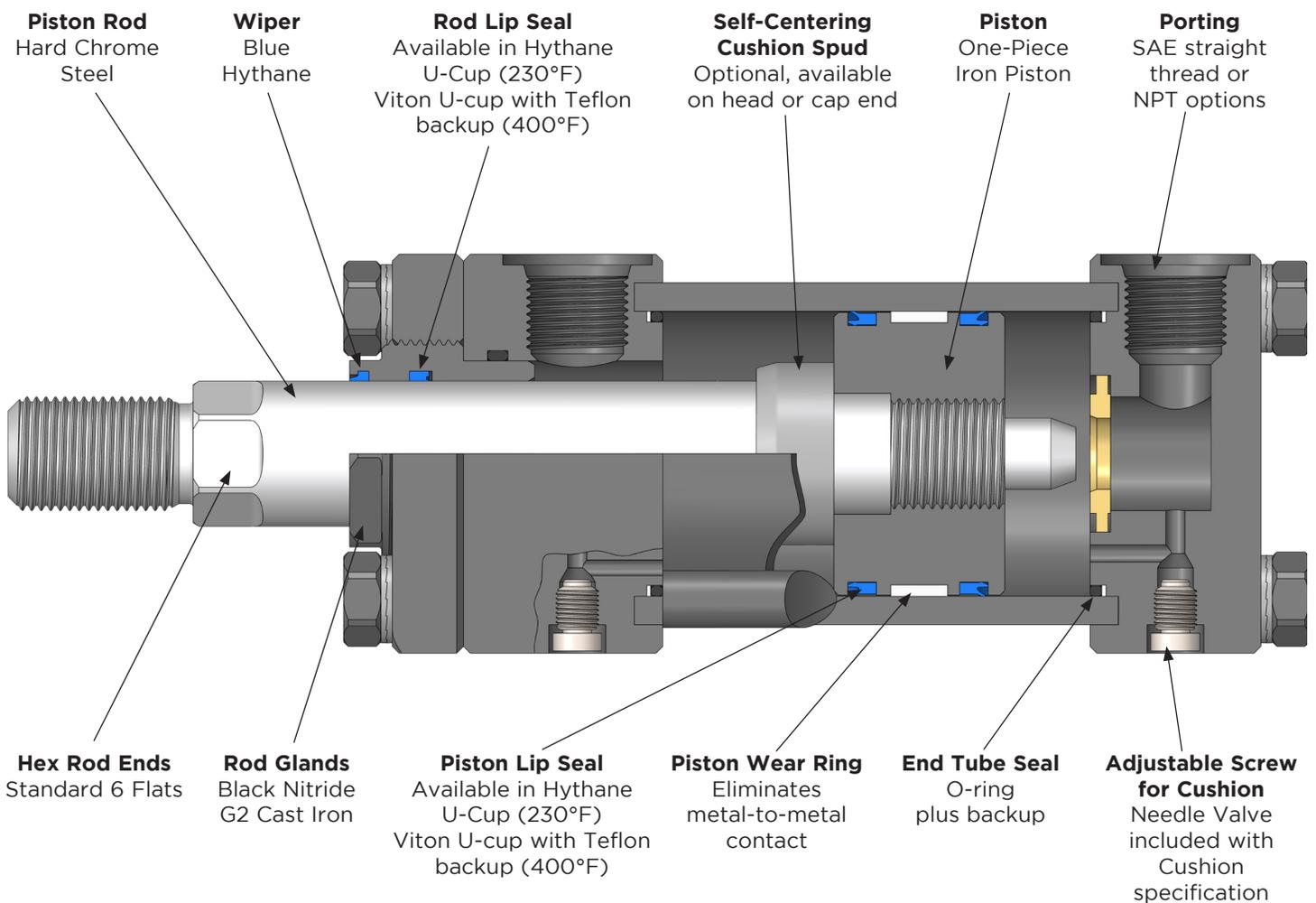




## MOLD CYLINDERS

### 2H COMPATIBLE: HEAVY DUTY HYDRAULIC

Compatible with industry standards, Progressive's Mold Cylinders offer advanced performance benefits to provide reliability and extend service life.



