MOLD CYLINDERS
HEAVY DUTY HYDRAULIC

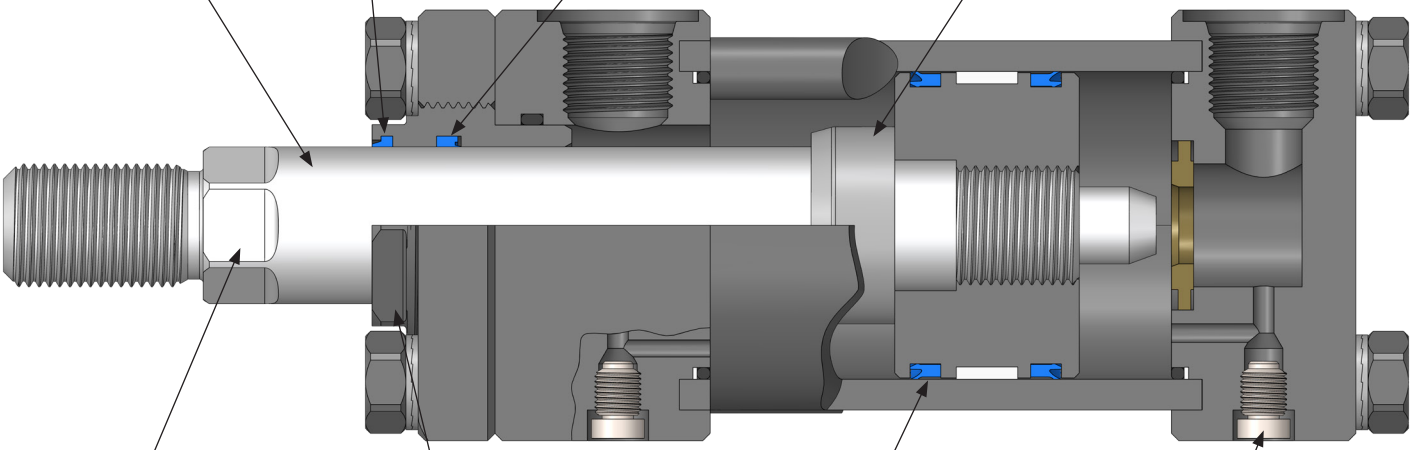
Progressive's Mold Cylinders deliver advanced performance, reliable operation, and extended service life, while being engineered to applicable NFPA standards for interchangeability.

Piston Rod
Hard Chrome Steel

Wiper
Blue Hythane® Seals

Rod Lip Seal
Available in Hythane U-Cup (180°F/82°C) Viton with a PTFE fluoropolymer backup (400°F/200°C)

Self-Centering Cushion Spud
Optional, available on head or cap end



Hex Rod Ends
Standard 6 Flats

Rod Glands
Black Nitride Graphitic Cast Iron

Piston Lip Seal
Available in Hythane U-Cup (180°F/82°C) Viton with a PTFE fluoropolymer backup (400°F/200°C)

Adjustable Screw for Cushion
Needle Valve included with Cushion specification

MOLD CYLINDERS
HOW TO ORDER

Style ME5
Head Rectangular Mount

Style MF1
Head Rectangular Flange Mount

Style MS2
Side Lug Mount

Style MS2P
Side Lugs with Thrust Key

Bore Diameter	Mounting Style		Piston Seals	Rod Seals	Port Type	Rod Diameter (2 Dec. Places)		Piston Rod End	Port Location	Cushion Requirement & Locations		Stroke (2 Dec. Places)
2.50	**ME5**	**-**	**H**	**H**	**S**	**1.38**	**-**	**2**	**P11**	**C33**	**-**	**6.00**

BORE DIAM. OPTIONS
1.50
2.00
2.50
3.25
4.00
5.00
6.00

MOUNTING STYLE DESCRIPTIONS	OPTIONS
Head Rectangular Mount (See page L-3)	ME5
Head Rectangular Flange Mount (See page L-4)	MF1
Side Lugs (See page L-5)	MS2
Side Lugs with Thrust Key (See page L-5)	MS2P

