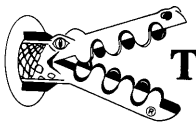
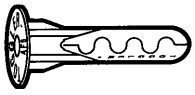
TOGGLER® ANCHOR SYSTEM TECHNICAL BULLETIN



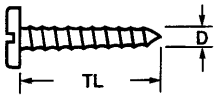
THE ALLIGATOR® ANCHOR

- Anchor pre-installs without screw
- Utilizable in any substrate, solid, thick and hollow walls
- Screw cuts its own thread-usable with UNC, metric, sheet metal and wood screws
- Usable with wide range of screw sizes in the same anchor
- Designed for use with screw gun

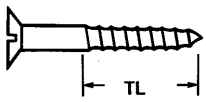


with flange

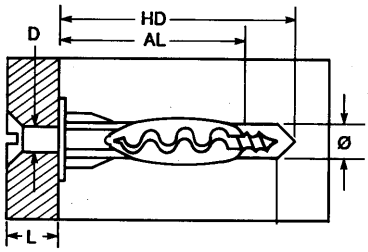
without flange



sheet metal screw



wood screw



APPLICATION SPECIFICATIONS:

Anchor (diam.)	5mm (3/16") Flange AF5	5mm (3/16") No Flange A5	6mm (1/4") Flange AF6	6mm (1/4") No Flange A6	8mm (5/16") Flange AF8	8mm (5/16") No Flange A8
drill (Ø)	3/16" (5mm)[1]		1/4" (6mm)[2]		5/16" (8mm)	
screw sizes (D)[4]	#4-#10 (3-4.5mm)		#6-#12 (4-5.5mm)		#8-#14 (4.5-6.5mm)	
minimum screw thread (TL) length[3]	1 3/16"+L (31mm+L)	1 1/8"+L (29mm+L)	1 3/8"+L (35mm+L)	1 5/16"+L (34mm+L)	1 13/16"+L (46mm+L)	1 3/4"+L (45mm+L)
anchor length (AL)	1" (26mm)	15/16" (24mm)	1 3/16" (31mm)	1 1/8" (29mm)	1 5/8" (42mm)	1 9/16" (40mm)
hole (HD) depth(min)	1 3/8" (35mm)	1 5/16" (34 mm)	1 9/16" (40mm)	1 1/2" (38mm)	2" (51mm)	1 15/16" (50mm)
minimum wall thickness	0.25" (6.4mm)		0.32" (8.1mm)		0.48" (12.2mm)	

APPLICATION NOTES:

[1] In dry wall, a 10d nail or awl will suffice to make insertion hole for 5mm AF anchor

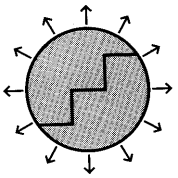
[2] For optimum utility with large screws, use 6mm (15/64") drill for soft substrate (drywall) and use 1/4" (6.3mm) drill for very hard substrate (high compression concrete).

[3] Total screw length should never exceed hole depth (HD) + fixture thickness (L).
In hollow walls, minimum screw length = wall thickness + fixture thickness (L) + 1/4" (6.3mm)

[4] In high compression strength substrates, screws that are nominally equal in diameter to the anchor can be used for high strength applications.

TO ENSURE MAXIMUM HOLDING AND TO ACCOMMODATE ANCHOR ELONGATION, HOLE DEPTH (HD) SHOULD BE AT LEAST TWO ANCHOR DIAMETERS MORE THAN THE ANCHOR LENGTH (AL) - ANCHOR SHOULD BE FULLY THREADED BY SCREW AS SHOWN. UNLIKE OTHER PLASTIC ANCHORS, THE FINS ON THE ALLIGATOR ANCHOR PREVENT THE ANCHOR FROM SINKING INTO THE HOLE AND SPINNING ON INSTALLATION.

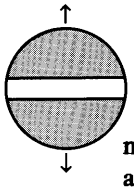
THE UNIQUE WAY THE ALLIGATOR WORKS



360° holding

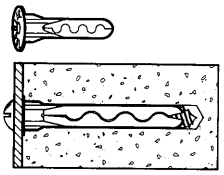
solid Alligator
circular cross section

The Alligator anchor has several features which dramatically increase its holding strength in solid and thick walls as compared to other solid wall anchors. The anchor has a circular cross-section and is completely solid. This circular cross-section causes all forces exerted by a screw threaded into the Alligator anchor to be fully transmitted around the anchor to the wall of the hole (360^0 and along its full length) for full compressive holding over the entire length of the screw.



