

D-M-E Hydraulic Unscrewing Devices

STANDARDIZED SYSTEMS
FOR MOLDING
INTERNAL THREADS

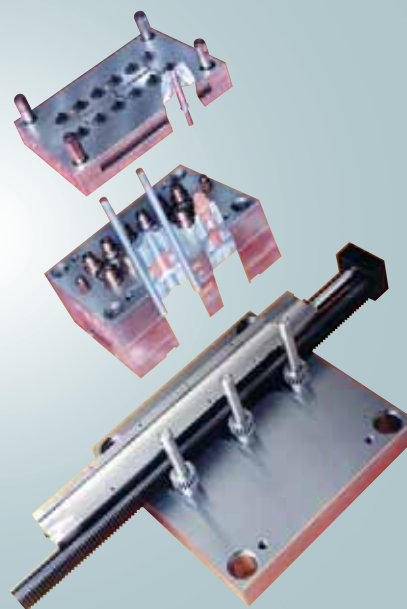


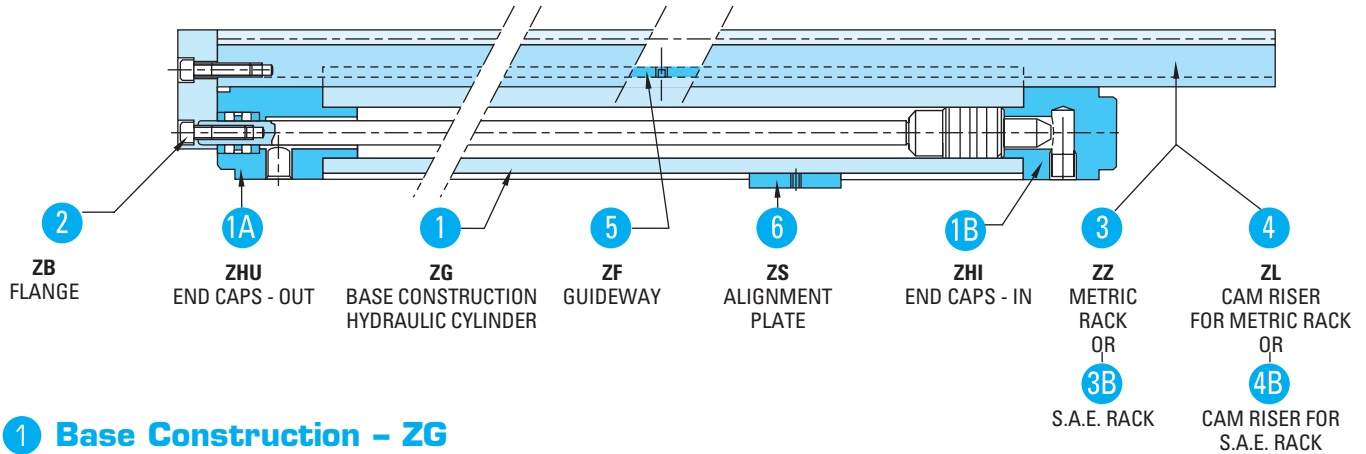
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Components

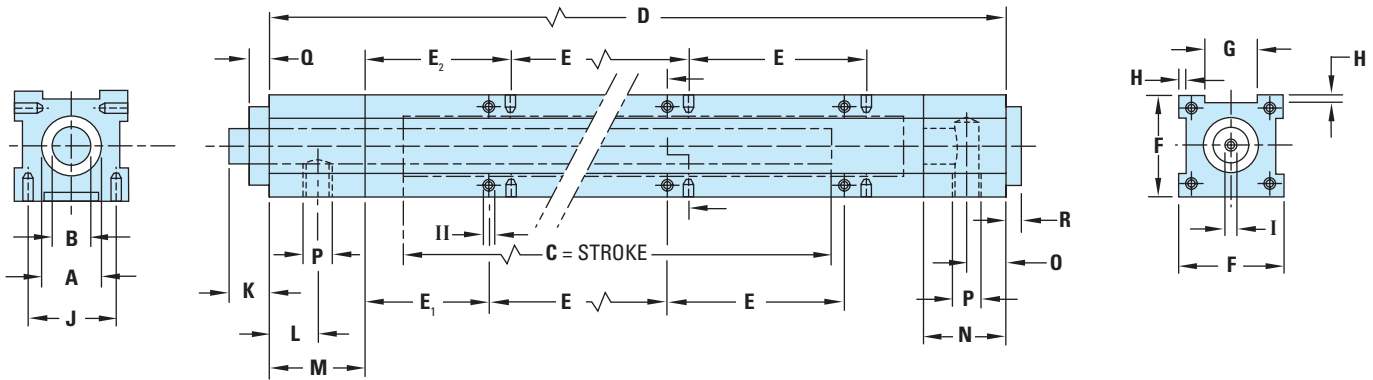


NOTE:
End caps 1A and 1B,
Internal Seals ZD, and NPT Pipe
Thread Adapters are included
in Base Construction.