# CYLINDERS

## HOW TO ORDER

### Style JJ

Head Rectangular Mount  
NFPA ME5



### Style C

Side Lug Mount  
NFPA MS2



### Style CP

Side Lugs with Thrust Key  
NFPA MS2



**Standard Features**

Items in boxes at right are standard features that do not have options, but must be specified as part of the catalog number. Details are below for those features.

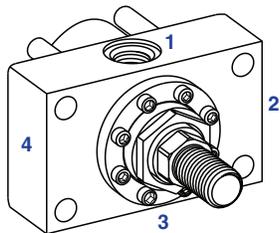
Bore Diam.	Head Cushion	Mounting Style	Series	Piston Seal	Piston Magnet	Gland & Seal	Port Type	Rod Seals	SPECIAL (Add Suffix)	Rod No.	Piston Rod End	Rod Threads	Cap Cushion	Stroke
2.50	C	JJ	2H	H	N	A	T	1	S	3	9	A	C	6.000

BORE DIAMETER OPTIONS		CUSHION HEAD OPTIONS		PISTON SEAL DESCRIPTIONS		HEAD/CAP PORT TYPE DESCRIPTIONS		ROD SEALS DESCRIPTIONS		ROD NO. OPTIONS		PISTON ROD END DESCRIPTIONS		CAP CUSHION OPTIONS	
1.50	2.00	C	If Required	Blue Hythane Asymmetric U-Cup Seals (230°F Max)	H	NPTF Ports Dry Seal Pipe Thread	U	Blue Hythane Asymmetric U-Cup Seals (230°F Max)	1	1	1	Style #2: Small Male	4	C	If Required
2.50	3.25	(Loc 2 is std for style C & CP. Loc 3 is std for style JJ.)		Viton U-Cup with Teflon Backup (200°-400°F)	K	SAE Straight Thread O-Ring	T	Viton U-Cup with Teflon Backup (200°-400°F)	5	2	2	Style #4: Short Female	9	(Loc 2 is std for style C & CP. Loc 3 is std for style JJ.)	Blank If not required
4.00	5.00	Blank If not required		<b>MOUNTING STYLE DESCRIPTIONS</b>		<b>ROD SEALS DESCRIPTIONS</b>				3	3				
6.00				Head Rectangular Mount (See page L-3)	JJ					4	4				
				Side Lugs (See page L-4)	C										
				Side Lugs with Thrust Key (See page L-4)	CP										

STANDARD FEATURES / SPECIFICATION	DESCRIPTION
Series	2H Heavy Duty Hydraulic Tie Rod Cylinder
Piston Magnet	N No Magnet
Gland & Seal	A Threaded Black Nitride Cast Iron Gland
Rod Threads	A UNF Standard Integral Cut Thread

**Optional Features**

1. Specify "S" in the catalog number as shown above if any of the features below are required.
2. Then, specify those features as applicable based on the details below after the stroke in the catalog number.



Port Locations

**P32**

**PORT LOCATION OPTIONS**

SPECIFY P AND THEN THE HEAD AND CAP PORT LOCATIONS WHEN CHANGING FROM THE DEFAULT LOCATION 1.

NOTE: IF ONE OF THE TWO LOCATIONS ARE NOT CHANGING, UTILIZE 0 (ZERO) AS A PLACEHOLDER.

2  
3  
4

Cushion Locations

**C03**

**CUSHION (NEEDLE VALVE) LOCATION OPTIONS**

SPECIFY C AND THEN THE HEAD AND CAP LOCATIONS WHEN CHANGING FROM THE DEFAULT LOCATIONS LISTED.

NOTE: IF ONE OF THE TWO LOCATIONS ARE NOT CHANGING, UTILIZE 0 (ZERO) AS A PLACEHOLDER.