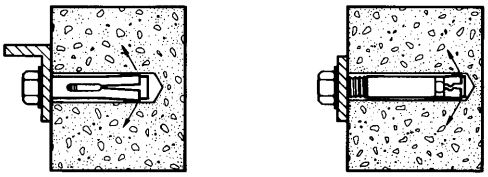
two directional holding

non-solid ordinary plug
anchor cross section



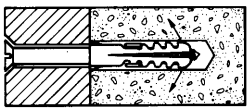
full length holding

other limited holding anchors



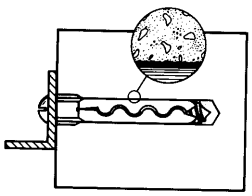
split sleeve and wedge anchors
limited ring-shaped holding area

Many other solid wall expansion anchors transmit compressive forces only to the thickest portion of the anchor and unevenly against the wall of the hole. They are hollow virtually their entire length and have many ridges, lumps, or bumps on their outer surfaces allowing for extreme pressure differences along the anchor. Virtually all heavy duty metal anchors utilize an expanding wedge which presses against only a small portion of the anchor. This force is exerted against a short ring-shaped interval of the hole and is often so concentrated that it fractures the substrate. The wedge element is forced against the split sleeve by the action of the screw.



ordinary plug anchor

Due to the solid form of the Alligator anchor, the screw extrudes and compresses all the plastic **into** the screw threads and **outwardly** against and into the wall of the hole. Under tremendous pressure, the plastic of the anchor flows to form a solid cylinder which is molded and conformed exactly to the surface of the hole and the screw for the most complete compression holding possible. Furthermore, the Alligator anchor flows into and locks up with any undercuts in the hole. With this fully conformed cylinder of plastic, the Alligator anchor provides a high degree of safety with high residual holding power even if the anchor is partially withdrawn.



cutaway closeup of
Alligator-wall interface

Old-fashioned plastic plug anchors are usually made of a relatively hard plastic such as nylon or polyvinyl chloride, which will not readily conform and flow into the surface imperfections of the wall of the hole. Accordingly, there is no bonding of the anchor to the walls of the hole. The Alligator anchor is made of a specially formulated grade of polypropylene. The screw extrudes and molds the anchor into all the wall's imperfections providing an additional locking bond of the anchor to the wall. Following removal of the screw, nylon and other hard plastic anchors slide right out of the insertion hole. The Alligator anchor, however, remains molded to the wall. A significant force is required for its removal, an additional factor in of its holding strength.

Old fashioned metal wedge type anchors, when tightened, frequently damage and tear out portions of solid walls making the hole unsuitable for re-use. The Alligator anchor does not damage walls when loosened or removed. As a result, the same hole can be reused for use with another Alligator anchor of the same size. In addition, metal anchors which operate with a wedging action must be spaced far apart to avoid overlapping "cones of force" and the consequential weakening of the wall. Because Alligator anchors, with their unique technology, do not concentrate their holding in a small area, they can be more closely spaced for greater maximum total load on the smallest substrate surface area.

Maximum Strength Anchoring Guidelines

The diameter of screw changes the compressive force of the anchor assembly. This allows the same diameter anchor, when used with different screw diameters, to work in all kinds of substrates. Small diameter screws should be used in low strength, easily compressed substrates and large diameter screws should be used in high strength substrates. When using porous masonry materials such as low compressive strength concrete, aerated concrete, small unsupported blocks, or brick, it is recommended that the screw size not exceed those given in the chart on page 1.

Unlike common plastic solid wall anchors, Alligator anchors can be used with screws of virtually the same nominal diameter as the anchor, providing **heavy duty holding that is measured in tons rather than pounds.** Under field conditions (using a manually operated hammer drill and screw gun), tensile pull-outs easily exceed 3000 pounds (see test results).

Screws or lag bolts used with Alligator anchors do not directly engage the surrounding masonry material. As a result, the Alligator-anchored screws have low susceptibility to failure by vibration or shock loads, very high residual holding strength, and even the maximum size screws do little, if any, damage when pulled out. (The same hole can usually be reused without any lessening of anchoring strength.)