1 Base Construction - ZG

Hydraulic Cylinder



ITEM NO	A	B	C	D	E	E1	E2	F	G	H	J	K	L	M	N	O	P	Q	R	Metric Threads		
																				I	II	
ZG-25-300			11.811	16.693	3x3.150	2.205	2.598															
ZG-25-400	Ø .984	Ø .630	15.748	20.630	3x3.150	4.173	4.567	1.811	.787	.138	1.339	.709	.846	1.693	1.142	.433	1/4" BSPT	.354	.236	M 8x1.25x20	SM 5x.80x10	
ZG-25-500			19.685	24.567	5x3.150	2.992	3.386															
ZG-40-300			11.811	17.008	3x3.150	2.205	2.598															
ZG-40-400	Ø 1.575	Ø .866	15.748	20.945	3x3.150	4.173	4.567	2.205	1.181	.138	1.732	.866	1.339	2.087	1.063	.512	1/2" BSPT	.354	.315	M 10x1.5x30	SM 5x.80x10	
ZG-40-500			19.685	24.882	5x3.150	2.992	3.386															
ZG-63-400	Ø 2.480	Ø 1.417	15.748	21.890	3x3.150	4.488	4.882	3.780	1.969	.315	2.756	1.496	.984	2.047	1.378	.630	3/4" BSPT	.866	.472	M 16x2.0x45	SM 8x1.25x16	
ZG-63-500			19.685	25.827	5x3.150	3.307	3.701															

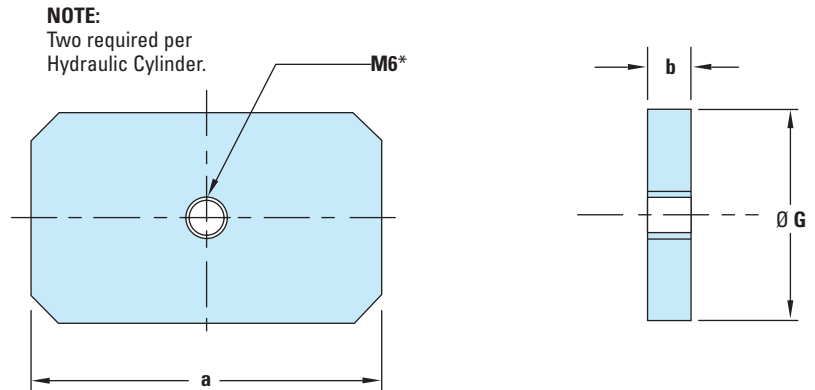
NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

Components

Standardized system for molding internal threads

- SAE-rack design
- Off-the-shelf replacement parts
- Simplifies mold design
- Applicable to different design styles
- Technical and application support
- Rack sized to provide maximum stroke lengths

6 Alignment Plate - ZS

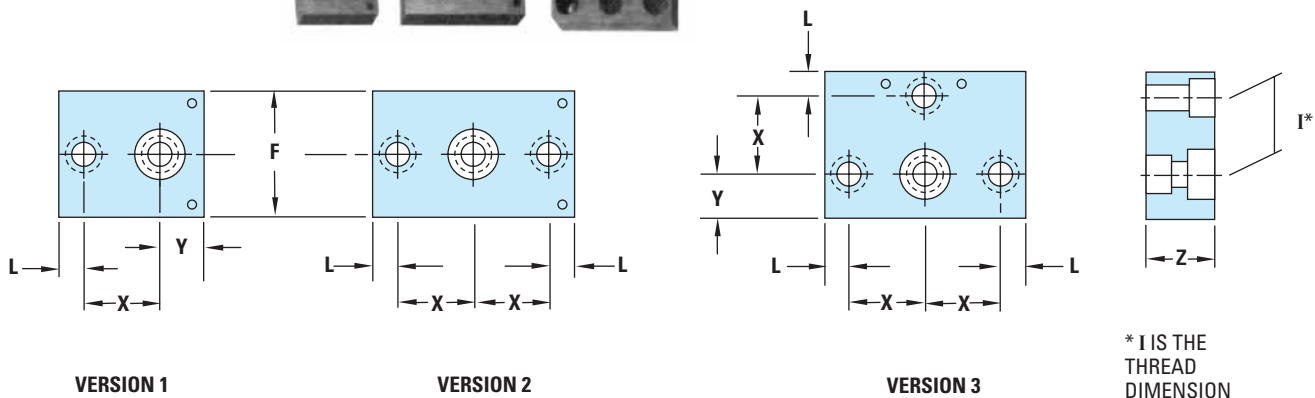


ITEM NO	A	G	a	b
ZS-25	Ø.984	.787	1.575	.236
ZS-40	Ø1.575	1.181	1.969	.236
ZS-63	Ø2.480	1.969	3.150	.591

*M6 Metric socket head screw included.

NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

2 Flange - ZB



ITEM NO	A	X	Y	F	Z	L	Metric Threads I	Version
ZB-25-1							2 qty. M 8x1.25x20	Vers. 1
ZB-25-2	Ø.984	1.063	.492	1.811	.787	.413	3 qty. M 8x1.25x20	Vers. 2
ZB-25-3							4 qty. M 8x1.25x20	Vers. 3
ZB-40-1							2 qty. M 10x1.5x30	Vers. 1
ZB-40-2	Ø1.575	1.339	.787	2.205	1.181	.433	3 qty. M 10x1.5x30	Vers. 2
ZB-40-3							4 qty. M 10x1.5x30	Vers. 3
ZB-63-1							1 qty. M 12x1.75x40 / 1 qty. M 16x2.0x45	Vers. 1
ZB-63-2	Ø2.480	2.165	1.181	3.780	1.575	.591	2 qty. M 12x1.75x40 / 1 qty. M 16x2.0x45	Vers. 2
ZB-63-3							3 qty. M 12x1.75x40 / 1 qty. M 16x2.0x45	Vers. 3

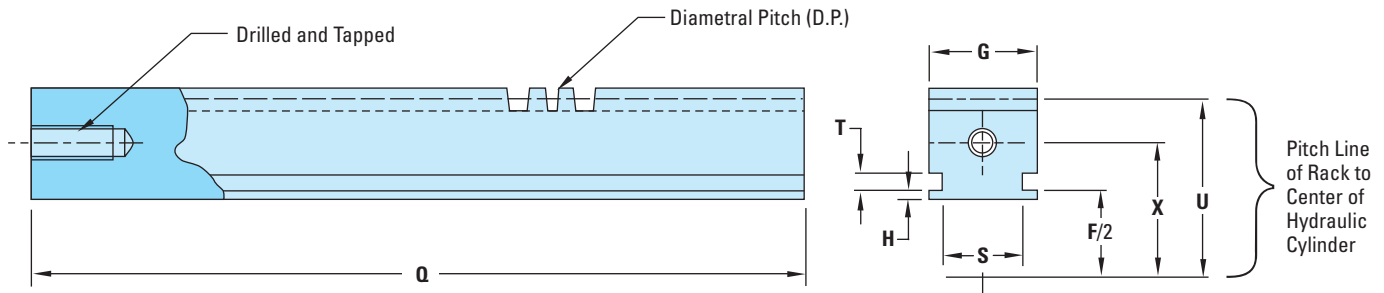
*Metric socket head cap screws included with Flange (see I).

NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

Components

3B S.A.E. Rack - ZZ

20 Degree Pressure Angle Gear Teeth



NOTE: Mating Gear to be supplied by moldmaker.

ITEM NO	A	F/2	G	H	Q	S.A.E. Diametral Pitch	S	T	U	X	Metric I
ZZ2501	Ø.984	.906	.772	.118	48	12	.551	.250	1.500	1.063	M 8x1.25x20
ZZ4001	Ø1.575	1.102	1.166	.118	48	12	.945	.250	1.750	1.339	M 10x1.5x30
ZZ6301	Ø2.480	1.890	1.953	.295	48	12	1.654	.312	2.625	2.165	M 12x1.75x40

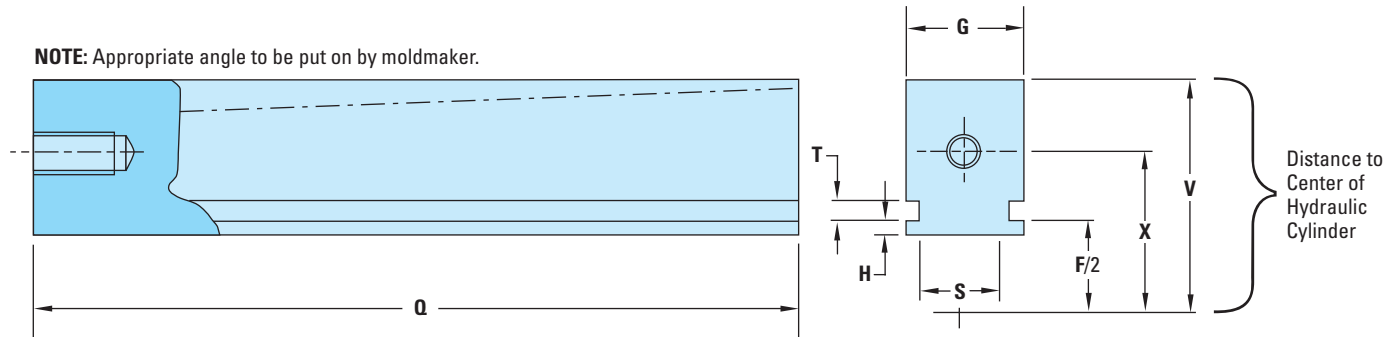
NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

4B CAM Riser - ZL

(for use with S.A.E. Racks)



NOTE: Appropriate angle to be put on by moldmaker.



