



# *Mobile Cylinders*

*Product Information, Quick Reference  
Data & Application Guide*

*Catalog HY18-0001/US Rev B 07/01/04*



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Cylinders were among the first hydraulic products of Commercial Hydraulics beginning in 1928. In 2000 Commercial Intertech Corp. merged with the Parker Hannifin Corp. Today, the Parker Mobile Cylinder Division is recognized as one of the largest independent manufacturers of hydraulic cylinders for mobile equipment and a leading supplier to refuse, mining, truck, material handling and positioning markets. Parker's Mobile Cylinder Division products include double- and single-acting telescopic cylinders, rod cylinders and "smart cylinders" with internal electronic controls.

Additionally, the company enjoys a reputation for quality custom built cylinders that demonstrate engineering know how and adept manufacturing. Cylinders represent a significant portion of the company's Hydraulic Systems sales - their contribution has resulted in significant capital expenditures geared to establish Parker's Mobile Cylinder Division as the world's leading manufacturer of hydraulic cylinders.

## **About our Quick Reference and Application Guide . . .**

It's our goal to provide our customers with the highest quality cylinders. If the need arises for a cylinder not listed in this guide, please furnish us the following information and we'll do our best to provide a new or replacement.

- \* **OEM identification number**
  - \* **Single- or double-acting type**
  - \* **Outside diameter of the largest moving stage or rod and bore diameters**
  - \* **Number of moving stages**
  - \* **Application**
  - \* **Retract or closed length**
  - \* **Stroke length**
  - \* **Extend or open length**
  - \* **Pineye sizes**
  - \* **Plunger mount type**
  - \* **Base mount type**
- Please refer to the cylinder specification data forms for more information.**

Parker's Mobile Cylinder Division has complete manufacturing facilities to fill all your cylinder needs from 1 piece to 1000 pieces. If you're looking for a prototype, a special cylinder, or a production run, Parker's Mobile Cylinder Division is the place to call.

Parker Hannifin Corp.  
Mobile Cylinder Div.  
P.O. Box 239  
Youngstown, OH 44501-0239

Phone: 800-848-5575  
Fax: 800-694-3392  
E-mail: [mcdsales@parker.com](mailto:mcdsales@parker.com)  
[www.parker.com](http://www.parker.com)

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**MOBILE CYLINDER DIVISION  
PRODUCTS & CAPABILITIES**

- **TELESCOPIC CYLINDERS**  
Single Acting  
Double Acting
- **SINGLE STAGE “Rod Type” CYLINDERS**  
Single Acting  
Double Acting
- **BUILD TO CUSTOMER PRINTS OR PER APPLICATION SPECIFICATIONS**
- **BORE SIZES UP TO 20” DIAMETER**
- **STROKE LENGTHS UP TO 500”**
- **OPERATING PRESSURES UP TO 10,000 PSI**
- **VARIOUS OPERATING FLUIDS**
- **BATCH SIZES 1PC TO 100’s**
- **VARIOUS MATERIALS & COATINGS**  
Stainless Steel  
Electroless Nickel  
Nitriding  
Chrome  
Double Chrome
- **TYPICAL OPTIONS**  
Load Holding Valves  
Electro-Hydraulic Transducers  
End of Stroke Hydraulic Cushions  
Protective Rod Boots  
Proximity Switches  
Flow Controls  
Flow Fuses

## Hydraulic Cylinder Model Number Coding

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The code and model numbers of a Parker Mobile (Commercial) Cylinder are references to its size and type. Using these numbers when ordering or inquiring greatly facilitates accurate understanding.

The following are examples of Parker Mobile Cylinder code and model numbers.

Single-acting Telescopic  
**S63MB-9-120**  
① ② ③ ④ ⑤ ⑥ ⑦

Double-acting Telescopic  
**SD96CC-3-199**  
① ② ③ ④ ⑤ ⑥ ⑦

Double-acting Piston Rod  
**D72LB-11-83**  
① ② ④ ⑤ ⑥ ⑦

- S = Single-acting Telescopic or Displacement Cylinder**  
(Commercial has also used SA, SF, and H as a prefix)  
**SD = Double-acting Telescopic Cylinder**  
**D = Double-acting Piston Rod Cylinder**
- = Nominal O.D. of the largest moving stage on Single-acting and Double-acting Telescopic cylinders or the Nominal Bore of Double-acting Piston Rod Cylinders**
- = Number of moving stages or sleeves in a Telescopic Cylinder**
- = Mounting option on the body or base end of cylinder**  
(See mounting Option and Code Chart for mount descriptions)
- = Mounting option on the rod or plunger end of cylinder**  
(See mounting Option and Code Chart for mount descriptions)
- = Modification or design variation of the cylinder**
- = Length of cylinder stroke in inches**

### OUR DESIGN ADVANTAGES INCLUDE:

- \* Longer sleeve overlap for improved stability and higher column loading.
- \* Nylon tipped set screws that conform to the shape of the packing nut threads. It is nearly impossible for the packing nut to back off accidentally.
- \* Snap-on, glass-filled bearings that absorb contaminants without damaging cylinder walls.
- \* Threaded steel stop rings for easier servicing and more reliable stopping action.
- \* External packing nuts give added support to the tube exterior while making service procedures easier.
- \* Wave springs and chevron packing for self-compensating seals.
- \* Hytrel rod wipers that resist higher temperatures without extrusion.
- \* Positive manual air bleeder prevents cavitation and "mushy" cylinder action.
- \* Cast steel mountings offer dependable strength. Pin-eye and rod-end are welded into a single unit.