2  
3  
4

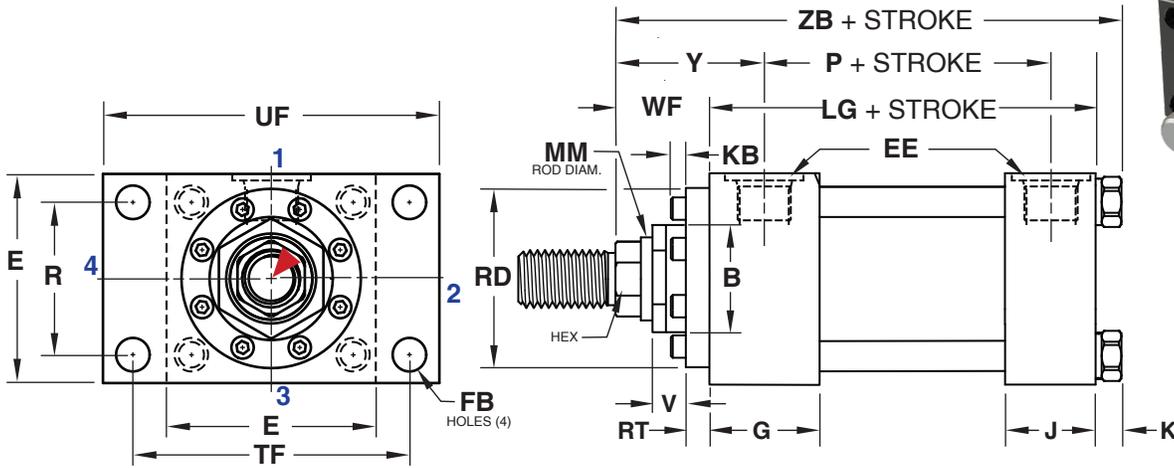
**Catalog Number Examples:**

- 2.00CJJ2HKNAT524AC2.633 (JJ Style with Viton with Cushion locations of default port 3.)
- 2.50CP2HKNAT5S24A4.550P32 (Style C with Viton, alternate Port locations)
- 4.00CCP2HHNAU1S14AC5.388C03 (Style CP-Thrust Key, Blue Hythane Seals, and an alternate Cap Cushion location.)



# HEAD RECTANGULAR MOUNTING

## STYLE JJ / NFPA STYLE ME5



▶ CAD insertion point

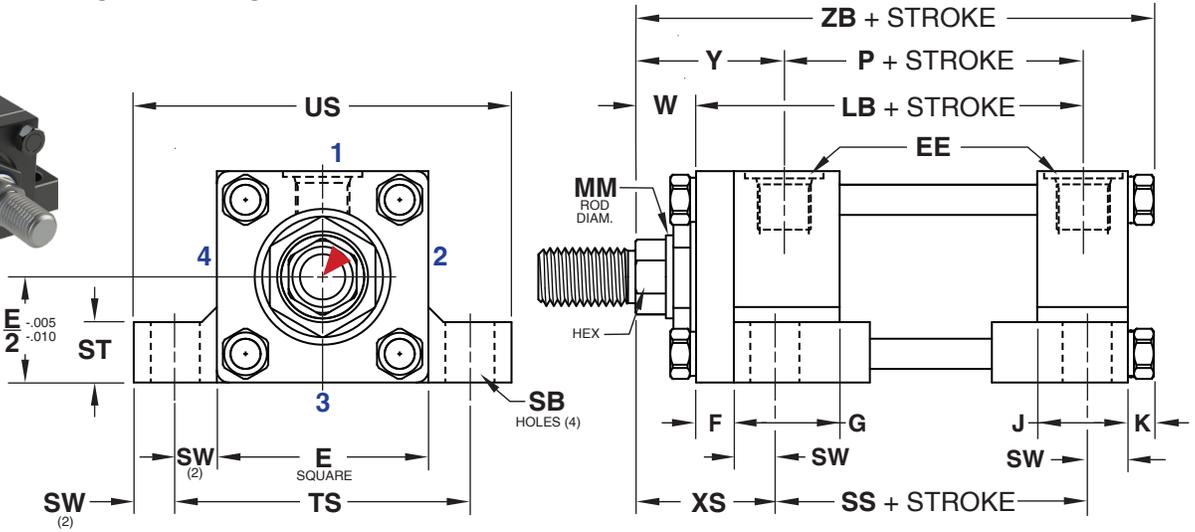
BORE DIAMETER	E	EE		FB DIAM.	G	J	K MAX	R	TF	UF	ADD STROKE	
		NPTF <sup>1</sup>	SAE <sup>2</sup>								LG	P
1.50	2.50	1/2	10	.44	1.75	1.50	.37	1.63	3.44	4.25	4.63	2.88
2.00	3.00	1/2	10	.56	1.75	1.50	.43	2.05	4.13	5.13	4.63	2.88
2.50	3.50	1/2	10	.56	1.75	1.50	.43	2.55	4.63	5.63	4.75	3.00
3.25	4.50	3/4	12	.69	2.00	1.75	.56	3.25	5.88	7.13	5.50	3.50
4.00	5.00	3/4	12	.69	2.00	1.75	.56	3.82	6.38	7.63	5.75	3.75
5.00	6.50	3/4	12	.94	2.00	1.75	.81	4.95	8.19	9.75	6.25	4.25
6.00	7.50	1	16	1.06	2.25	2.25	.87	5.73	9.44	11.25	7.38	4.88

<sup>1</sup>NPTF ports are available at no extra charge.