PISTON & ROD SEAL DESCRIPTIONS	OPTIONS
Blue Hythane Asymmetric U-Cup Seals (180°F / 82°C Max)	H
Viton with PTFE fluoropolymer backup (400°F/ 200°C)	V

HEAD/CAP PORT TYPE DESCRIPTIONS	OPTIONS
NPTF Ports Dry Seal Pipe Thread	N
SAE Straight Thread O-Ring	S

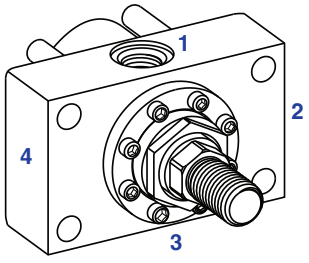
ROD DIAMETER OPTIONS
.63
1.00
1.38
1.75
2.00
2.50
3.00
3.50
4.00

PISTON ROD END DESCRIPTIONS	OPTIONS
Small Male	2
Short Female	4

PORT LOCATION OPTIONS SPECIFY P AND THEN THE PORT LOCATIONS. DEFAULTS ARE LOCATION 1 ON ALL STYLES.
1
2
3
4

CUSHION (NEEDLE VALVE) LOCATION OPTIONS SPECIFY C AND THEN THE HEAD AND CAP LOCATIONS IF THE HEAD CUSHION (NEEDLE VALVE) IS REQUIRED.. DEFAULTS ARE AS SHOWN BELOW, AND BOTH DIGITS MUST BE SPECIFIED AS PART OF THE CATALOG NUMBER. ME5=LOC 3 / MF1, MS2, MS2P=LOC 2. NOTE: IF NO CUSHION IS REQUIRED, SPECIFY 00 (ZEROS) IN BOTH SPOTS.
00 (No Cushion)
1
2
3
4

MOUNTING DESCRIPTION	NFPA DESIGNATION	PARKER® 2H STYLE REFERENCE
Head Rectangular / Extended Tie Rod	ME5	JJ
Front Flange	MF1	J
Side Lugs	MS2	C
Side Lugs with Thrust Key	MS2P	CP



Catalog Number Examples:

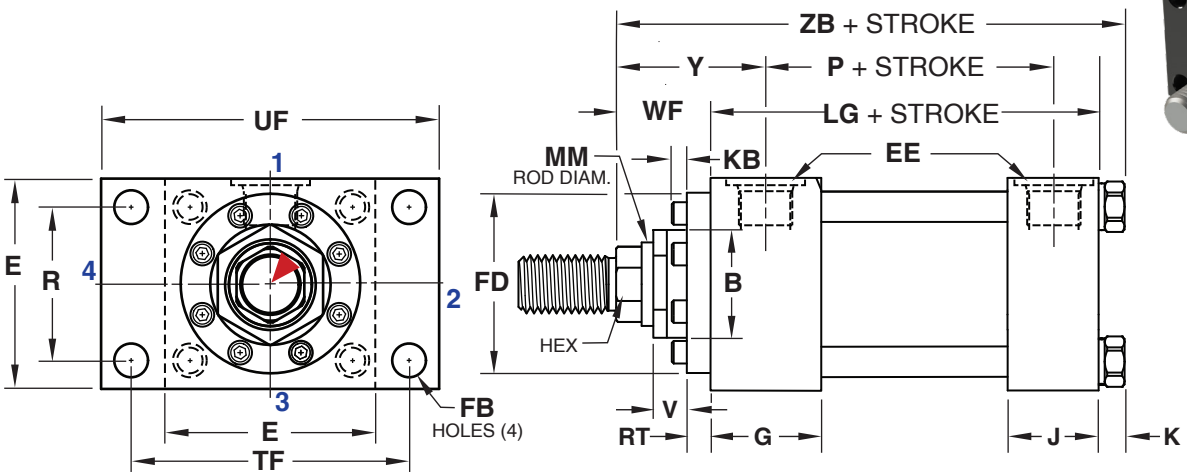
- 1.50MF1-HHS.63-2P11C00-2.00 = Flange Mount style with default port locations and no Cap Cushion. Threads are SAE and Seals standard Hythane with small male rod ends.
- 2.50ME5-VVN1.38-4P22C33-6.00 = Rectangular Mount style with alternate port locations and Cushion required at location 3. Threads are NPTF with High temperature seals and short female threads.
- 3.25MS2-VVS1.38-2P11C22-5.50 = Side Lug style with default port locations and cushion required at location 2. Threads are SAE with high temperature seals and small male threads.

