

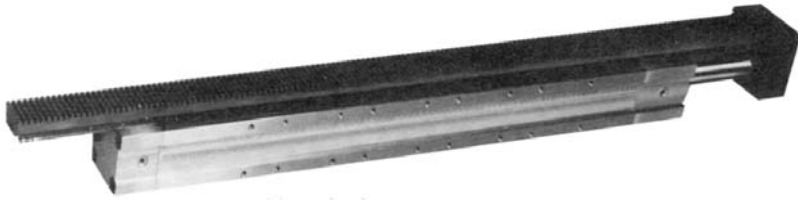
# D-M-E Hydraulic Unscrewing Device

Standardized system  
for molding  
internal threads

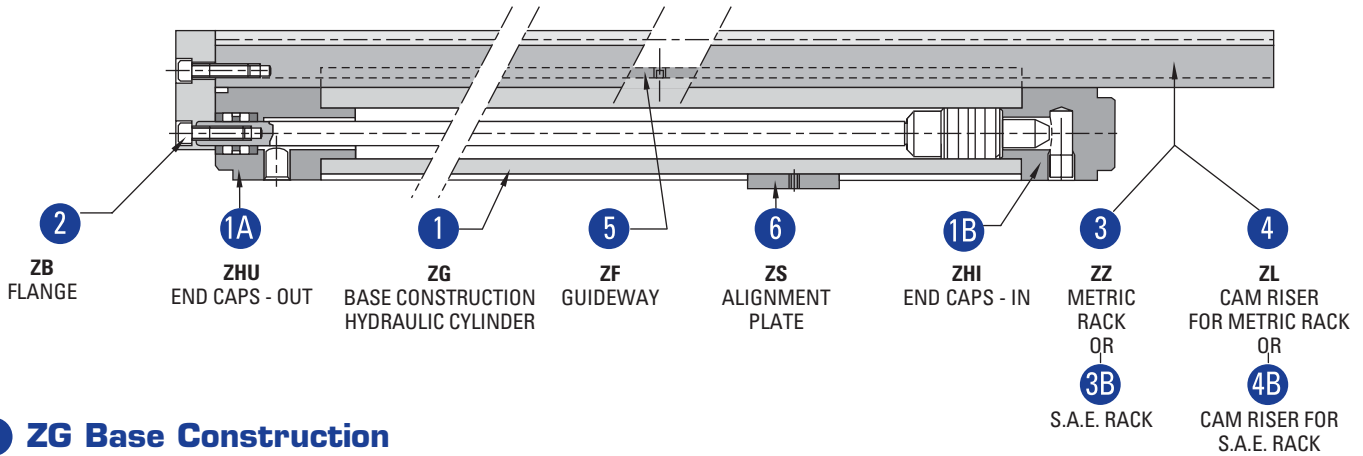


**D-M-E**  
*Every step of the way*

# D-M-E Hydraulic Unscrewing Device

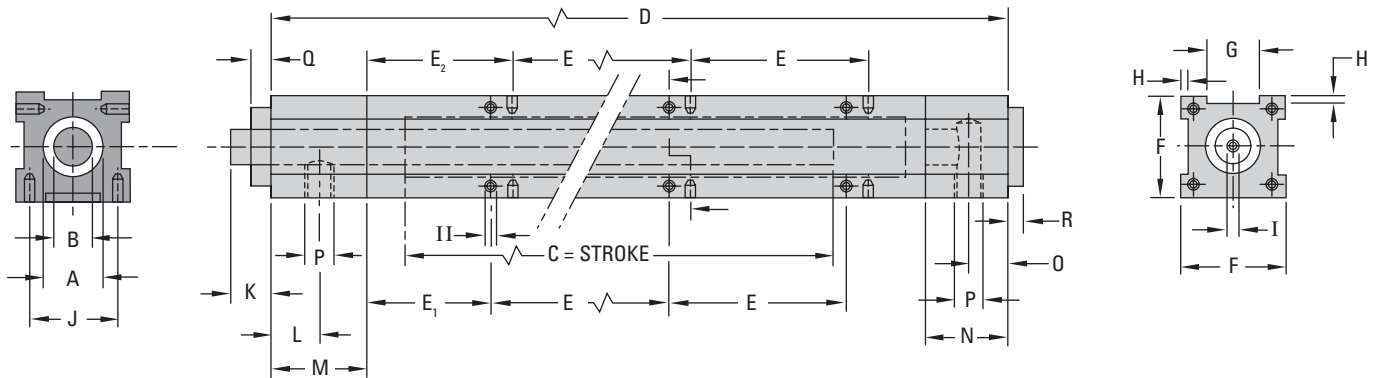
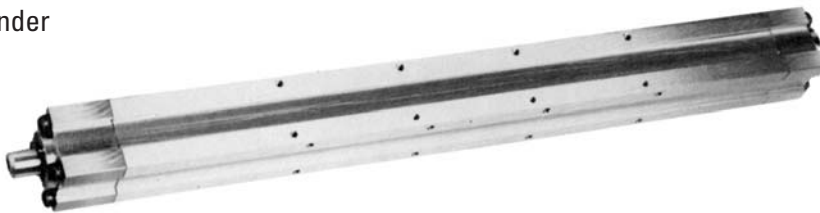


