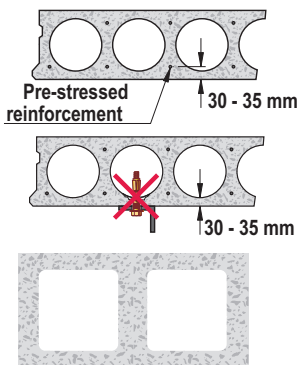


Hollow Set Drop-in Anchor

Introduction

The Hollow Set Drop-In anchor is designed for anchoring in hollow base materials such as hollow concrete block, extruded wire cut brick, and hollow core pre-cast concrete. It can also be used in solid base materials.

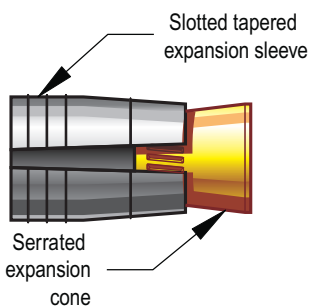
Description



There is typically only 30 to 35mm thickness of concrete to fasten into above or below hollow core concrete cores. During the drilling process, spalling on the back side of these wall sections (as the bit penetrates into the hollow portion of the base material) often decreases the wall thickness available for anchoring to 25mm or less. This creates a problem for most conventional anchors which will not function properly in materials of this thickness. The design of the Hollow Set Drop-In overcomes this problem because the expansion sleeve length is sized to be compatible with the outer wall thickness of most hollow base materials.



The slotted and tapered Zamac alloy expansion sleeve has a large radial bearing area which reduces the amount of compression force applied to the base material during the expansion process. As the anchor is tightened, the specially tapered cone is drawn into the expansion sleeve to develop a locking action against the walls of the hole.

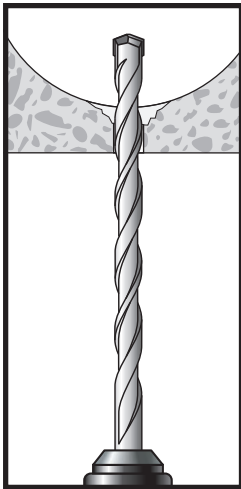


The published capacities may be used for non-safety critical static load applications. The given capacities shall not be used for vibratory / dynamic / wind / heavy sustained load conditions. As the expansion sleeve is made of Zamac alloy therefore Hollow-Set Drop-In anchor shall not be used for fire-rated applications requiring fire rating on the anchors. Other commercial structural bolts, supported by a suitable distribution plate or beam on other side, inserted through the cores / cavities may be an ideal fixing for safety critical sustained load applications in hollow base material. These should be designed by the consulting design engineer. Corrosion resistant requirements shall be assessed. Carbon steel serrated expansion cones assembled in Hollow-Set Drop-In anchors have 5µm zinc coating suitable for use only in internal applications in non-corrosive environment.

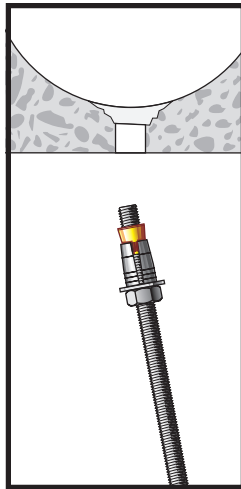
Material specifications

Anchor component	Material
Anchor body	Zamac 7 alloy
Expander cone	AISI C1008
Plating, cone	Electroplated zinc. Coating thickness 5 microns min.

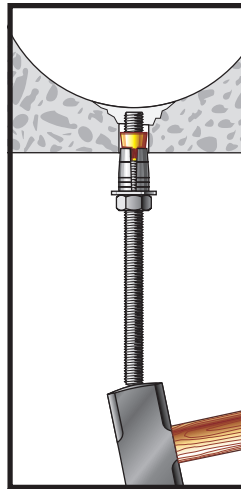
Installation - Core section, threaded rod



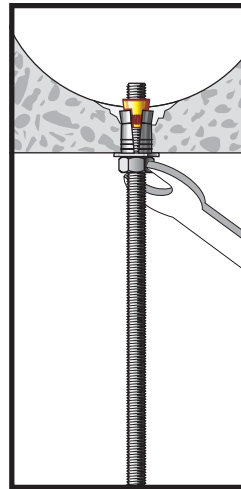
Drill a hole through the concrete into the core using a masonry bit of correct diameter and tolerance.