ITEM NO	A	F/2	G	H	Q	S	T	V	X	Metric I
ZL2501	Ø.984	.906	.772	.118	48	.551	.177	1.949	1.063	M 8x1.25x20
ZL4001	Ø1.575	1.102	1.166	.118	48	.945	.177	2.539	1.339	M 10x1.5x30
ZL6301	Ø2.480	1.890	1.953	.295	48	1.654	.256	3.937	2.165	M 12x1.75x40

NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

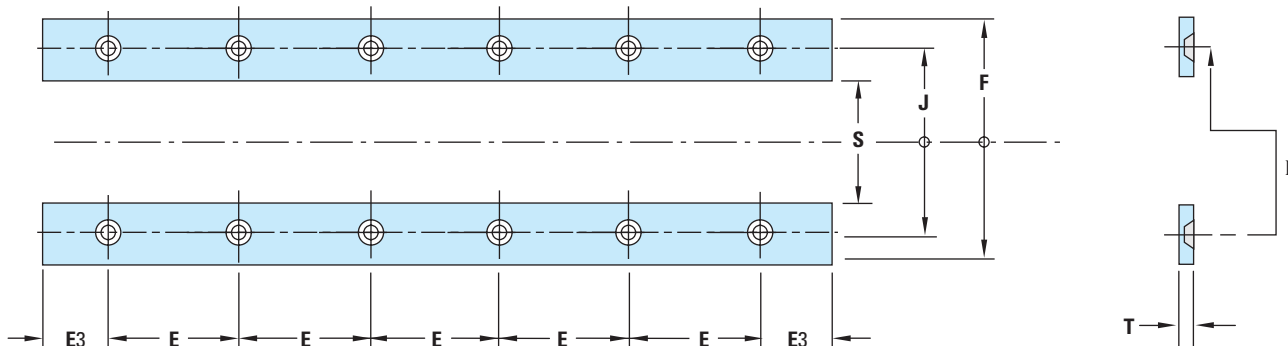
Components

5 Guideway - ZF



NOTES:

1. Two guideways are required per Rack or per Cam Riser.
2. Only one length is stocked and must be cut to length to fit for shorter Hydraulic Cylinders.
3. Metric flat head screws are included with Guideway (see II).



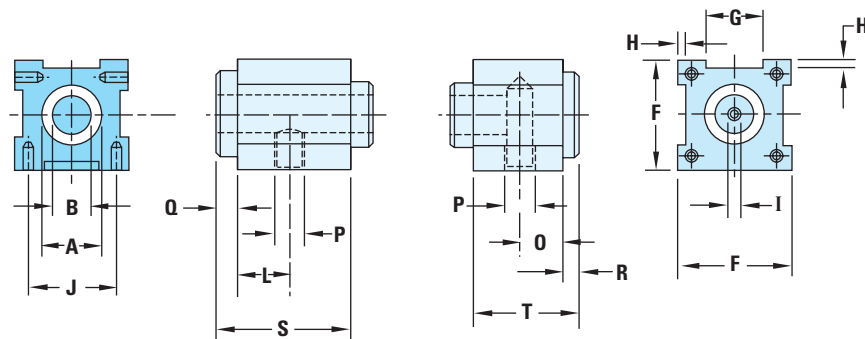
ITEM NO	A	C	E	E3	F	J	S	T	Metric II
ZF0001	Ø.984	19.685	5x3.150	2.599	1.811	1.339	.551	.188	SM 5x.80x10
ZF0001	Ø1.575	19.685	5x3.150	2.599	2.205	1.732	.945	.188	SM 5x.80x10
ZF0002	Ø2.480	19.685	5x3.150	1.913	3.780	2.756	1.654	.250	SM 8x1.25x16

NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

MAINTENANCE REPLACEMENT PARTS ONLY

1A End Caps (out) - ZHU

1B End Caps (in) - ZHI



ITEM NO	L	Q	P	S
ZHU-25	.846	.354	1/4" BSPT	2.047
ZHU-40	1.339	.354	1/2" BSPT	2.441
ZHU-63	.984	.866	3/4" BSPT	2.913

ITEM NO	O	R	P	T
ZHI-25	.433	.236	1/4" BSPT	1.378
ZHI-40	.512	.315	1/2" BSPT	1.378
ZHI-63	.630	.472	3/4" BSPT	1.850

NOTE: BSPT = British Standard Pipe Taper
Ø = Diameter in Inches

M = Metric Socket Head Cap Screw
SM = Metric Flat Head Socket Cap Screw

NOTE: All other dimensions in inches unless otherwise specified.

Seal Kit - ZD



ITEM NO
ZD-25
ZD-40
ZD-63

Pipe Thread Adapters - ZG

Adapter converts male BSPT to female NPT.

ITEM NO	CONVERSION
ZG2501	1/4" BSPT = 1/4" NPT
ZG4001	1/2" BSPT = 1/2" NPT
ZG6301	3/4" BSPT = 3/4" NPT

Calculations/Specifications

Thread Lead = $1/(\text{Threads per inch}) = 1/\text{Pitch} = \text{Inches}/\text{Thread}$

Thread Length = Length of threads to be removed from the cap

A. Stroke (Inches)

NOTE: Limit switches should be used if possible to limit full cylinder travel. This will extend the seal life inside the hydraulic cylinder.