**NOTE:**  
End caps 1A and 1B,  
Internal Seals ZD, and NPT Pipe  
Thread Adapters are included  
in Base Construction.



## 1 ZG Base Construction

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	Ø1.984	Ø0.630	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	Ø1.575	Ø0.866	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	Ø2.480	Ø1.417	15.748	21.890	3x3.150	4.488	4.882															
ZG-63-500			19.685	25.827	5x3.150	3.307	3.701	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	

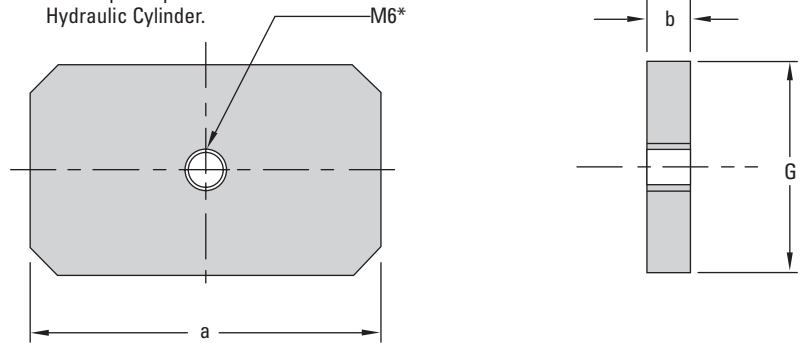
NOTE: "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

## 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 ZS Alignment Plate

**NOTE:**  
Two required per Hydraulic Cylinder.

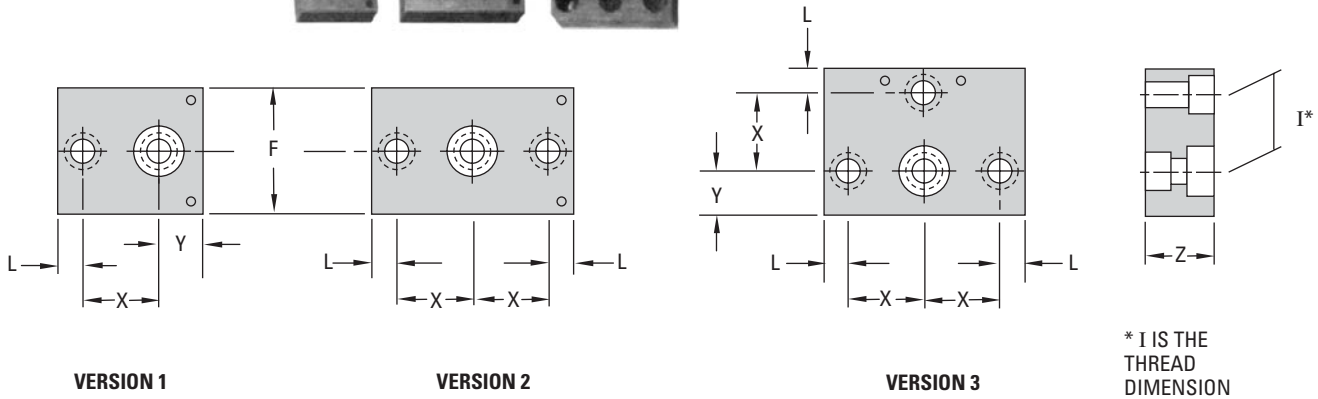


ITEM NO	A	G	a	b
ZS-25	Ø.984	.787	1.575	.236
ZS-40	Ø1.575	1.181	1.969	.236
ZS-63	Ø2.480	1.969	3.150	.591

\*M6 Metric socket head screw included.