FOR HEAVY DUTY ANCHORING APPLICATIONS the following criteria should be met to insure maximum anchoring strength:

Screw and Drill Guide for Optimum Strength

Alligator Anchor	Drill Size	Screw Type	Minimum Thread Length
A5/AF5	3/16" 5mm	#10 UNC 5mm SMS	1 7/8" 48mm
A6/AF6	1/4" 1/4" 6mm	#14 UNC 1/4" UNC Lag 6mm SMS	2" 2" 50mm
A8/AF8	5/16" 8mm	5/16" UNC Lag 3/16" SMS 8mm Lag	2 3/8" 2 3/8" 62mm

Notes: SMS refers to Sheet Metal Screws, Lag refers to Lag bolt
Drill insertion holes twice anchor length to ensure requisite clearance.
Drilled hole length plus thickness of fixture should exceed screw length by at least 1/2" (13mm) minimum.

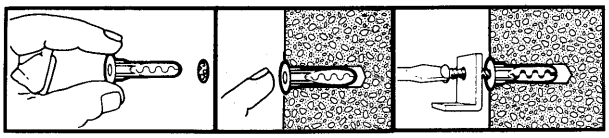
Precautions:

- ★ Because of the high compression forces exerted by the screw the anchors should be installed at least 1.5" (39mm) from an unsupported edge in high strength materials.
- ★ Ultimate tensile pull-out of sheet metal screws often depends upon tensile strength of the screw and screw head, which may pull off or break before anchor is loosened.
- ★ Use hardened or stainless steel screws to increase shear and tensile strength.
- ★ With lag bolts do not permit unthreaded portion to enter substrate.
- ★ Due to high back pressure, use hex head screws whenever possible.

INSTALLATION:

The Alligator anchor is supplied in the closed position, ready for rapid and immediate utilization. The screw used to fasten the object also opens and sets the anchor in place. Due to remolding of the anchor under pressure, it is recommended that the screw be completely set without pause. **Setting screw head flush with fixture completes installation.** All sizes are available with flanges for use in soft or hollow materials and without flanges for flush mount.

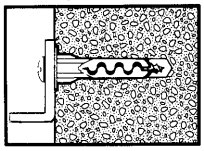
Installation:



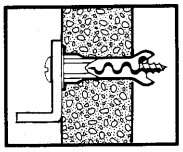
1. Drill proper size hole.
2. Insert anchor in hole, flush with wall.
3. Place item over anchor. Insert screw and tighten flush. Non-flange Alligator anchors can be used as push-through anchors.

The Alligator anchor has substantial anti-rotation fins which wedge against (the fins cut into dry wall) the interior of the hole to prevent excessive sinking and spinning even with use of a screw gun. No other solid wall anchor has this feature.

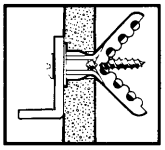
In any wall thickness:



in solid wall
(fins wedged)



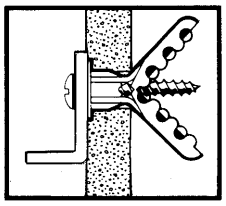
in thick wall
(fins wedged)



in hollow dry wall
(fins cut into wall)

Ordinary plastic plug anchors are liable to spin in a hole preventing screw insertion. They are also very likely to be pushed to the bottom of the insertion hole, resulting in incomplete screw engagement (the screw is stopped by the bottom of the hole) and very significant loss of holding strength.

The Alligator anchor has a patented structure designed to lever and wedge open behind hollow walls. This provides real holding power, greater than many much larger and more specialized anchors specifically made for hollow walls, such as the wall auger type. No other solid wall anchor provides an additional structure or capability for reliable use in hollow walls.



hollow wall application

Features of the Alligator anchors:

- ★ Very high holding strength - more than double that of comparably sized plastic anchors and significantly more than nearly all metal anchors of similar size
- ★ High holding strength even with deviations in hole diameter and screw size: (larger hole, smaller screw) where other anchors fail entirely
- ★ Entire anchor holds wall - along its full circumference
- ★ Bond to concrete and other hard porous material
- ★ Quick and simple installation
- ★ Anchors do not spin with installation - a screw gun can be used for installation in any type of wall
- ★ Unique design prevents sinking into hole - engagement with screw is complete

Conversion Tables:

mm to inches		inches to mm
4mm	0.158"	3/16" (.1875") 4.76mm
5mm	0.199"	15/64" (.2344") 5.95mm
6mm	0.236"	1/4" (.2500") 6.35mm
8mm	0.315"	5/16" (.3125") 7.94mm

UNC screw sizes to metric value	
#4 (.112") 2.8mm	#10 (.188") 4.8mm
#6 (.138") 3.5mm	#12 (.219") 5.5mm
#7 (.151") 3.8mm	#14 (.250") 6.3mm
#8 (.164") 4.2mm	available in metric screws in .5mm increments- 3; 3.5; 4; 4.5; 5; 5.5; 6; and 6.5

All Toggler Anchors are completely constructed out of inert materials. OHSA standard 29 CFR 1910.1200 and DOT standards are not applicable. No MSDS is required for any TOGGLER® anchor.