## ***Hydraulic Cylinder Load & Displacements***

### **“ S ” SERIES SINGLE-ACTING, SINGLE & MULTIPLE STAGE CYLINDERS**

Sleeve or Plunger O.D. (in inches)	Effective Area in square inches	Load Capacity lbs @ 2000 p.s.i.	Displacement per inch of stroke in gallons *
1.75"	2.41"	4,811	0.010
2.75"	5.94"	11,880	0.026
3.75"	11.04"	22,089	0.048
4.75"	17.72"	35,441	0.077
5.75"	25.97"	51,935	0.112
6.75"	35.78"	71,570	0.155
7.90"	49.02"	98,034	0.212
9.38"	69.03"	138,059	0.299
10.75"	90.76"	181,526	0.393
12.50"	122.72"	245,438	0.531
14.00"	153.94"	307,877	0.666

### **“ SD ” SERIES DOUBLE-ACTING, MULTIPLE STAGE CYLINDER**

Sleeve or Plunger O.D. (in inches)	Bore of Main or Sleeve (in inches)	Effective area (sq. inches) to extend	Effective area (sq. inches) to retract	Load capacity lbs @ 2000 p.s.i. extending	Load capacity lbs @ 2000 p.s.i. retracting	Displacement per inch of stroke (in gallons)* to extend	Displacement per inch of stroke (in gallons)* to retract
1.75"	2.25"	3.98"	1.57"	7,952	3,142	0.017	0.007
2.75"	3.25"	8.29"	2.35"	16,592	4,712	0.036	0.010
3.75"	4.25"	14.18"	3.14"	28,372	6,283	0.061	0.014
4.75"	5.25"	21.64"	3.92"	43,296	7,854	0.094	0.017
5.75"	6.25"	30.68"	4.71"	61,360	9,426	0.133	0.020
6.75"	7.25"	41.28"	5.49"	82,564	10,994	0.179	0.024
7.90"	8.44"	55.68"	6.97"	111,360	13,946	0.242	0.030
9.38"	9.88"	76.59"	7.56"	153,180	15,120	0.332	0.033
10.75"	11.50"	103.87"	13.11"	207,738	26,213	0.450	0.057
12.50"	13.00"	132.73"	10.01"	265,465	20,028	0.575	0.043
14.00"	14.50"	165.13"	11.19"	330,261	22,384	0.715	0.048

**Note: The Effective area to RETRACT a Standard “SD” series double acting multiple stage cylinder is the effective area of the PLUNGER (plunger bore area minus the plunger O.D. area).**

Example: Retract force for a SD94CC-8-190 (which has 5.75” O.D. plunger and fits in 6.25” bore) would be 9,426 lbs @ 2,000 psi, based on a 4.71 sq. in. effective area.

**To calculate effective area in square inches:** Multiply diameter times diameter times .78

Example: 5 dia. x 5 dia. = 25 x .78 = 19.63 Square inches of area

**To calculate load capacity / cylinder force:** Multiply effective area times operating pressure (psi)

Example: 19.63 Square inches x 1750 P.S.I = 34,361 lbs of force

**To calculate the required gallons of fluid to extend a cylinder:**

Add each “Displacement per inch of stroke” (from chart) for the required sleeve sizes.

Divide this total by the number of moving sleeves, then multiply that total by the desired cylinder stroke.

**Note: The “Gallons required to extend” does not include the necessary fluid to fill an empty cylinder.**

Example: Required fluid to extend a S83DC-40-134 single-acting telescopic cylinder with following stage sizes:

5.75" O.D.= .112

6.75" O.D.= .155

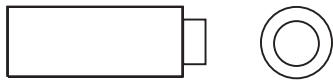
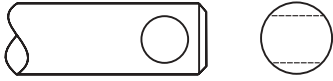



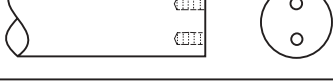
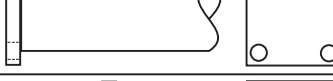

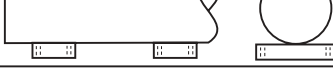



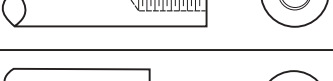

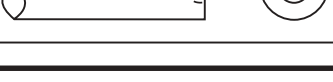
7.90" O.D.= .210

.477

.447 ÷ 3 = .159 gallons per inch of stroke

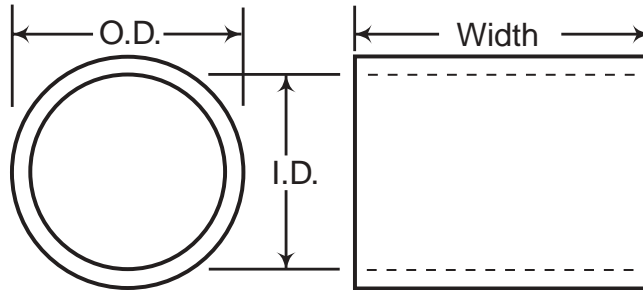
.159 gallons per inch x 134" of stroke = 21.31 gallons to extend cylinder

**Mounting Options and Code Chart**

<b>Code Letter</b>	<b>Mount Description</b>	<b>Mount Sketch</b>	<b>Mount Location</b>
<b>A</b>	<b>Plain No Mount</b>		<b>Body or Rod</b>
<b>B</b>	<b>Pin-Eye Drilled Thru Rod</b>		<b>Rod</b>
<b>C</b>	<b>Pin-Eye Drilled Thru Lug</b>		<b>Body or Rod</b>
<b>D</b>	<b>Cross Tube</b>		<b>Body or Rod</b>
<b>E</b>	<b>Threaded</b>		<b>Body or Rod</b>
<b>F</b>	<b>Drilled and Tapped</b>		<b>Body or Rod</b>
<b>G</b>	<b>Flange Mount at Base</b>		<b>Body</b>
<b>H</b>	<b>Flange Mount Mid-Body</b>		<b>Body</b>
<b>J</b>	<b>Foot / Pad Mount</b>		<b>Body</b>
<b>K</b>	<b>Centerline Mount</b>		<b>Body</b>
<b>L</b>	<b>Double Lug Clevis Mount</b>		<b>Body or Rod</b>
<b>M</b>	<b>Trunnion Mount</b>		<b>Body</b>
<b>N</b>	<b>Rod End Drilled and Tapped</b>		<b>Rod</b>
<b>O</b>	<b>Ball Mount</b>		<b>Body or Rod</b>
<b>P</b>	<b>Socket Mount</b>		<b>Body or Rod</b>