Quotation Assistance:

For application assistance or to obtain a quote, please send the Cylinder catalog number designated above or a competitive replacement item number to **tech@procomps.com** along with the quantity required.

Seal kits and replacement parts are also available by sending an inquiry to tech@procomps.com.

HEAD RECTANGULAR MOUNTING
NFPA STYLE ME5



CAD insertion point

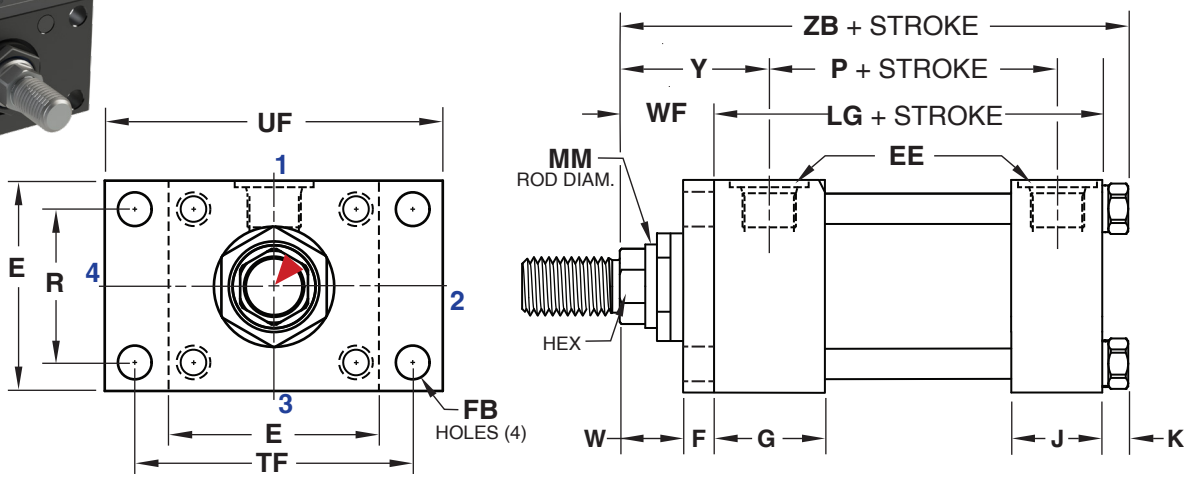
BORE DIAMETER	E	EE		FB DIAM.	G	J	K MAX	R	TF	UF	ADD STROKE	
		NPTF	SAE								LG	P
1.50	2.50	1/2	10	.44	1.75	1.50	.37	1.63	3.44	4.25	4.63	2.88
2.00	3.00	1/2	10	.56	1.75	1.50	.43	2.05	4.13	5.13	4.63	2.88
2.50	3.50	1/2	10	.56	1.75	1.50	.43	2.55	4.63	5.63	4.75	3.00
3.25	4.50	3/4	12	.69	2.00	1.75	.56	3.25	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

Note: SAE straight thread ports are standard, and NPTF ports are available at no extra charge.

