Powder Actuated Fastening

INTRODUCTION

Powder actuated fastening systems provide a cost effective method of attaching fixtures for light duty, static load conditions. Powers' systems consist of specially designed fasteners, installation tools, and powder loads which are designed to function in combination to provide optimum performance.

These systems provide the contractor with the ability to fasten directly into concrete, masonry, and structural steel without pre-drilling holes.

GENERAL APPLICATIONS AND USES

- Attaching Steel to Concrete, Block or Steel
- Attaching Wood members to Concrete, Block or Steel
- Attaching accessories to Concrete, Block or Steel
- Attaching ceiling clips and threaded rod to Concrete or Steel

APPROVALS AND LISTINGS

- Tested in accordance to ASTM E 488 and E 1190
- International Code Council, Evaluation Service (ICC-ES), ESR-2024 (Formerly ER-5330)
- International Code Council, Evaluation Service (ICC-ES), ESR-1995
- City of Los Angeles (COLA) Research Report LARR-25304
- FM Global (Factory Mutual) - File No. J.I. 3002070 (Threaded Studs)

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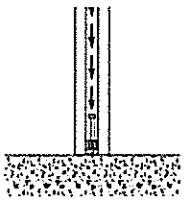
FUNCTIONING PRINCIPLES

Operating Principle

Powder actuated systems, often described as forced entry systems, require special installation tools which are critical components of a successful fastening. Two types of tools have been used in the market which operate on different driving principles, direct acting and indirect acting. The basic design of the tools are similar in that each has a breech which holds the powder load and a barrel or guide mechanism to hold the fastener. However, the installation and safety characteristics of the tools are very different.

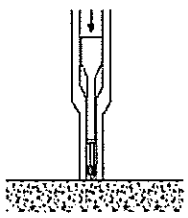
Direct Acting Principle

As the powder load is ignited in a direct acting tool, the expanding gases of the load act directly on the fastener to drive it down the barrel of the tool and into the base material. In a tool of this type, 100% of the energy developed by the powder load is transferred to the fastener. Penetration of the fastener into the base material is controlled primarily by the density of the base material and the load level selected. While the direct acting principle may allow fastenings to be made in very dense concrete and thick steel base materials, safety concerns have made the indirect principle the technology of choice. Powder actuated tools using this principle are no longer commercially available.



Indirect Acting Principle

In a tool which operates using the indirect acting principle, the expanding gases of the ignited powder load act directly on a captive piston which is housed within the barrel of the tool. The piston drives the fastener into the base material providing better control over the penetration of the fastener. In a tool of this type, most of the energy developed by the powder load is retained by the piston. Penetration of the fastener into the base material is controlled by the design of the piston, the load level selected, and the density of the base material. All Powers' powder actuated tools operate using the indirect acting principle and are classified as low velocity tools.



Tool Classification

Powder actuated tools can be classified as low, medium, or high velocity. This classification system can apply to either direct or indirect acting tools and is based on a ballistic test. Using the strongest powder load and the lightest fastener commercially available from the manufacturer for a specific tool, the velocity of the tool is determined by measuring the average velocity of the fastener for ten individual tests. The velocity classifications based on ANSI A10.3 are as follows:

1. **Low Velocity Tool**
   A tool in which the average test velocity does not exceed 328 feet per second (100 meters per second).
2. **Medium Velocity Tool**
   A tool in which the average test velocity exceeds 328 feet per second (100 meters per second) but is less than 492 feet per second (150 meters per second). Medium velocity tools are no longer commercially available.
3. **High Velocity Tool**
   A tool in which the average test velocity exceeds 492 feet per second (150 meters per second). High velocity tools are no longer commercially available.

Tool Safety

Powder actuated fasteners must be installed by properly trained and licensed operators as described in ANSI Standard A 10.3. Authorized Powers distributors offer complete training programs for end users. Contact your local Powers branch office or distributor for complete details. While the powder actuated tools are summarized in this section of the manual, only trained and licensed operators are allowed to use the tools. These summaries are for general information only.