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

## 2 ZB Flange



\* I IS THE THREAD DIMENSION

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

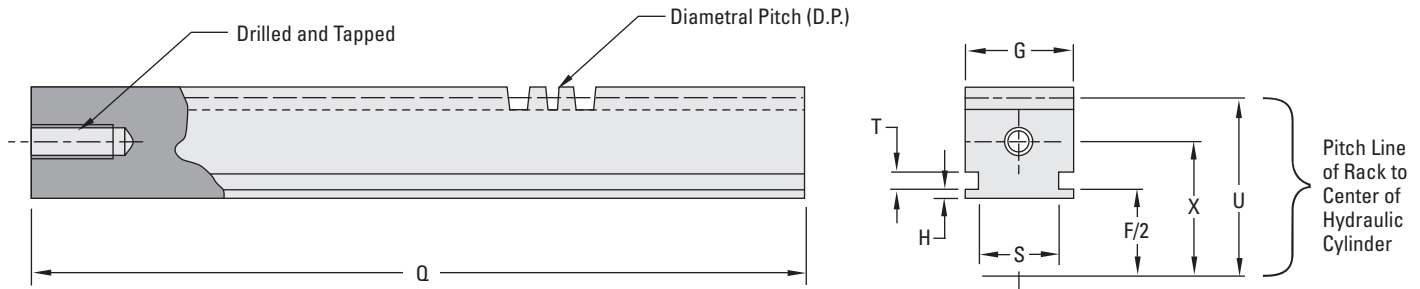
\*Metric socket head cap screws included with Flange (see I).

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

# D-M-E Hydraulic Unscrewing Device

## 3B ZZ S.A.E. Rack

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

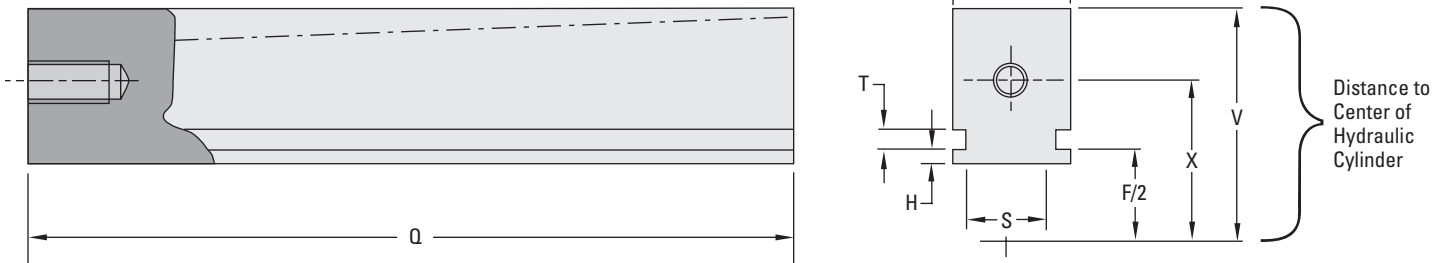
**NOTE:** "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

## 4B ZL CAM Riser

(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

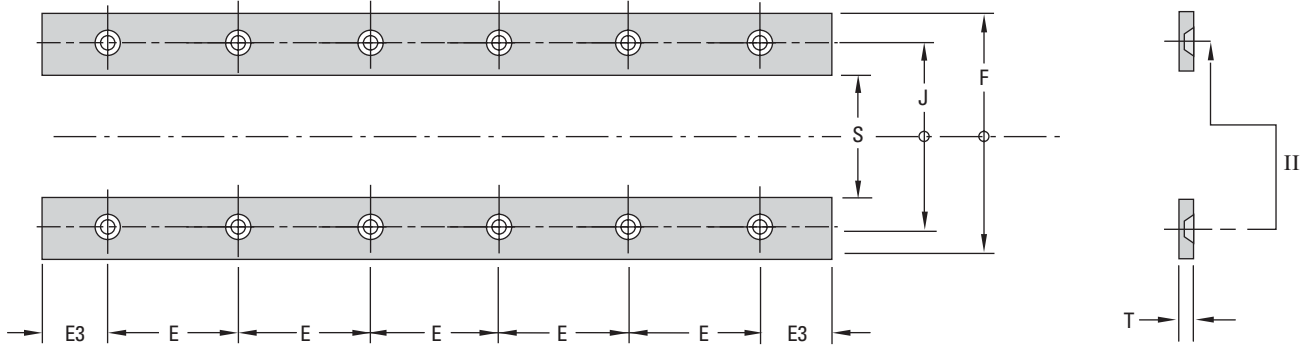
**NOTE:** "A" is the bore size of the ZG Base Construction Hydraulic Cylinder.

