STARCYL
AIR CYLINDERS

HEAVY DUTY
Hydraulic Cylinders

STAR6 SERIES

HEAVY DUTY SERVICES
INDUSTRIAL TIE ROD CONSTRUCTION

NOMINAL PRESSURE - 3000 PSI

STANDARD BORE SIZES 1.5” THROUGH 6”

PISTON ROD DIAMETERS 5/8” THROUGH 4”

18 STANDARD MOUNTING STYLES

STARNITE AVAILABLE ON EVERY STEEL PARTS

Piston Rod
High Strength Aloy Steel (SAE4140). **STARNITE** (Nitrocarburation) treatment on the rod gives better corrosion-resistant properties (out performs 12-micron, (.0005 in.) chromium electroplating by ratio up to 20:1.), Improved wear resistance, better lubrication retention, dent resistance without induction hardening (65-70Rc), environmentally friendly,no surface pitting, flaking, or hydrogen embrittlement. The finish created by the process is a lustrous black. (Available in Stainless Steel)

Wiper
The Urethane wiper is designed to wipe off abrasive dust and contaminants on the retract stroke to ensure long life for the seals, rod bushing and piston rod. (temperature: -50° to 230°F)

Rod lips seal
Our New Design with a real rod u-cup is completely self compensating for zero leakage at all pressures (temperature: -50° to 230°F)

Self Centering Cushion Spud
Self centering design allows for close tolerance and min. wear. Optional at extra charge. For faster cycle time and increased productivity, maximum performance, economical, flexible for even the most demanding applications, reduces shock and machine noise, lower maintenance costs, can be supplied at head, cap or both ends.

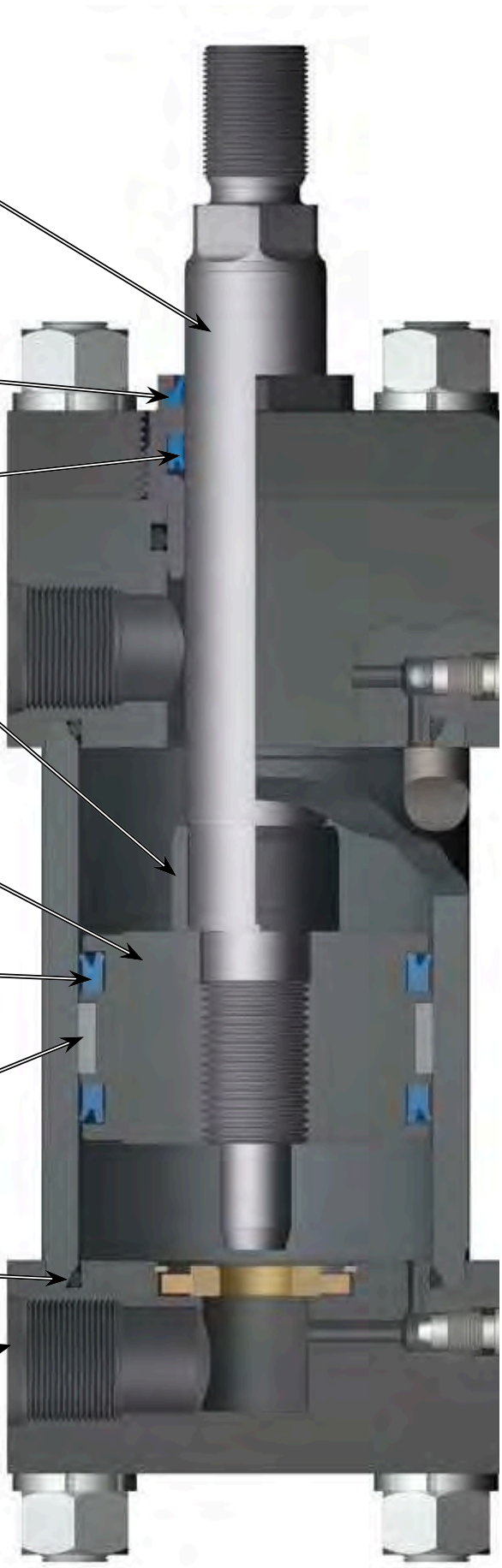
One-Piece Iron Piston (U-cup Design) Std.
One piece design for maximum strength and bearing surface. Anaerobic adhesive is used to permanently lock and seal the piston to the rod. 3 different styles of piston available.

Piston Lip Seal (std)
Lip-type low friction urethane piston seals are pressure energized and wear compensating for low friction and long life (temperature: -50° to 230°F)

Piston Wear Ring
Nylon material is designed for low friction, and to ensure minimum wear in the cylinder's tubing in side load application. Eliminates metal-to-metal contact.

O-ring Tube End Seals
Nitrile O-ring design is pressure compensating and reusable. Pressure-actuated cylinder body-to-head and cap

Porting
SAE Straight thread "O"Ring Ports are standard. NPT ports are optional at no extra cost. Standard port position is number 1. Specify if another location is needed. SAE Code 61 ports are also available.



*All Blue seals can withstand most chemical washdown, No Fluorocarbon Required

Hex. Rod Ends •
Special and unique 6 Flats Hexagonal rod end, for easy access of the rod with tools

Rod Gland •
Starnite Cast iron gland is externally removable without cylinder disassembly for easy maintenance. Designed to provide maximum rod bearing. **The New STARNITE Cast Iron** This bushing has been designed for tough application with side load. The STARNITE Technology improves bearing resistance against wear with an hardened Layer on both parts.

Precision Steel Head & Cap •
Precision machined Concentric with flat and parallel surfaces. Provides true aligment of tubing and rod gland.

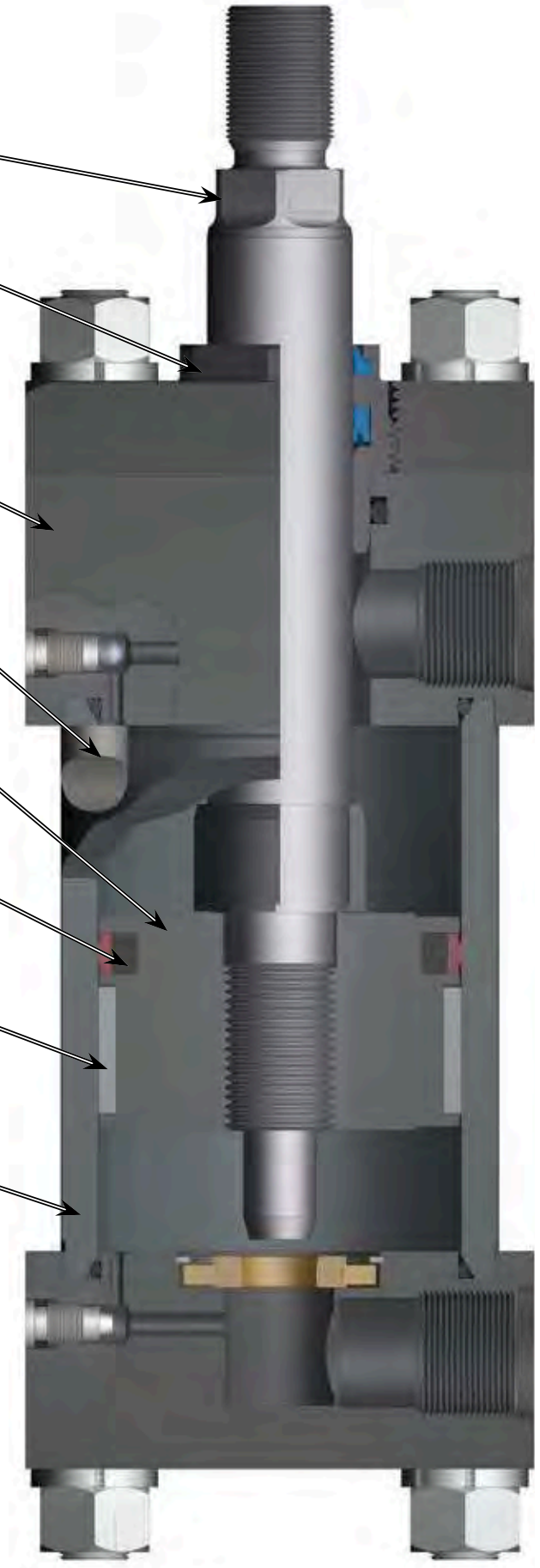
Tie rods •
Corrosion resistant STARNITE (Nitrocarburation), stress proof steel maintains uniform compression on tube end seals.

One-Piece Iron Piston (Hi-Load Option) •
One piece design for maximum strength and bearing surface. Anaerobic adhesive is used to permanently lock and seal the piston to the rod. 3 different styles of piston available.

Piston Seal (Hi-Load Option) •
Compact double acting piston seal assembly designed for one piece pistons and is suitable for low to high pressure, medium to heavy duty applications.

Extra Large Piston Wear Ring (Hi-Load Option) •
Nylon material is designed for low friction, and to ensure minimum wear in the cylinder's tubing in side load application. Eliminates metal-to-metal contact.

The Cylinder Body •
Heavy wall steel tubing, honed to a micro finish bore. **STARNITE** for hard layer ID, Tube ends are machined on the OD concentric with the ID. They are confined by the close tolerance machining of the head and cap which provides greater hoop strength.



STARNITE THE ANSWER TO WEAR, CORROSION AND FATIGUE PROBLEMS

The STARNITE process improves component properties.

High wear resistance, as well as excellent sliding and running properties, is obtained through STARNITE treatment. The service life of cylinders parts is extended. The finish created by the STARNITE process is a lustrous black.

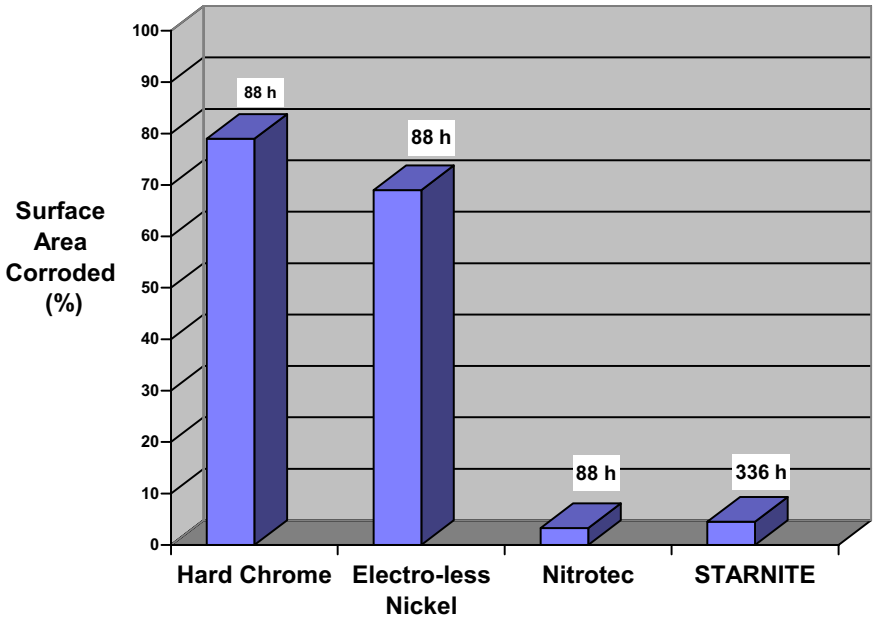
During the process, which takes place at 1075°F, the metal surface is enriched with nitrogen and carbon. A two part nitride layer consisting of a monophase compound layer and a diffusion layer is formed. Total depth ranges from 0.008-0.040", depending on composition of the base material and treating time. Hardness in the compound layer ranges from approximately HV 700 (60 Rc) to about HV 1600 for high alloyed tools steel. As part of the salt-bath nitriding and QPQP (Quench-Polish & Quench & Polish) sequence, finish-machine parts are polished and chemically processed to produce a highly corrosion-resistant surface with a finish suitable for bearing or seal-type applications.

ENVIRONMENTALLY & ECONOMICALLY SAFE

Great concern exists in North America community regarding many critical materials because of North America' reliance on metals that are not native to this continent. Some 91% of the chromium used here is imported (9% balance from recycling). STARNITE process provides at least a partial solution to this problem and because it is not a plating or a coating but in the steel itself the process offers superior performance.

Corrosion resistance developed by the STARNITE technique out performs 12-micron (.0005 in.) chromium electroplating by ratio up to 20:1, and 20 micron (.0008 in.) nickel plating by a factor of 8:1.

Corrosion Resistance Evaluation
Test conditions; Spool Shaft, ASTM B-117,
(88h)test hours



Chrome plated Vs STARNITE

Chromed plated cylinders	STARNITE Process on cylinders
• Chrome plate can flake and blister.	• Superior corrosion resistance.
• Flakes and slivers will destroy seals and glands.	• Improved wear resistance.
• Loose chrome will cause massive leaking and rapid system failure.	• Better lubrication retention. • Dent resistance without induction hardening.
• Chrome lacks dimensional uniformity.	• Environmentally Friendly • No surface pitting, flaking, or hydrogen embrittlement. • INCREASED SERVICE LIFE.

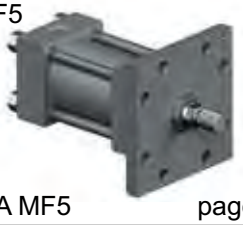
Standard Specifications

HeavyDuty Service – ANSI/(NFPA) T3.6.7R2 - 1996 Specifications and Mounting Dimensions Standard
Standard Construction: Square Head, Tie Rod Design
Nominal Pressure : 3000 PSI*
Standard Fluid: Hydraulic Oil
Standard Temperature :-40°F to +230°F**
Bore Sizes from 1.5” through 6”
Piston Rod Diameter from 5/8” through 4”

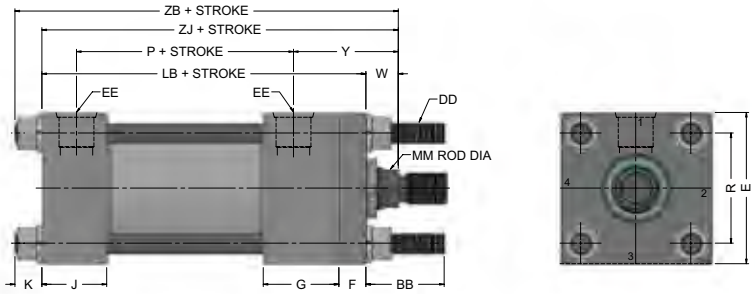
Mounting Styles: 18 standard styles at various application ratings
Strokes : Available in any practical stroke length
Cushions : Optional at either end or both ends of stroke.
Float Check at cap end.
Rod Ends :Three Standard Choices – Specials to Order

See page 18, 19 and 20 For Spherical Bearing Mount Style ST6SB.