<sup>2</sup>SAE straight thread ports are standard and are indicated by the port number, which are designated in blue.

BORE DIAMETER	ROD NUMBER	MM ROD DIAMETER	B +.000 - .002	KB	RD DIAM.	RT	V	WF	Y	ADD STROKE
										ZB
1.50	1 (std.)	0.625	1.124	0	2.13	.38	.25	1.00	2.00	6.00
	2	1.000	1.499	0	2.50	.38	.50	1.38	2.38	6.37
2.00	1 (std.)	1.000	1.499	0	2.50	.38	.50	1.38	2.38	6.43
	2	1.375	1.999	.19	3.00	.36	.63	1.63	2.63	6.68
2.50	1 (std.)	1.000	1.499	0	2.50	.38	.50	1.38	2.38	6.56
	2	1.750	2.374	.25	3.50	.38	.75	1.88	2.88	7.06
	3	1.375	1.999	.25	3.00	.36	.63	1.63	2.63	6.81
3.25	1 (std.)	1.375	1.999	.25	3.00	.36	.63	1.63	2.75	7.68
	2	2.000	2.624	.13	4.00	.63	.50	2.00	3.13	8.06
	3	1.750	2.374	.25	3.50	.38	.75	1.88	3.00	7.93
4.00	1 (std.)	1.750	2.374	.25	3.50	.38	.75	1.88	3.00	8.18
	2	2.500	3.124	.25	4.50	.60	.63	2.25	3.38	8.56
	3	2.000	2.624	.13	4.00	.63	.50	2.00	3.13	8.31
5.00	1 (std.)	2.000	2.624	.13	4.00	.63	.50	2.00	3.13	9.06
	2	3.500	4.249	.25	5.75	.63	.63	2.25	3.38	9.31
	3	2.500	3.124	.25	4.25	.60	.63	2.25	3.38	9.31
	4	3.000	3.749	.25	5.25	.63	.63	2.25	3.38	9.31
6.00	1 (std.)	2.500	3.124	.25	4.50	.60	.63	2.25	3.50	10.50
	2	4.000	4.749	.25	6.50	.75	.50	2.25	3.50	10.50
	3	3.000	3.749	.25	5.25	.63	.63	2.25	3.50	10.50
	4	3.500	4.249	.25	5.75	.63	.63	2.25	3.50	10.50

# SIDE LUG MOUNTING STYLE C / NFPA STYLE MS2



CAD insertion point

BORE DIAMETER	E	EE		F	G	J	K MAX	SB DIAM.	ST	SW	TS	US	ADD TO STROKE		
		NPTF <sup>1</sup>	SAE <sup>2</sup>										LB	P	SS
1.50	2.50	1/2	10	.38	1.75	1.50	.37	.44	.50	.38	3.25	4.00	5.00	2.88	3.88
2.00	3.00	1/2	10	.63	1.75	1.50	.43	.56	.75	.50	4.00	5.00	5.25	2.88	3.63
2.50	3.50	1/2	10	.63	1.75	1.50	.43	.81	1.00	.69	4.88	6.25	5.38	3.00	3.38
3.25	4.50	3/4	12	.75	2.00	1.75	.56	.81	1.00	.69	5.88	7.25	6.25	3.50	4.13
4.00	5.00	3/4	12	.88	2.00	1.75	.56	1.06	1.25	.88	6.75	8.50	6.63	3.75	4.00
5.00	6.50	3/4	12	.88	2.00	1.75	.81	1.06	1.25	.88	8.25	10.00	7.13	4.25	4.50
6.00	7.50	1	16	1.00	2.25	2.25	.87	1.31	1.50	1.13	9.75	12.00	8.38	4.88	5.13

<sup>1</sup>NPTF ports are available at no extra charge.

