Fastener Comparison

PEERLESS TESTED ANCHORS and SCREWS (concrete, metal stud, and wood stud Tensile Ultimate Load Data)

Anchor		4000 psi Concrete	Cinder Block (hollow/solid area)	Wood Stud	25 ga. Metal Stud & 1/2" Drywall	1/2" Drywall
AF6 Alligator + #14 wd scr 590-0097 + 5S4-015-C03		2000	450 / 1000			
Rawl 5005/Hilty HLC 8/40 560-9707 (concrete)		1600	1600 / 1600			
Toggler Bolt + 1/4-20 x 2.5" scr 560-9708 + 520-9521(metal)					675	
Toggler Wing + #10-24 x 2" scr 560-9717 + 520-2078 (metal)					300	95
Wood screw #14 x 2.5 hex phl 5S1-015-C03/04 (wood stud)				900		

CONCLUSIONS

Peerless carries two types of concrete fasteners, the Alligator anchor and the Rawl/Hilty metal expansion sleeve anchor. The Alligator anchor is inexpensive and effective for use in dense concrete and solid areas of cinder block. For maximum holding strength, it requires deeper than 2-3/4" embedment into solid material. The expansion anchor costs 46% more, but works well in most masonry material, and requires only 1-1/2" embedment.

For metal stud applications, Peerless offers two varieties as well, the Toggler Bolt and the Toggler Wing. The Toggler Wing is inexpensive and works well in light applications, but cannot be reused. Once the screw is removed completely from the wing assembly, the wing will fall into the wall. The Toggler Bolt costs almost 3 times as much, but holds more than twice as much weight, and is installed independently from the screw.

The Peerless offered wood screw is a 1022 case hardened steel (equivalent to a Grade 5) extra hard wood screw that has a specially designed head for ease of assembly. The hex head allows for high torque applications, the philips drive means that a screw driver can be readily used with it, and the integrated washer head removes the clumsy assembly of a separate washer.

CONCRETE ANCHORS FROM MANUFACTURERS (Tensile and Shear Ultimate Load Data)

Anchor	4000 psi Concr	3500 psi Concr	2000 psi Concr	Concrete Block	Cinder Block	Solid Red Br	Brick w/ hole	Clay Tile	1/2" Drywall
[1] **Alligator Anchor (AF6)**									
#10 sms S									153
#10 sms T		676							
#12 sms T				[2] 1230 - 1600	1000+				
1/4" sms T	2366								
5mm sms T		1362							69
6mm sms T	2633								
Rawl Lok/Bolt									
5/16" x 1-1/2" (1/4" bolt) T	1750		1590	1430		1230			
5/16" x 1-1/2" (1/4" bolt)	2015		2015	1970		1120			
Hilty HLC									
5/16" x 1-1/2" (1/4" bolt) T	1800		1400	1500					
5/16" x 1-1/2" (1/4" bolt)	2500		2500	2500					
Rawl Tapper									
1/4" x 1-1/4" T	1540		1090	880					
1/4" x 1-1/4" S	2150		1630	1270					
ITW Tapcon									
1/4" x 1-1/4" T	1240		840	615					
1/4" x 1-1/2" T	1600		1120	851					
1/4" x 1-3/4" T	2140		1320	984					
1/4" x 1-1/4" S	1660		1280	1058					
1/4" x 1-1/2" S	1680		1280						
1/4" x 1-3/4" S	2160		1500	1059					
[3] **Hilty HIT HY20**									
[4] 1/4" ms T				1440			1800	510	
[5] 1/4" ms S				2040			2120	600	
[6] **Hilty HIT HY150**									
3/8" x 1-3/4" T		2980							
3/8" x 1-3/4" S		2880							
3/8" x 4-1/4" T			9935						
3/8" x 4-1/4" S			5960						
Powers Wedge-Bolt									
[7] 1/4" x 1-1/2" T	2360		1860	1180					
1/4" x 2" T	4230		2800						
1/4" x 2-1/2" T						2280			
[7] 1/4" x 1-1/2" S	2690		2580	1750					
1/4" x 2" S	2780		2780						
1/4" x 2-1/2" S						1480			

NOTES

Unless otherwise noted, recommended load rating is 1/4 of above Ultimate Load data.
Next to the screw used, “T” stands for Tensile force, and “S” stands for Shear force.
[1] 2" embedment
[2] depending on actual dim. of drill used
[3] 2" embedment of threaded insert for use in hollow applications. Drilled pilot hole approx. 3/16" larger.
[4] Tensile value is recommended at 1/6 tested
[5] Shear value is recommended at 1/4 tested
[6] for use in solid applications. Drilled pilot hole approx. 3/16" larger.
[7] For hollow concrete block, use of “Block Plug” is required

RESULTS

Alligator Anchor

Plastic anchor that’s inserted into predrilled hole. As fastener is screwed into anchor, it expands uniformly around screw and elongates from 1-3/16" to over 2". The threads of the screw cut into the anchor, and the anchor spreads to fill into the crevices and pores of the mansonry.
Benefits: Can be used in solid concrete, hollow blocks, or even drywall. It is inexpensive and does not require special installation or drilling tools.
Drawbacks: Anchors cannot be reused, and a separate screw must be used together with the anchor.