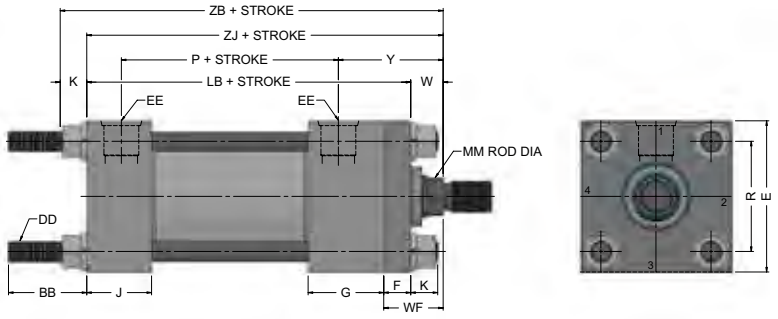
*** See page 25 for more details on Pressure rating per bore.**
**** See page 26 Viton seals for higher temperature service.**

Tie rods Head end ST6X3  NFPA MX3 page 6	Tie rods Cap end ST6X2  NFPA MX2 page 6	Tie rods Extended Both ends ST6X1  NFPA MX1 page 6	Head Rectangular Flange ST6F1  NFPA MF1 page 8
Head Square Flange ST6F5  NFPA MF5 page 8	Head Rectangular Mount ST6E5  NFPA ME5 page 8	Cap Rectangular Flange ST6F2  NFPA MF2 page 10	Cap Square Flange ST6F6  NFPA MF6 page 10
Cap Rectangular Mount ST6E6  NFPA ME6 page 10	Side Lugs ST6S2  NFPA MS2 page 12	Center Lugs ST6S3  NFPA MS3 page 12	Side Tap ST6S4  NFPA MS4 page 12
End Angles ST6S1  NFPA MS1 page 14	End Lugs ST6S7  NFPA MS7 page 14	Cap Fixed Clevis ST6P1  NFPA MP1 page 14	Head Trunnion ST6T1  NFPA MT1 page 16
Cap Trunnion ST6T2  NFPA MT2 page 16	Intermediate Trunnion ST6T4  NFPA MT4 page 16	Spherical Bearing ST6SB  page 18	Double Rod Cylinders ST6D  page 21

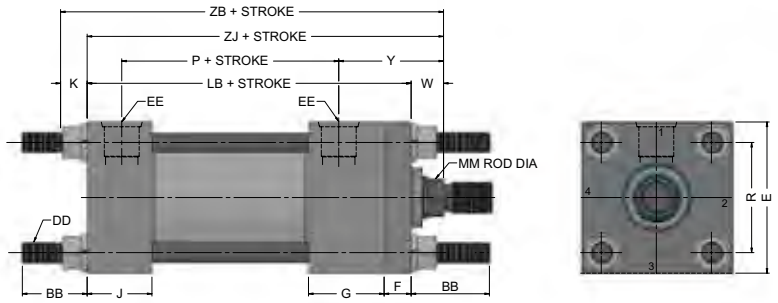
Tie Rods Extended Head End
Style ST6X3
(NFPA Style MX3)



Tie Rods Extended Cap End
Style ST6X2
(NFPA Style MX2)



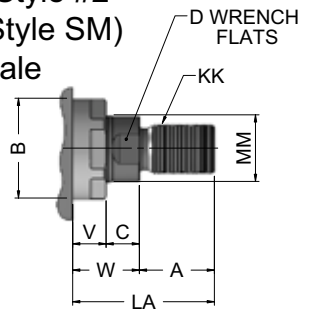
Tie Rods Extended Head End
Style ST6X1
(NFPA Style MX1)



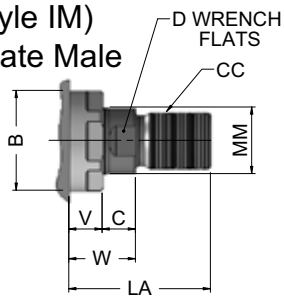
Basic Mounting ST3X0 — NFPA MX0 — no tie rods extended can be supplied upon request.

Rod End Dimensions—see table 2

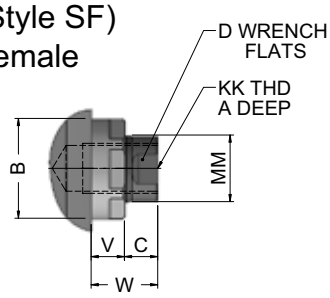
Thread Style #2
(NFPA Style SM)
Small Male



Thread Style #1
(NFPA Style IM)
Intermediate Male



Thread Style #4
(NFPA Style SF)
Small Female



"Specials" Thread Style #X

To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

Table 1—Envelope and Mounting Dimensions

BORE	AA	BB	DD	E	EE		F	G	J	K	R	ADD STROKE	
					NPTF*	SAE[std]						LB	P
1 1/2	2.3	1 3/8	3/8-24	2 1/2	1/2	10	3/8	1 3/4	1 1/2	3/8	1.63	5	2 7/8
2	2.9	1 13/16	1/2-20	3	1/2	10	5/8	1 3/4	1 1/2	7/16	2.05	5 1/4	2 7/8
2 1/2	3.6	1 13/16	1/2-20	3 1/2	1/2	10	5/8	1 3/4	1 1/2	7/16	2.55	5 3/8	3
3 1/4	4.6	25/16	5/8-18	4 1/2	3/4	12	3/4	2	1 3/4	9/16	3.25	6 1/4	3 1/2
4	5.4	25/16	5/8-18	5	3/4	12	7/8	2	1 3/4	9/16	3.82	6 5/8	3 3/4
5	7.0	33/16	7/8-14	6 1/2	3/4	12	7/8	2	1 3/4	13/16	4.95	7 1/8	4 1/4
6	8.1	35/8	1-14	7 1/2	1	16	1	2 1/4	2 1/4	7/8	5.73	8 3/8	47/8

[std] SAE straight thread ports will be furnished as standard and are indicated by port number.
*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions								Y	Add Stroke	
			STYLE #1	STYLE #2 &#4 KK	A	±.001 B	C	D	LA	NA	V	W		ZB	ZJ
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	2	6	5 5/8
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 3/8	6 3/8	6
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	6 7/16	6
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	6 11/16	6 1/4
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	6 9/16	6 1/8
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	6 13/16	6 3/8
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 7/8	7 1/16	6 5/8
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 3/4	7 11/16	7 1/8
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	3	7 15/16	7 3/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3 1/8	8 1/16	7 1/2
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	3	8 3/16	7 5/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	8 5/16	7 3/4
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	8 9/16	8
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	9 1/16	8 1/4
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	9 5/16	8 1/2
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 3/8	9 5/16	8 1/2
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 3/8	9 5/16	8 1/2
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 1/2	10 1/2	9 5/8

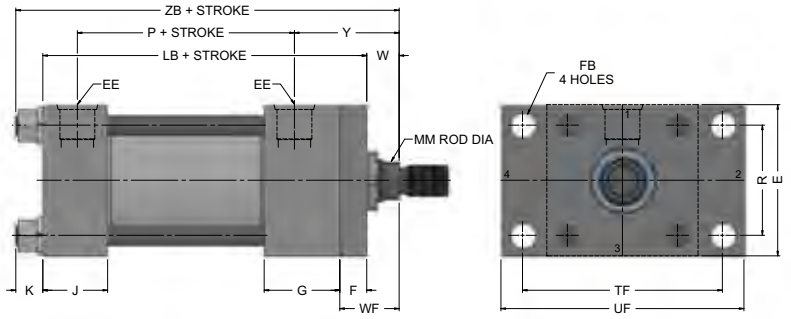
Table 3—Envelope and Mounting Dimensions

Head Rectangular Flange mounting Style ST6F1 (NFPA Style MF1)

For Pressures exeeding those shown please use mounting style ST6F5 or ST6E5

Bore Size	Max PSI — Push* Rod Size				
	5/8	1	1 3/8	1 3/4	2
1 1/2	1500	1000	-	-	-
2	-	2000	1200	-	-
2 1/2	-	2000	1100	1500	
3 1/4	-	-	1800	1300	1400
4	-	-	-	1800	1300
5	-	-	-	-	1300

Rod size				
Bore	2 1/2	3	3 1/2	4
4	1700	-	-	-
5	800	1200	1000	-
6	1200	800	1000	900

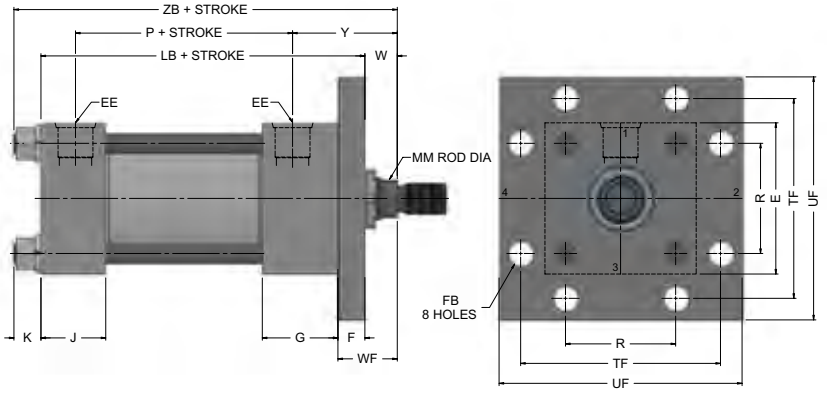


* Maximum pressure rating — push application.

Head Square Flange mounting Style ST6F5 (NFPA Style MF5)

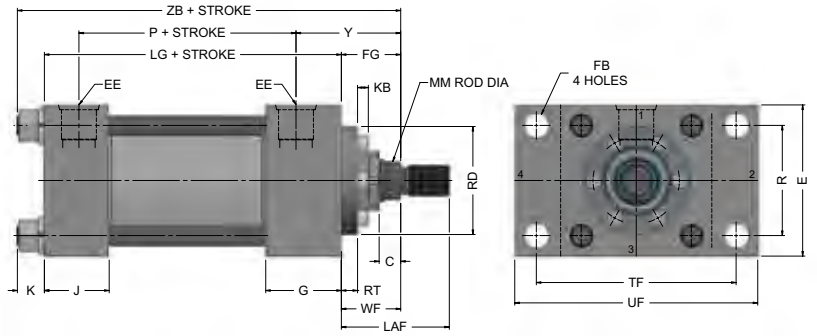
Bore Size	Max PSI — Push* Rod Size				
	5/8	1	1 3/8	1 3/4	2
1 1/2	3000	3000	-	-	-
2	-	3000	3200	-	-
2 1/2	-	3000	3000	3000	
3 1/4	-	-	3000	3000	3000
4	-	-	-	3000	3000
5	-	-	-	-	3000

Rod size				
Bore	2 1/2	3	3 1/2	4
4	3000	-	-	-
5	3000	3000	3000	-
6	3000	2700	3000	2700



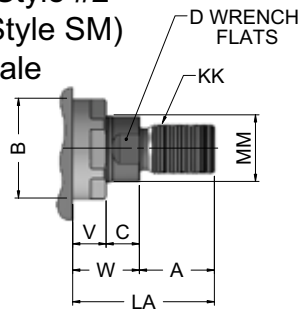
* Maximum pressure rating — push application.

Head Rectangular mounting Style ST6E5 (NFPA Style ME5)

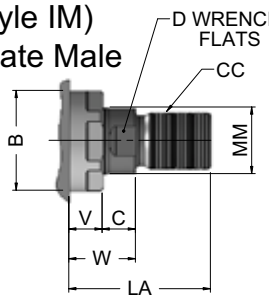


Rod End Dimensions—see table 2

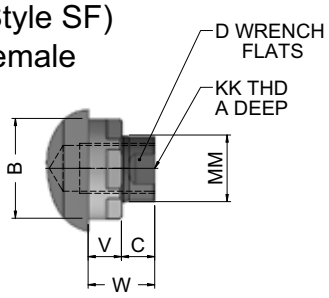
Thread Style #2 (NFPA Style SM) Small Male



Thread Style #1 (NFPA Style IM) Intermediate Male



Thread Style #4 (NFPA Style SF) Small Female



"Specials" Thread Style #X

To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE		
		NPTF*	SAE[std]									LB	LG	P
1 1/2	2 1/2	1/2	10	3/8	7/16	1 3/4	1 1/2	3/8	1.63	3 7/16	4 1/4	5	4 5/8	2 7/8
2	3	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.05	4 1/4	5 1/8	5 1/4	4 5/8	2 7/8
2 1/2	3 1/2	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.55	4 5/8	5 5/8	5 3/8	4 3/4	3
3 1/4	4 1/2	3/4	12	3/4	11/16	2	1 3/4	9/16	3.25	5 7/8	7 1/8	6 1/4	5 1/2	3 1/2
4	5	3/4	12	7/8	11/16	2	1 3/4	9/16	3.82	6 3/8	7 5/8	6 5/8	5 3/4	3 3/4
5	6 1/2	3/4	12	7/8	15/16	2	1 3/4	13/16	4.95	8 3/16	9 3/4	7 1/8	6 1/4	4 1/4
6	7 1/2	1	16	1	1 1/16	2 1/4	2 1/4	7/8	5.73	9 7/16	11 1/4	8 3/8	7 3/8	47/8

[std] SAE straight thread ports will be furnished as standard and are indicated by port number.
*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions														Add Stroke
			STYLE #1	STYLE #2 &#4 KK	A	±.001 B	C	D	KB	LA	LAF	NA	V	W	RD	RT	Y	WF	ZB
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	0	1 3/8	1 3/4	9/16	1/4	5/8	2 1/8	3/8	2	1	6
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	0	2 1/8	2 1/2	15/16	1/2	1	2 1/2	3/8	2 3/8	1 3/8	6 3/8
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	0	1 7/8	2 1/2	15/16	1/4	3/4	2 1/2	3/8	2 3/8	1 3/8	6 7/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	1/4	2 5/8	3 1/4	1 5/16	3/8	1	3	3/8	2 5/8	1 5/8	6 11/16
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	0	1 7/8	2 1/2	15/16	1/4	3/4	2 1/2	3/8	2 3/8	1 3/8	6 9/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	1/4	2 5/8	3 1/4	1 5/16	3/8	1	3	3/8	2 5/8	1 5/8	6 13/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	1/4	3 1/4	3 7/8	1 11/16	1/2	1 1/4	3 1/2	3/8	2 7/8	1 7/8	7 1/16
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	1/4	2 1/2	3 1/4	1 5/16	1/4	7/8	3	3/8	2 3/4	1 5/8	7 11/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	1/4	3 1/8	3 7/8	1 11/16	3/8	1 1/8	3 1/2	3/8	3	1 7/8	7 15/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	1/8	3 1/2	4 1/4	1 15/16	3/8	1 1/4	4	5/8	3 1/8	2	8 1/16
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	1/4	3	3 7/8	1 11/16	1/4	1	3 1/2	3/8	3	1 7/8	8 3/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	1/8	3 3/8	4 1/4	1 15/16	1/4	1 1/8	4	5/8	3 1/8	2	8 5/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	1/4	4 3/8	5 1/4	2 3/8	3/8	1 3/8	4 1/2	5/8	3 3/8	2 1/4	8 9/16
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	1/8	3 3/8	4 1/4	1 15/16	1/4	1 1/8	4	5/8	3 1/8	2	9 1/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	1/4	4 3/8	5 1/4	2 3/8	3/8	1 3/8	4 1/2	5/8	3 3/8	2 1/4	9 5/16
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	1/4	4 7/8	5 3/4	2 7/8	3/8	1 3/8	5 1/4	5/8	3 3/8	2 1/4	9 5/16
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	4 7/8	5 3/4	3 3/8	3/8	1 3/8	5 3/4	5/8	3 3/8	2 1/4	9 5/16
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	1/4	4 1/4	5 1/4	2 3/8	1/4	1 1/4	4 1/2	5/8	3 1/2	2 1/4	10 1/2
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	1/4	4 3/4	5 3/4	2 7/8	1/4	1 1/4	5 1/4	5/8	3 1/2	2 1/4	10 1/2
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	1/4	4 3/4	5 3/4	3 3/8	1/4	1 1/4	5 3/4	5/8	3 1/2	2 1/4	10 1/2
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	1/4	5 1/4	6 1/4	3 7/8	1/4	1 1/4	6 1/2	5/8	3 1/2	2 1/4	10 1/2