Blow hole clean of dust and other material. Attach threaded rod, nut and washer onto anchor. Threaded rod should engage a minimum of two thirds of the cone's threads.

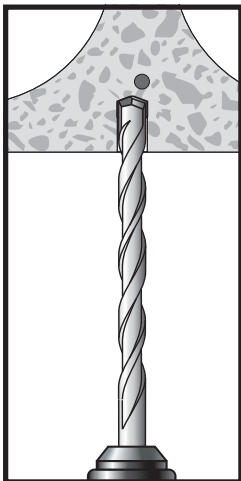


Insert cone end and tap until anchor is flush to the concrete surface.

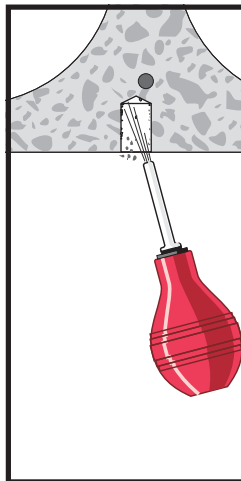


Tighten the anchor by turning the nut 3 to 4 turns. The threaded rod, anchor is now set.
(NOTE: Number of turns vary depending on the available thickness after drilling and strength of concrete. The anchor may be tightened to a maximum 30Nm torque)

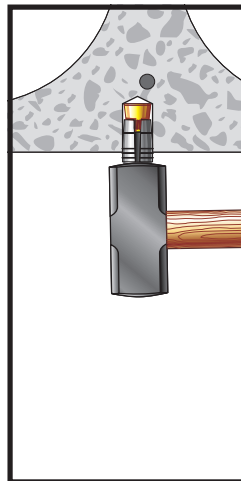
Installation - Solid section



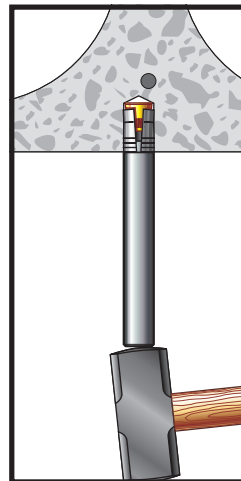
Drill a hole to the required depth using a masonry bit of correct diameter and tolerance.



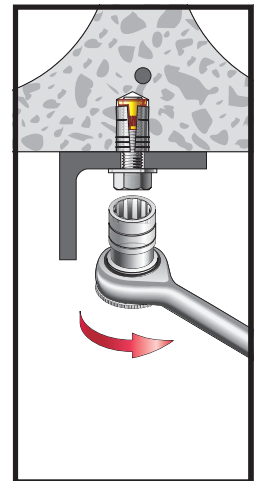
Blow hole clean of dust and other material.



Insert cone end and tap until fully seated in the anchor hole. Do not expand anchor.



Place solid setting tool inside anchor body and tap to drive the anchor to the bottom of the hole and to drive the anchor body / sleeve over the cone using several sharp hammer blows.



Remove setting tool, attach fixture, insert bolt and tighten. Only tighten snug tight as anchor is already expanded. Bolt should engage a minimum of 2/3 of the threads in the cone.



- Pre-stressed strand should not be exposed or hit by the drill bit during the drilling process.
- Anchor should be installed away from the prestressed strand to avoid reducing its minimum required cover unless prior approval is received from the consulting design engineer.

Installation - Concrete block

Drill a hole through the concrete into the core using a masonry bit of correct diameter and tolerance. Blow the hole clean of dust and other material.

