630 (16.1)	910 (4.0)	7,170 (31.9)	1,795 (8.0)	3,815 (17.0)	955 (4.2)	7,280 (32.4)	1,820 (8.1)	4,190 (18.6)	1,050 (4.7)	7,505 (33.4)	1,875 (8.3)	4,935 (22.0)	1,235 (8.3)	7,955 (35.4)	1,990 (8.9)

1. Tabulated load values are for anchors installed in uncracked 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. Allowable load capacities listed are calculated using and applied safety factor of 4.0.
3. Allowable loads for lightweight concrete may be determined by multiplying the tabulated allowable load capacities for normal weight concrete by 0.60.
4. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.
5. The tabulated capacities are for the steel drop-in anchors which must be checked against the steel strength of the corresponding threaded rod or bolt size and type, the lowest load level controls.

**DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)**

**Combined Loading**

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

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

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<sup>1</sup>**

NOTE: 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.

**LOAD ADJUSTMENT FACTORS FOR NORMAL-WEIGHT CONCRETE**

**Spacing Distance Adjustment Factors - Tension ( $F_{NS}$ )**

Dia. (in)	1/4"	3/8"	1/2"
$h_v$	1	1-9/16	2
$s_{cr}$	3	4-1/2	6
$s_{min}$	1-1/2	2-3/8	3
Spacing Distance (inches)	1/2	-	-
	1	-	-
	1-1/2	0.90	-
	2	0.94	-
	2-1/2	0.97	0.84
	3	1.00	0.87
	3-1/2	1.00	0.91
	4	1.00	0.95
	4-1/2	1.00	1.00
	5	1.00	1.00
5-1/2	1.00	1.00	
6	1.00	1.00	

**Spacing Distance Adjustment Factors - Shear ( $F_{VS}$ )**

Dia. (in)	1/4"	3/8"	1/2"
$h_v$	1	1-9/16	2
$s_{cr}$	3	5	6
$s_{min}$	1-1/2	2-3/8	3
Spacing Distance (inches)	1/2	-	-
	1	-	-
	1-1/2	0.62	-
	2	0.75	-
	2-1/2	0.88	0.65
	3	1.00	0.73
	3-1/2	1.00	0.81
	4	1.00	0.89
	4-1/2	1.00	0.97
	5	1.00	1.00
5-1/2	1.00	1.00	
6	1.00	1.00	

**Edge Distance Adjustment Factors - Tension ( $F_{NC}$ )**

Dia. (in)	1/4"	3/8"	1/2"
$h_v$	1	1-9/16	2
$c_{cr}$	2	4-11/16	6
$c_{min}$	2	3-1/8	4
Edge Distance (inches)	1/2	-	-
	1	-	-
	1-1/2	-	-
	2	1.00	-
	2-1/2	1.00	-
	3	1.00	-
	3-1/2	1.00	0.98
	4	1.00	0.99
	4-1/2	1.00	1.00
	5	1.00	1.00
5-1/2	1.00	1.00	
6	1.00	1.00	

**Edge Distance Adjustment Factors - Shear ( $F_{VC}$ )**

Dia. (in)	1/4"	3/8"	1/2"
$h_v$	1	1-9/16	2
$c_{cr}$	3	4-11/16	6
$c_{min}$	2	3-1/8	4
Edge Distance (inches)	1/2	-	-
	1	-	-
	1-1/2	-	-
	2	0.87	-
	2-1/2	0.94	-
	3	1.00	-
	3-1/2	1.00	0.96
	4	1.00	0.98
	4-1/2	1.00	1.00
	5	1.00	1.00
5-1/2	1.00	1.00	
6	1.00	1.00	

**ORDERING INFORMATION**

**Smart DI Anchor (Drop-In) Carbon Steel Smooth Wall Dropin**

Cat. No.	Rod/Anchor Size	Outside Diameter	Overall Length	Pack Qty.	Carton Qty.
6304SD-PWR	1/4"	3/8"	1"	100	1,000
6306SD-PWR	3/8"	1/2"	1-9/16"	50	500
6308SD-PWR	1/2"	5/8"	2"	50	500



**DI System Setting Tool**

<b>Cat. No.</b>	00425SD-PWR	00427SD-PWR	00429SD-PWR
<b>Rod/Anchor Size</b>	1/4"	3/8"	1/2"
<b>Pin Length</b>	39/64"	61/64"	1-3/16"



**DI Stop Drill Bit**

<b>Cat. No.</b>	00391SD-PWR	00397SD-PWR	00410SD-PWR
<b>Description</b>	Smart Bit for 1/4"	Smart Bit for 3/8"	Smart Bit for 1/2"
<b>Bit Diameter</b>	3/8"	1/2"	5/8"



**Manual Setting Tools for Smart DI Anchor (Drop-In)**

<b>Cat. No.</b>	06305-PWR	06307-PWR	06309-PWR
<b>Rod/Anchor Size</b>	1/4"	3/8"	1/2"
<b>Pin Length</b>	39/64"	61/64"	1-3/16"



**Recommended Rotary Hammer Drills**

Cat. No.	Description
DCH273P2*	1" 20V SDS Plus Rotary Hammer
DCH263R2*	1-1/8" 20V SDS Plus Rotary Hammer D-Handle
DCH293R2*	1 1/8" 20V SDS Comb Rotary Hammer L-Shape

\*ADD "DH" for On-Board Dust Extraction