Table 3—Envelope and Mounting Dimensions

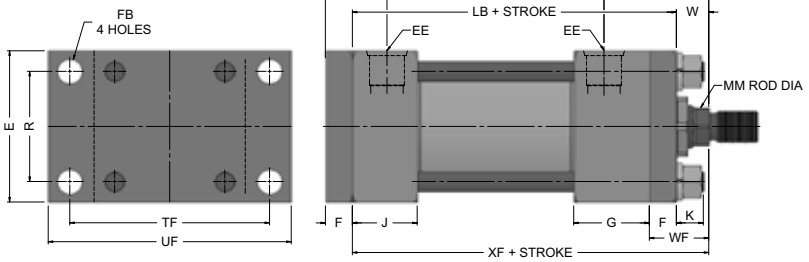
Cap Rectangular Flange mounting Style ST6F2 (NFPA Style MF2)

For Pressures exeeding those shown please use mounting style ST6F6 or ST6E6

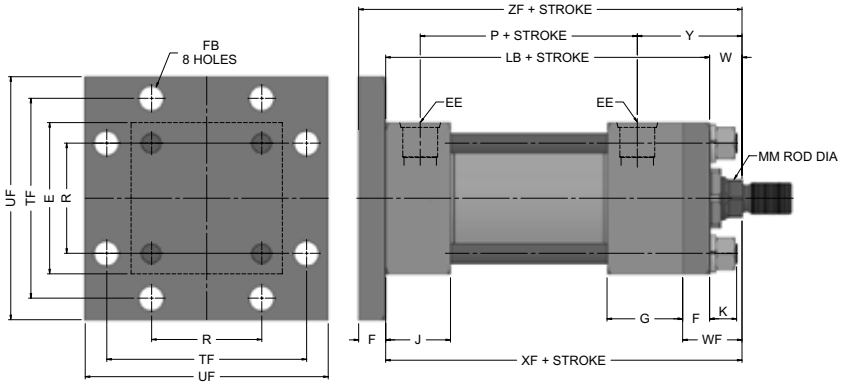
Bore Size	Max PSI — Pull* Rod Size				
	5/8	1	1 3/8	1 3/4	2
1 1/2	2500	3000	-	-	-
2	-	3000	3000	-	-
2 1/2	-	3000	3000	3000	
3 1/4	-	-	3000	3000	3000
4	-	-	-	3000	3000
5	-	-	-	-	2000

Rod size				
Bore	2 1/2	3	3 1/2	4
4	3000	-	-	-
5	3000	2000	3000	-
6	1800	2500	2000	2000

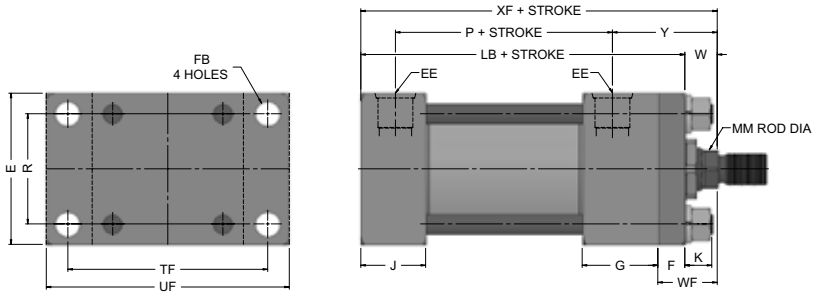
* Maximum pressure rating — pull application.



Cap Square Flange mounting Style ST6F6 (NFPA Style MF6)

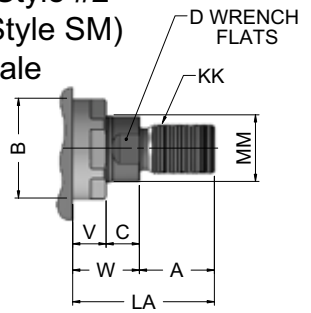


Cap Rectangular mounting Style ST6E6 (NFPA Style ME6)

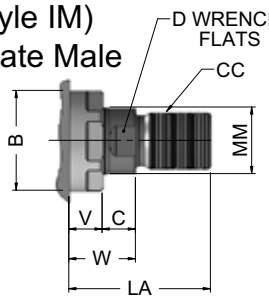


Rod End Dimensions—see table 2

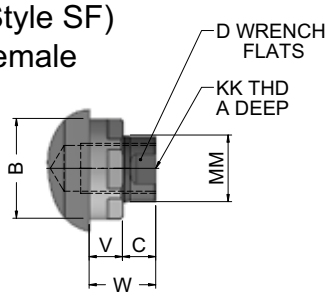
Thread Style #2 (NFPA Style SM) Small Male



Thread Style #1 (NFPA Style IM) Intermediate Male



Thread Style #4 (NFPA Style SF) Small Female



"Specials" Thread Style #X

To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	FB	G	J	K	R	TF	UF	ADD STROKE	
		NPTF*	SAE[std]									LB	P
1 1/2	2 1/2	1/2	10	3/8	7/16	1 3/4	1 1/2	3/8	1.63	3 7/16	4 1/4	5	2 7/8
2	3	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.05	4 1/4	5 1/8	5 1/4	2 7/8
2 1/2	3 1/2	1/2	10	5/8	9/16	1 3/4	1 1/2	7/16	2.55	4 5/8	5 5/8	5 3/8	3
3 1/4	4 1/2	3/4	12	3/4	11/16	2	1 3/4	9/16	3.25	5 7/8	7 1/8	6 1/4	3 1/2
4	5	3/4	12	7/8	11/16	2	1 3/4	9/16	3.82	6 3/8	7 5/8	6 5/8	3 3/4
5	6 1/2	3/4	12	7/8	15/16	2	1 3/4	13/16	4.95	8 3/16	9 3/4	7 1/8	4 1/4
6	7 1/2	1	16	1	1 1/16	2 1/4	2 1/4	7/8	5.73	9 7/16	11 1/4	8 3/8	47/8

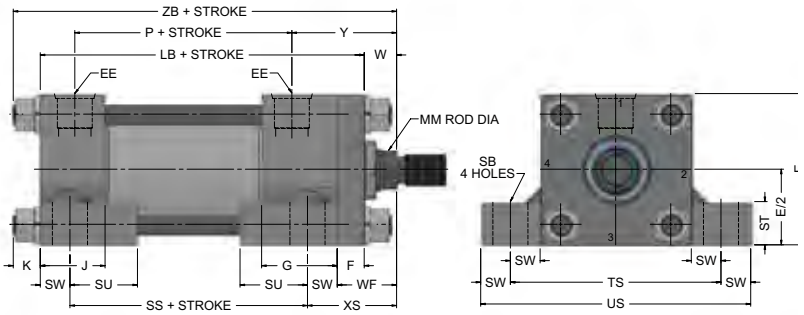
[std] SAE straight thread ports will be furnished as standard and are indicated by port number.
*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

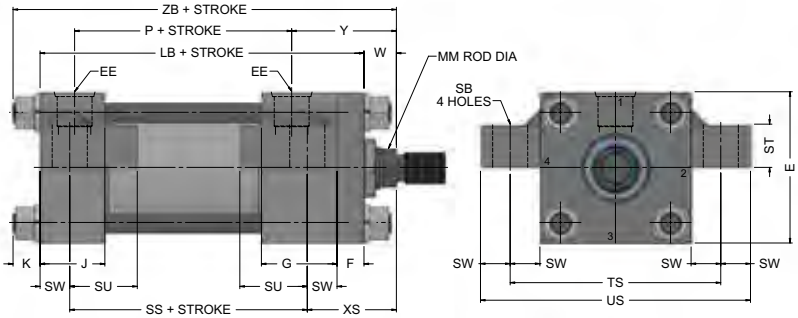
BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions										Add Stroke	
			STYLE #1	STYLE #2 &#4 KK	A	±.001 B	C	D	LA	NA	V	W	Y	WF	XF	ZF
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	2	1	5 5/8	6
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 3/8	1 3/8	6	6 3/8
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	1 3/8	6	6 3/8
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	1 5/8	6 1/4	6 7/8
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	1 3/8	6 1/8	6 3/4
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	1 5/8	6 3/8	7
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 7/8	1 7/8	6 5/8	7 1/4
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 3/4	1 5/8	7 1/8	7 7/8
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	3	1 7/8	7 3/8	8 1/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3 1/8	2	7 1/2	8 1/4
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	3	1 7/8	7 5/8	8 1/2
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	2	7 3/4	8 5/8
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	2 1/4	8	8 7/8
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	2	8 1/4	9 1/8
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	2 1/4	8 1/2	9 3/8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 3/8	2 1/4	8 1/2	9 3/8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 3/8	2 1/4	8 1/2	9 3/8
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 1/2	2 1/4	8 1/2	9 3/8

Table 3—Envelope and Mounting Dimensions

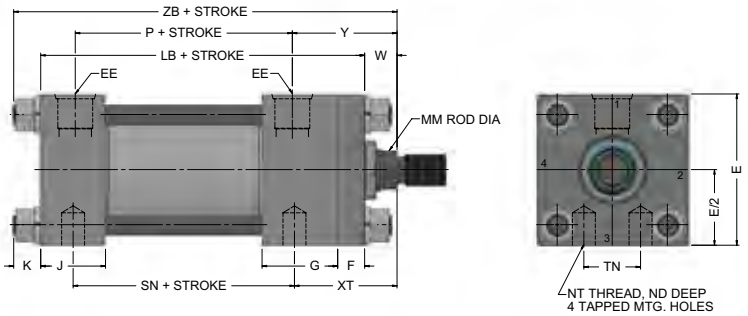
Side Lugs mounting
Style ST6S2
(NFPA Style MS2)



Center Lugs mounting
Style ST6S3
(NFPA Style MS3)

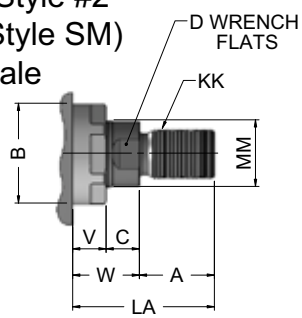


Side Tapped mounting
Style ST6S4
(NFPA Style MS4)

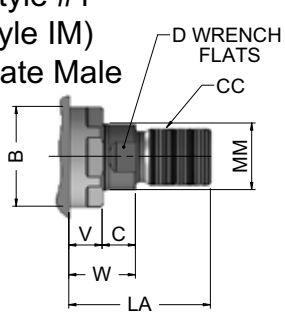


Rod End Dimensions—see table 2

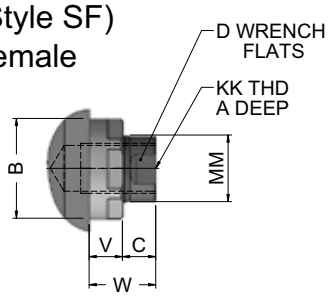
Thread Style #2
(NFPA Style SM)
Small Male



Thread Style #1
(NFPA Style IM)
Intermediate Male



Thread Style #4
(NFPA Style SF)
Small Female



"Specials" Thread Style #X

To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

Table 1—Envelope and Mounting Dimensions

BORE	E	EE		F	G	J	K	NT	SB[1]	ST	SU	SW	TN	TS	US	ADD STROKE			
		NPTF*	SAE[std]													LB	P	SN	SS
1 1/2	2 1/2	1/2	10	3/8	1 3/4	1 1/2	3/8	3/8-16	7/16	1/2	15/16	3/8	3/4	3 1/4	4	5	2 7/8	2 7/8	3 7/8
2	3	1/2	10	5/8	1 3/4	1 1/2	7/16	1/2-13	9/16	3/4	1 1/4	1/2	15/16	4	5	5 1/4	2 7/8	2 7/8	3 5/8
2 1/2	3 1/2	1/2	10	5/8	1 3/4	1 1/2	7/16	5/8-11	13/16	1	1 9/16	11/16	1 5/16	4 7/8	6 1/4	5 3/8	3	3	3 3/8
3 1/4	4 1/2	3/4	12	3/4	2	1 3/4	9/16	3/4-10	13/16	1	1 9/16	11/16	1 1/2	5 7/8	7 1/4	6 1/4	3 1/2	3 1/2	4 1/8
4	5	3/4	12	7/8	2	1 3/4	9/16	1-8	1 1/16	1 1/4	2	7/8	2 1/16	6 3/4	8 1/2	6 5/8	3 3/4	3 3/4	4
5	6 1/2	3/4	12	7/8	2	1 3/4	13/16	1-8	1 1/16	1 1/4	2	7/8	2 15/16	8 1/4	10	7 1/8	4 1/4	4 1/4	4 1/2
6	7 1/2	1	16	1	2 1/4	2 1/4	7/8	1 1/4-7	1 5/16	1 1/2	2 1/2	11/8	3 5/16	9 3/4	12	8 3/8	4 7/8	4 7/8	5 1/8

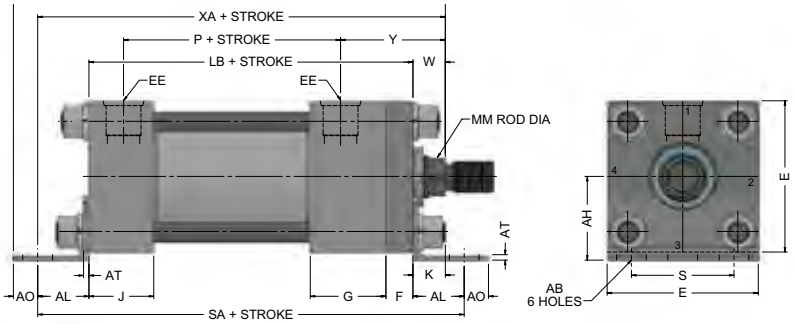
[std] SAE straight thread ports will be furnished as standard and are indicated by port number.
*NPTF ports are available at no extra charge.
[1] Upper suface spotfaced for S.H.C.S.

Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions								ND	XS	XT	Y	Add Stroke
			STYLE #1	STYLE #2 &#4 KK	A	±.001 B	C	D	LA	NA	V	W					ZB
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	3/8	1 3/8	2	2	6
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	3/8	1 3/4	2 3/8	2 3/8	6 3/8
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	7/16	1 7/8	2 3/8	2 3/8	6 7/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	7/16	2 1/8	2 5/8	2 5/8	6 11/16
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	1/2	2 1/16	2 3/8	2 3/8	9 9/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	1/2	2 5/16	2 5/8	2 5/8	6 13/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	1/2	2 9/16	2 7/8	2 7/8	7 1/16
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	11/16	2 5/16	2 3/4	2 3/4	7 11/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	11/16	2 9/16	3	3	7 15/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	11/16	2 11/16	3 1/8	3 1/8	8 1/16
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	11/16	2 3/4	3	3	8 3/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	11/16	2 7/8	3 1/8	3 1/8	8 5/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	11/16	3 1/8	3 3/8	3 3/8	8 9/16
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	1	2 7/8	3 1/8	3 1/8	9 1/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	1	3 1/8	3 3/8	3 3/8	9 5/16
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	1	3 1/8	3 3/8	3 3/8	9 5/16
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	1	3 1/8	3 3/8	3 3/8	9 5/16
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	1 1/4	3 3/8	3 1/2	3 1/2	10 1/2

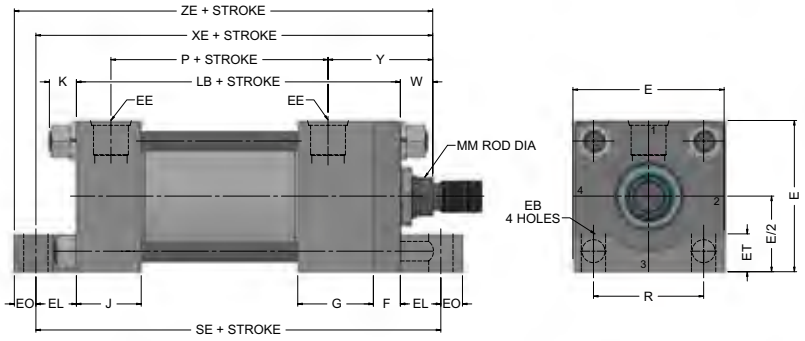
Table 3—Envelope and Mounting Dimensions

Side End Angles mounting Style ST6S1 (NFPA Style MS1)



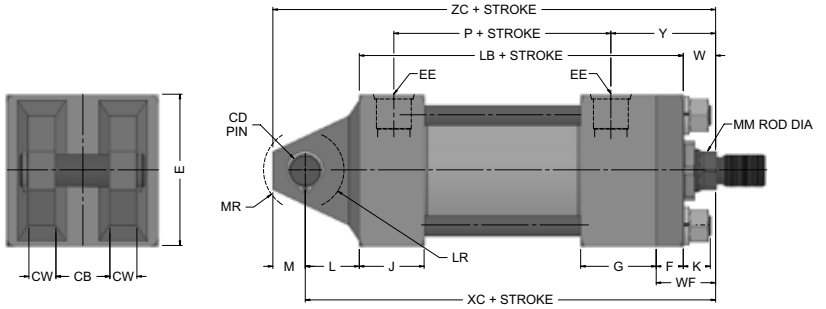
The maximum recommended operating pressure for Style CB is 500 psi. The recommended minimum stroke length is two times the bore size.