a) Required revolutions (thread core)

$$= \frac{\text{Thread Length}}{\text{Thread Lead}} + \text{Safety (.5 revolutions minimum)}$$

b) 1. Required stroke – Inches

$$= \text{Gear Pitch Diameter} \times \pi \times \text{Required Revolutions}$$

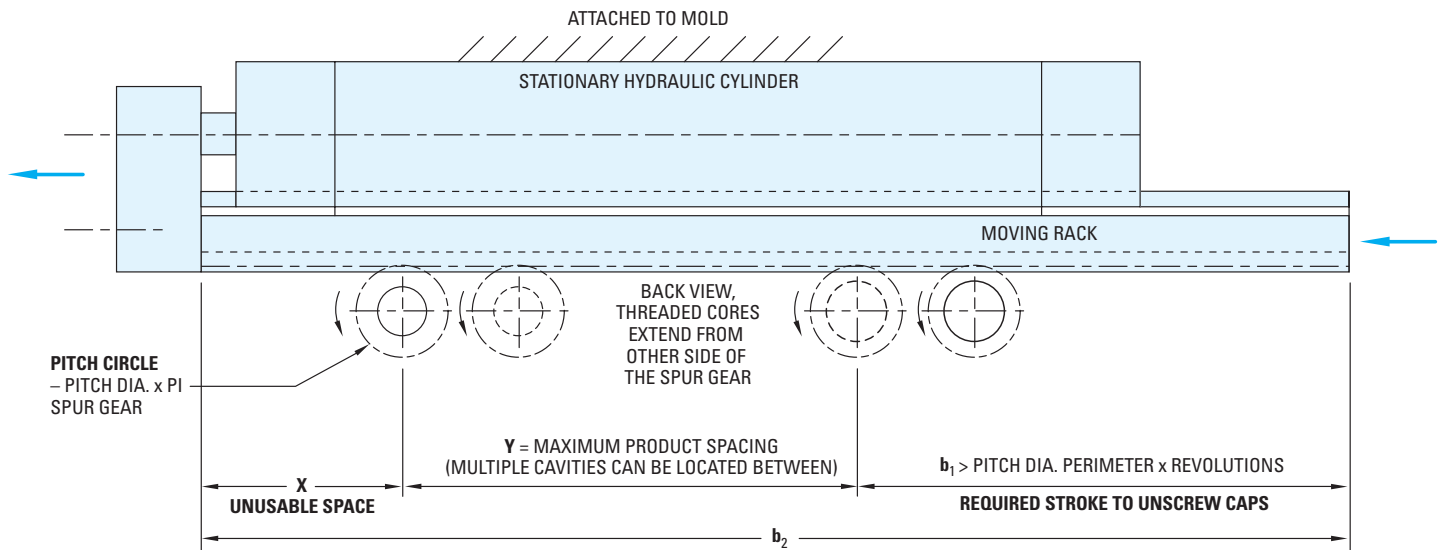
If required stroke is too long, a cogwheel transmission should be used.

2. Length of Rack

$$b_2 = x + y + b_1$$

c) Stripper stroke (Inches)

$$= \text{Cylinder Stroke} - \text{Required Rack Stroke}$$



Calculations/Specifications

B. Control Cam Calculation

d) Moving Cam (α)

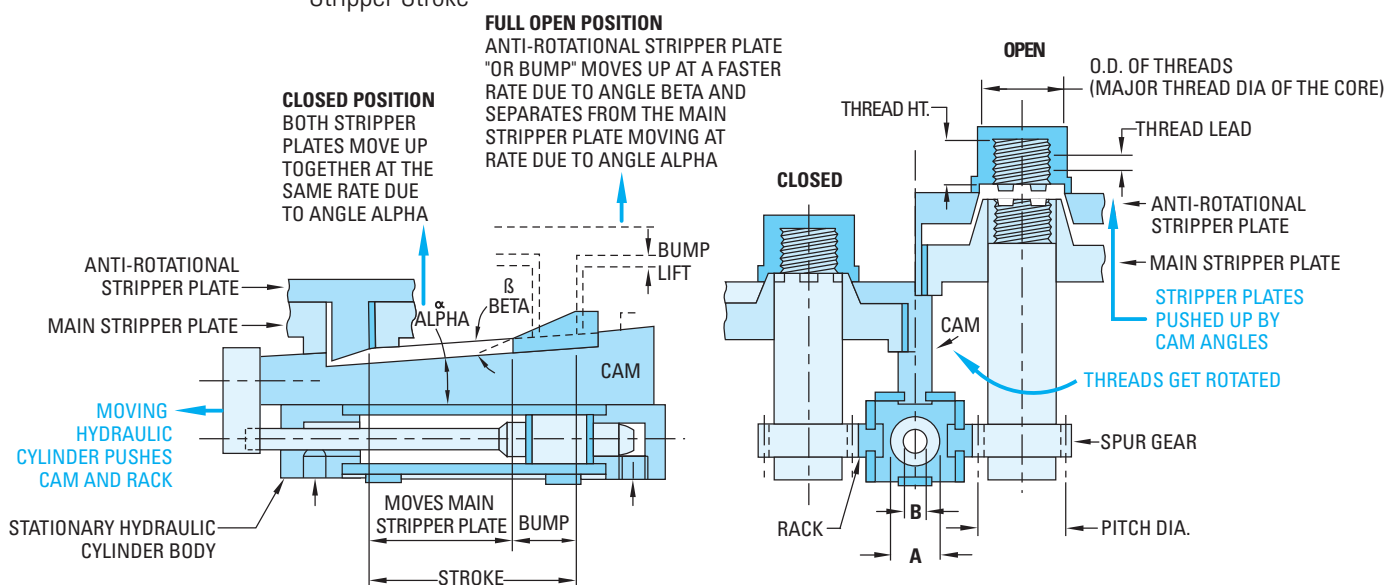
NOTE: Moves Main Stripper Plate in sync. with unscrewing thread.