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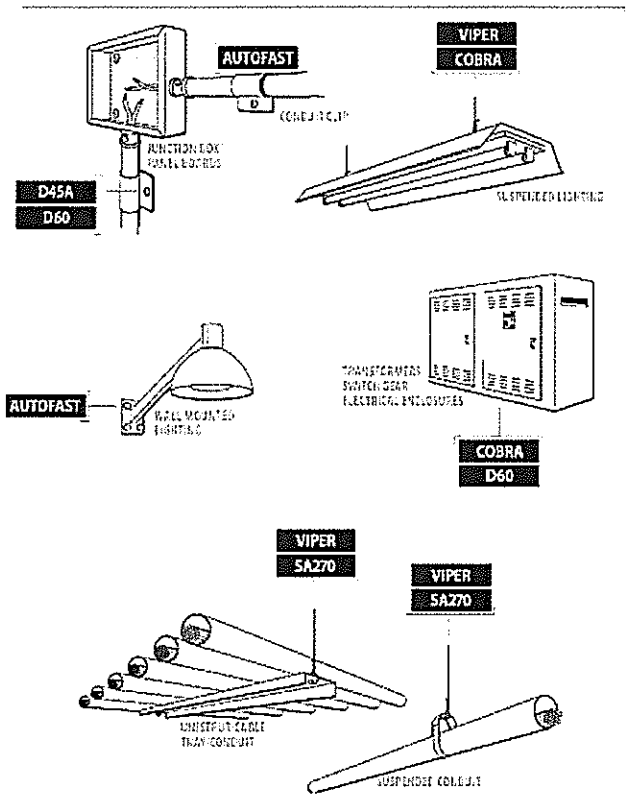
Ramset

APPLICATION GUIDE AND TOOL SELECTION

Electrical



Back to Ramset Fastening Systems

Application Guide and Tool Selection : Electrical Applications : Mechanical Applications
Drywall and Carpentry Applications : Acoustical Ceiling : Specialty Applications

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SA270
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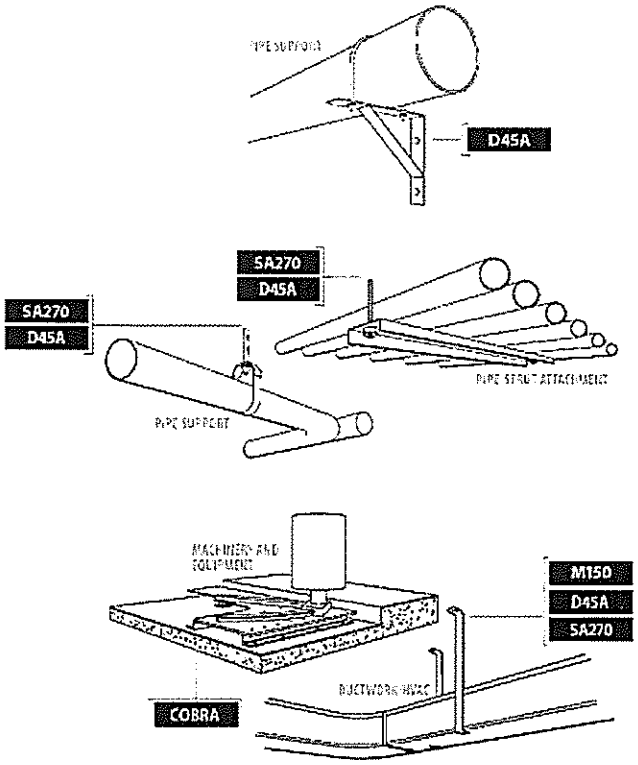
POWERS
P350C
SNIPER

HILTI
DX 36
DX 351-CT

Ramset APPLICATION GUIDE AND TOOL SELECTION

Mechanical



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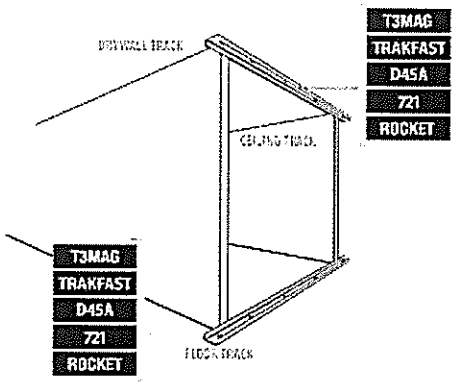
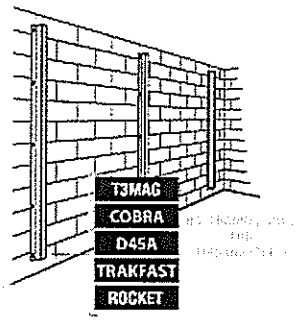
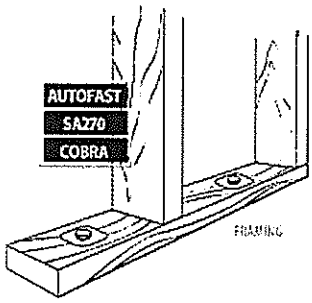
APPLICATION GUIDE AND TOOL SELECTION