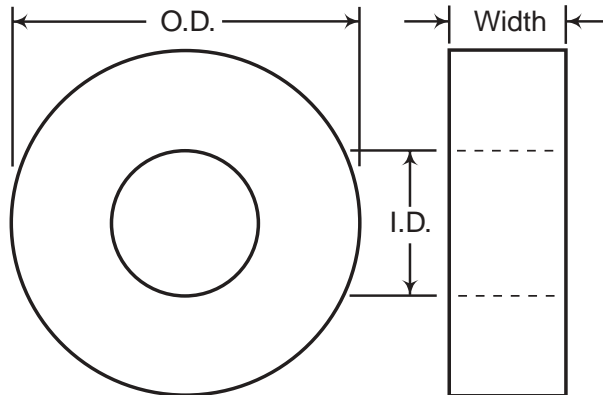


**Accessories to Modify Cylinder Mounting Pin Hole Diameters and Mount Widths**



**Pin - Eye Mount Bushings**

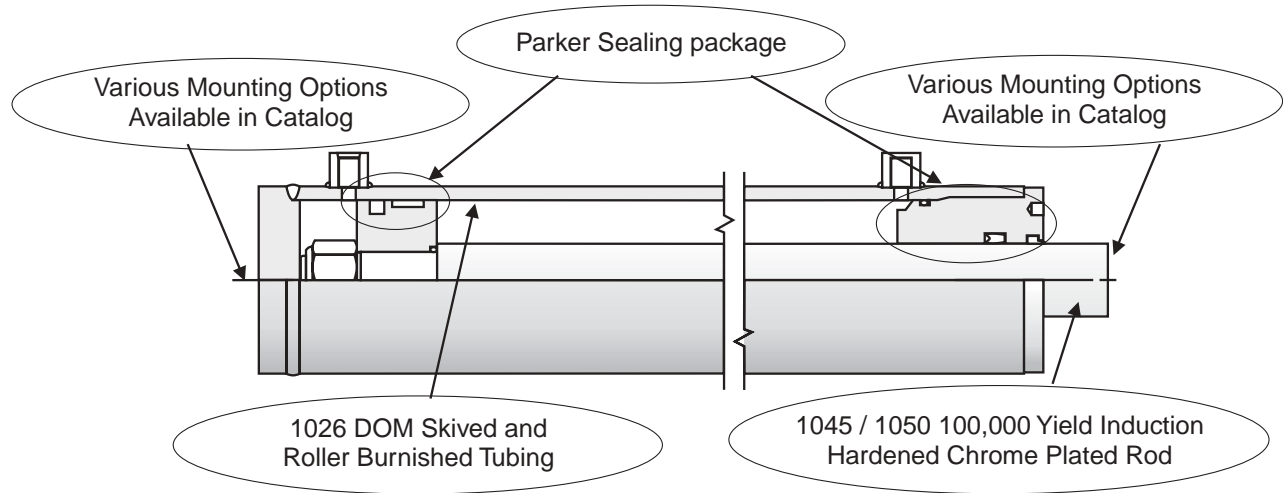
Engineering #	Part Number	Nominal Dimensions
CC1519-1-1.5	375-1519-556	1.50 I.D. X 2.00 O.D. X 1.50 Wide
CC1519-1-2.0	375-1519-557	1.50 I.D. X 2.00 O.D. X 2.00 Wide
CC1519-2-1.5	375-1519-558	1.75 I.D. X 2.00 O.D. X 1.50 Wide
CC1519-2-2.0	375-1519-559	1.75 I.D. X 2.00 O.D. X 2.00 Wide
CC1519-3-2.0	375-1519-560	1.31 I.D. X 2.00 O.D. X 2.00 Wide
CC1519-4-2.0	375-1519-561	1.68 I.D. X 2.00 O.D. X 2.00 Wide



**Pin - Eye Mount Spacers**

Engineering #	Part Number	Nominal Dimensions
CC1519-5-0.25	375-1519-562	1.81 I.D. X 3.00 O.D. X 0.25 Wide
CC1519-5-0.50	375-1519-563	1.81 I.D. X 3.00 O.D. X 0.50 Wide
CC1519-5-1.0	375-1519-564	1.81 I.D. X 3.00 O.D. X 1.00 Wide
CC1519-5-0.75	375-1519-565	1.81 I.D. X 3.00 O.D. X 0.75 Wide
CC1519-6-0.25	375-1519-566	2.12 I.D. X 3.00 O.D. X 0.25 Wide
CC1519-6-0.50	375-1519-567	2.12 I.D. X 3.00 O.D. X 0.50 Wide
CC1519-6-1.0	375-1519-568	2.12 I.D. X 3.00 O.D. X 1.00 Wide
CC1519-6-0.75	375-1519-569	2.12 I.D. X 3.00 O.D. X 0.75 Wide

## Welded Medium Duty (WMD) Series



(2500 psi)

## WHD Series

### FEATURES

#### Parker Sealing Technology:

##### Parker OD Sealing Wiper:

Additional outside diameter lip that prevents contaminants from entering the system by bypassing the OD of the wiper body.

##### Parker BTU Rod Seal:

Superior seal increasing the conformity of the seal to the rod. Second lip on the seal improves the stability, thus helps limit the rocking motion of the seal reducing seepage.

##### Piston:

Includes wear ring and bronze filled teflon seal. Bronze filled teflon seals designed for extrusion free, leak proof service and longer cylinder life.

##### Rod:

1045/1050 chrome plated, induction hardened, 100K yield providing more resistance to rod and seal damage.