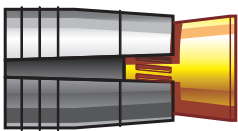
Insert cone end and tap until anchor is flush to the concrete surface.

Attach setting tool or bolt and washer onto anchor and expand it by turning the hollow setting tool or bolt 3 to 4 turns. Number of turns vary depending on the available thickness after drilling and strength of the base material. A reduced 10-20Nm torque may be applied for installations in better blocks.

Remove setting tool or bolt and attach fixture using appropriate bolt. Bolt should engage a minimum of 2/3 of the threads in the cone.

To avoid losing the cone, the setting tool or a fully threaded bolt and washer can be threaded to the anchor before inserting in the hole. Make sure the head of the bolt and washer face or face of the setting tool are in close contact with the anchor. Tap the setting tool or bolt head until the face of the tool or the washer contacts the base material and the anchor is fully embedded before tightening.

Anchor size and Setting tools



Hollow Set Drop-in (Carbon steel cone)

Part No	Description	Drill Ø mm	Overall Length mm	Anchor body length mm	Thread	Box qty	Carton qty
HSDIM10-PWR	M10	16	33	24	M10	100	500



Setting tool – Hollow base materials

Part No	Description	Box qty
HSDIM10TOOL-PWR	To suit M10 Hollow-set Drop-in	1



Setting tool – Solid base materials

Part No	Description	Box qty
09342-PWR	To suit M10 Hollow-set Drop-in	1

Performance data (Static load conditions in uncracked concrete)

The load capacity values given in this document are based on local testing and evaluation conducted in the Powers' test laboratory. Hollow-Set Drop-In anchor has not been issued with an ETA. Please refer to the exclusive range of other products, supplied by Stanley Black and Decker (Powers), that have an ETA (European Technical Assessment / Approval) for applications requiring design according to SA TS 101:2015 or AS 5216:2018.

Working stress design – Hollow core concrete 40MPa

Allowable working load capacities for Hollow set Drop-in Anchors in 40MPa hollow core concrete

ANCHOR SIZE	DRILL SIZE mm	CORE SECTION		SOLID SECTION	
		Tension kN	Embedment depth mm	Embedment depth mm	Tension kN
M10	16	1.3	26	26	2.3

Limit state design – Hollow core concrete 40MPa

Limit state design capacities for Hollow set Drop-in Anchors in 40MPa hollow core concrete

ANCHOR SIZE	DRILL SIZE mm	CORE SECTION		SOLID SECTION	
		Tension kN	Embedment depth mm	Embedment depth mm	Tension kN
M10	16	1.8	26	26	3.2

NOTES:

- Core section: Loads based on installation below core section, concrete thickness prior to drilling 30-35mm and after drilling 20-25mm
- Solid section: Loads based on installation using solid setting tool. Pre-stressed strand shall not get exposed or hit by the drill bit during the drilling process. Anchor should be installed away from the pre-stressed strand unless prior approval is received from the consulting design engineer.
- The tabulated load values are applicable to single anchors installed at critical edge and spacing i.e. not influenced by the edge/spacing effects.
- Incorporated safety factor = 3.0 for working stress design load. Consideration of a safety factor of 20 or higher may be necessary depending on the application, such as overhead sustained tension load safety critical application.
- Incorporated capacity reduction factor $\phi = 0.47$ for limit state design loads.
- Hollow core concrete slabs come in different dimensions and strength. Amount of spalling and the resultant amount of remaining concrete thickness depends on drill machine and drilling effort. Therefore, site load tests are highly recommended to assess the available thickness and load capacity. The above loads should be taken as a guide only.

Working stress design – Solid concrete

Allowable working load capacities for Hollow set Drop-in anchors in concrete

ANCHOR SIZE	HOLE SIZE mm	EMBED. DEPTH mm	20 MPa concrete		32 MPa concrete		40 MPa concrete	
			Tension kN	Shear kN	Tension kN	Shear kN	Tension kN	Shear kN
M10	16	25	1.5	2.0	1.9	2.3	2.1	2.3
		38	2.3	2.8	3.1	2.8	3.4	2.8

NOTES:

- Incorporated safety factor = 3.0. Consideration of a safety factor of 20 or higher may be necessary depending on the application, such as overhead sustained tension load critical application. Please also refer to note for reduction factors given below limit state design data for solid concrete.