## 5 ZF Guideway



**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).

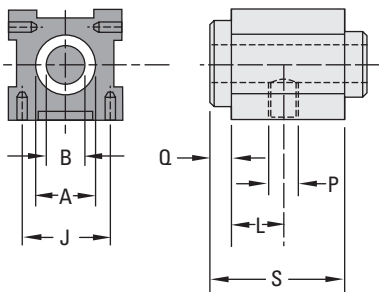


ITEM NO	A	C	E	E3	F	J	S	T	Metric II
ZF0001	Ø.984	19.685	5x3.150	2.599	1.811	1.339	.551	.188	SM 5x.80x10
ZF0001	Ø1.575	19.685	5x3.150	2.599	2.205	1.732	.945	.188	SM 5x.80x10
ZF0002	Ø2.480	19.685	5x3.150	1.913	3.780	2.756	1.654	.250	SM 8x1.25x16

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

### MAINTENANCE REPLACEMENT PARTS ONLY

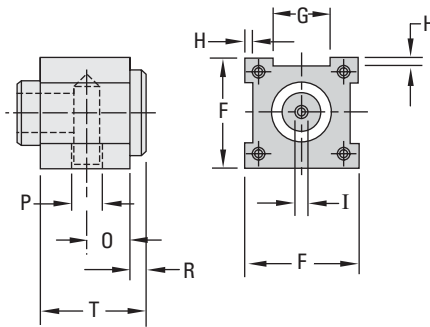
#### 1A ZHU End Caps - out



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

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

#### 1B ZHI End Caps - in



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

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

**NOTE:** All other dimensions in inches unless otherwise specified.

#### ZD Seals - Kit



ITEM NO
ZD-25
ZD-40
ZD-63

#### Pipe Thread Adapters

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

# D-M-E Hydraulic Unscrewing Device

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

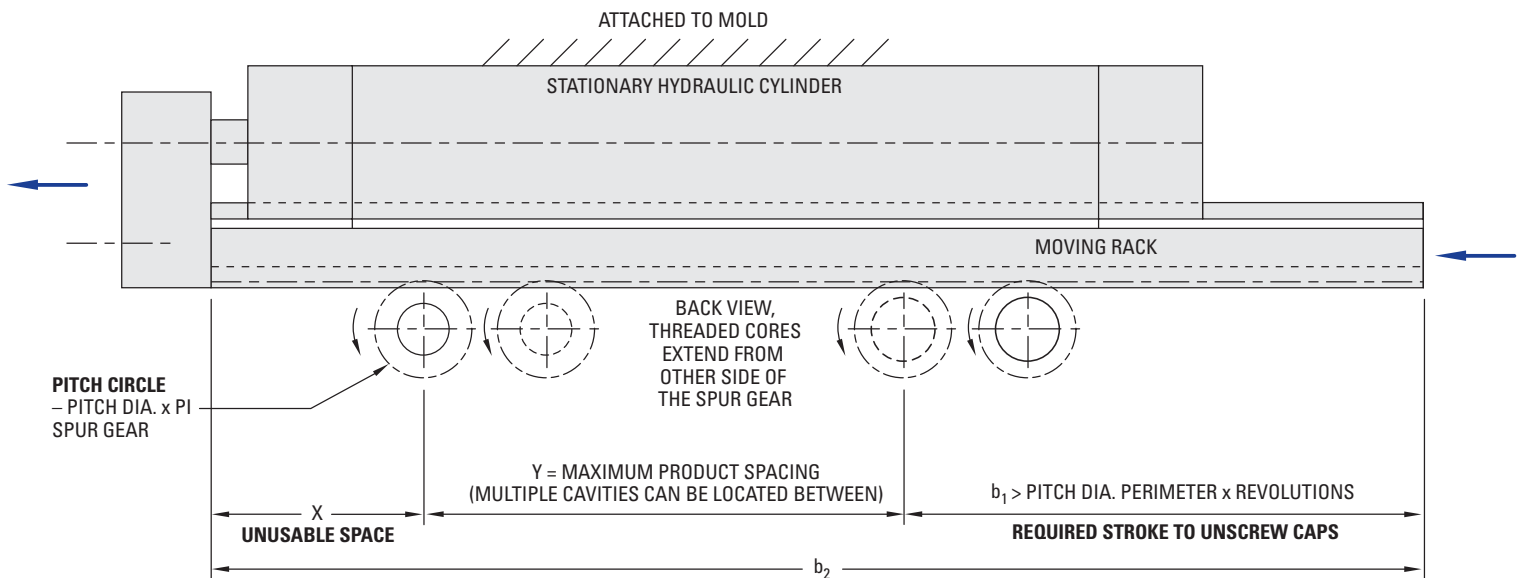
= Gear Pitch Diameter  $\times \pi \times$  Required Revolutions  
 If required stroke is too long, a cogwheel transmission should be used.