##### Main Barrel:

1026 DOM cylinder tube bores are skived and roller burnished to provide precision finishes for extended seal life.

##### Paint:

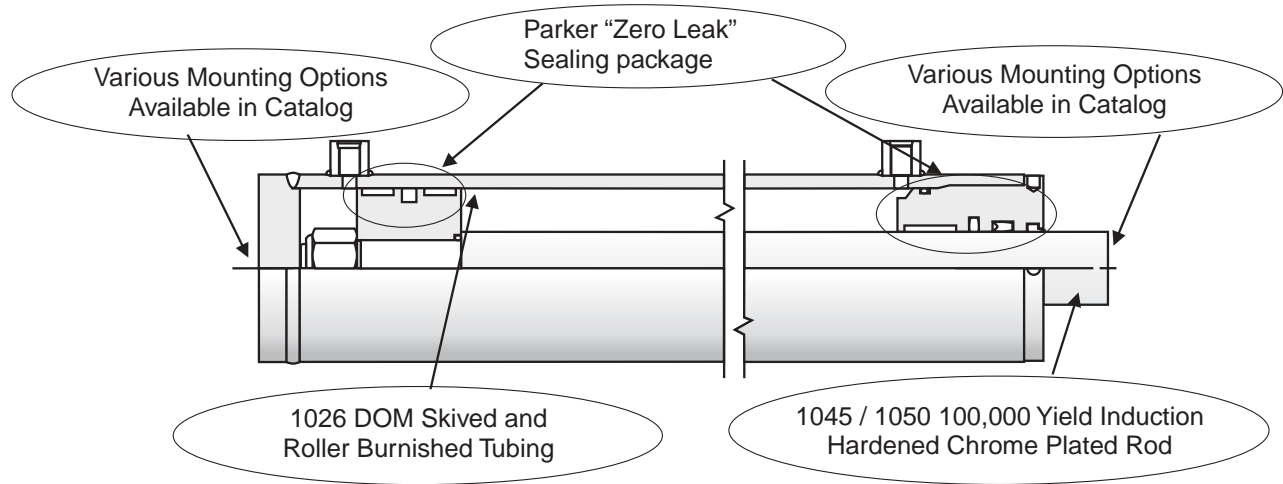
Flat grey prime

### BENEFITS

- ◆ Benefit of **“Custom Design”** options creating a highly engineered quality cylinder configurable to provide **“Quick Delivery.”**
- ◆ Configurable menu provides:
  - ◆ Same day assembly drawings
  - ◆ Same day pricing
- ◆ Bill of materials and manufacturing processes to support **1-2 wk. LeadTime**
- ◆ Standard tube and rod sizes; components; & seal kits provide consistent quality and standardization to assist in service needs (same day delivery)
- ◆ Standard build product line cylinders will be manufactured at Parker’s ISO certified Blaine, MN. manufacturing facility utilizing state of the art equipment and lean enterprise system.

Please refer to **Catalog HY18-0014/US** for more information.

## Welded Heavy Duty (WHD) Series



(3000 psi)

## WHD Series

### FEATURES

#### Parker "Zero Leak" Sealing Technology:

##### Parker OD Sealing Wiper:

##### Parker BTU Rod Seal:

##### Parker BR Buffer Ring:

##### Piston:

##### Rod:

##### Main Barrel:

##### Paint:

### BENEFITS

Additional outside diameter lip that prevents contaminants from entering the system by bypassing the OD of the wiper body.

Superior seal increasing the conformity of the seal to the rod. Second lip on the seal improves the stability, thus helps limit the rocking motion of the seal reducing seepage.

Buffer ring acts as a primary seal and pressure spike suppressor. The BTU rod seal in combination with the buffer ring results in longer life with an exceptionally dry rod.

Includes 2 wear rings and bronze filled teflon seal. Bronze filled teflon seals designed for extrusion free, leak proof service and longer cylinder life.

1045/1050 chrome plated, induction hardened, 100K yield providing more resistance to damage to the rod and the seal.

1026 DOM cylinder tube bores are skived and roller burnished to provide precision finishes for extended seal life.

Flat grey prime

- ♦ Benefit of "**Custom Design**" options creating a highly engineered quality cylinder configurable to provide "**Quick Delivery**."
- ♦ Configurable menu provides:
  - ♦ Same day assembly drawings
  - ♦ Same day pricing
- ♦ Bill of materials and manufacturing processes to support **1-2 wk. LeadTime**
- ♦ Standard tube and rod sizes; components; & seal kits provide consistent quality and standardization to assist in service needs (same day delivery)
- ♦ Standard build product line cylinders will be manufactured at Parker's ISO certified Blaine, MN. manufacturing facility utilizing state of the art equipment and lean enterprise system.

Please refer to **Catalog HY18-0014/US** for more information.

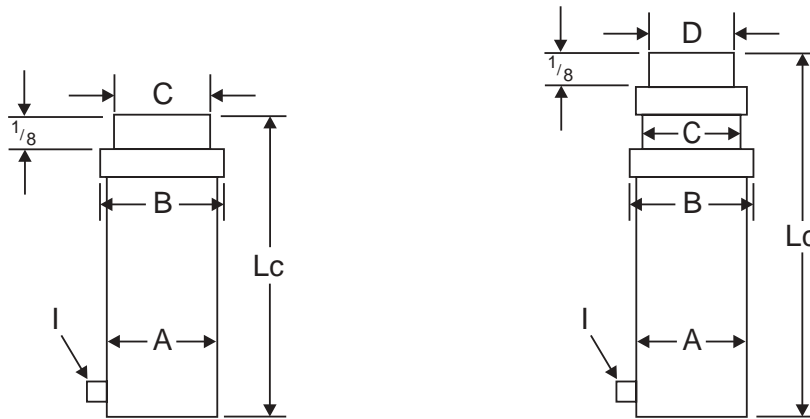
## Closed Length Calculations for Single-Acting Single & Multiple Stage Cylinders

\* Closed length (Lc) for S Models is computed by one of the three equations below. Model number and stroke required determines which equation to use. Example: To find Lc for S41 cylinder with 68" stroke. Under S41 column, use equation III, because the stroke is over 50".

$$L_c = \text{Stroke} + X_1 + X_2 = 68" + 7.50" + \frac{(68 - 50)}{10} = 68" + 7.50" + (1.8)$$