Limit state design – Solid concrete

Limit state design capacities for Hollow set Drop-in anchors in concrete

ANCHOR SIZE	HOLE SIZE mm	EMBED. DEPTH mm	20 MPa concrete		32 MPa concrete		40 MPa concrete	
			Tension kN	Shear kN	Tension kN	Shear kN	Tension kN	Shear kN
M10	16	25	2.1	2.8	2.6	3.2	2.9	3.2
		38	3.2	3.9	4.3	3.9	4.8	3.9

NOTES:

- Incorporated capacity reduction factor $\phi = 0.47$.
- The tabulated load values are applicable for installations in solid concrete slab / wall for single anchors not influenced by the edge/spacing effects. Refer to reduction factors for spacing and / or edge distances. When an anchor is affected by both reduced spacing and edge distance or multiple reduced spacing distances, the spacing and edge reduction factor must be combined (multiplied) depending on the anchor group configuration.

Load Capacities – Concrete blocks (10MPa)

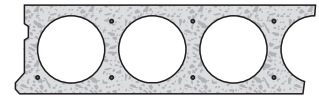
Load capacities for Hollow set Drop-in anchors in Besser concrete blocks

Anchors set flush to the block surface.

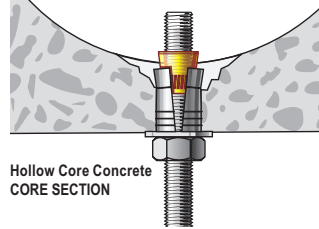
ANCHOR SIZE	HOLE SIZE mm	Working Stress Design Tension Load kN	Working Stress Design Shear Load kN	Ultimate Limit State Design Tension Load kN	Ultimate Limit State Design Shear Load kN
M10	16	0.65	0.65	0.9	0.9

NOTE:

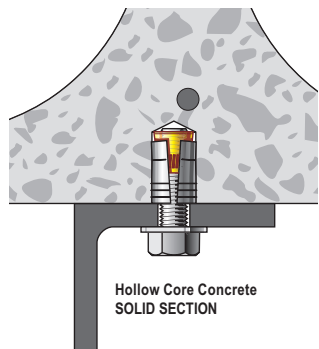
- Loads are for single anchor not influenced by the spacing and / or edge / end distances and installed in the face of wall in front of hollow core section of a typical Besser block of minimum 25mm shell thickness.
- Load capacities are for an anchor in a block in a well restrained wall.
- Masonry wall shall be capable to support the applied loads. As a guide, anchor should be installed in a block at least 3 block courses down from the top of an unrestrained wall and 1 block away from side end of wall.
- Besser blocks come in different dimensions and strength. Consistency and strength of masonry walls vary greatly. Site load tests are recommended to determine capacities.



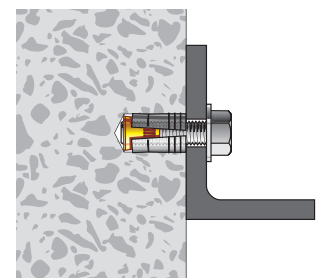
Typical section
Minimum overall thickness = 200mm
Maximum diameter of core = 350mm
Maximum width of rectangular opening = 250mm
Minimum shell thickness = 30mm



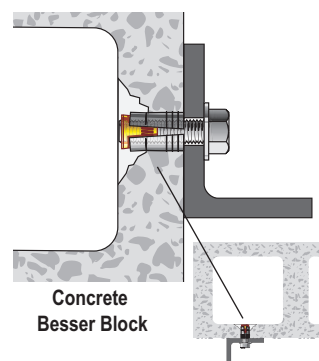
Hollow Core Concrete
CORE SECTION



Hollow Core Concrete
SOLID SECTION



Solid Concrete



Concrete
Besser Block

Base Material Thickness for M10 Hollow-Set Drop-In Anchor in solid concrete slab/wall

The base material thickness (BMT) must be minimum 2 times the depth of embedment of anchor but not less than 80mm, when using Hollow-Set Drop-In anchor in solid concrete slab / wall.