### 2. Length of Rack

$$b_2 = x + y + b_1$$

### c) Stripper stroke (Inches)

= Cylinder Stroke – Required Rack Stroke



## B. Control Cam Calculation

### d) Moving Cam ( $\alpha$ )

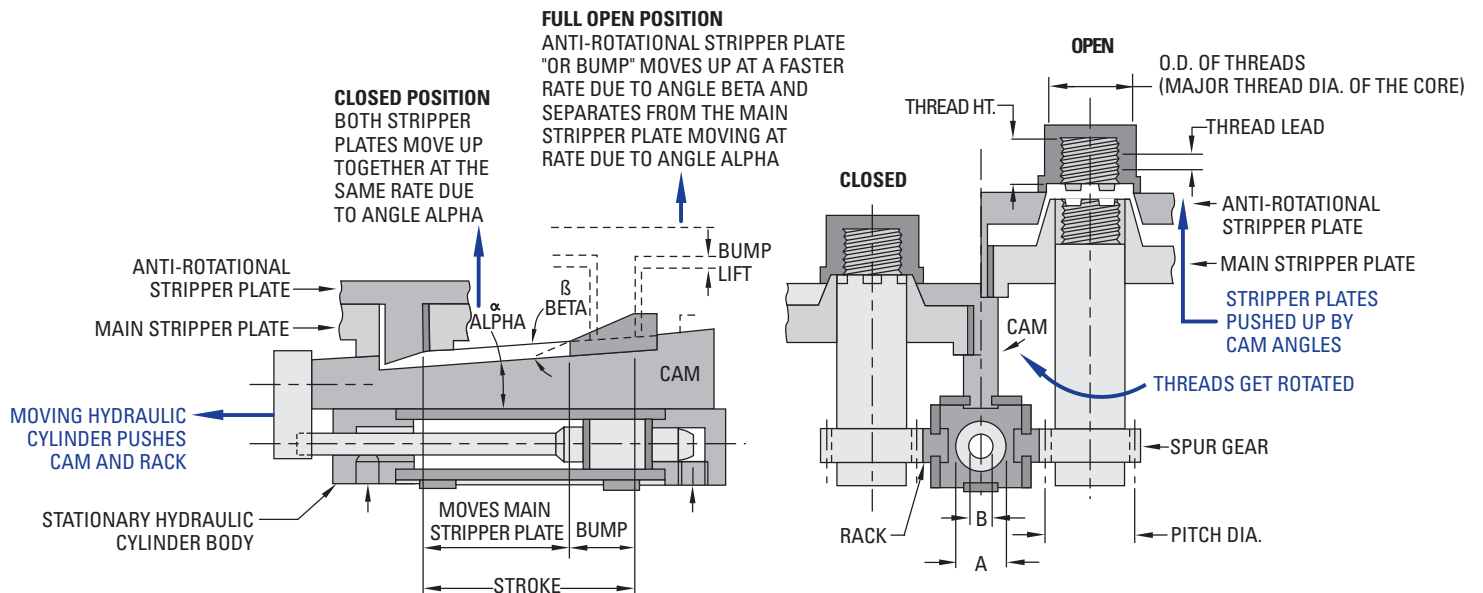
**NOTE:** Moves Main Stripper Plate in sync. with unscrewing thread.

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

### e) Stripper Cam ( $\beta$ )

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

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



# D-M-E Hydraulic Unscrewing Device

## 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 in<sup>2</sup>, 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  $\pi$  x thread height x 2