BORE DIAMETER	MM ROD DIAMETER	B +.000 -.002	KB	FD DIAM.	RT	V	WF	Y	ADD STROKE
									ZB
1.50	.63	1.124	0	2.13	.38	.25	1.00	2.00	6.00
	1.00	1.499	0	2.50	.38	.50	1.38	2.38	6.37
2.00	1.00	1.499	0	2.50	.38	.50	1.38	2.38	6.43
	1.38	1.999	.19	3.00	.36	.63	1.63	2.63	6.68
2.50	1.00	1.499	0	2.50	.38	.50	1.38	2.38	6.56
	1.38	1.999	.25	3.00	.36	.63	1.63	2.63	6.81
	1.75	2.374	.25	3.50	.38	.75	1.88	2.88	7.06
3.25	1.38	1.999	.25	3.00	.36	.63	1.63	2.75	7.68
	1.75	2.374	.25	3.50	.38	.75	1.88	3.00	7.93
	2.00	2.624	.13	4.00	.63	.50	2.00	3.13	8.06
4.00	1.75	2.374	.25	3.50	.38	.75	1.88	3.00	8.18
	2.00	2.624	.13	4.00	.63	.50	2.00	3.13	8.31
	2.50	3.124	.25	4.50	.60	.63	2.25	3.38	8.56
5.00	2.00	2.624	.13	4.00	.63	.50	2.00	3.13	9.06
	2.50	3.124	.25	4.25	.60	.63	2.25	3.38	9.31
	3.00	3.749	.25	5.25	.63	.63	2.25	3.38	9.31
	3.50	4.249	.25	5.75	.63	.63	2.25	3.38	9.31
6.00	2.50	3.124	.25	4.50	.60	.63	2.25	3.50	10.50
	3.00	3.749	.25	5.25	.63	.63	2.25	3.50	10.50
	3.50	4.249	.25	5.75	.63	.63	2.25	3.50	10.50
	4.00	4.749	.25	6.50	.75	.50	2.25	3.50	10.50