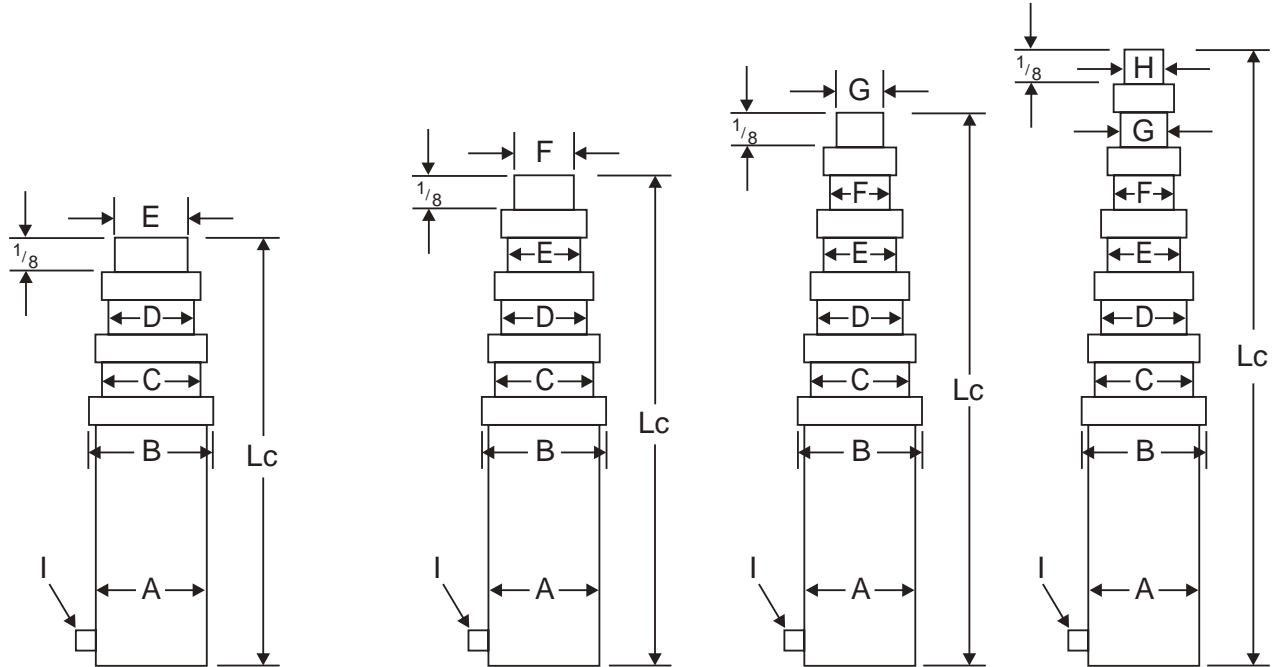
Use next largest whole number. = 68" + 7.50" + 2" = 77.50".

The closed length (Lc) is 77.50". Add Lc 77.50" to the stroke 68" for extended length of 145.50"



	SINGLE STAGE								2 STAGE								
Cylinder Dimensions (inches)		S31	S41	S51	S61	S71	S81	S91		S42	S52	S62	S72	S82	S92		
Main Cylinder O.D.	A	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>		
Largest Packing Nut O.D.	B	4 <sup>3</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>8</sub>	6 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	5 <sup>3</sup> / <sub>8</sub>	6 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>		
1st Sleeve O.D.	C	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>		
2nd Sleeve O.D.	D								D	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>		
3rd Sleeve O.D.	E								E								
4th Sleeve O.D.	F								F								
5th Sleeve O.D.	G								G								
6th Sleeve O.D.	H								H								
NPT Port	I	3 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	1	1	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	I	3 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	1	1	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>		
Max. Stroke at 2000 PSI		71	84	88	95	118	128	190		126	137	138	164	186	265		
*To Find Closed Length - Lc	X	5.75	5.75	5.75	6.00	6.00	6.50	6.62	X	6.69	6.69	6.94	6.94	7.44	7.56		
Equation I	L <sub>c</sub>	Stroke + X up to 35" stroke							O.L. = 1 <sup>1</sup> / <sub>4</sub> "	L <sub>c</sub>	$\frac{\text{Stroke}}{2} + X$ up to 35" stroke						O.L. = 1 <sup>1</sup> / <sub>4</sub> "
Equation II	X <sub>1</sub>	7.50	7.50	7.50	7.75	7.75	8.25	8.38	X <sub>1</sub>	8.44	8.44	8.69	8.69	9.19	9.31		
	L <sub>c</sub>	Stroke + X <sub>1</sub> 36" to 50" stroke							O.L. = 3"	L <sub>c</sub>	$\frac{\text{Stroke}}{2} + X_1$ 36" to 50" stroke						O.L. = 3"
Equation III	X <sub>2</sub>	$\frac{\text{Stroke} - 50}{10}$ (To next largest whole number)								X <sub>2</sub>	$\frac{\text{Stroke} - 50}{20}$ (To next largest whole number)						
	L <sub>c</sub>	Stroke + X <sub>1</sub> + X <sub>2</sub> over 50" stroke							O.L. = 3" + X <sub>2</sub>	L <sub>c</sub>	$\frac{\text{Stroke}}{2} + X_1 + X_2$ over 50" stroke						O.L. = 3" + X <sub>2</sub>

# Closed Length Calculations for Single-Acting Single & Multiple Stage Cylinders



3 STAGE					4 STAGE					5 STAGE				6 STAGE					
	S53	S63	S73	S83	S93		S64	S74	S84	S94		S75	S85	S95		S86	S96		
A	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>		
B	6 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>		
C	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>		
D	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	D	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	D	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	D	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>		
E	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	E	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	E	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	E	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>		
F						F	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	F	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	F	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>		
G						G					G	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	G	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>		
H						H					H				H	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>		
I	3/4	1	1	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	I	1	1	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	I	1	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	I	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>		
	181	186	204	224	312		238	262	265	352		335	336	410		T.B.A.	T.B.A.		
X	7.62	7.88	7.88	8.38	8.50	X	8.81	8.81	9.31	9.44	X	9.75	10.25	10.38	X	11.19	11.31		
L <sub>c</sub>	$\frac{\text{Stroke}}{3} + X$ O.L. = 1 <sup>1</sup> / <sub>4</sub> " up to 50" stroke					L <sub>c</sub>	$\frac{\text{Stroke}}{4} + X$ O.L. = 1 <sup>1</sup> / <sub>4</sub> " up to 70" stroke					L <sub>c</sub>	$\frac{\text{Stroke}}{5} + X$ O.L. = 1 <sup>1</sup> / <sub>4</sub> " up to 85" stroke				L <sub>c</sub>	$\frac{\text{Stroke}}{6} + X$ O.L. = 1 <sup>1</sup> / <sub>4</sub> " up to 100" stroke	
X <sub>1</sub>	9.38	9.62	9.62	10.12	10.25	X <sub>1</sub>	10.56	10.56	11.06	11.19	X <sub>1</sub>	11.50	12.00	12.12	X <sub>1</sub>	12.94	13.06		
L <sub>c</sub>	$\frac{\text{Stroke}}{3} + X_1$ O.L. = 3" 51" to 75" stroke					L <sub>c</sub>	$\frac{\text{Stroke}}{4} + X_1$ O.L. = 3" 71" to 100"					L <sub>c</sub>	$\frac{\text{Stroke}}{5} + X_1$ O.L. = 3" 86" to 125" stroke				L <sub>c</sub>	$\frac{\text{Stroke}}{6} + X_1$ O.L. = 3" 101" to 150" stroke	
X <sub>2</sub>	$\frac{\text{Stroke} - 75}{30}$ (To next largest whole number)					X <sub>2</sub>	$\frac{\text{Stroke} - 100}{40}$ (To next largest whole number)					X <sub>2</sub>	$\frac{\text{Stroke} - 125}{50}$ (To next largest whole number)				X <sub>2</sub>	$\frac{\text{Stroke} - 150}{60}$ (To next largest whole number)	
L <sub>c</sub>	$\frac{\text{Stroke}}{3} + X_1 + X_2$ O.L. = 3" + X <sub>2</sub> over 75" stroke					L <sub>c</sub>	$\frac{\text{Stroke}}{4} + X_1 + X_2$ O.L. = 3" + X <sub>2</sub> over 100" stroke					L <sub>c</sub>	$\frac{\text{Stroke}}{5} + X_1 + X_2$ O.L. = 3" + X <sub>2</sub> over 125" stroke				L <sub>c</sub>	$\frac{\text{Stroke}}{6} + X_1 + X_2$ O.L. = 3" + X <sub>2</sub> over 150" stroke	