### h) Unscrewing torque (in-lb<sub>f</sub>)

= Residual Press. x Effective core surface area x major thread radius of core

### i) Unscrewing force rack (lb<sub>f</sub>)

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

### k) Hydraulic force (lb<sub>f</sub>)

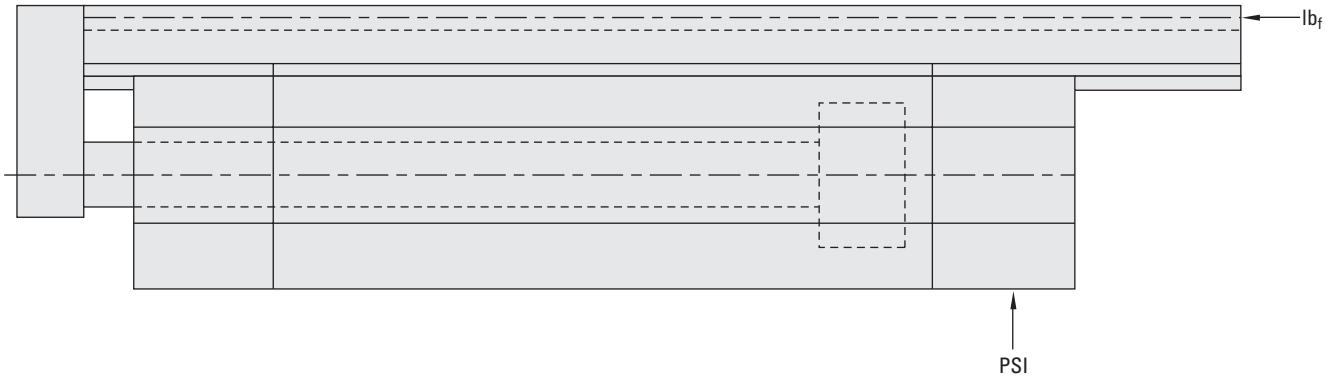
**NOTE:** x 1.5 is 50% Safety Factor, if x 1.0 there would be no safety factor.

= Unscrewing Force x 1.5

## Working Cylinder Stroke

Unscrewing force available at different hydraulic pressures (PSI)

### Working Stroke



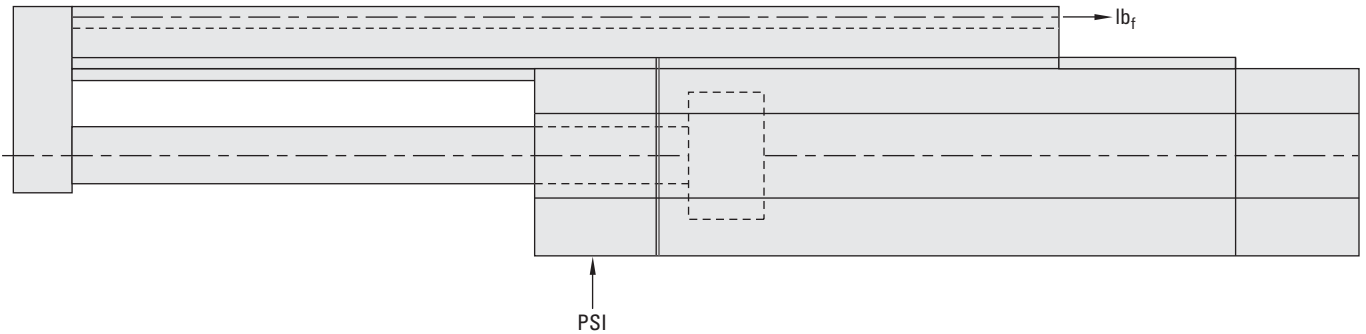
A (piston)	B (shaft)	1,160 PSI	1,450 PSI	1,740 PSI	2,030 PSI	2,175 PSI
Ø.984"	Ø.630"	887 lb <sub>f</sub>	1,102 lb <sub>f</sub>	1,326 lb <sub>f</sub>	1,529 lb <sub>f</sub>	1,664 lb <sub>f</sub>
Ø1.575"	Ø.866"	2,248 lb <sub>f</sub>	2,810 lb <sub>f</sub>	3,395 lb <sub>f</sub>	3,957 lb <sub>f</sub>	4,204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

**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 <sub>f</sub>	652 lb <sub>f</sub>	787 lb <sub>f</sub>	922 lb <sub>f</sub>	989 lb <sub>f</sub>
Ø1.575"	Ø.866"	1,574 lb <sub>f</sub>	1,978 lb <sub>f</sub>	2,361 lb <sub>f</sub>	2,743 lb <sub>f</sub>	2,967 lb <sub>f</sub>
Ø2.480"	Ø1.417"	3,777 lb <sub>f</sub>	4,721 lb <sub>f</sub>	5,665 lb <sub>f</sub>	6,587 lb <sub>f</sub>	7,081 lb <sub>f</sub>