Spacing between M10 Hollow-Set Drop-In anchors - Tension & Shear loads in solid concrete slab/wall

To obtain the maximum load in tension or shear, a spacing, S, of 115mm should be used for Hollow-Set Drop-In anchor. The minimum recommended anchor spacing, S, is 60mm at which point the load should be reduced by 50%. The following table lists the load reduction factor, Rs, based on the anchor spacing.

Edge distance for M10 Hollow-Set Drop-In anchors - Tension loads in solid concrete slab/wall

To obtain the maximum tension load, an edge distance E, of 14 anchor diameters (14d) should be used. The minimum recommended edge distance, E, is 8 anchor diameters (8d) at which point the tension load should be reduced by 20%. The following table lists the load reduction factor, Re(t), for M10 size based on the anchor center to edge distance.

Edge distance for M10 Hollow-Set Drop-In anchors - Shear loads in solid concrete slab/wall

For Hollow-Set Drop-In anchors, an edge distance, E, of 14 anchor diameters (14d) should be used to obtain the maximum shear load. The minimum recommended edge distance, E, is 8 anchor diameters (8d) at which point the shear load should be reduced by 50%. The following table lists the load reduction factor, Re(s), for M10 size, based on the anchor center to edge distance.

Anchor Dimension	Load Type	Critical Distance and Reduction Factor		Reduced Minimum Distance and Reduction Factor	
		Critical Distance (Full Anchor Capacity)	Critical Load Factor for Critical Distance	Minimum Distance (Reduced Capacity)	Minimum Load Factor for Minimum Distance
Spacing	Tension and Shear	3.0x38 = 114mm	1.00	1.5x38 = 57mm	0.50
Edge Distance	Tension	14d	1.00	8d	0.80
	Shear	14d	1.00	8d	0.50

Note: The load values for anchors installed in solid concrete slab / wall should be multiplied by the above reduction factors when anchor spacing or edge distances are less than the critical distances. Linear interpolation is allowed for intermediate spacing and edge distances between critical and minimum distances. When an anchor is affected by both reduced spacing and edge distance or multiple reduced spacing distances, the spacing and edge reduction factors must be combined (multiplied). Multiple reduction factors for anchor spacing and edge distances may be required depending on the anchor group configuration.

Reduction factors for spacing and edge distances rounded up to to the nearest 5mm for M10 Hollow-Set Drop-In Anchors installed in solid normal-weight concrete slab/wall.

EDGE DISTANCE								
Edge Distance	140	130	115	100	90	80		
Reduction Factor - Tension loads, Re(T)	1.00	0.97	0.92	0.87	0.83	0.80		
Reduction Factor - Shear loads, Re(S)	1.00	0.92	0.79	0.67	0.58	0.50		
SPACING, Tension and Shear								
Spacing between anchors	140	130	115	100	90	80	70	60
Reduction Factor - Tension and Shear loads, Rs	1.00	1.00	1.00	0.86	0.77	0.68	0.59	0.50

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The information contained in this document is based on local testing and evaluation conducted in the Powers' test laboratory. Hollow-Set Drop-In anchor has not been issued with an ETA. Please refer to the exclusive range of other products, supplied by Stanley Black and Decker (Powers), that have an ETA (European Technical Assessment / Approval) for applications requiring design according to SA TS 101:2015 or AS 5216:2018.

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The performance data given in this manual are the result of the evaluation of tests conducted under laboratory conditions. It is the responsibility of the designer and installer in charge to consider the conditions on site and to ensure the performance data given in the manual is applicable to the actual conditions. In particular the base material and environmental conditions have to be checked prior to installation. In case of doubt, contact the technical support of Stanley Black & Decker.

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