HEAD RECTANGULAR FLANGE MOUNTING

NFPA STYLE MF1



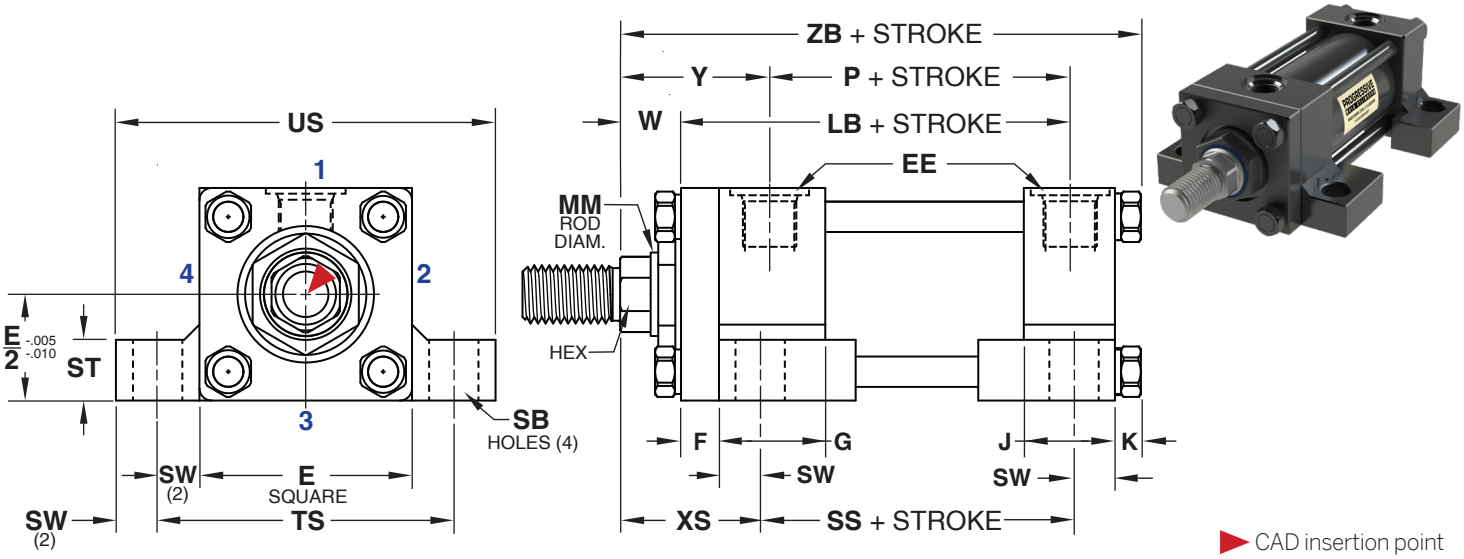
CAD insertion point

BORE DIAMETER	E	EE		F	FB DIAM.	G	J	K MAX	R	TF	UF	ADD STROKE	
		NPTF	SAE									LG	P
1.50	2.50	1/2	10	.38	.44	1.75	1.50	.37	1.63	3.44	4.25	4.63	2.88
2.00	3.00	1/2	10	.63	.56	1.75	1.50	.43	2.05	4.13	5.13	4.63	2.88
2.50	3.50	1/2	10	.63	.56	1.75	1.50	.43	2.55	4.63	5.63	4.75	3.00
3.25	4.50	3/4	12	.75	.69	2.00	1.75	.56	3.25	5.88	7.13	5.50	3.50
4.00	5.00	3/4	12	.88	.69	2.00	1.75	.56	3.82	6.38	7.63	5.75	3.75
5.00	6.50	3/4	12	.88	.94	2.00	1.75	.81	4.95	8.19	9.75	6.25	4.25
6.00	7.50	1	16	1.00	1.06	2.25	2.25	.87	5.73	9.44	11.25	7.38	4.88

Note: SAE straight thread ports are standard, and NPTF ports are available at no extra charge.

BORE DIAMETER	MM ROD DIAMETER	W	WF	Y	ADD STROKE ZB	MAXIMUM PSI PUSH
1.50	.63	.63	1.00	2.00	6.00	1500
	1.00	1.00	1.38	2.38	6.37	1000
2.00	1.00	.75	1.38	2.38	6.43	2000
	1.38	1.00	1.63	2.63	6.68	1200
2.50	1.00	.75	1.38	2.38	6.56	2000
	1.38	1.00	1.63	2.63	6.81	1500
	1.75	1.25	1.88	2.88	7.06	1100
3.25	1.38	.88	1.63	2.75	7.68	1800
	1.75	1.13	1.88	3.00	7.93	1400
	2.00	1.25	2.00	3.13	8.06	1300
4.00	1.75	1.00	1.88	3.00	8.18	1800
	2.00	1.13	2.00	3.13	8.31	1700
	2.50	1.38	2.25	3.38	8.56	1300
5.00	2.00	1.13	2.00	3.13	9.06	1300
	2.50	1.38	2.25	3.38	9.31	1200
	3.00	1.38	2.25	3.38	9.31	1000
	3.50	1.38	2.25	3.38	9.31	800
6.00	2.50	1.25	2.25	3.50	10.50	1200
	3.00	1.25	2.25	3.50	10.50	1000
	3.50	1.25	2.25	3.50	10.50	900
	4.00	1.25	2.25	3.50	10.50	800

SIDE LUG MOUNTING
NFPA STYLE MS2

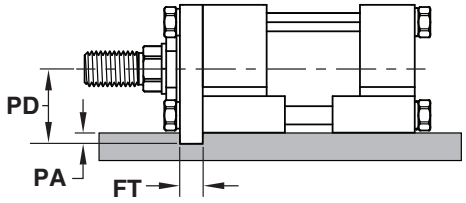


BORE DIAMETER	E	EE		F	G	J	K MAX	SB DIAM.	ST	SW	TS	US	ADD TO STROKE		
		NPTF	SAE										LB	P	SS
1.50	2.50	1/2	10	.38	1.75	1.50	.37	.44	.50	.38	3.25	4.00	5.00	2.88	3.88
2.00	3.00	1/2	10	.63	1.75	1.50	.43	.56	.75	.50	4.00	5.00	5.25	2.88	3.63
2.50	3.50	1/2	10	.63	1.75	1.50	.43	.81	1.00	.69	4.88	6.25	5.38	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

Notes:
- SAE straight thread ports are standard, and NPTF ports are available at no extra charge.
- SB holes are spotfaced for Socket Head Cap Screws. (Not included.)