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

# D-M-E Hydraulic Unscrewing Device

## 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-yyy	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-yyy	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-yyy	4	Guideways for Racks

#### Application D

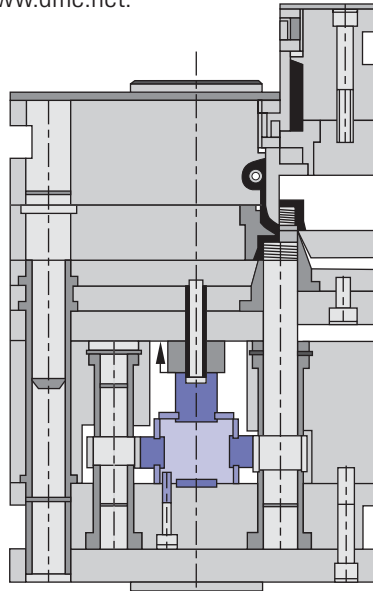
Item No.	Qty.	Description
ZG-xx-yyy	1	Hydraulic Cylinder
ZS-xx	2	Alignment Plate
ZB-xx-y	1	Flange-Version 2
ZZ-xx-yy	1	Cam Riser
ZF-yyy	2	Guideways for Cam

#### NOTE:

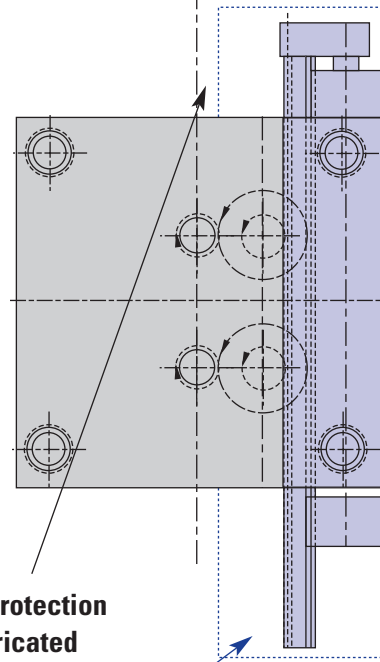
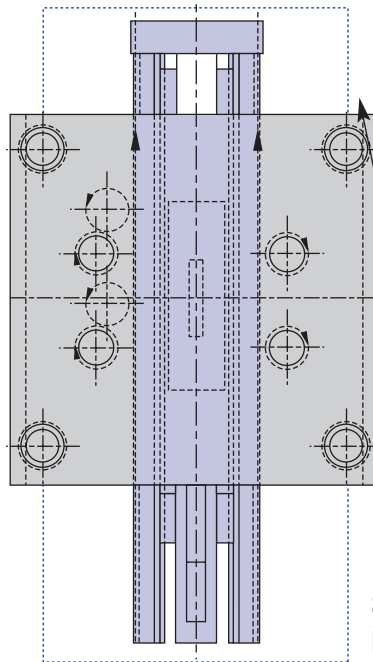
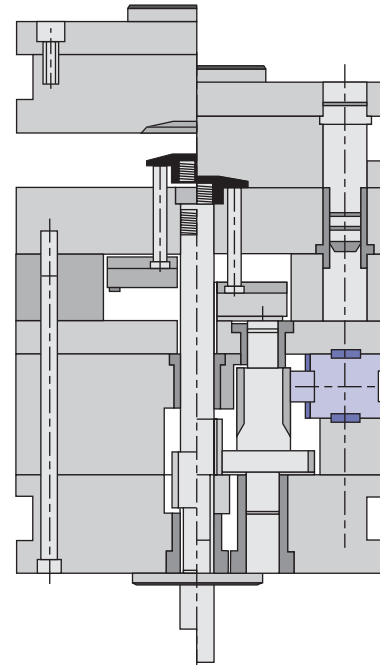
Moldmaker should provide limit switches for fully closed and for cylinder extended. Full cylinder extension should be avoided to improve internal cylinder seal life.

## Application A Without guiding thread thread with cam

A complete Engineering Design Guide is available for this application at [www.dme.net](http://www.dme.net).