Side End Lugs mounting Style ST6S7 (NFPA Style MS7)



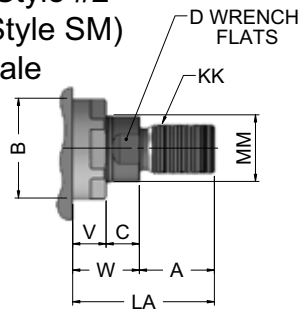
For this cylinder mounting style, both the mounting lugs and cylinder end caps must rest on a firm surface

Cap Fixed Clevis mounting Style ST6P1 (NFPA Style MP1)

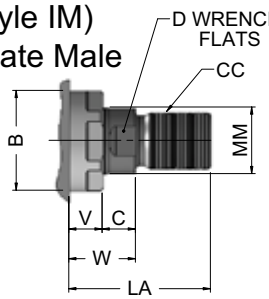


Rod End Dimensions—see table 2

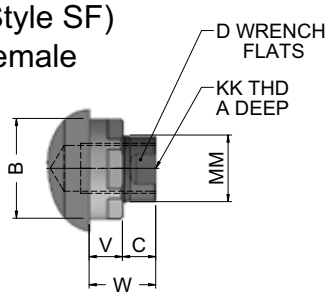
Thread Style #2 (NFPA Style SM) Small Male



Thread Style #1 (NFPA Style IM) Intermediate Male



Thread Style #4 (NFPA Style SF) Small Female



"Specials" Thread Style #X

To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

Table 1—Envelope and Mounting Dimensions

BORE	AB	AH	AL	AO	AT	CB	PIN +.000 -.002 CD	CW	E	EB	EE NPTF*	EE SAE std	EL	EO	ES	ET	F	G	J	K	L	LR	M	MR	R	S	ADD STROKE LB	P	SA	SE
1 1/2	7/16	1 3/8	1	3/8	1/8	3/4	.501	1/2	2 1/2	7/16	1/2	10	7/8	3/8	7/8	3/4	3/8	1 3/4	1 1/2	3/8	3/4	9/16	1/2	5/8	1.63	1 3/4	5	2 7/8	7	6 3/4
2	9/16	1 11/16	1 1/4	1/2	1/8	1 1/4	.751	5/8	3	9/16	1/2	10	15/16	1/2	15/16	7/8	5/8	1 3/4	1 1/2	7/16	1 1/4	1	3/4	15/16	2.05	2	5 1/4	2 7/8	7 3/4	7 1/8
2 1/2	11/16	1 15/16	1 3/16	9/16	1/8	1 1/4	.751	5/8	3 1/2	9/16	1/2	10	15/16	1/2	15/16	7/8	5/8	1 3/4	1 1/2	7/16	1 1/4	15/16	3/4	15/16	2.55	2 3/8	5 3/8	3	7 3/4	7 1/4
3 1/4	13/16	2 9/16	1 13/16	11/16	1/4	1 1/2	1.001	3/4	4 1/2	11/16	3/4	12	1 1/8	5/8	1 1/4	1 1/4	3/4	2	1 3/4	9/16	1 1/2	1 1/4	1	1 3/16	3.25	3 1/8	6 1/4	3 1/2	9 7/8	8 1/2
4	1 1/16	2 13/16	2 1/8	7/8	1/4	2	1.376	1	5	11/16	3/4	12	1 1/8	5/8	1 1/4	1 1/4	7/8	2	1 3/4	9/16	2 1/8	1 3/4	1 3/8	1 5/8	3.82	3 1/4	6 5/8	3 3/4	10 7/8	8 7/8
5	1 1/16	3 11/16	2 1/8	7/8	5/16	2 1/2	1.751	1 1/4	6 1/2	15/16	3/4	12	1 1/2	3/4	1 1/2	1 1/2	7/8	2	1 3/4	13/16	2 1/4	2 1/16	1 3/4	2 1/8	4.95	4 3/4	7 1/8	4 1/4	11 3/8	10 1/8
6	1 5/16	4 1/4	2 7/16	1 1/16	3/8	2 1/2	2.001	1 1/4	7 1/2	1 1/16	1	16	1 11/16	7/8	1 3/4	1 3/4	1	2 1/4	2 1/4	7/8	2 1/2	5 5/16	2	2 3/8	5.73	5 3/8	8 3/8	4 7/8	13 1/4	11 3/4

std SAE straight thread ports will be furnished as standard and are indicated by port number.
*NPTF ports are available at no extra charge.

Table 2—Rod Dimensions

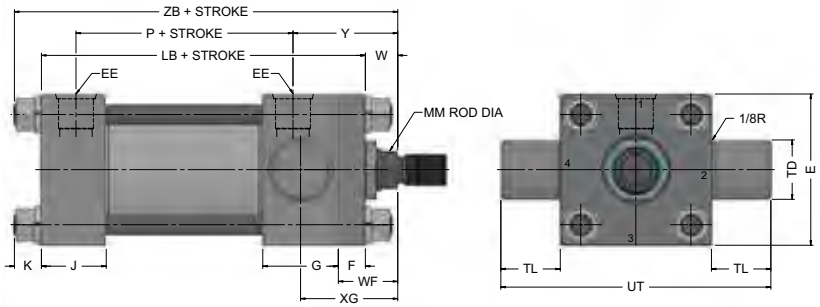
BORE	ROD SIZE		Thread Style STYLE #1	STYLE #2 &#4 KK	Rod Extensions and pilot dimensions A	±.001 B	C	D	LA	NA	V	W	Y	Add Stroke XA	XC	XE	ZA	ZC	ZE
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	2	6 5/8	6 3/8	6 1/2	7	6 7/8	6 7/8
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 3/8	7	6 3/4	6 7/8	7 3/8	7 1/4	7 1/4
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	7 1/4	7 1/4	6 15/16	7 3/4	8	7 7/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	7 1/2	7 1/2	7 1/2	7 3/16	8	8 1/4
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 3/8	7 5/16	7 3/8	7 1/16	7 7/8	8 1/8	7 9/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 5/8	7 9/16	7 5/8	7 5/16	8 1/8	8 3/8	7 13/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 7/8	7 13/16	7 7/8	7 9/16	8 3/8	8 5/8	8 1/16
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 3/4	8 15/16	8 5/8	8 1/4	9 5/8	9 5/8	8 7/8
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	3	9 3/16	8 7/8	8 1/2	9 7/8	9 7/8	9 1/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3 1/8	9 5/16	9	8 5/8	10	10	9 1/4
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	3	9 3/4	9 3/4	8 3/4	10 5/8	11 1/8	9 3/8
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	9 7/8	9 7/8	8 7/8	10 3/4	11 1/4	9 1/2
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	10 1/8	10 1/8	9 1/8	11	11 1/2	9 3/4
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3 1/8	10 3/8	10 1/2	9 3/4	11 1/4	12 1/4	10 1/2
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 3/8	10 5/8	10 3/4	10	11 1/2	12 1/2	10 3/4
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 3/8	10 5/8	10 3/4	10	11 1/2	12 1/2	10 3/4
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 3/8	10 5/8	10 3/4	10	11 1/2	12 1/2	10 3/4
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 1/2	12 1/16	12 1/8	11 5/16	13 1/8	14 1/8	12 3/16

Table 3—
Envelope and Mounting
Dimensions

Head Trunnion
Style ST6T1
(NFPA Style MT1)

Mount Maximum Pressure Rating
- PSI for Head trunnion

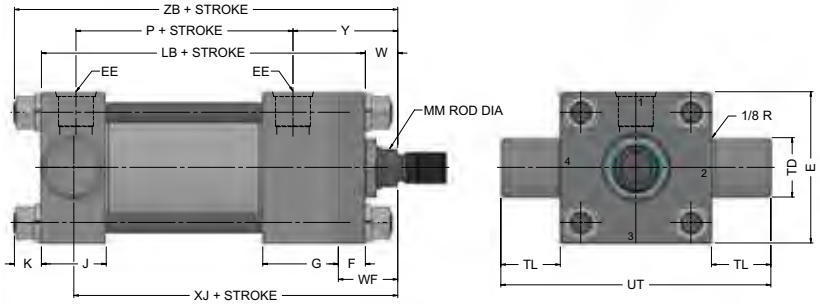
Bore Size	Max PSI
1 1/2	3000
2	3000
2 1/2	3000
3 1/4	2800
4	1800
5	1200
6	1000



Cap Trunnion
Style ST6T2
(NFPA Style MT2)

Mount Maximum Pressure Rating
- PSI for Cap trunnion

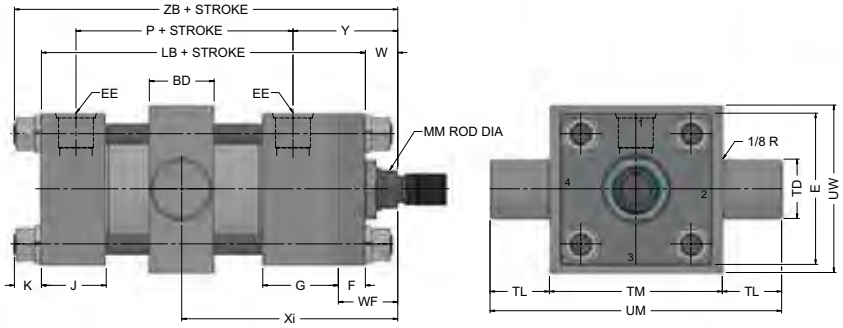
Bore Size	Max PSI
1 1/2	3000
2	3000
2 1/2	3000
3 1/4	2800
4	1800
5	1200
6	1000



Intermediate Fixed Trunnion
Style ST6T4
(NFPA Style MT4)

Mount Maximum Pressure Rating
- PSI for Center trunnion

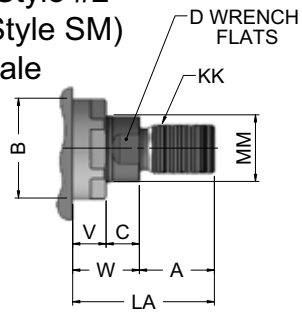
Bore Size	Max PSI
1 1/2	3000
2	3000
2 1/2	3000
3 1/4	2800
4	1800
5	1200
6	1000



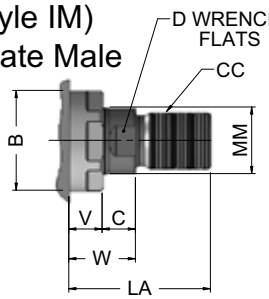
**Dimension XI to be specified by customer.

Rod End Dimensions—see table 2

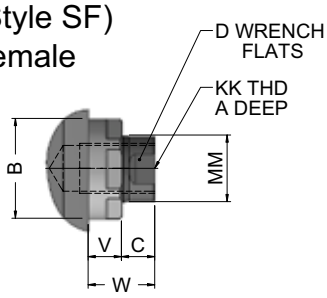
Thread Style #2
(NFPA Style SM)
Small Male



Thread Style #1
(NFPA Style IM)
Intermediate Male



Thread Style #4
(NFPA Style SF)
Small Female



"Specials" Thread Style #X

To order, specify "Style #X" and give desired dimensions for CC or KK, A and LA. If otherwise special, furnish dimensional sketch.

A high strength rod end stud is supplied on thread style #2 through 1" diameter rods and on thread style #1 through 1" diameter rods. Larger sizes or special rod ends are cut threads. Style #2 rod ends are recommended where the workpiece is secured against the rod shoulder. When the workpiece is not shouldered, style 4 rod ends are recommended through 2" piston rod diameters and style #1 rod ends are recommended on larger diameters. Use style #4 for applications where female rod end threads are required. If rod end is not specified, style #2 will be supplied

Table 1—Envelope and Mounting Dimensions

BORE	BD	E	EE		F	G	J	K	+.000 -.001 TD	TL	TM	UM	UT	UW	ADD STROKE		STYLE DD MIN STROKE
			NPTF*	SAE**											LB	P	
1 1/2	1 1/4	2 1/2	1/2	10	3/8	1 3/4	1 1/2	3/8	1.000	1	3	5	4 1/2	3 3/8	5	2 7/8	0
2	1 1/2	3	1/2	10	5/8	1 3/4	1 1/2	7/16	1.375	1 3/8	3 1/2	6 1/4	5 3/4	4 1/8	5 1/4	2 7/8	1/4
2 1/2	1 1/2	3 3/4	1/2	10	5/8	1 3/4	1 1/2	7/16	1.375	1 3/8	4	6 3/4	6 1/4	4 5/8	5 3/8	3	1/8
3 1/4	2	4 1/2	3/4	12	3/4	2	1 3/4	9/16	1.750	1 3/4	5	8 1/2	8	5 13/16	6 1/4	3 1/2	3/8
4	2	5 1/2	3/4	12	7/8	2	1 3/4	9/16	1.750	1 3/4	5 1/2	9	8 1/2	6 3/8	6 5/8	3 3/4	1/8
5	2	6 1/2	3/4	12	7/8	2	1 3/4	13/16	1.750	1 3/4	7	10 1/2	10	7 3/4	7 1/8	4 1/4	0
6	3	7 1/2	1	16	1	2 1/4	2 1/4	7/8	2	2	8 1/2	12 1/2	11 1/2	10 3/8	8 3/8	4 7/8	1/4

*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.
** SAE straight thread ports are indicated by port number.