BORE DIAMETER	MM ROD DIAMETER	W	XS	Y	ADD TO STROKE ZB
1.50	.63	.63	1.38	2.00	6.00
	1.00	1.00	1.75	2.38	6.37
2.00	1.00	.75	1.88	2.38	6.43
	1.38	1.00	2.13	2.63	6.68
2.50	1.00	.75	2.06	2.38	6.56
	1.38	1.00	2.31	2.63	6.81
	1.75	1.25	2.56	2.88	7.06
3.25	1.38	.88	2.31	2.75	7.68
	1.75	1.13	2.56	3.00	7.93
	2.00	1.25	2.69	3.13	8.06
4.00	1.75	1.00	2.75	3.00	8.18
	2.00	1.13	2.88	3.13	8.31
	2.50	1.38	3.13	3.38	8.56
5.00	2.00	1.13	2.88	3.13	9.06
	2.50	1.38	3.13	3.38	9.31
	3.00	1.38	3.13	3.38	9.31
	3.50	1.38	3.13	3.38	9.31
6.00	2.50	1.25	3.38	3.50	10.50
	3.00	1.25	3.38	3.50	10.50
	3.50	1.25	3.38	3.50	10.50
	4.00	1.25	3.38	3.50	10.50

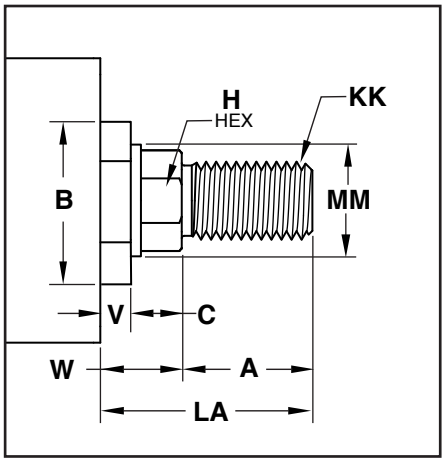
Thrust Key Mounting Style (MS2P)
Thrust Key Mountings elminimate the need of using fitted bolts or external keys on side-mounted cylinders. Progressive Cylinders with the mounting style of "MS2P" can be provided with the Gland Retainer Plate extended below the mounting side of the cylinder as shown below.



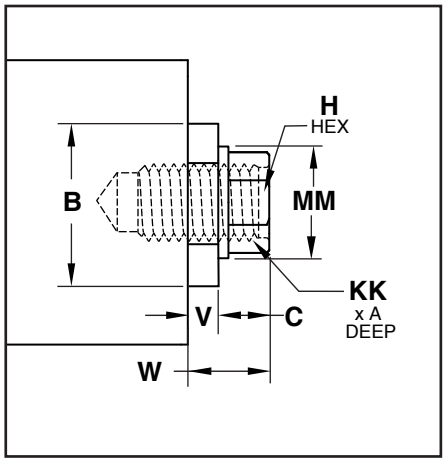
BORE DIAMETER	FT	PA	PD
1.50	.312 +.000 -.002	.19	1.44
2.00	.562 +.000 -.002	.31	1.81
2.50	.562 +.000 -.002	.31	2.06
3.25	.687 +.000 -.003	.38	2.63
4.00	.812 +.000 -.003	.44	2.94
5.00	.812 +.000 -.003	.44	3.69
6.00	.937 +.000 -.003	.50	4.25