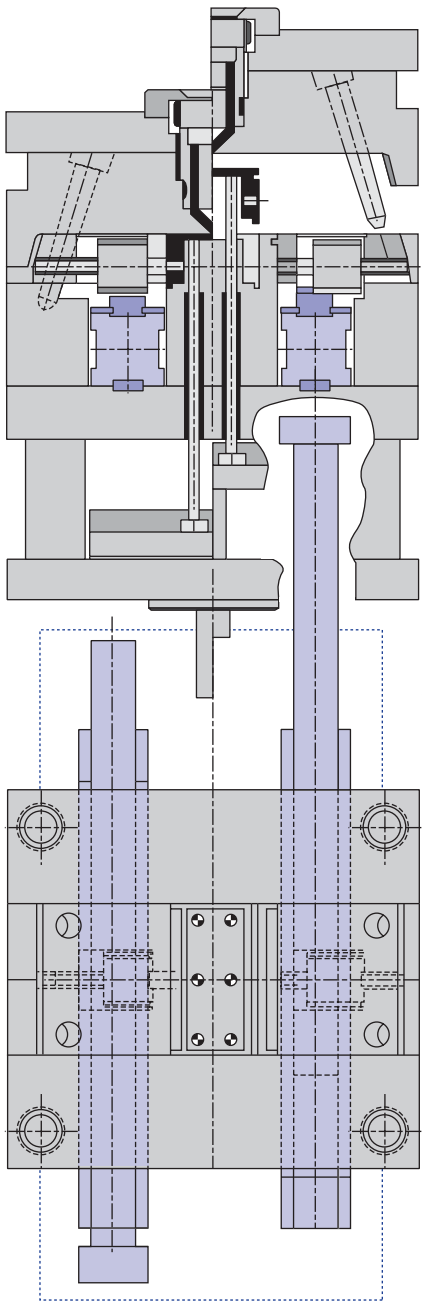


## Application B With guiding thread

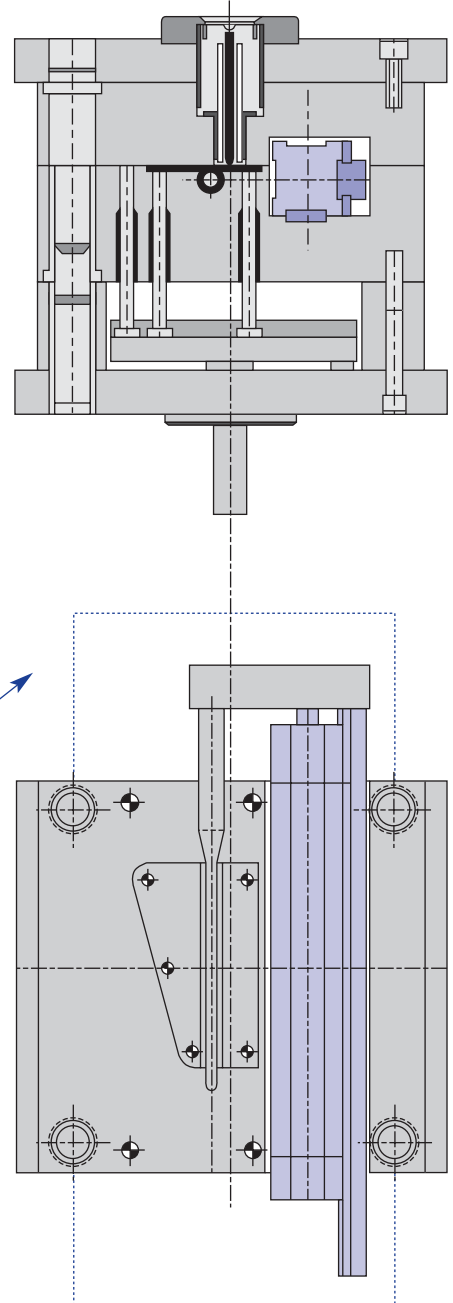


**Safety Protection Box fabricated by moldmaker completely covers full movement of Unscrewing Device.**

### 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.

**World Headquarters**

**D-M-E Company**

29111 Stephenson Highway  
Madison Heights, MI 48071  
800-626-6653 *toll-free tel*  
248-398-6000 *tel*  
888-808-4363 *toll-free fax*  
www.dme.net *web*  
appl\_eng@dme.net *e-mail*

**D-M-E of Canada, Ltd.**

6210 Northwest Drive  
Mississauga, Ontario  
Canada L4V 1J6  
800-387-6600 *toll-free tel*  
905-677-6370 *tel*  
800-461-9965 *toll-free fax*  
dme\_canada@dme.net *e-mail*

**D-M-E Europe C.V.B.A.**

Industriepark Noord  
B-2800 Mechelen  
Belgium  
32-15-215011 *tel*  
32-15-218235 *fax*  
sales@dmeeu.com *e-mail*



*Every step of the way*