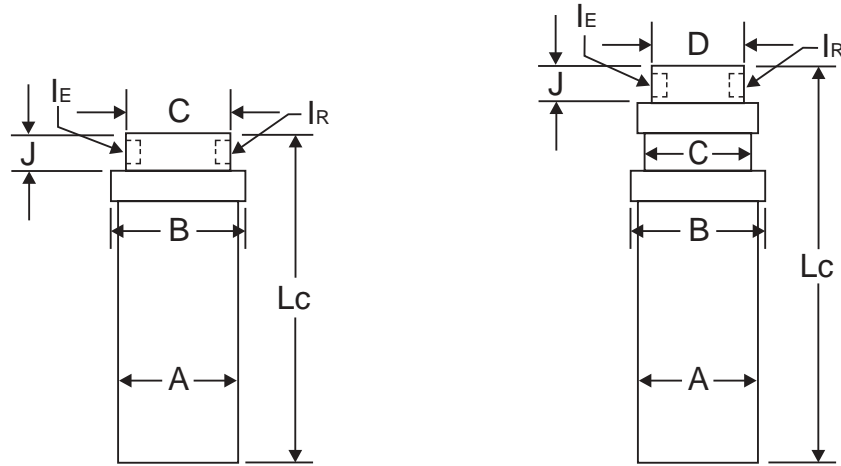
## Closed Length Calculations for Double-Acting Single & Multiple Stage Cylinders

\* Closed length (Lc) for SD Models is computed by one of the three equations below. Model number and stroke required determines which equation to use. Example: To find Lc for SD41 cylinder with 68" stroke. Under SD41 column, use equation III, because the stroke is over 66".

$$L_c = \text{Stroke} + X_1 + X_2 = 68" + 12" + \frac{68 - 50}{4.5} = 68" + 12" + (.666).$$

Use next largest whole number. = 68" + 12" + 1" = 81".

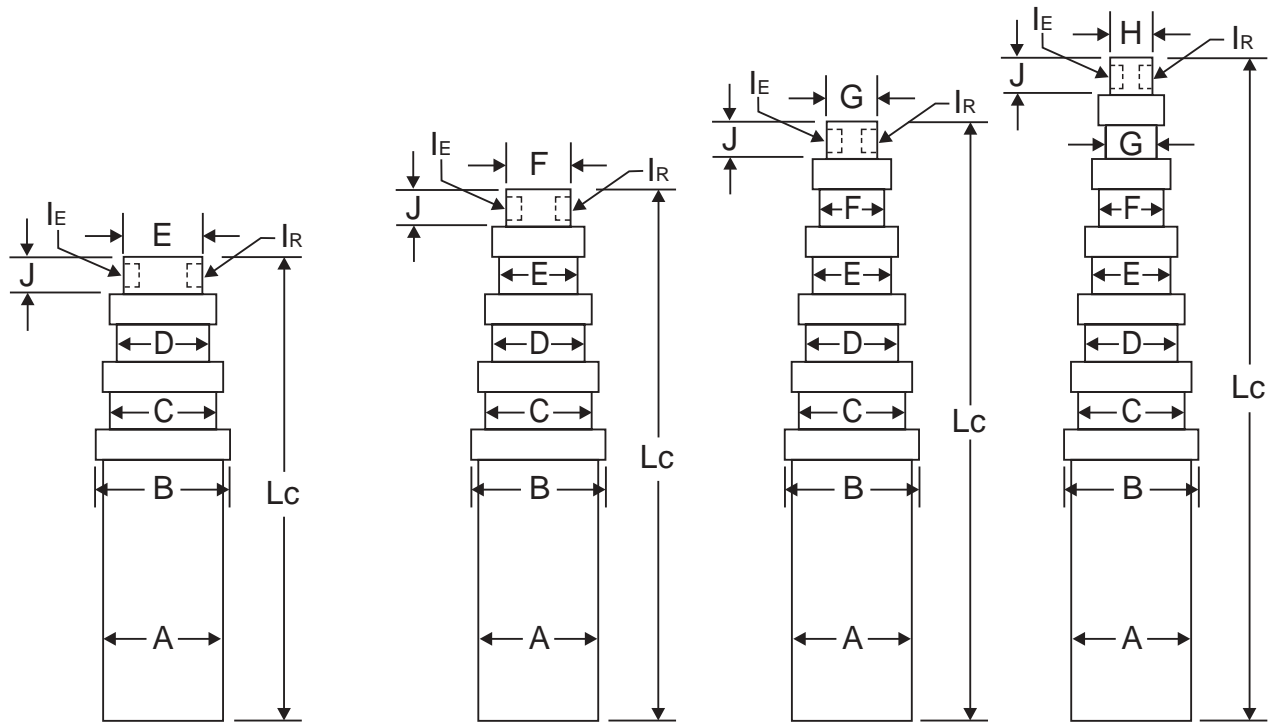
The closed length (Lc) is 81". Add Lc 81" to the stroke 68" for extended length of 149"