MOLD CYLINDERS
ROD END DIMENSIONS

Thread Style #2
Small Male
NFPA Style SM



Thread Style #4
Short Female
NFPA Style SF



BORE DIAMETER	MM ROD DIAMETER	KK THREAD	A	B +.000 -.002	H	V	W
1.50	.63	7/16-20	.75	1.124	.50	.25	.63
	1.00	3/4-16	1.13	1.499	.88	.50	1.00
2.00	1.00	3/4-16	1.13	1.499	.88	.25	.75
	1.38	1-14	1.63	1.999	1.13	.38	1.00
2.50	1.00	3/4-16	1.13	1.499	.88	.25	.75
	1.38	1-14	1.63	1.999	1.13	.38	1.00
	1.75	1 1/4-12	2.00	2.374	1.50	.50	1.25
3.25	1.38	1-14	1.63	1.999	1.13	.25	.88
	1.75	1 1/4-12	2.00	2.374	1.50	.38	1.13
	2.00	1 1/2-12	2.25	2.624	1.69	.38	1.25
4.00	1.75	1 1/4-12	2.00	2.374	1.50	.25	1.00
	2.00	1 1/2-12	2.25	2.624	1.69	.25	1.13
	2.50	1 7/8-12	3.00	3.124	2.06	.38	1.38
5.00	2.00	1 1/2-12	2.25	2.624	1.69	.25	1.13
	2.50	1 7/8-12	3.00	3.124	2.06	.38	1.38
	3.00	21/4-12	3.50	3.749	2.63	.38	1.38
	3.50	2 1/2-12	3.50	4.249	3.00	.38	1.38
6.00	2.50	1 7/8-12	3.00	3.124	2.06	.25	1.25
	3.00	2 1/4-12	3.50	3.749	2.63	.25	1.25
	3.50	2 1/2-12	3.50	4.249	3.00	.25	1.25
	4.00	3-12	4.00	4.749	3.38	.25	1.25

MOLD CYLINDERS
PRESSURE RATINGS & CALCULATIONS

Push Force and Displacement

Progressive's 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 DIAM.	PRESSURE RATING AT 4:1 DESIGN FACTOR (ON TENSILE)
1.50	.63	2,530
2.00	1.00	2,950
2.50	1.00	2,340
3.25	1.38	2,250
4.00	1.75	2,130
5.00	2.00	2,171
6.00	2.50	2,270

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	1.767	1,770	2,655	3,540	4,417	5,310	.00765
2.00	3.14	3,140	4,710	6,280	7,850	9,420	.0136
2.50	4.91	4,910	7,365	9,820	12,275	14,730	.0213
3.25	8.30	8,300	12,450	16,600	20,750	24,900	.0359
4.00	12.57	12,570	18.855	25,140	31,425	37,710	.0544
5.00	19.64	19,640	29,460	39,280	49,100	58,920	.0850
6.00	28.27	28,270	42,405	56,540	70,675	848,101	.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 DIAM.	ROD AREA	PISTON ROD DIAMETER FORCE IN POUNDS AT VARIOUS PRESSURES					DISPLACEMENT PER INCH OF STROKE (GAL.)
		1000	1500	2000	2500	3000	
.63	.307	307	460	614	767	921	.0013
1.00	.785	785	1,177	1,570	1,962	2,355	.0034
1.38	1.490	1,490	2,235	2,980	3,725	4,470	.0065
1.75	2.410	2,410	3,615	4,820	6,025	7,230	.0104
2.00	3.141	3,141	4,711	6,280	7,854	9,420	.0136
2.50	4.910	4,910	7,365	9,820	12,275	14,730	.0213
3.00	7.070	7,070	10,605	14,140	17,675	21,210	.0306
3.50	9.620	9,620	14,430	19,240	24,050	28,860	.0416
4.00	12.57	12,570	23,355	25,140	31,425	37,710	.0544

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 x AE
Cylinder Pull Force Formula	FR = P x AR
Cylinder Volume (Gallons)	$\frac{\text{G = Net Area (in2) x Stroke (in)}}{231}$

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

NOTES