Drywall and Carpentry







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POWDER ACTUATED FASTENING SELECTION GUIDES

Legend ■ Suitable □ Maybe Suitable

Pin Category		0.300" Head Drive Pin						8mm Head Drive Pin						Threaded Studs		Heavy Duty Pins	
Product		0.300" Head Drive Pin		0.300" Head Drive Pin with Top Hat	0.300" Head Drive Pin with Washers		0.300" Head Step Shank Drive Pins	8mm Head Drive Pin		8mm Head Drive Pin with Top Hat	8mm Head Drive Pin with Washers		8mm Head Spiral CSI Drive Pin	1/4" - 20 Threaded Stud	3/8" - 16 Threaded Stud	3/8" Head Drive Pin	10mm Head Drive Pin
Page		14	14	15	15	15	14	17	17	17	17	17	18	19	19	20	18
Pin Dimensions	Shank Length	1/2" to 1-1/2"	1-3/4" to 3"	1/2" to 1"	3/4" to 1-1/2"	2" to 3"	3/4" to 1"	5/8" to 1-1/2"	1-5/8" to 2-7/8"	5/8" to 1"	1" to 1-1/2"	2" to 2-7/8"	5/8" to 1-5/8"	1/2" to 1-1/4"	3/4" to 1-1/4"	1" to 3-1/8"	3/4" to 3-1/4"
	Shank Diameter	0.145"					0.145"/ .130"	0.145"					0.157"	0.145"	0.205"	.172"/ .216"/ .188"	0.177"
Base Material	Concrete	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Lightweight Concrete	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■
	Grout-filled Concrete Masonry	■	□	□	■	□		■	□	□	□	□	□	□	□	□	□
	Steel	■		■	■		■	■		■	■		■	■	■	■	■
Load Power Level	Gray-Power Level 1																
	Brown-Power Level 2																
	Green-Power Level 3																
	Yellow-Power Level 4																
	Red-Power Level 5																
	Purple/Black-Power Level 6																
Power Tools	P3600														■		■
	PA351	□		□	□		□	■	■		□	□	□				
	P3801		■											□	■	■	■
	P3500 / PA3500	■	■	■	■	■	■	■	■	■	■	■	■	■			
	P35s	■		■	■	■	■	■	■	■	■	■	■				
	P7201	■		■	■		■	■		■	■		■	■			
	P2201	■	■	■	■	■	■	■	■	■	■	■	■	■			
	P7000	■	■	■	■	■	■	■	■	■	■	■	■	■			
	P60	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Sniper Tool	■		■	■		■	■		■	■		■				
	Hammer Drive Tool																
Other Tools	721	■		■	■		■	■		■	■		■	■			
	M70	■	■	■	■	■	■	■	■	■	■	■	■	■			
	LADD(L1600)																
	D45	■	■	■	■	■	■	■	■	■	■	■	■	■			
	D60 / D60L	■	■	■	■	■	■	■	■	■	■	■	■	■			
	MD380														■	■	
	SA270	■	■	■	■	■	■	■	■	■	■	■	■	■			
	Cobra	■	■	■	■	■	■	■	■	■	■	■	■				
	Viper	■		■	■			■		■	■		■				
	DX E37	■		■	■		■	■		■	■		■	■			
	DX E72	■	■	■	■	■	■	■	■	■	■	■	■	■			
	DX400	■	■	■	■	■	■	■	■	■	■	■	■	■			
	DX600N														■	■	□
	DX35	■		■	■		■	■		■	■		■	■			
	DX350 / DX351	■	■	■	■	■	■	■	■	■	■	■	■	■			
	DX36M	■	■	■	■	■	■	■	■	■	■	■	■	■			
	DX450																
	DX451	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	DXA40	■		■	■		■	■		■	■		■	■			■
	DXA41	□	□	□	□	□	□	□	□	□	□	□	□	□	■	■	■
	DX100	■	■	■	■	■	■	■	■	■	■		■	■			
	DX200	■	■	■	■	■	■	■	■	■	■		■	■			
	DX460	□		□	□		□	■		□	□		■				D