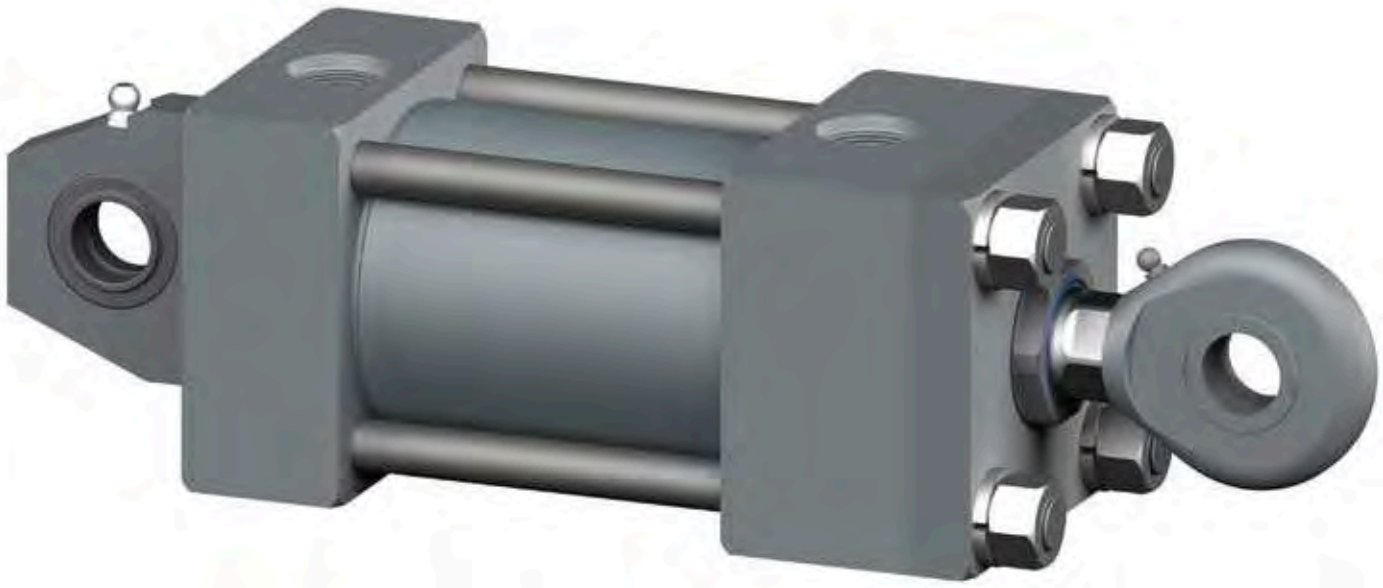
Table 2—Rod Dimensions

BORE	ROD SIZE		Thread Style		Rod Extensions and pilot dimensions								XG	MIN XI*	Y	Add Stroke	
			STYLE #1	STYLE #2 &#4 KK	A	±.001 B	C	D	LA	NA	V	W				XJ	ZB
1 1/2	std	5/8	1/2-20	7/16-20	3/4	1.123	3/8	1/2	1 3/8	9/16	1/4	5/8	1 7/8	3 7/16	2	4 7/8	6
		1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	2 1/8	15/16	1/2	1	2 1/4	3 13/16	2 3/8	5 1/4	6 3/8
2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 1/4	3 15/16	2 3/8	5 1/4	6 7/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 1/2	4 3/16	2 5/8	5 1/2	6 11/16
2 1/2	std	1	7/8-14	3/4-16	1 1/8	1.498	1/2	7/8	1 7/8	15/16	1/4	3/4	2 1/4	3 15/16	2 3/8	5 3/8	9 9/16
		1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 5/8	1 5/16	3/8	1	2 1/2	4 3/16	2 5/8	5 5/8	6 13/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/4	1 11/16	1/2	1 1/4	2 3/4	4 7/16	2 7/8	5 7/8	7 1/16
3 1/4	std	1 3/8	1 1/4-12	1-14	1 5/8	1.998	5/8	1 1/8	2 1/2	1 5/16	1/4	7/8	2 5/8	4 11/16	2 3/4	6 1/4	7 11/16
		1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3 1/8	1 11/16	3/8	1 1/8	2 7/8	4 15/16	3	6 1/2	7 15/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 1/2	1 15/16	3/8	1 1/4	3	4 15/16	3 1/8	6 5/8	8 1/16
4	std	1 3/4	1 1/2-12	1 1/4-12	2	2.373	3/4	1 1/2	3	1 11/16	1/4	1	2 7/8	4 15/16	3	6 3/4	8 3/16
		2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3	5 1/16	3 1/8	6 7/8	8 5/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 1/8	8 9/16
5	std	2	1 3/4-12	1 1/2-12	2 1/4	2.623	7/8	1 11/16	3 3/8	1 15/16	1/4	1 1/8	3	5 1/16	3 1/8	7 3/8	9 1/16
		2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 3/8	2 3/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 3/8	9 5/16
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 7/8	2 7/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 3/8	9 5/16
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 7/8	3 3/8	3/8	1 3/8	3 1/4	5 5/16	3 3/8	7 3/8	9 5/16
6	std	2 1/2	2 1/4-12	1 7/8-12	3	3.123	1	2 1/16	4 1/4	2 3/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2
		3	2 3/4-12	2 1/4-12	3 1/2	3.748	1	2 5/8	4 3/4	2 7/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2
		3 1/2	3 1/4-12	2 1/2-12	3 1/2	4.248	1	3	4 3/4	3 3/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2
		4	3 3/4-12	3-12	4	4.748	1	3 3/8	5 1/4	3 7/8	1/4	1 1/4	3 3/8	6 1/16	3 1/2	8 3/8	10 1/2

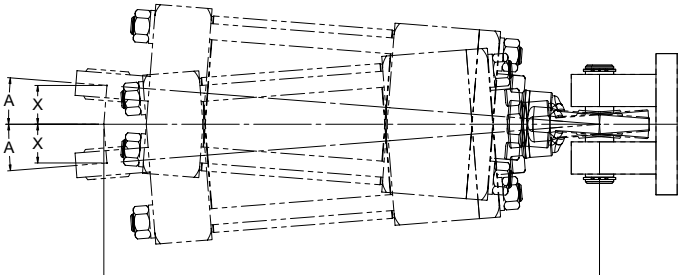
**Dimension XI to be specified by customer.

Table 3—Envelope and Mounting Dimensions

Spherical Bearing Mount
Style SB



Mounting Information
Head End Mounting



Mounting Information
Cap End Mounting

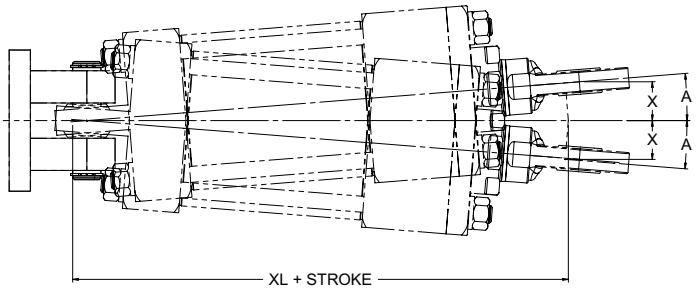
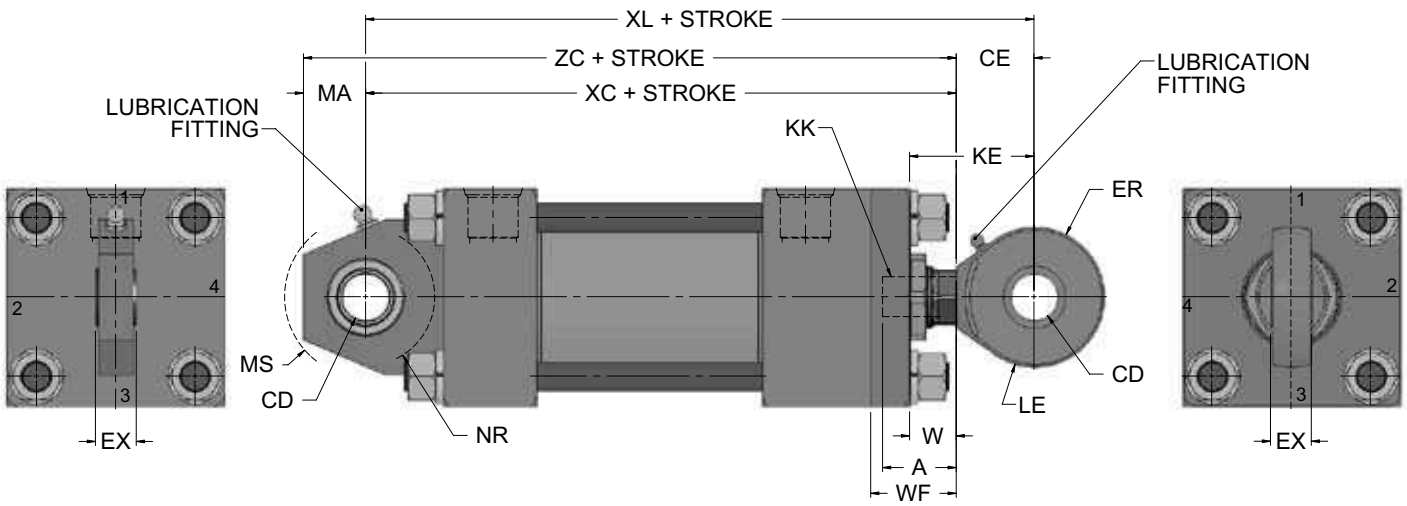


Table 1 — Dimensions

Recommended maximum swivel angle on each side of the cylinder centerline.

Bore	Head End Mount		Cap End Mount	
	Angle A	Tan. of A	Angle A	Tan. of A
1 1/2	2º	0.035	2º	0.035
2	2 1/2º	0.044	4 1/2º	0.079
2 1/2	2 1/2º	0.044	4 1/2º	0.079
3 1/4	3º	0.052	3º	0.052
4	2 1/2º	0.044	3º	0.052
5	3º	0.052	3º	0.052
6	3º	0.052	3º	0.052

Note: Dimension X is the maximum off center mounting of the cylinder. To Determine dimension X for various stroke lengths multiply the distance between pivot pin holes by tangent of angle A.
For extended position use X = XL times 2X stroke.

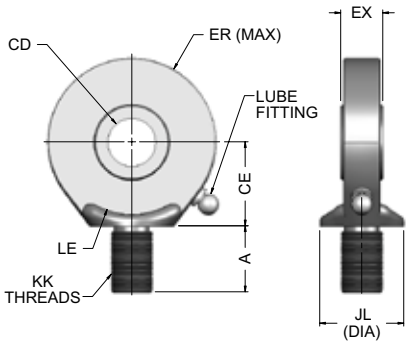


BORE		ROD SIZE	Thread Style STYLE #4 KK	Thread Style STYLE #7 KK	A	W	Add Stroke XC	Add Stroke XL	Add Stroke ZC	KE	CD*	CE	ER	EX	LE	MA	MS	NR	Max Oper. PSI ** ST6
1.5	std	5/8	7/16-20	-	3/4	5/8	6 3/8	7 1/4	7 1/8	1 1/2	-.0005 .5000	7/8	13/16	7/16	3/4	3/4	15/16	5/8	1250
		1	-	7/16-20	3/4	1	6 3/4	7 5/8	7 1/2	1 7/8									
2	std	1	3/4-16	-	1 1/8	3/4	7 1/4	8 1/2	8 1/4	2	-.0005 .7500	1 1/4	1 1/8	21/32	11/16	1	1 3/8	1	2200
		1 3/8	-	3/4-16	1 1/8	1	7 1/2	8 3/4	8 1/2	2 1/4									
2.5	std	1	3/4-16	-	1 1/8	3/4	7 1/4	8 1/2	8 1/4	2	-.0005 .7500	1 1/4	1 1/8	21/32	11/16	1	1 3/8	1	1450
		1 3/8	-	3/4-16	1 1/8	1	7 1/2	8 3/4	8 1/2	2 1/4									
		1 3/4	-	3/4-16	1 1/8	1 1/4	7 7/8	9 1/8	8 7/8	2 1/2									
3.25	std	1 3/8	1-14	-	1 5/8	7/8	8 5/8	10 1/2	9 7/8	2 3/8	-.0005 1.0000	1 7/8	1 1/4	7/8	1 7/16	1 1/4	1 11/16	1 1/4	1500
		1 3/4	-	1-14	1 5/8	1 1/4	9	10 7/8	10 1/4	3 1/2									
		2	-	1-14	1 5/8	1 1/8	8 7/8	10 3/4	10 1/8	3									
4	std	1 3/4	1 1/4-12	-	2	1	9 3/4	11 7/8	11 5/8	3 1/8	-.0005 1.3750	2 1/8	1 11/16	1 3/16	1 7/8	1 7/8	2 7/16	1 5/8	1850
		2	-	1 1/4-12	2	1 1/8	9 7/8	12	11 3/4	3 1/4									
		2 1/2	-	1 1/4-12	2	1 3/8	10 1/8	12 1/4	12	3 1/2									
5	std	2	1 1/2-12	-	2 1/4	1 1/8	10 1/2	13	13	3 5/8	-.0005 1.7500	2 1/2	2 1/16	1 17/32	2 1/8	2 1/2	2 7/8	2 1/16	2000
		2 1/2	-	1 1/2-12	2 1/4	1 3/8	10 3/4	13 1/4	13 1/4	3 7/8									
		3	-	1 1/2-12	2 1/4	1 3/8	10 3/4	13 1/4	13 1/4	3 7/8									
		3 1/2	-	1 1/2-12	2 1/4	1 3/8	10 3/4	13 1/4	13 1/4	3 7/8									
6	std	2 1/2	1 7/8-12	-	3	1 1/4	12 1/8	14 7/8	14 5/8	4	-.0005 2.0000	2 3/4	2 1/2	1 3/4	2 1/2	2 1/2	3 5/16	2 3/8	1800
		3	-	1 7/8-12	3	1 1/4	12 1/8	14 7/8	14 5/8	4									
		3 1/2	-	1 7/8-12	3	1 1/4	12 1/8	14 7/8	14 5/8	4									
		4	-	1 7/8-12	3	1 1/4	12 1/8	14 7/8	14 5/8	4									

* Dimension “CD” is hole diameter

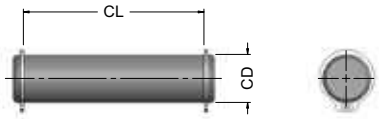
** Maximum operatioin pressure at 4:1 design factor is based on tensile strength of material. Pressure ratings are based on standard commercial bearing ratings

NFPA SPHERICAL ROD EYE



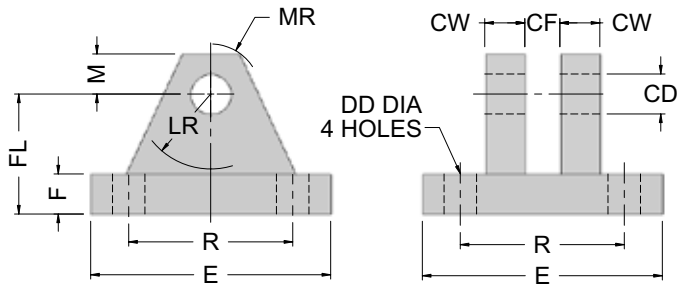
Bore Size	Part #	CD	A	CE	EX	ER	LE	KK	JL	LOAD
1 1/2, 2 & 2 1/2	RES-05	.5000$^{-.0005}$	11/16	7/8	7/16	13/16	3/4	7/16-20	7/8	2644
3 1/4, 4 & 5	RES-07	.7500$^{-.0005}$	1	1 1/4	21/32	1 1/8	1 1/16	3/4-16	1 5/16	9441
6 & 8	RES-10	1.0000$^{-.0005}$	1 1/2	1 7/8	7/8	1 1/4	1 7/16	1-14	1 1/2	16860
10	RES-13	1.3750$^{-.0005}$	2	2 1/8	1 3/16	1 11/16	1 7/8	1 1/4-12	2	28562
12	RES-17	1.7500$^{-.0005}$	2 1/8	2 1/2	1 17/32	2 1/16	2 1/8	1 1/2-12	2 1/4	43005
14	RES-20	2.000$^{-.0005}$	2 7/8	2 3/4	1 3/4	2 1/2	2 1/2	1 7/8-12	2 3/4	70193