Cylinder Dimensions (inches)	SINGLE STAGE								2 STAGE							
		SD31	SD41	SD51	SD61	SD71	SD81	SD91		SD42	SD52	SD62	SD72	SD82	SD92	
Main Cylinder O.D.	A	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	
Largest Packing Nut O.D.	B	4 <sup>3</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>8</sub>	6 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	5 <sup>3</sup> / <sub>8</sub>	6 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	
1st Sleeve O.D.	C	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	
2nd Sleeve O.D.	D								D	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	
3rd Sleeve O.D.	E								E							
4th Sleeve O.D.	F								F							
5th Sleeve O.D.	G								G							
6th Sleeve O.D.	H								H							
NPT Port - Extend	I <sub>E</sub>	3/4	3/4	3/4	1	1	1 1/4	1 1/4	I <sub>E</sub>	3/4	1	1	1 1/4	1 1/4	1 1/4	
NPT Port - Retract	I <sub>R</sub>	1/2	1/2	1/2	3/4	3/4	1	1	I <sub>R</sub>	1/2	3/4	3/4	1	1	1	
Plunger Extension	J	1 5/8	1 5/8	1 5/8	2 1/8	2 1/8	2 5/8	2 5/8	J	1 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	
Max. Recommended Ext. Lgth. at 2000 PSI		131	155	170	186	235	272	386		171	184	199	241	275	390	
Max. Stroke at 2000 PSI		59	70	77	84	106	122	174		100	108	117	142	162	234	
*To Find Closed Length - Lc	X	9.38	9.38	9.38	10.12	10.12	11.12	11.25	X	13.00	13.50	13.75	14.50	14.75	14.88	
Equation I	L <sub>C</sub>	Stroke + X up to 45" stroke O.L. = 3 3/8"								L <sub>C</sub>	Stroke 2 + X up to 95" stroke O.L. = 6"					
Equation II	X <sub>1</sub>	12.00	12.00	12.00	12.75	12.75	13.75	13.88	X <sub>1</sub>	Stroke - 95 6 (To next largest whole number)						
	L <sub>C</sub>	Stroke + X <sub>1</sub> 46" to 65" stroke O.L. = 6"								L <sub>C</sub>	Stroke 2 + X + X <sub>1</sub> 95" stroke to max. O.L. = 6" + X <sub>1</sub>					
Equation III	X <sub>2</sub>	Stroke - 65 4.5 (To next largest whole number)								X <sub>2</sub>	Not Required					
	L <sub>C</sub>	Stroke + X <sub>1</sub> + X <sub>2</sub> 66" stroke to max.								L <sub>C</sub>	Not Required					



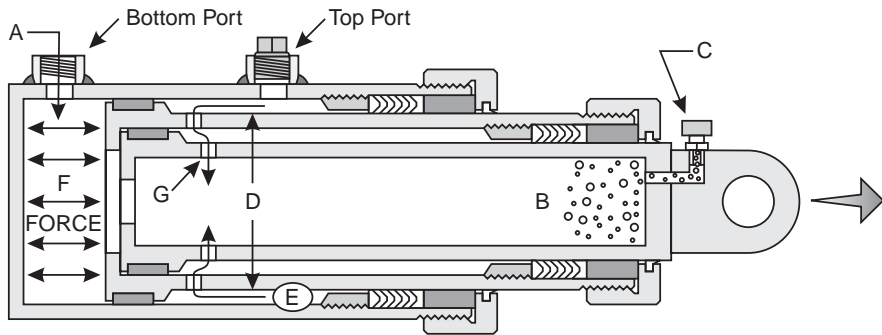
# Closed Length Calculations for Double-Acting Single & Multiple Stage Cylinders



3 STAGE					4 STAGE				5 STAGE			6 STAGE					
	SD53	SD63	SD73	SD83	SD93		SD64	SD74	SD84	SD94		SD75	SD85	SD95		SD86	SD96
A	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	6 <sup>3</sup> / <sub>4</sub>	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	8	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>	A	9 <sup>1</sup> / <sub>8</sub>	10 <sup>13</sup> / <sub>16</sub>
B	6 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	7 <sup>3</sup> / <sub>8</sub>	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	8 <sup>5</sup> / <sub>8</sub>	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	B	9 <sup>7</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>
C	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>	C	7 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>8</sub>
D	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	D	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	D	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>	D	6 <sup>3</sup> / <sub>4</sub>	7 <sup>7</sup> / <sub>8</sub>
E	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	E	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	E	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	E	5 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>
F						F	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	F	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	F	4 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>
G						G					G	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	G	3 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>
H						H					H				H	2 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>4</sub>
I <sub>E</sub>	3/4	1	1	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	I <sub>E</sub>	3/4	1	1	1 <sup>1</sup> / <sub>4</sub>	I <sub>E</sub>	3/4	1	1	I <sub>E</sub>	3/4	1
I <sub>R</sub>	1/2	3/4	3/4	1	1	I <sub>R</sub>	1/2	3/4	3/4	1	I <sub>R</sub>	1/2	3/4	3/4	I <sub>R</sub>	1/2	3/4
J	1 <sup>5</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>	2 <sup>5</sup> / <sub>8</sub>	2 <sup>5</sup> / <sub>8</sub>	J	1 <sup>5</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>	2 <sup>5</sup> / <sub>8</sub>	J	1 <sup>5</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>	J	1 <sup>5</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>8</sub>
	215	220	259	289	403		263	289	314	425		350	370	465		T.B.D.	T.B.D.
	146	150	175	194	268		191	209	226	304		259	272	335		T.B.D.	T.B.D.
X	14.00	14.75	14.75	15.75	15.88	X	15.25	15.75	16.25	16.88	X	16.25	17.25	17.88	X	17.75	18.38
L <sub>C</sub>	$\frac{\text{Stroke}}{3} + X$ O.L. = 6" up to 120" stroke					L <sub>C</sub>	$\frac{\text{Stroke}}{4} + X$ O.L. = 6" up to 140" stroke				L <sub>C</sub>	$\frac{\text{Stroke}}{5} + X$ O.L. = 6" up to 140" stroke			L <sub>C</sub>	$\frac{\text{Stroke}}{6} + X$ O.L. = 6" up to 150" stroke	
X <sub>1</sub>	$\frac{\text{Stroke} - 120}{5}$ (To next largest whole number)					X <sub>1</sub>	$\frac{\text{Stroke} - 140}{6}$ (To next largest whole number)				X <sub>1</sub>	$\frac{\text{Stroke} - 140}{8}$ (To next largest whole number)			X <sub>1</sub>	$\frac{\text{Stroke} - 150}{10}$ (To next largest whole number)	
L <sub>C</sub>	$\frac{\text{Stroke}}{3} + X + X_1$ O.L. = 6" + X <sub>1</sub> 120" stroke to max.					L <sub>C</sub>	$\frac{\text{Stroke}}{4} + X + X_1$ O.L. = 6" + X <sub>1</sub> 140" stroke to max.				L <sub>C</sub>	$\frac{\text{Stroke}}{5} + X + X_1$ O.L. = 6" + X <sub>1</sub> 140" to 210" stroke			L <sub>C</sub>	$\frac{\text{Stroke}}{6} + X + X_1$ O.L. = 6" + X <sub>1</sub> 150" to 250" stroke	
X <sub>2</sub>	Not Required					X <sub>2</sub>					X <sub>2</sub>	$\frac{\text{Stroke} - 210}{3.5}$ (To next largest whole number)			X <sub>2</sub>	Check with Engineering	
L <sub>C</sub>	Not Required					L <sub>C</sub>					L <sub>C</sub>	$\frac{\text{Stroke}}{5} + X + X_2$ O.L. = 15" + X <sub>2</sub> 211" stroke to max.			L <sub>C</sub>	Check with Engineering	