★ Used with any inexpensive wood or sheet metal screw in a wide range of sizes including very small and very large sizes - no protruding bolts or nuts

★ Self lubricating polypropylene facilitates screw insertion - even large diameter screws (no screw shearing)

★ Color neutral, i.e. translucent plastic, and is invisible on wall without inserted screw. It is ideal for installing clear plastic molded parts or sheets on a decorated wall.

★ Used in any type wall, of any thickness above 1/4" (6mm)

★ Minimal wall damage even when used in gypsum drywall

★ True hollow wall locking

★ Vibration and shock resistant

★ Resistant to thermal shock

★ Non-conductive, non-magnetic, non-corrodible

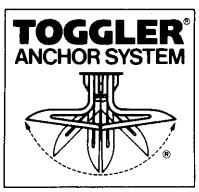
TEST RESULTS:

Alligator anchors in all sizes (5mm, 6mm, and 8mm) support much greater loads than all other comparably sized plastic and most metal and chemical solid wall anchors and cost significantly less. Alligator anchors are also designed for use in hollow walls and outhold nearly all hollow wall anchors. The following are tensile and shear pull-out values in **pounds (kilograms)** from independent testing laboratories. Industry safety standards recommend 1/4 of values for actual static applications. Holding strength for a given sized anchor varies directly with strength of wall material, screw size and extent of screw engagement, and inversely with variations in hole diameter:

Alligator Size & Drill	Screw size	in drywall 1/2" (13mm) Flanged TENSILE (T) or SHEAR (S)	in drywall 1" (25 mm) Flanged TENSILE (T) or SHEAR (S)	in Concrete 3500 psi Unflanged TENSILE	in Concrete 4000 psi** Unflanged TENSILE
5mm - 5mm	4mm sheet metal screw	57 (26)T	68 (31)T	788 (358)	-----
	5mm sheet metal screw	-----	-----	-----	2316 (1053)
5mm - 3/16"	#8 sheet metal screw	125 (55)S	-----	544 (247)	-----
	#10 sheet metal screw	-----	-----	-----	1716 (780)
6mm - 6mm	5mm sheet metal screw	69 (31)T	104 (47)T	1362 (619)	-----
	6mm sheet metal screw	-----	-----	-----	2633 (1197)
6mm - 1/4"	#10 sheet metal screw	153 (69.5)S	-----	676 (307)*	-----
	#8 sheet metal screw	136 (62)S	-----	-----	-----
	1/4" lag screw	-----	-----	-----	2116 (962)
	1/4" sheet metal screw	-----	-----	-----	2366 (1075.5)
8mm - 8mm	6mm sheet metal screw	85 (39)T	174 (79)T	1239 (563)	-----
	8mm lag screw	-----	-----	-----	3083 (1401)
8mm - 5/16"	#12 sheet metal screw	171 (78)S	276 (125.5)S	1025 (466)	-----
	#8 sheet metal screw	155 (70.5)S	254 (115.5)S		

* Use of #12 screws in cinder block provide tensile pull-out values in excess of 1000 pounds (455kg); in concrete block #12 screws provide tensile pull-out values of 1230 and 1600 lbs. depending on actual dimension of drill used

** Tests performed under field conditions: hammer drill and screw gun used. All tests performed in single concrete block.