NFPA SPHERICAL PIVOT PIN



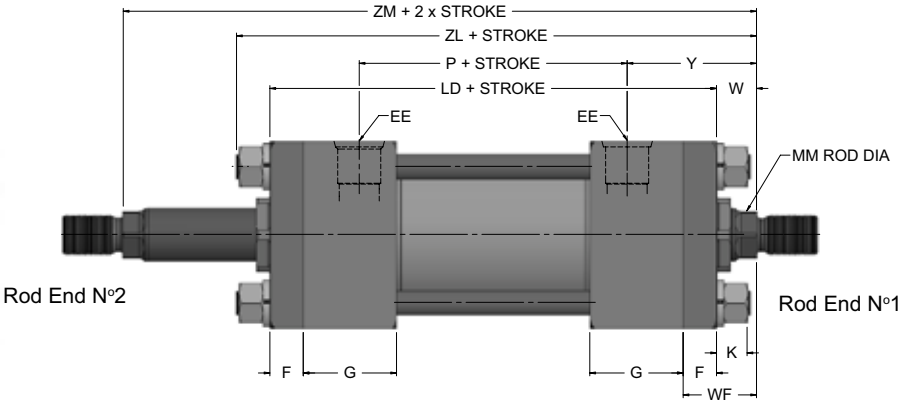
Bore Size	Part #	CD	CL	LOAD
1 1/2, 2 & 2 1/2	PS-05	.5000$^{-.0004}$	1 9/16	8600
3 1/4, 4 & 5	PS-07	.7500$^{-.0005}$	2 1/32	19300
6 & 8	PS-10	1.0000$^{-.0005}$	2 1/2	34300
10	PS-13	1.3750$^{-.0006}$	3 5/16	65000
12	PS-17	1.7500$^{-.0006}$	4 7/32	105200
14	PS-20	2.000$^{-.0007}$	4 15/16	137400

NFPA SPHERICAL CLEVIS BRACKET



Bore Size	Part #	CD	CF	CW	DD	E	F	FL	LR	M	MR	R	LOAD
1 1/2, 2 & 2 1/2	CBS-05	1/2$^{+.004/+.002}$	7/16	1/2	13/32	3	1/2	1 1/2	15/16	1/2	5/8	2.05	5770
3 1/4, 4 & 5	CBS-07	3/4$^{+.004/+.002}$	21/32	5/8	17/32	3 3/4	5/8	2	1 3/8	7/8	1	2.76	9450
6 & 8	CBS-10	1$^{+.004/+.002}$	7/8	3/4	17/32	5 1/2	3/4	2 1/2	1 11/16	1	1 3/16	4.10	14300
10	CBS-13	1 3/8$^{+.004/+.002}$	1 3/16	1	21/32	6 1/2	7/8	3 1/2	2 7/16	1 3/8	1 5/8	4.95	20322
12	CBS-17	1 3/4$^{+.004/+.002}$	1 17/32	1 1/4	29/32	8 1/2	1 1/4	4 1/2	2 7/8	1 3/4	2 1/16	6.58	37800
14	CBS-20	2$^{+.004/+.002}$	1 3/4	1 1/2	29/32	10 5/8	1 1/2	5 1/2	3 5/16	2	2 3/8	7.92	50375

Double Rod end
Style ST6D



To determine dimensions for a double rod cylinder, first refer to the desired single rod mounting style cylinder shown on preceding pages of this catalog. After selecting necessary dimensions from that drawing, return to this page supplement the single rod dimensions with those shown on drawings above and dimension table below. Note that double rod cylinders have a head (Dim. G) at both ends and that dimension LD replaces LB and ZL replaces ZB, etc. The double rod dimensions differ from, or are in addition to those for single rod cylinders shown on preceding pages and provide the information needed to completely dimension a double rod cylinder. On a double rod cylinder where the two rod ends are different, be sure to clearly state which rod end is to be assembled at which end. Port position 1 is standard. If other than standard, specify pos. 2, 3 or 4 when viewed from rod end Nº1 only. (See port position information in Page 29.)

BORE		ROD SIZE	Add Stroke										Add 2X Stroke
			LD	ZL	SS_D	SN_D	SE_D	XE_D	ZE_D	SA_D	XA_D	XA_D	ZM
1 1/2	std	5/8	5 5/8	6 1/4	4 1/8	2 7/8	7 3/8	7 1/8	7 1/2	7 5/8	7 1/4	7 5/8	6 7/8
2	std	1	6 1/8	6 7/8	3 7/8	2 7/8	8	7 13/16	8 5/16	8 5/8	8 1/8	8 5/8	7 5/8
2 1/2	std	1	6 1/4	7	3 5/8	3	8 1/8	7 15/16	8 7/16	8 5/8	8 3/16	8 3/4	7 3/4
3 1/4	std	1 3/8	7 1/4	8 1/8	4 3/8	3 1/2	9 1/2	9 1/4	9 7/8	10 7/8	9 15/16	10 5/8	9
4	std	1 3/4	7 3/4	8 3/4	4 1/4	3 3/4	10	9 7/8	10 1/2	12	10 7/8	11 3/4	9 3/4
5	std	2	8 1/4	9 3/8	4 3/4	4 1/4	11 1/4	10 7/8	11 5/8	12 1/2	11 1/2	12 3/8	10 1/2
6	std	2 1/2	9 38	10 5/8	5 1/8	4 7/8	12 3/4	12 5/16	13 3/16	14 1/4	13 1/16	14 1/8	11 7/8
Replaces :			**LB**	**ZB**	**SS**	**SN**	**SE**	**XE**	**ZE**	**SA**	**XA**	**XA**	--
On single rod mounting styles:			All Mtgs. Style		MS2, MS3	MS4	MS7			MS1			All Mtgs.

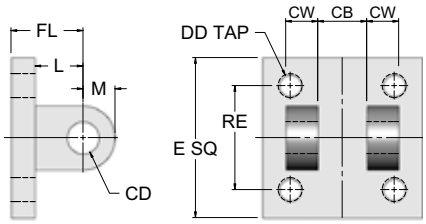
All dimensions are in inches and apply to standard rod sizes only.
For alternate rod sizes, determine all envelope dimensions (within LD dim.) as described above and then use appropriate rod end dimensions for proper rod size from single rod cylinder.

BORE	E	EE		F	G	K
		NPTF*	SAE**			
1 1/2	2 1/2	1/2	10	3/8	1 1/2	3/8
2	3	1/2	10	5/8	1 1/2	7/16
2 1/2	3 3/4	1/2	10	5/8	1 1/2	7/16
3 1/4	4 1/2	3/4	12	3/4	1 3/4	9/16
4	5 1/2	3/4	12	7/8	1 3/4	9/16
5	6 1/2	3/4	12	7/8	1 3/4	13/16
6	7 1/2	1	16	1	2	7/8

*NPTF ports will be furnished as standard unless SAE straight thread ports are specified.
** SAE straight thread ports are indicated by port number.

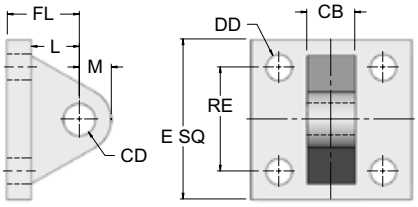
ST6 SERIES
Heavy Duty Hydraulic Cylinders

NFPA CLEVIS BRACKET



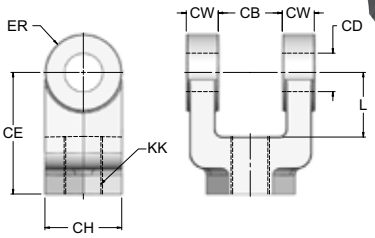
Part #	CB	CD PIN DIA.	CW	DD	E	FL	L	M	RE	load capacity (lbs)
CB-05	.765	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1 5/8	7300
CB-07	1.265	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2 9/16	14000
CB-10	1.515	1	3/4	5/8-18	4 1/2	2 1/4	1 1/2	1	3 1/4	19200
CB-13	2.032	1 3/8	1	5/8-18	5	3	2 1/8	1 3/8	3 13/16	36900
CB-17	2.531	1 3/4	1 1/4	7/8-14	6 1/2	3 1/8	2 1/4	1 3/4	4 15/16	34000
CB-20	2.531	2	1 1/4	1-14	7 1/2	3 1/2	2 1/2	2	5 3/4	33000
CB-25	3.032	2 1/2	1 1/2	1 1/8-12	8 1/2	4	3	2 1/2	6 19/32	34900
CB-30	3.032	3	1 1/2	1 1/4-12	9 1/2	4 1/4	3 1/4	2 3/4	7 1/2	33800
CB-35	4.032	3 1/2	2	1 3/4-12	12 5/8	5 11/16	4	3 1/2	9 5/8	83500
CB-40	4.532	4	2 1/4	2-12	14 7/8	6 7/16	4 1/2	4	11 1/2	102600

NFPA EYE BRACKET



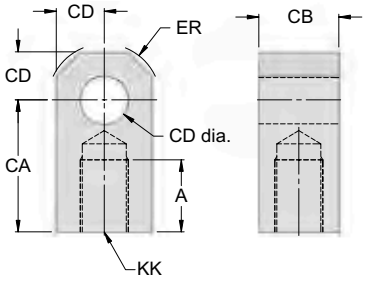
Part #	CB	CD PIN DIA.	DD	E	FL	L	M	RE	load capacity (lbs)
EB-05	.750	1/2	13/32	2 1/2	1 1/8	3/4	1/2	1 5/8	4100
EB-07	1.25	3/4	17/32	3 1/2	1 7/8	1 1/4	3/4	2 9/16	10500
EB-10H	1.50	1	21/32	4 1/2	2 3/8	1 1/2	1	3 1/4	20400
EB-13	2.00	1 3/8	21/32	5	3	2 1/8	1 3/8	3 13/16	21200
EB-17H	2.50	1 3/4	29/32	6 1/2	3 3/8	2 1/4	1 3/4	4 15/16	49480
EB-20H	2.50	2	1 1/16	7 1/2	4	2 1/2	2	5 3/4	70000
EB-25H	3.00	2 1/2	1 3/16	8 1/2	4 3/4	3	2 1/2	6 19/32	94200
EB-30H	3.00	3	1 5/16	9 1/2	5 1/4	3 1/4	3	7 1/2	121900
EB-35	4.00	3 1/2	1 13/16	12 5/8	5 11/16	4	3 1/2	9 5/8	57400
EB-40	4.50	4	2 1/16	14 7/8	6 7/16	4 1/2	4	11 1/2	75000

NFPA ROD CLEVIS



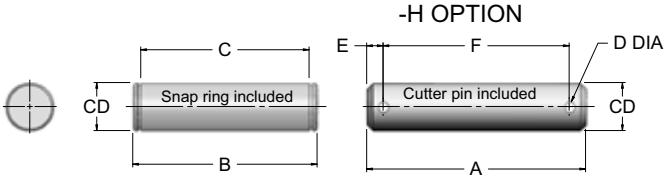
Part #	CB	CD PIN DIA.	CE	CH HEX.	CW	ER	KK	L	load capacity (lbs)
RC-05	.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4	4250
RC-07	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4	11200
RC-07H	1.265	3/4	2 1/8	1 3/8	5/8	3/4	3/4-16	1	11200
RC-10	1.515	1	3 1/8	1 1/2	3/4	1	1-14	1 1/2	19500
RC-10H	1.515	1	2 15/16	1 1/2	3/4	1	1-14	1 5/16	19500
RC-13	2.032	1 3/8	4 1/8	2	1	1 3/8	1 1/4-12	2 1/8	33500
RC-13H	2.032	1 3/8	3 3/4	2	1	1 3/8	1 1/4-12	1 3/4	33500
RC-17	2.531	1 3/4	4 1/2	2 3/8	1 1/4	1 3/4	1 1/2-12	2 1/4	45600
RC-20	2.531	2	5 1/2	2 15/16	1 1/4	2	1 7/8-12	2 1/2	65600
RC-25	3.032	2 1/2	6 1/2	3 1/2	1 1/2	2 1/2	2 1/4-12	3	98200
RC-30	3.032	3	6 3/4	3 7/8	1 1/2	2 3/4	2 1/2-12	3 1/4	98200
RC-30H	3.032	3	6 3/4	3 7/8	1 1/2	3	2 1/2-12	3 1/4	98200
RC-35	4.032	3 1/2	8 1/2	5	2	3 1/2	3 1/4-12	4	156700
RC-35H	4.032	3 1/2	7 3/4	5	2	3 1/2	3 1/4-12	4 1/4	156700
RC-40	4.532	4	10	6 1/8	2 1/4	4	4-12	4 1/2	221200

NFPA ROD EYE



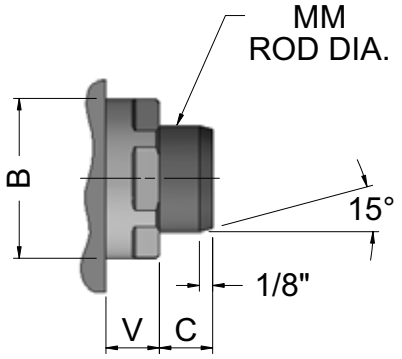
Part #	A	CA	CB	CD PIN DIA.	ER	KK	load capacity (lbs)
RE-05	3/4	1 1/2	3/4	1/2	5/8	7/16-20	5000
RE-07	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4-16	12100
RE-10	1 5/8	2 13/16	1 1/2	1	1 3/16	1-14	21700
RE-10H	1 1/8	2 3/8	1 1/2	1	1 7/16	1-14	21700
RE-13	2	3 7/16	2	1 3/8	1 9/16	1 1/4-12	33500
RE-17	2 1/4	4	2 1/2	1 3/4	2	1 1/2-12	45000
RE-20	3	5	2 1/2	2	2 1/2	1 7/8-12	53500
RE-20H	2 1/4	4 3/8	2 1/2	2	2 7/8	1 3/4-12	75000
RE-25	3 1/2	6 13/16	3	2 1/2	2 13/16	2 1/4-12	98700
RE-30	3 1/2	6 1/8	3	3	3 1/4	2 1/2-12	110000
RE-30H	3 5/8	6 1/2	3 1/2	3	3 1/4	2 3/4-12	123300
RE-35	4 1/2	7 5/8	4	3 1/2	3 7/8	3 1/4-12	161300
RE-35H	5	7 5/8	4	3 1/2	3 7/8	3 1/2-12	217300
RE-40	5 1/2	9 1/8	4 1/2	4	4 7/16	4-12	273800
RE-40H	5 3/4	9 1/8	5	4	4 7/16	4 1/2-12	308500

NFPA PIN



Part #	CD	A	B	C	D	E	F
P-05	1/2	2.281	2.094	1.875	0.106	0.172	1.938
P-07	3/4	3.094	2.875	2.625	0.140	0.188	2.719
P-10	1	3.594	3.375	3.125	0.140	0.188	3.219
P-13	1 3/8	4.656	4.485	4.187	0.173	0.203	4.25
P-17	1 3/4	5.656	5.547	5.188	0.173	0.219	5.250
P-20	2	5.719	5.547	5.188	0.204	0.234	5.281
P-25	2 1/2	2.360	6.625	6.188	0.219	0.219	6.313
P-30	3	2.838	6.780	6.250	0.250	0.250	6.344
P-35	3 1/2	3.316	8.845	8.125	0.312	0.282	8.406
P-40	4	3.792	9.845	9.125	0.312	0.282	9.969