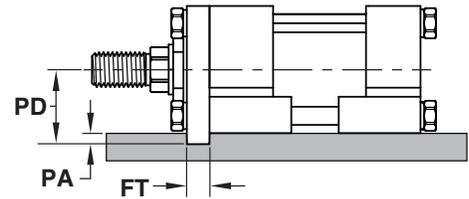
<sup>2</sup>SAE straight thread ports are standard and are indicated by the port number, which are designated in blue.

SB holes are spotfaced for Socket Head Cap Screws. (Not included.)

BORE DIAMETER	ROD NUMBER	MM ROD DIAMETER	W	XS	Y	ADD TO STROKE
						ZB
1.50	1 (std.)	.625	.63	1.38	2.00	6.00
	2	1.000	1.00	1.75	2.38	6.37
2.00	1 (std.)	1.000	.75	1.88	2.38	6.43
	2	1.375	1.00	2.13	2.63	6.68
2.50	1 (std.)	1.000	.75	2.06	2.38	6.56
	2	1.750	1.25	2.56	2.88	7.06
	3	1.375	1.00	2.31	2.63	6.81
3.25	1 (std.)	1.375	.88	2.31	2.75	7.68
	2	2.000	1.25	2.69	3.13	8.06
	3	1.750	1.13	2.56	3.00	7.93
4.00	1 (std.)	1.750	1.00	2.75	3.00	8.18
	2	2.500	1.38	3.13	3.38	8.56
	3	2.000	1.13	2.88	3.13	8.31
5.00	1 (std.)	2.000	1.13	2.88	3.13	9.06
	2	3.500	1.38	3.13	3.38	9.31
	3	2.500	1.38	3.13	3.38	9.31
	4	3.000	1.38	3.13	3.38	9.31
6.00	1 (std.)	2.500	1.25	3.38	3.50	10.50
	2	4.000	1.25	3.38	3.50	10.50
	3	3.000	1.25	3.38	3.50	10.50
	4	3.500	1.25	3.38	3.50	10.50

### Thrust Key Mounting Style CP

Thrust Key Mountings eliminate the need of using fitted bolts or external keys on side-mounted cylinders. Progressive Cylinders with the mounting style of "CP" can be provided with the Gland Retainer Plate extended below the mounting side of the cylinder as shown below.



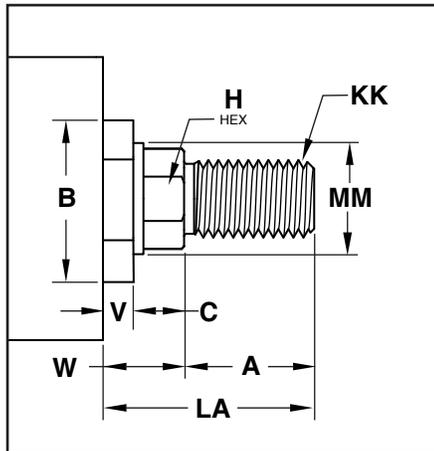
BORE DIAMETER	FT	PA	PD
1.50	.312 <sup>+0.000</sup> / <sub>-.002</sub>	.19	1.44
2.00	.562 <sup>+0.000</sup> / <sub>-.002</sub>	.31	1.81
2.50	.562 <sup>+0.000</sup> / <sub>-.002</sub>	.31	2.06
3.25	.687 <sup>+0.000</sup> / <sub>-.003</sub>	.38	2.63
4.00	.812 <sup>+0.000</sup> / <sub>-.003</sub>	.44	2.94
5.00	.812 <sup>+0.000</sup> / <sub>-.003</sub>	.44	3.69
6.00	.937 <sup>+0.000</sup> / <sub>-.003</sub>	.50	4.25