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TENSILE STRENGTH IN DRYWALL AND IN CONCRETE — lbs (kgs)

ALLIGATOR Anchor Diameter & Drill	Screw Size	in drywall 1/2" (13mm) Flanged	in drywall 1" (25mm) Flanged	in Concrete 3500 psi Unflanged	in Concrete 4000 psi** Unflanged
Ø5mm – Ø5mm	Ø4mm sheet metal screw	57 (26)	68 (31)	788 (358)	
	Ø5mm sheet metal screw				2316 (1053)
Ø5mm - 3/16" dia.	#8 sheet metal screw			544 (247)	
	#10 sheet metal screw				1716 (780)
Ø6mm - Ø6mm	Ø 5mm sheet metal screw	69 (31)	104 (47)	1362 (619)	
	Ø 6mm sheet metal screw				2633 (1197)
Ø6mm - 1/4" dia.	#10 sheet metal screw			676 (307) *	
	#8 sheet metal screw				
	1/4" lag screw				2116 (962)
	1/4" sheet metal screw				2366 (1075.5)
Ø8mm - Ø8mm	Ø 6mm sheet metal screw	85 (39)	174 (79)	1239 (563)	
	Ø 8mm lag screw				3083 (1401)
Ø8mm - 5/16" dia.	#12 sheet metal screw			1025 (466)	
	#8 sheet metal screw				
Ø10mm - Ø10mm	Ø10mm x 100mm lag screw (K35 concrete)				4270 (1937)
	Ø10mm x 80mm lag screw (K35 concrete)				3748 (1700)
	Ø8mm x 85mm lag screw				2542 (1153)

***** Use of #12 screws in cinder block provide tensile pull-out values in excess of 1000 lbs (455 kg); in concrete block #12 screws provide tensile pull-out values of 1230 lbs (558 kg) and 1600 lbs (726 kg) depending on actual dimension of drill used.

****** Tests performed under field conditions: hammer drill and screw gun used. All tests performed in single concrete block.

SHEAR STRENGTH IN DRYWALL — lbs (kgs)

ALLIGATOR Anchor Diameter & Drill	Screw Size	in drywall 1/2" (13mm) Flanged	in drywall 1" (25mm) Flanged
Ø5mm - Ø5mm	Ø4mm sheet metal screw		
	Ø5mm sheet metal screw		
Ø5mm - 3/16" dia.	#8 sheet metal screw	125 (55)	
	#10 sheet metal screw		
Ø6mm - Ø6mm	Ø5mm sheet metal screw		
	Ø6mm sheet metal screw		
Ø6mm - 1/4" dia.	#10 sheet metal screw	153 (69.5)	
	#8 sheet metal screw	136 (62)	
	1/4" lag screw		
	1/4" sheet metal screw		
Ø8mm - Ø8mm	Ø6mm sheet metal screw		
	Ø8mm lag screw		
Ø8mm - 5/16" dia.	#12 sheet metal screw	171 (78)	276 (125.5)
	#8 sheet metal screw	155 (70.5)	254 (115.5)

ALLIGATOR® anchors in all sizes support much greater loads than all other comparably sized plastic ***and*** most metal and chemical solid-wall anchors—and cost significantly less. The tensile and shear pull-out values on this sheet are shown in pounds (kilograms) from independent testing laboratories. Industry safety standards recommend 1/4 of these ultimate loads for actual static applications. Holding strength for a given sized anchor varies directly with strength of wall material, screw size, and extent of screw engagement—and inversely with variations in hole diameter.

Screw and Drill Guide for Optimum Strength

Alligator Anchor	Drill Size	Screw Type	Min. Embedded Thread Length
A5/AF5	3/16"	#10 UNC	1 7/8"
	Ø5mm	Ø5mm SMS	48mm
A6/AF6	1/4"	#14 UNC	2'
	1/4"	#14 UNC Lag	2'
	Ø6mm	Ø6mm SMS	50mm
A8/AF8	5/16"	5/16" UNC Lag	2 3/8"
	5/16"	5/16" SMS	2 3/8"
	Ø8mm	Ø8mm Lag	62mm
A10	3/8"	3/8 Lag	2 9/16"
	Ø10mm	Ø10mm Lag	65mm

Heavy-Duty Anchoring Applications should meet criteria to the left to insure maximum holding. Also —

* Because of the high compression forces exerted by the screw, the anchors should be installed at least 1.5" (39mm) from an unsupported edge in high-strength materials.
* With lag bolts do not permit unthreaded portion to enter substrate.
* Because of high back pressure, use hex head screws wherever possible.

Notes: SMS refers to Sheet Metal Screws; Lag refers to lag Bolt.
Drill insertion hole twice anchor length to ensure requisite clearance.
Drilled hole length plus thickness of fixture should exceed screw length by at least 1/2" (13mm) minimum.

ALLHOLD0402

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