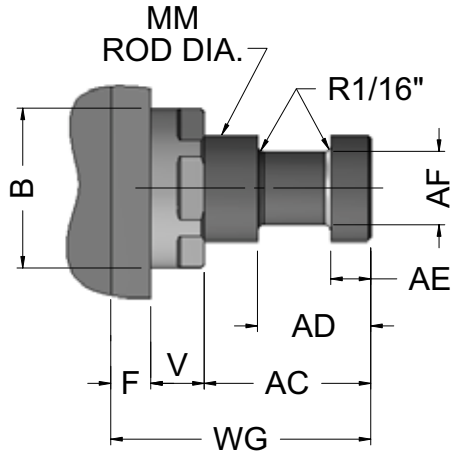
Style #6 Piston Rod End Plain



Style #5 Piston Rod End Flange

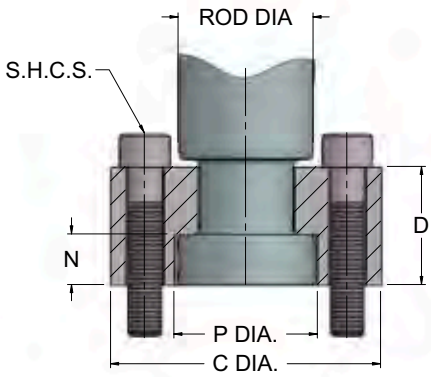
Rod End Flange Coupling For series ST5, ST6 Hydraulic and ST3 and ST4 Pneumatic

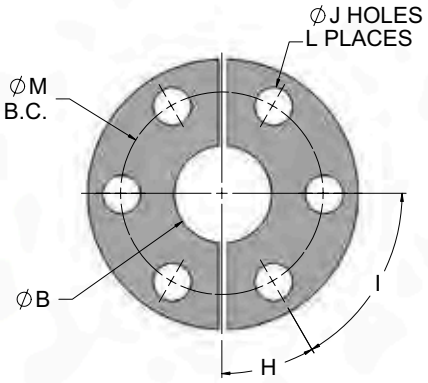
- Simplifies alignment
- Reduces assembly time
- Allows full rated hydraulic pressure in push and pull directions
- Available in 5/8" through 5.5" piston rod diameters



BORE		ROD SIZE MM	±.001 B	C	AC	AD	AE	AF	V	WG
1 1/2	std	5/8	1.123	3/8	1 1/8	5/8	1/4	3/8	1/4	1 3/4
		1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8
2	std	1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8
		1 3/8	1.998	5/8	1 3/4	1 1/16	3/8	7/8	5/8	2 3/4
2.5	std	1	1.498	1/2	1 1/2	15/16	3/8	11/16	1/2	2 3/8
		1 3/8	1.998	5/8	1 3/4	1 1/16	3/8	7/8	5/8	2 3/4
		1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8
3.25	std	1 3/8	1.998	5/8	1 3/4	1 1/16	3/8	7/8	5/8	2 3/4
		1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8
		2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4
4	std	1 3/4	2.373	3/4	2	1 5/16	1/2	1 1/8	3/4	3 1/8
		2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4
		2 1/2	3.123	1	3 1/4	1 15/16	3/4	1 3/4	5/8	4 1/2
5	std	2	2.623	7/8	2 5/8	1 11/16	5/8	1 3/8	1/2	3 3/4
		2 1/2	3.123	1	3 1/4	1 15/16	3/4	1 3/4	5/8	4 1/2
		3	3.748	1	3 5/8	2 7/16	7/8	2 1/4	5/8	4 7/8
		3 1/2	4.248	1	4 3/8	2 11/16	1	2 1/2	5/8	5 5/8
6	std	2 1/2	3.123	1	3 1/4	1 15/16	3/4	1 3/4	5/8	4 1/2
		3	3.748	1	3 5/8	2 7/16	7/8	2 1/4	5/8	4 7/8
		3 1/2	4.248	1	4 3/8	2 11/16	1	2 1/2	5/8	5 5/8
		4	4.748	1	4 1/2	2 11/16	1	3	1/2	5 3/4

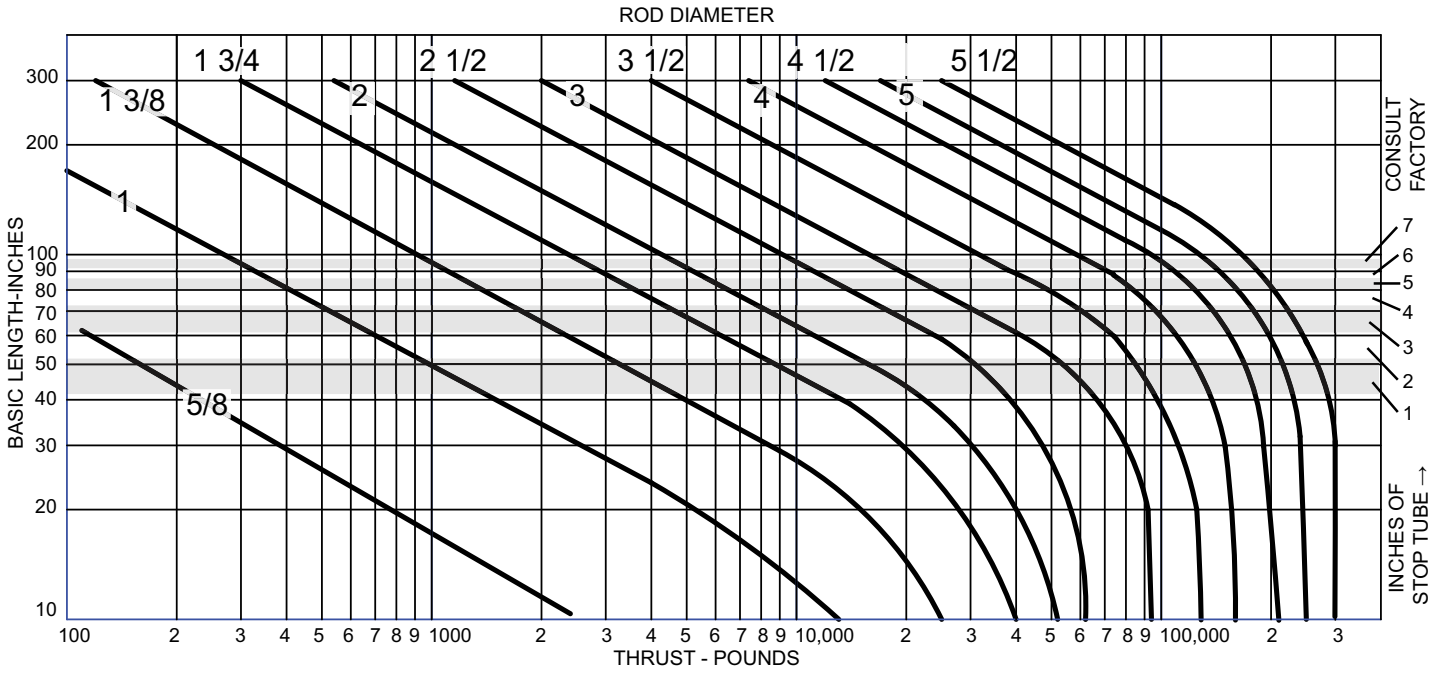
Rod End Flange Couplers





Part #	ROD DIA	B	C	D	H	I	J	L	M	N	P	MAT'L
FC-063	0.625	0.406	1 1/2	9/16	45°	90°	7/32	4	1 1/8	1/4	9/16	1144 CD
FC-100	1.000	0.750	2	7/8	30°	60°	9/32	6	1 1/2	3/8	1 1/16	1144 CD
FC-138	1.375	0.938	2 1/2	1	30°	60°	11/32	6	2	3/8	1 7/16	1018 CD
FC-175	1.750	1.187	3	1 1/4	22.5°	45°	11/32	8	2 3/8	1/2	1 13/16	1018 CD
FC-200	2.000	1.438	3 1/2	1 5/8	15°	30°	13/32	12	2 11/16	5/8	2 1/16	1018 CD
FC-250	2.500	1.875	4	1 7/8	15°	30°	13/32	12	3 3/16	3/4	2 5/8	1018 CD
FC-300	3.000	2.375	5	2 3/8	15°	30°	17/32	12	4	7/8	3 1/8	1018 CD
FC-350	3.500	2.625	5 7/8	2 5/8	15°	30°	21/32	12	4 11/16	1	3 5/8	C1119 MOD
FC-400	4.000	3.125	6 3/8	2 5/8	15°	30°	21/32	12	5 3/16	1	4 1/8	C1119 MOD
FC-450	4.500	3.625	6 7/8	3 1/8	15°	30°	21/32	12	5 11/16	1 1/2	4 5/8	C1119 MOD
FC-500	5.000	4.000	7 3/8	3 1/8	15°	30°	21/32	12	6 3/16	1 1/2	5 1/8	C1119 MOD
FC-550	5.500	4.500	8 1/4	3 7/8	15°	30°	25/32	12	6 7/8	1 7/8	5 5/8	C1119 MOD

ST6 SERIES
Heavy Duty Hydraulic Cylinders



ROD SIZE SELECTION

To determine the minimum recommended piston rod dia for your application:
1) Determine the cylinder thrust using the force volume chart. (Page 25) (Thrust equals bore area multiplied by the operating pressure.)
2) Select from the diagram beside the type of mounting you will use.
3) Determine the basic length by multiplying the real stroke by the stroke factor.
4) Enter the graph along the values of “basic length“ and ”Thrust”.

The stripe within which these lines intersect represents the minimum recommended piston rod diameter.

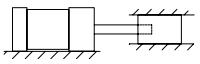
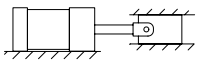
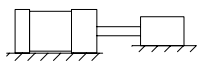
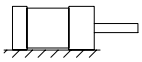
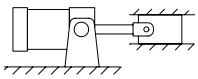
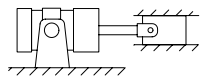
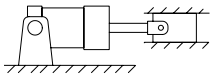
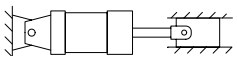
STOP TUBE SELECTION

Stop tubes are installed between the piston and the head on long stroke cylinders to reduce the load on the bearing. That, in turn, reduces bearing wear and tendency to buckle.

To determine if a stop tube is required and, if so, its length, first determine the “basic length” from the diagram . Step 1, 2 & 3 of The Rod Size Selection.

If the “basic length” is less than 40”, no stop tube is needed. If it’s over than 40”, a one-inch stop tube is recommended for every 10” (or fraction thereof) over 40”

See Page 27 on Stop Tube Option and how to Order

MOUNTING STYLE		ROD END CONNECTION	STROKE FACTOR
Center line Mounting Centerline mounting places the mounting bolts in simple shear or simple tension so that the mechanism is protected from compound forces. Centerline mounting is a rigid mounting style and this requires accurate cylinder alignment to prevent damage to the cylinder working parts. Mountings are : MX1, MX2, MX3, MF1, MF2, ME3, ME4.		 Fixed & Rigidly Guided	0.50
		 Pivoted & Rigidly Guided	0.70
Foot Mounting Foot mounting secures the cylinder along its side. Since the mounting surface plane is thus not centered directly on the line of force, the mounting bolts are subjected to a significant amount of shear stress. Because foot mounts are rigid, they require accurate cylinder alignment. Mountings are : MS1, MS2, MS4, MS7.		 Supported but not Rigidly Guided	2.00
		 Unsupported	4.00
Pivot Mounting Pivot mounting is used when the cylinder must pivot during piston motion. Clevis and Trunnion mounts are two methods used to allow this motion. The Clevis end design locates the pivot point at the cap end of the cylinder. Trunnion mounting uses the head or the cap of the cylinder to allow it to pivot at any of the two locations. The Mountings are: MP1, MP2, MP4, MT1, MT2, MT4.	MT1 TRUNNION ON HEAD END	 Pivoted & Rigidly Guided	1.00
	MT4 INTERMEDIATE TRUNNION	 Pivoted & Rigidly Guided	1.50
	MT2 TRUNNION ON CAP END	 Pivoted & Rigidly Guided	2.00
	MP1, MP2, MP4 CLEVIS ON CAP	 Pivoted & Rigidly Guided	2.00

ST6 series hydraulic cylinders are recomended for pressures to 3000 PSI for heavy duty services with hydraulic oil. The 4:1 design factor reatings shown here are based on tensile strength of the material and for the rod size shown below only. The rating is conservative for continuous severe applications. Design factors at other pressures can be calculated from those value. In addition please refer mounting pages for additional ratings base per Mount.

Bore Size	Rod Size	Pressure Rating at 4:1 Design Factor (on Tensile)
1 1/2	5/8	2530
2	1	2950
2.5	1	2340
3.25	1 3/8	2250
4	1 3/4	2130
5	2	2171
6	2 1/2	2270
8	3 1/2	2040

Push Force and Displacement

Bore Size	piston Area	Cylinder Push Force in pounds at various Pressures					Displacement Per inch of stroke (Gallons)
		1000	1500	2000	2500	3000	
1 1/2	1.767	1770	2655	3540	4417	5310	.00765
2	3.14	3140	4710	6280	7850	9420	.0136
2 1/2	4.91	4910	7365	9820	12275	14730	.0213
3 1/4	8.30	8300	12450	16600	20750	24900	.0359
4	12.57	12570	18855	25140	31425	37710	.0544
5	19.64	19640	29460	39280	49100	58920	.0850
6	28.27	28270	42405	56540	70675	848101	.1224
8	50.27	50270	75405	100540	125675	150810	.2176

Deductions for Pull Force or Displacement

To determine Cylinder Pull Force or displacement, deduct the following force or displacement corresponding to rod size, from selected push Force or displacement corresponding to Bore size in table above

Rod Size	Rod Area	Piston Rod Diameter Force in pounds at various Pressures					Displacement Per inch of stroke (Gallons)
		1000	1500	2000	2500	3000	
5/8	0.307	307	460	614	767	921	.0013
1	0.785	785	1177	1570	1962	2355	.0034
1 3/8	1.490	1490	2235	2980	3725	4470	.0065
1 3/4	2.410	2410	3615	4820	6025	7230	.0104
2	3.141	3141	4711	6280	7854	9420	.0136
2 1/2	4.910	4910	7365	9820	12275	14730	.0213
3	7.070	7070	10605	14140	17675	21210	.0306
3 1/2	9.620	9620	14430	19240	24050	28860	.0416
4	12.57	12570	23355	25140	31425	37710	.0544
4 1/2	15.90	15900	23850	31800	39750	47708	.0688
5	19.64	19640	23460	39280	49100	58920	.0850
5 1/2	23.76	23760	35640	47520	59400	71280	.1028

Area Extended stroke Push : $AE = .7854\ BD^2$

Area Retracted stoke Pull : $AR = (.7854\ BD^2 - .7854\ RD^2)$

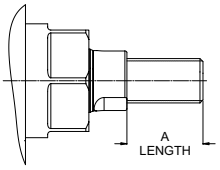
Cylinder Push Force Formula : $FE = P \times AE$

Cylinder Pull Force Formula : $FR = P \times AR$

Cylinder Volume (Gallons) : $G = \frac{\text{Net area (in}^2\text{)} \times \text{Stroke (in)}}{231}$

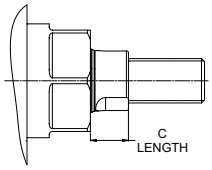
FE= Force Extended Stroke
FR= Force Retracted Stroke
P= Working Pressure
BD= Bore Diameter
RD= Rod Diameter

Thread Extension



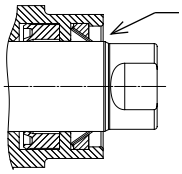
Option code **A**
Piston Rod Thread Extension can be ordered over standard. To order add option code **A=(_)** and specify "A" length.