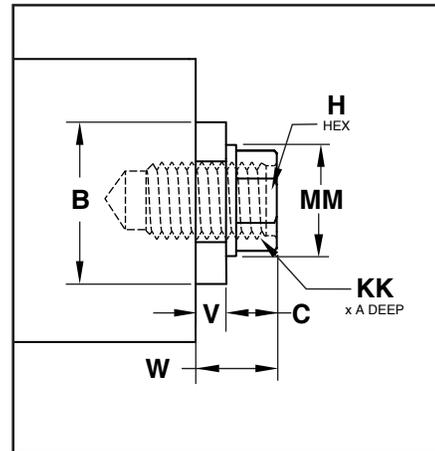
# 2H SERIES CYLINDERS

## ROD END DIMENSIONS

**Thread Style #4**  
Small Male  
NFFPA Style SM



**Thread Style #9**  
Small Female  
NFFPA Style SF



BORE DIAMETER	ROD NUMBER	MM Diameter	KK Thread	A	B +0.000 -0.002	H	V	W
1.50	1 (std.)	.625	7/16-20	.75	1.124	.50	.25	.63
	2	1.000	3/4-16	1.13	1.499	.88	.50	1.00
2.00	1 (std.)	1.000	3/4-16	1.13	1.499	.88	.25	.75
	2	1.375	1-14	1.63	1.999	1.13	.38	1.00
2.50	1 (std.)	1.000	3/4-16	1.13	1.499	.88	.25	.75
	2	1.750	1 1/4-12	2.00	2.374	1.50	.50	1.25
	3	1.375	1-14	1.63	1.999	1.13	.38	1.00
3.25	1 (std.)	1.375	1-14	1.63	1.999	1.13	.25	.88
	2	2.000	1 1/2-12	2.25	2.624	1.69	.38	1.25
	3	1.750	1 1/4-12	2.00	2.374	1.50	.38	1.13
4.00	1 (std.)	1.750	1 1/4-12	2.00	2.374	1.50	.25	1.00
	2	2.500	1 7/8-12	3.00	3.124	2.06	.38	1.38
	3	2.000	1 1/2-12	2.25	2.624	1.69	.25	1.13
5.00	1 (std.)	2.000	1 1/2-12	2.25	2.624	1.69	.25	1.13
	2	3.500	2 1/2-12	3.50	4.249	3.00	.38	1.38
	3	2.500	1 7/8-12	3.00	3.124	2.06	.38	1.38
	4	3.000	2 1/4-12	3.50	3.749	2.63	.38	1.38
6.00	1 (std.)	2.500	1 7/8-12	3.00	3.124	2.06	.25	1.25
	2	4.000	3-12	4.00	4.749	3.38	.25	1.25
	3	3.000	2 1/4-12	3.50	3.749	2.63	.25	1.25
	4	3.500	2 1/2-12	3.50	4.249	3.00	.25	1.25

## 2H SERIES CYLINDERS PRESSURE RATINGS & CALCULATIONS

### Push Force and Displacement

Progressive's 2H Hydraulic Cylinders are recommended for pressures to 3000 PSI for heavy duty services with hydraulic oil. The 4:1 design factor ratings 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 values.

BORE DIAM.	ROD SIZE	PRESSURE RATING AT 4:1 DESIGN FACTOR (ON TENSILE)	BORE DIAM.	PISTON AREA	CYLINDER PUSH FORCE IN POUNDS AT VARIOUS PRESSURES					DISPLACEMENT PER INCH OF STROKE (GAL.)
					1000	1500	2000	2500	3000	
1.50	5/8	2,530	1.50	1.767	1,770	2,655	3,540	4,417	5,310	.00765
2.00	1	2,950	2.00	3.14	3,140	4,710	6,280	7,850	9,420	.0136
2.50	1	2,340	2.50	4.91	4,910	7,365	9,820	12,275	14,730	.0213
3.25	1-3/8	2,250	3.25	8.30	8,300	12,450	16,600	20,750	24,900	.0359
4.00	1-3/4	2,130	4.00	12.57	12,570	18,855	25,140	31,425	37,710	.0544
5.00	2	2,171	5.00	19.64	19,640	29,460	39,280	49,100	58,920	.0850
6.00	2-1/2	2,270	6.00	28.27	28,270	42,405	56,540	70,675	84,810	.1224

### Deductions for Pull Force or Displacement

To determine the Cylinder Pull Force or Displacement, deduct the following force or displacement for each corresponding Rod Size from the selected push Force or displacement corresponding to the Bore Diameter in table above.

ROD SIZE	ROD AREA	PISTON ROD DIAMETER FORCE IN POUNDS AT VARIOUS PRESSURES					DISPLACEMENT PER INCH OF STROKE (GAL.)
		1000	1500	2000	2500	3000	
5/8	.307	307	460	614	767	921	.0013
1	.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 Stroke 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

For application assistance or to obtain a quote, please send the Cylinder catalog number or questions to [tech@procomps.com](mailto:tech@procomps.com). Seal kits and replacement parts are available.