Rawl Lok/Bolt and Hilty HLC

Metal expansion sleeve anchors that are screwed into predrilled holes of same diameter and depth. Anchor is inserted into hole through fixture, then tightened with wrench or screw driver. As screw is tightened, it pulls metal sleeve outward from the hole, thus expanding the sides and wedging it into the concrete.
Benefits: Can be used in solid concrete, hollow blocks, or brick. Does not need special drill bit. Single piece system so no extra assembly is needed. High holding strength. Short embedment. Anchor may possibly be reused if sleeve and nylon compression ring are not damaged.
Drawbacks: These anchors are more expensive than Alligator anchors and self tapping masonry screws. They’re not as strong in dense concrete as Alligator anchors.

Rawl Tapper and ITW Tapcon

High strength steel screw that self taps into predrilled hole. Hole must be drilled with specially toleranced drill bit that is mated with that particularly sized screw. A special installation tool is required. It’s used to attach to the drill bit, and also has a torque slip mechanism to fasten the screw without over tightening it.
Benefits: Can be used in solid concrete, hollow blocks, or brick. It’s inexpensive, easy to use and does not need separate anchors. Can be reused.
Drawbacks: A special installation tool and drill bit are required. These fasteners are not as strong as Alligator anchors.

Hilty HIT HY20 and HY150

Sleeve, threaded rod, or rebar anchored to masonry by means of fast hardening adhesive. Hole must be predrilled with normal drill to proper length, then cleaned with nylon bristled brush, then blown with air hose. A wire mesh screen sleeve is inserted into the hole. A special applicator that houses a resin and a hardener in separate containers must be used. Once injected into the screen sleeve, the mixing of the two compounds creates a gel that hardens into a concrete-like material. Before hardening, a threaded rod, rebar, or internally threaded insert is pressed into the screen sleeve. This displaces the gel through the mesh and into the pores of the masonry located along the shaft of the screen. For hollow applications, the gel expands behind the wall of the concrete block and fills part of the void. At room temperature (68° F) the gel setting time is 6 minutes. Within this time frame, the anchor may be shifted or moved. After this time, the gel begins to set firmly. 60 more minutes is required for the gel to cure to proper hardness before loading may begin. The higher the temperature, the shorter the setting and curing times.

Benefits: Can be used in solid concrete, hollow blocks, or brick. Superior holding strength. Basically bonds to masonry in solid and hollow applications. Can be used with threaded insert, threaded rods, and rebars.

Drawbacks: Many steps and parts are required to install a single fastener, plus installation may be messy. Very long gel setting and curing times. More expensive than other methods. Hardener and resin refill packs must be purchased. Must be installed at least 16" or 2 full bricks away from any edge. Fasteners smaller than 1/4" are not available.

Powers Wedge-Bolt

High strength steel screw that's engineered for masonry application. Features reverse parabolic threads for holding strength, high helix angle for fast installation, relief grooves for low installaion torque and dust relief, and chamfered tip for easy centering. Screw head is hex head and has flange with locking teeth, and screw size is stamped on head. Holes must be drilled with specially toleranced Wedge-Bit.

Benefits: Can be used in solid concrete, hollow blocks, or brick. Very high holding strength even with shallow embedment. Vibration resistant.

Drawbacks: Must use a special Wedge-Bit drill bit for pilot hole. For hollow applications, a Block Plug must be used. For self-tapping masonry screws, these are more expensive than Rawl Tapper or ITW Tapcon.

CONCLUSIONS

For heavy duty masonry applications that require the most holding strength, the Hilty HIT system is recommended. It does involve a lot of work and expense but will provide the best holding power in medium and low density concrete.

For medium strength applications, use of the Alligator anchor, Rawl Lok/Bolt, Hilty HLC, or the Powers Wedge-Bolt will provide high holding strength for relatively low cost. The Alligator anchor needs a separate screw to be used with it, the Wedge-Bolt needs a special Wedge-Bit for the pilot hole, and the Rawl Lok/Bolt and Hilty HLC are more expensive. Strength wise, the Alligator anchor is better used for dense masonry, whereas the Hilty HLC and Rawl Lok/Bolt expansion anchors are better suited for lower density masonry and concrete block. The Powers Wedge-Bolt is a good all-around performer. The latter three are also good for applications where shallow embedment is required.

For general light to medium applications, the Rawl Tapper and ITW Tapcon fasteners may be used. They are inexpensive and easy to use, although they require the use of an application tool and special drill bit. If an application is currently using the Alligator anchor, these two fasteners cannot be used in its place unless testing for that particular application is done first.