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POWDER ACTUATED FASTENING SELECTION GUIDES (Continued)

Legend ■ Suitable □ Maybe Suitable

	Pin Category	Ballistic Point Pin			Specialty Fasteners		Clips and Accessories				Powder Actuated Loads									
	Product	Ballistic Point Pin	Ballistic Point Step Shank Pin		Forming Pin	Hammer Drive Pin	Ceiling Clip Assemblies (.300" & 8mm)	Ceiling Clip Assemblies CSI & Ballistic Point	BX-EMT Conduit Clip Assemblies (.300"&8mm)	Rebar Basket Clip Assemblies (8mm)	22 Caliber "A" Single Load	22 Caliber "A" Single Loads Load Tool (L1600)	25 Caliber Disk Load	25 Caliber Disk Loads (Red)	25 Caliber Single Load	27 Caliber Single Loads	27 Caliber Single Long Loads	25 Caliber 10 Load Strip	27 Caliber 10 Load Strip (Purple/Black)	27 Caliber Safety Strip
	Page	19	19	19	22	20	21	21	21	22	34	34	34	34	34	34	35	35	35	35
Pin Dimensions	Shank Length	1/2" to 7/8"	1-1/4"	1-7/8"	1-3/4" to 2-1/2"	3/4" to 1-1/4"	1" to 1-1/4"	7/8" to 1-1/4"	1" to 1-1/4"	1-5/8" to 2-7/8"										
	Shank Diameter	0.150"	0.181"/0.150"		0.145"/ 0.130"	0.145"	0.145"	0.157" & 0.150"	0.145"	0.145"										
Base Material	Concrete	■	■	■	■	■	■	■	■	■										
	Lightweight Concrete	■	■	■	■	■		■	■	■										
	Grout-filled Concrete Masonry	□	□		□	□	□		□	□										
	Steel	■	■	□	■		■	■	■	□										
Load Power Level	Gray-Power Level 1										■		■							
	Brown-Power Level 2										■		■			■				■
	Green-Power Level 3										■	■	■		■	■	■	■		■
	Yellow-Power Level 4										■	■	■		■	■	■	■		■
	Red-Power Level 5											■		■	■	■	■	■		■
	Purple/Black-Power Level 6											■			■	■	■		■	
Power Tools	P3600																		■	■
	PA351	□					□	□												■
	P3801															■	■			
	P3500 / PA3500	■	■	■	■		■	■	■	■										■
	P35s	■	■				■	■	■									■		
	P7201	■	■				■	■	■		■									
	P2201	■	■	■	■		■		■	■	■									
	P1000	■	■	■	■		■		■	■	■									
	P60	■	■	■	■		■	■	■	■										
	Hammer Drive Tool					■														
Other Tools	721	■	■				■		■	■	■									
	M70	■	■	■	■		■		■	■	■									
	LADD(L1600)											■								
	D45	■	■	■	■		■		■	■			■	■						
	D60 / D60L	■	■	■	■	■	■		■	■			■							
	MD380																■			
	SA270	■	■	■	■		■		■	■										■
	Cobra	■	■	■	■		■		■											■
	Viper	■		■	■				■											■
	DX E37	■		■	■		■		■		■									
	DX E72	■	■	■	■		■		■	■	■									
	DX400	■	■	■	■		■		■	■						■				
	DX600N																■			
	DX35	■		■	■		■		■									■		
	DX350 / DX351	■	■	■	■		■	■	■	■										■
	DX36M	■	■	■	■		■		■	■										■
	DX450																		■	■
	DX451	■	■	■															■	■
	DXA40	■		■	■		■		■											■
	DXA41	■	■	■	■		■		■	■										■
	DX100	■	■	■	■		■		■	■					■					
	DX200	■	■	■	■		■		■	■					■					
	DX460							■												■

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