Rod Extension



Option code **C**
Piston Rod Extension can be order over standard. To order add option code **C=(_)** and specify "C" length

Metallic Rod Scraper



Option **A1**
Aggressively Scrapes the exposed portion of the piston rod free of weld splatter, paint spray, abrasive powders or many other foreign materials that could damage the rod seal.

Chrome Rod Or Nitrotec Rod

Option Code **R2 or R3**
We still can supply old technology, for that matter you can request Chrome Rod (R2) Or Nitrotec Rod (R3).

Electroless Nickel

Option Code **FN**
The properties of Electroless nickel contribute to the multitude of uses. The coating provides an attractive finish, while exhibiting high abrasion and corrosion resistance. Its ability to uniform coat blind holes, threads, internal surfaces and sharp edges contributes to its effectiveness. It has a very high bonding strength to the base metal. Coating can be done on aluminum, steel, cast iron, etc

StarNite Head and Cap

Option Code **FM**
This option will give you a black finish resistant to corrosion for outside applications or caustic washdown, and really hard to scratch due to the hardness of the part after the chemical process of the StarNite. See page 4 for more detail.
Tubing, tie rods and rod are already process with StarNite.

Viton Seals

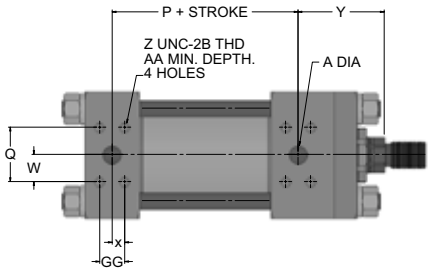
Option code **LV & PV**
Fluorocarbon will be chosen for higher temperature range from 200°F to 400°F (200°C)
For Chemical resistance our standard Blue Seals will Outstand Viton by far in most chemical Application and wear resistance. Resists most wash down application.
LV : U-cup Seals in Fluorocarbon With Teflon Backup
PV : Polypack Ucup/oring loaded in Fluorocarbon

Air Bleeder

Option **B1, B2, B3, B4**
An air bleed may be ordered at either or both ends of the cylinder as an option. To provide for maximum bleeding of air from the cylinder, STARCYL places its air bleeds in the end caps to bleed air from the tube/head or tube/cap juncture. The air is bleed from the cylinder by backing out the straight thread metallic seal plug to allow air to pass by the threads. When air bubbles stop and oil starts to flow, retighten plug. It is recommended that bleeding be done with pressure on the opposite end of the cylinder so that the bleed plug is not subjected to pump pressure when being backed out. Air bleeds should always be positioned at the highest point of the cylinder tube. Please specify positions of air bleeds by position number.

Flange Ports (Code 61, 3000 psi)

Option code **F**



Bore	Rod	SAE #	Y	A	P	Q	W	X	Z	AA	GG
2.50	1	8	2.39	.5	2.97	1.5	.75	.34	5/16-18	.81	.69
3.25	1 3/8	12	2.80	.75	3.41	1.87	.94	.44	3/8-16	.75	.87
	1 3/4		3.17								
	2		3.05								
4.00	1 3/4	12	3.05	.75	3.72	1.87	.94	.44	3/8-16	.75	.87
	2		3.39								
	2 1/2		3.17								
5.00	2	12	3.17	.75	4.22	1.87	.94	.44	3/8-16	.75	.87
	2 1/2		3.39								
	3		3.39								
	3 1/2		3.39								
6.00	ALL	16	3.52	1.00	4.85	2.06	1.03	.52	3/8-16	.87	1.03
7.00	ALL	20	3.7	1.25	5.59	2.31	1.16	.59	7/16-14	1.00	1.19
8.00	ALL	24	3.84	1.5	6.31	2.75	1.37	.70	1/2-13	1.06	1.41

END OF STROKE SENSOR

Option Code **G1(_)** & **H1**(_)

GO Switches are simple and built to last. With only one moving part and no metal-to-metal contact forcing it to move, there is nothing to wear out!
Must Indicate Position. Ex : G3 switch will be in position 3

Options Available
- Explosion Proof
- SPDT or DPDT
- HiTemp™ to 400°F
- SubSea™ Submersible
- Hermetically Sealed
- High Pressure to 10,000 psi
- English or metric threads

Option Code **G1**

Option Code **H1**

How it Works
When the ferrous cushion of a cylinder enters the sensing area of the switch, it attracts the primary magnet, which pulls the connecting rod forward. As a result, the common contact snaps to its operated position, closing the other contact circuit. When the target is removed the common contact automatically returns to its original unoperated position.

Stop Tube Design

Drawing A - Cushion design

Drawing B - Non Cushion design

Stop Tube

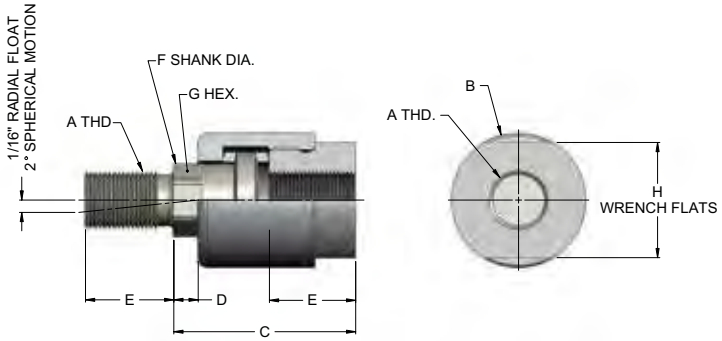
Option Code **ST(_)** Enhances the transverse load carying capability of a long stroke cylinder by increasing the distance between the piston and the rod bearing at full extension when placed on head end. Ideal for applications requiring longer strokes or where additional rod stability is desired. Specify stop tube length when ordering.

How To Order Stop Tube option

ex: ST6-3.25x60x1.38-ST4-N11C00 is a 3.25" bore with 60" Net stroke and a dual piston stop tube of 4" long, for a total gross stroke of 64" (must be used to calculate overall length "LB").

Linear Alignment Couplers

Starcyl's linear alignment couplers extend the bearing and seal life of your cylinders. Our couplers prevent binding and erratic movement that misalignment causes, which eventually wears down your cylinders. Not only do Starcyl couplers work equally well in "push" and "pull" applications, but they allow a greater tolerance between the cylinder center line and the mating member.

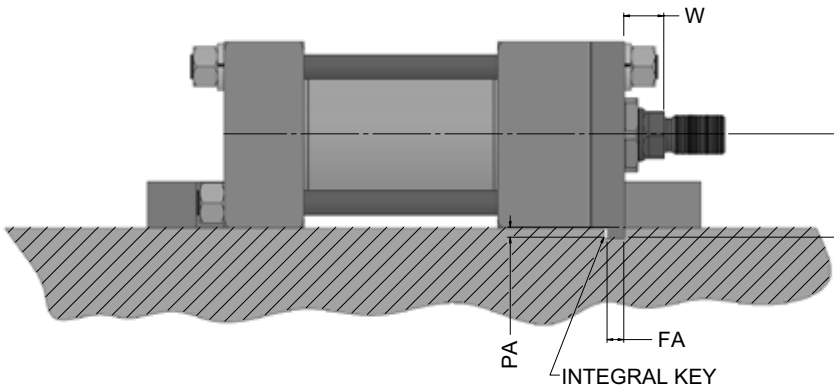


* Use jam nut to lock coupler to rod when used with full diameter threads.

Part #	A	B	C	D	E	F	G	H	MAX PULL AT YIELD
AC-250F	1/4-28	7/8	1 1/4	1/4	5/8	0.245	3/16	13/16	6000
AC-312F	5/16-24	7/8	1 1/4	1/4	5/8	0.308	1/4	13/16	8300
AC-375C	3/8-16	7/8	1 1/4	1/4	5/8	0.369	5/16	13/16	5000
AC-375F	3/8-24	7/8	1 1/4	1/4	5/8	0.370	5/16	13/16	8300
AC-437F	7/16-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	10000
AC-500C	1/2-13	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	14000
AC-500F	1/2-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	14000
AC-625F	5/8-18	1 1/4	2	1/2	3/4	5/8	1/2	1 1/8	14000
AC-750C	3/4-10	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-750F	3/4-16	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-875F	7/8-14	1 3/4	2 5/16	5/16	1 1/8	31/32	7/8	1 1/2	34000
AC-1000C	1-8	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1000F	1-14	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1250F	1 1/4-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1375F	1 3/8-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64000
AC-1500F	1 1/2-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	134000
AC-1750F	1 3/4-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	134000
AC-1875F	1 7/8-12	3 3/4	5 7/16	11/16	3	2 1/4	1 7/8	3 1/2	240000
AC-200F	2-12	3 3/4	5 7/16	11/16	3	2 1/4	1 7/8	3 1/2	240000

Thrust Key Mounting - Option code **P**

Thrust key mountings eliminate the need of using fitted bolts or external keys on side mounted cylinders. Starcyl Cylinders can provide on mounting styles such as ST6S1, ST6S2, ST6S4 and ST6S7 with the gland retainer plate extended below the mounting side of the cylinder (see drawing below). This extended retainer plate can then be fitted into a keyway milled into the mounting surface of the machine.



Bore	Dim FA	Dim PA	Dim PD Mounting style MS2, MS4, MS7	Dim PD Mounting style MS1
1.5	.312 +.000 -.002	3/16	1 7/16	1 9/16
2.0	.562 +.000 -.002	5/16	1 13/16	2
2.5	.562 +.000 -.003	5/16	2 1/16	2 1/4
3.25	.687 +.000 -.003	3/8	2 5/8	2 15/16
4.0	.812 +.000 -.003	7/16	2 15/16	3 1/4
5.0	.812 +.000 -.003	7/16	3 11/16	4 1/8
6.0	.937 +.000 -.003	1/2	4 1/4	4 3/4
8.0	.937 +.000 -.003	1/2	5 1/4	6

ST6 D* F1 - 3.25 X 22.22 X 1.38 - #2

Bore* Stroke* Rod Dia*

FEATURE	DESCRIPTION	SYMBOL
SERIES	Used in All ST6 part number	ST6

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Double rod End	Used only if double rod cylinder is required	21	D
Back-to-Back	(must request drawing)		B
Position Sensor	Temposonic Ready		X
Thust Key	Thrust key mount (MS1, MS2, MS4 & MS7)	27	P

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Mounting Style	Head End Tie Rod Extended	6	X3
	Cap End Tie Rods Extended	6	X2
	Both End Tie Rod Extended	6	X1
	Head Rectangular Flange	8	F1
	Head Square Flange	8	F5
	Head Rectangular Mount	8	E5
	Cap Rectangular Flange	10	F2
	Cap Square Flange	10	F6
	Cap Rectangular Mount	10	E6
	Side Lugs	12	S2
	Centerline Lugs	12	S3
	Side Tapped	12	S4
	End Angles	14	S1
	Side End Lugs	14	S7
	Cap Fixed Clevis	14	P1
	Head Trunnion	16	T1
	Cap Trunnion	16	T2
	Intermediate Fixed Trunnion Xi=(_)	16	T4
	Sperical Bearing Mount	18	SB

FEATURE	DESCRIPTION	PAGE NO.	SYMBOL
Piston Rod End	Select :		
	Style #1 Intermediate Male		#1
	Style #2 Small Male	6 to 16	**#2**
	Style #3 Full Male		#3
	Style #4 Short Female		#4
	Style #5 Flange Coupling	23	#5
	Style #6 Plain	23	#6
	Style #7 Spherical female	20	#7
	Style #X Special (Specify)		#X

*** SEE CATALOG PAGES FOR SELECTION OF BORE AND ROD SIZES COMBINATIONS**

HOW TO ORDER

-S121 S101 C00 - LU - A1 - FP

FEATURE	DESCRIPTION	SYMBOL
Head Port	NPT Port	N
	SAE Straight Thread O-ring Port	**S**
	Flange Port (C.61)	F
	British Parallel	G
	British Tappered	R
Head Port Size	NPT use 1/4=04,3/8=06,...,1-1/4=20 SAE use 04, 06, 08, 10, 12, 16 look at catalog for std port size	
Head Ports Location	Head Location Std 1 (2,3,4)	1

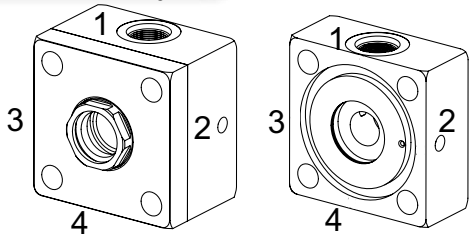
FEATURE	DESCRIPTION	SYMBOL
Cap Port	NPT Port	N
	SAE Straight Thread O-ring Port	**S**
	Flange Port (C.61)	F
	British Parallel	G
	British Tappered	R
Cap Port Size	NPT use 1/4=04,3/8=06,...,1-1/4=20 SAE use 04, 06, 08, 10, 12, 16 look at catalog for std port size	
Cap Ports Location	Cap Location Std 1 (2,3,4 & 5*) * Backside	1

FEATURE	DESCRIPTION	SYMBOL
Cushion & Location	**Head Non Cushion, Cap Non Cushion**	**C00**
	Head Cushion Only (where x = position 1,2,3,4)	CX0
	Cap Cushion Only (where x = position 1,2,3,4)	C0X
	Cushion both ends (where x = position 1,2,3,4)	CXX

Piston seals Option	Buna U-cup With Backup		LB
	Viton U-cup With Teflon Backup		LV
	Urethane asymetric U-cup seals (std)		**LU**
	Polypack Urethane U-cup		PU
	Polypack Viton U-cup		PV
	Hi-Load Piston	3	LH
	Ring Packed		RP
Options	Rod Extension C=	26	C=(_)
	Thread Extension A=	26	A=(_)
	Rod Scraper	26	A1
	Bleeder (philips screw type) pos.1,2,3,4	26	B1
	Go Switches (round) Position 1,2,3,4	26	G1
	Go Switches Cylindicator, Pos, 1 2 3 4	26	H1
	Stop Tube (length)	26	ST(_)
	Stop Tube Double piston (length)	26	STD(_)
	Rod Boot	26	R1
	Chomed Rod	26	R2
	Nitrotec Rod	26	R3
	Stainless Steel Rod	26	S1

FP = Finish Paint
FM = Finish Starnite
FN = Finish Nickel

Port & Adjustable Cushion Location



STD PORT PER BORE					STD PORT LOCATION HEAD , CAP
	EE				
BORE	NPTF	CODE	SAE	CODE	
1 1/2	1/2	08	10	10	1,1
2	1/2	08	10	10	1,1
2 1/2	1/2	08	10	10	1,1
3 1/4	3/4	12	12	12	1,1
4	3/4	12	12	12	1,1
5	3/4	12	12	12	1,1
6	3/4	12	12	12	1,1
8	1	16	16	16	1,1

Notes:

Offer of Sale

The items described in this document are hereby offered for sale at prices to be established by STARCYL Cylinder, and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions.
Buyer's order for any item described in its document, when communicated to STARCYL cylinder, or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F. O. B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment to Buyer. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES
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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges therefor by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer therefor. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights:
Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it non-infringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights. If claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, act of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of NEW YORK. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of the action accrues.