$$\tan \alpha = \frac{\text{Thread Lead}}{\text{Gear Pitch Diameter} \times \pi}$$

e) Stripper Cam (β)

NOTE: Moves Anti-Rotational Stripper Plate or provides "BUMP" to shake part off.

$$\tan \beta = \frac{\text{Stripper Height}}{\text{Stripper Stroke}}$$



C. Unscrewing Force

These figures should only be used as a guideline, as many other factors will affect the calculation (material, variation of dimensions, material shrinkage, core surface area, temperature, lubricants, friction, etc.).

f) Residual Pressure (PSI)

= 1/100 of maximum injection pressure

g) Effective core surface area (Square Inches or in², Outer Core Cylinder Shell)

Flat end of threaded core neglected, x 2 value for 45° triangle thread shape
 = major thread dia. of the core x π x thread height x 2

h) Unscrewing torque (in-lb.)

= Residual Pressure x Effective core surface area x major thread radius of core

i) Unscrewing force rack (lb.)

= $\frac{\text{Unscrewing Torque}}{\text{Gear pitch radius}}$ x number of cavities

k) Hydraulic force (lb.)

NOTE: x 1.5 is 50% Safety Factor, if x 1.0 there would be no safety factor.

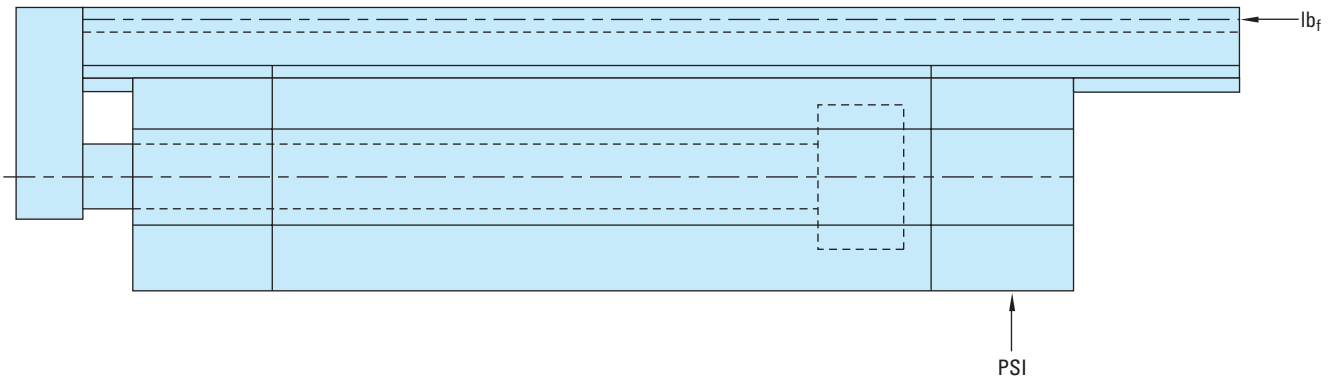
= Unscrewing Force x 1.5

Calculations/Specifications

Working Cylinder Stroke

Unscrewing force available at different hydraulic pressures (PSI)

Working Stroke



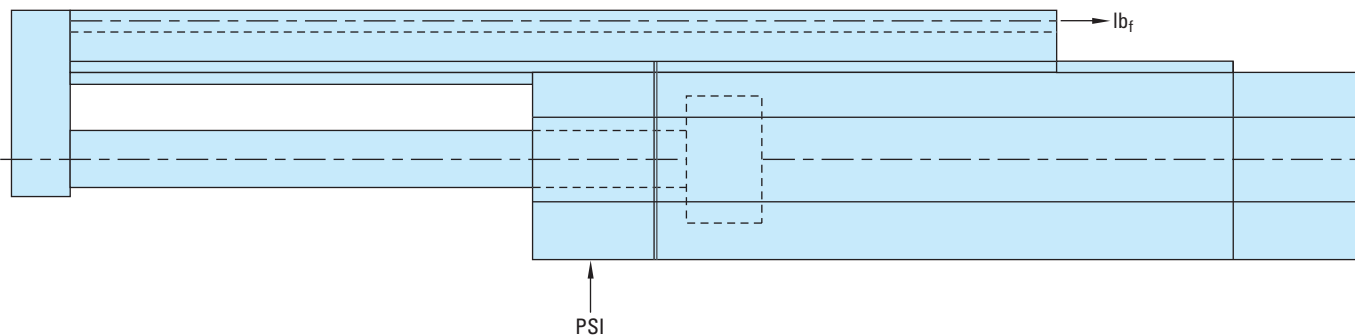
A (piston)	B (shaft)	1,160 PSI	1,450 PSI	1,740 PSI	2,030 PSI	2,175 PSI
Ø.984"	Ø.630"	887 lb _f	1,102 lb _f	1,326 lb _f	1,529 lb _f	1,664 lb _f
Ø1.575"	Ø.866"	2,248 lb _f	2,810 lb _f	3,395 lb _f	3,957 lb _f	4,204 lb _f
Ø2.480"	Ø1.417"	5,598 lb _f	6,992 lb _f	8,409 lb _f	9,802 lb _f	10,476 lb _f

NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

Returning Cylinder Stroke

Force available at different hydraulic pressures (PSI)

Return Back



A (piston)	B (shaft)	1,160 PSI	1,450 PSI	1,740 PSI	2,030 PSI	2,175 PSI
Ø.984"	Ø.630"	517 lb _f	652 lb _f	787 lb _f	922 lb _f	989 lb _f
Ø1.575"	Ø.866"	1,574 lb _f	1,978 lb _f	2,361 lb _f	2,743 lb _f	2,967 lb _f
Ø2.480"	Ø1.417"	3,777 lb _f	4,721 lb _f	5,665 lb _f	6,587 lb _f	7,081 lb _f

NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

Applications

APPLICATIONS

Required D-M-E Component List

Application A

Item No	Qty	Description
ZG-xx-yyy	1	Hydraulic Cylinder
ZS-xx	2	Alignment Plate
ZB-xx-y	1	Flange-Version 3
ZZ-xx-yy	2	S.A.E. Rack
ZL-xx-yy	1	Cam Riser
ZF-yyyy	6	Guideways for Racks & Cam

Application B

Item No	Qty	Description
ZG-xx-yyy	1	Hydraulic Cylinder
ZS-xx	4	Alignment Plate
ZB-xx-y	1	Flange-Version 1
ZZ-xx-yy	1	S.A.E. Rack
ZF-yyyy	2	Guideways for Rack

Application C

Item No	Qty	Description
ZG-xx-yyy	2	Hydraulic Cylinder
ZS-xx	4	Alignment Plate
ZB-xx-y	2	Flange-Version 1
ZZ-xx-yy	2	S.A.E. Rack
ZF-yyyy	4	Guideways for Racks

Application D

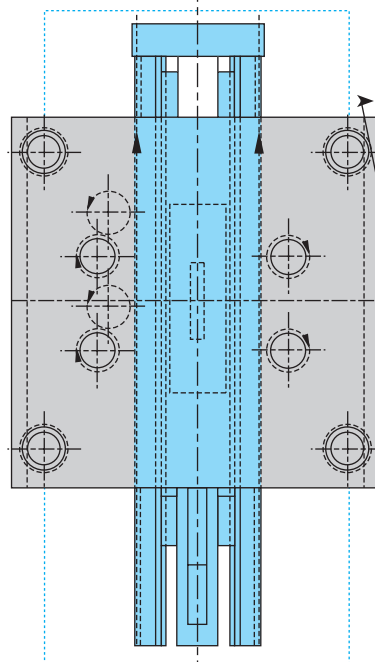
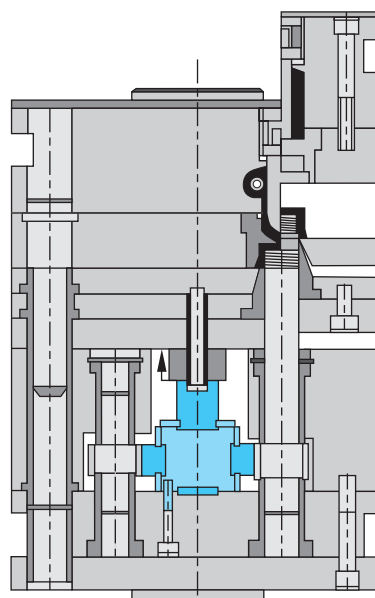
Item No	Qty	Description
ZG-xx-yyy	1	Hydraulic Cylinder
ZS-xx	2	Alignment Plate
ZB-xx-y	1	Flange-Version 2
ZZ-xx-yy	1	Cam Riser
ZF-yyyy	2	Guideways for Cam

NOTE:

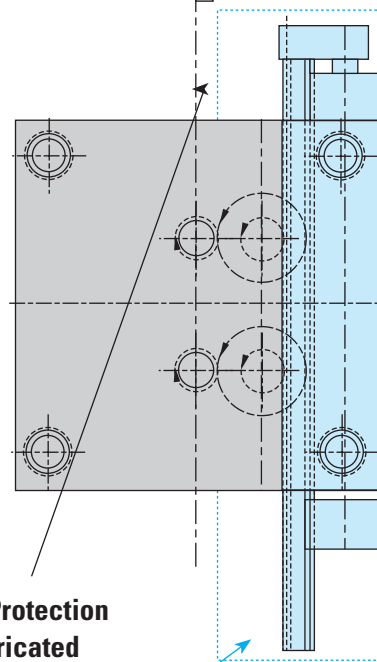
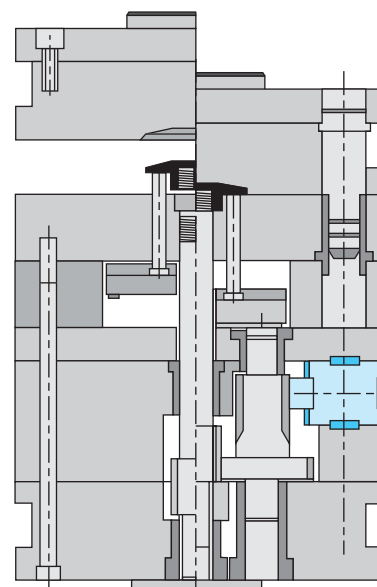
Moldmaker should provide limit switches for fully closed and for cylinder extended. Full cylinder extension should be avoided to improve internal cylinder seal life.

A complete Engineering Design Guide, plus separate example, are available at www.dme.net/hud

Application A Without guiding thread with cam



Application B With guiding thread

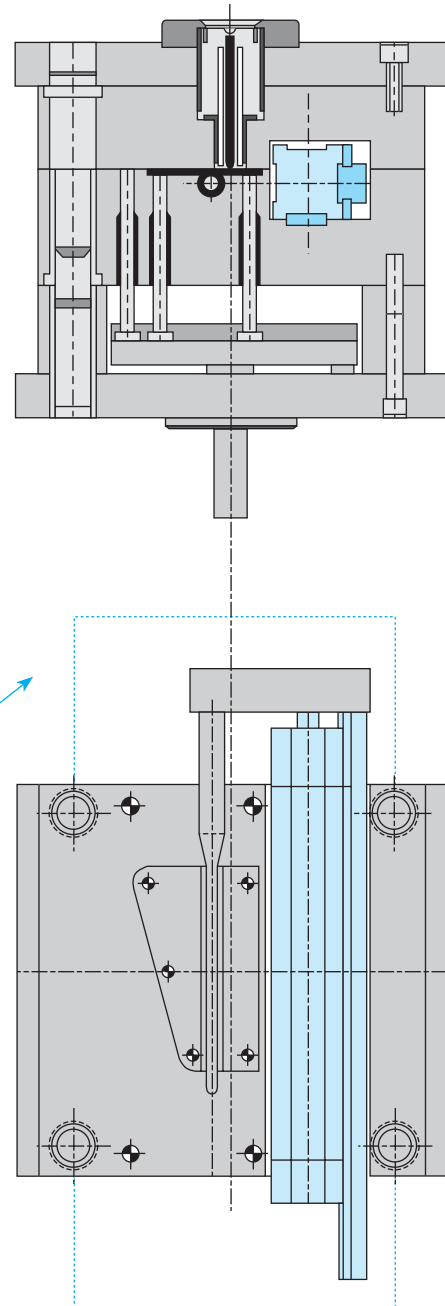
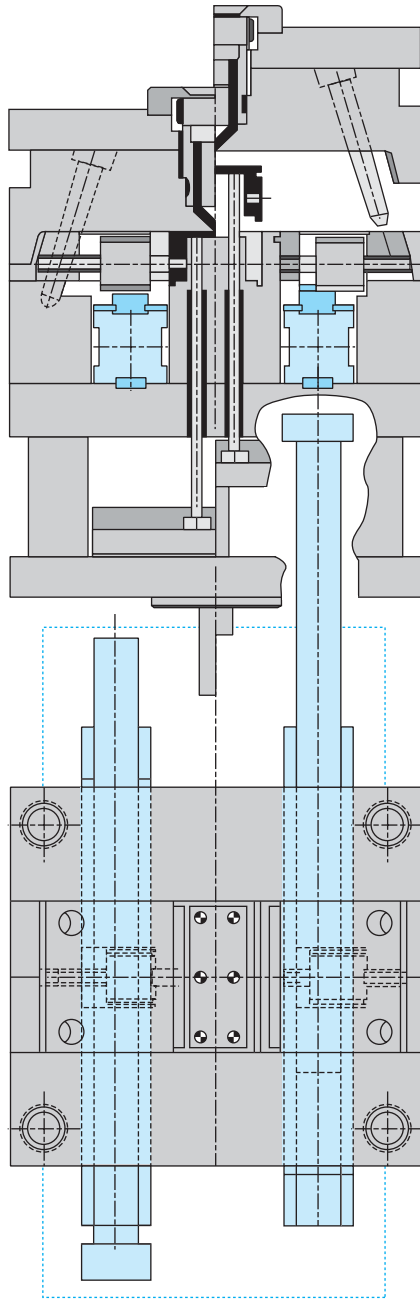


Safety Protection Box fabricated by moldmaker completely covers full movement of Unscrewing Device.

Applications

Application C With guiding thread

Application D Long guiding cores



**Safety Protection
Box fabricated
by moldmaker
completely covers
full movement of
Unscrewing Device.**

Safety Considerations: Moldmaker must fabricate boxes over the rack areas which move to protect against injury to personnel. Moldmaker must also use safety interlocks to prevent movement of unscrewing device if these protection boxes are removed for any reason. Also, sheet metal should be used to cover areas where the gears are, to prevent damage from loose debris falling between the gears and racks.