# Single Acting Telescopic Cylinder Operation

## Extending

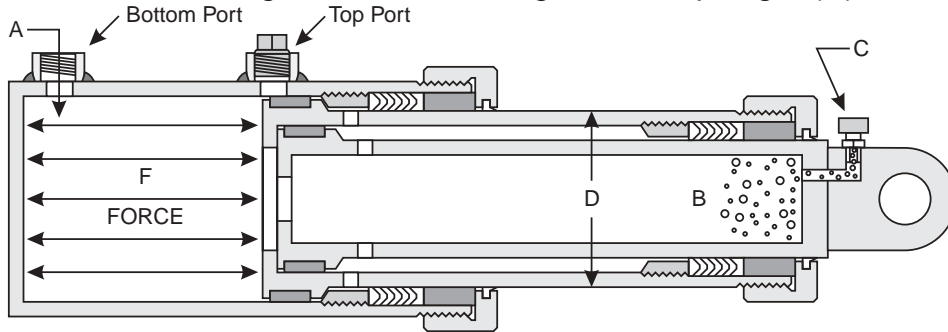


### To Extend:

High pressure oil from the pump is directed by the control valve through the port (A) to fill the cylinder. Any air in the system is trapped in the end of the cylinder (B) and may be bled off through the bleeder valve (C).

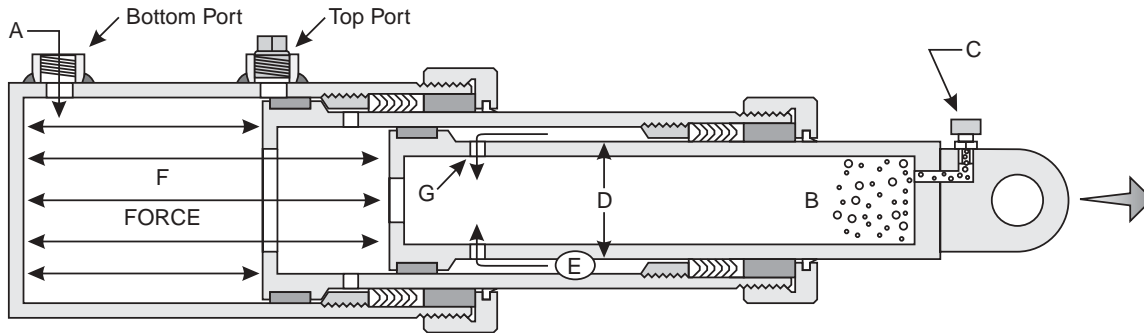
Generally, bleeding is only necessary on initial start up or if air has been allowed to enter the system (Note: the bleeder valve must be located at the highest part of the cylinder).

Oil pushes on the bottom of the sleeve or plunger forcing (F) it to move out. The outside diameter or sealing area of the moving sleeve or plunger (D) determines the effective area.

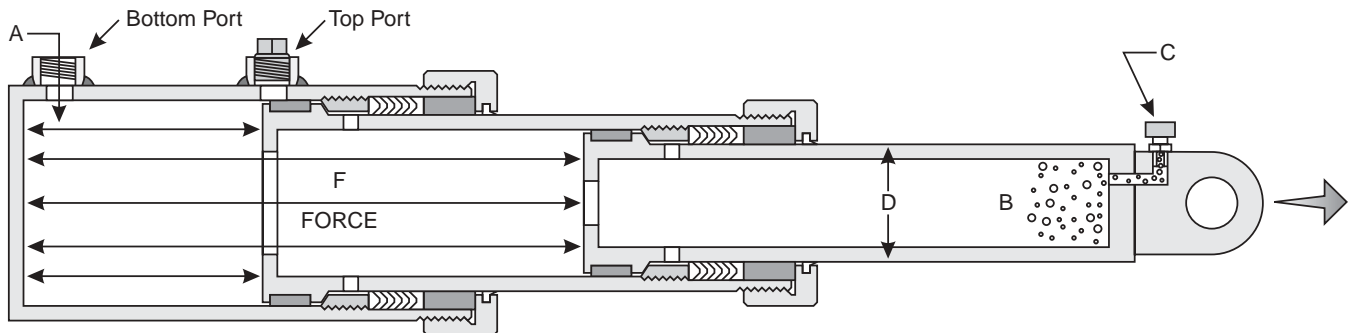


As the sleeve or plunger moves out, the oil trapped between (E) the sleeve or plunger wall is released through transfer holes (G) which are drilled in the sleeve or plunger.

Under normal operating conditions the largest diameter moving sleeve extends first, then the next largest sleeve, etc.

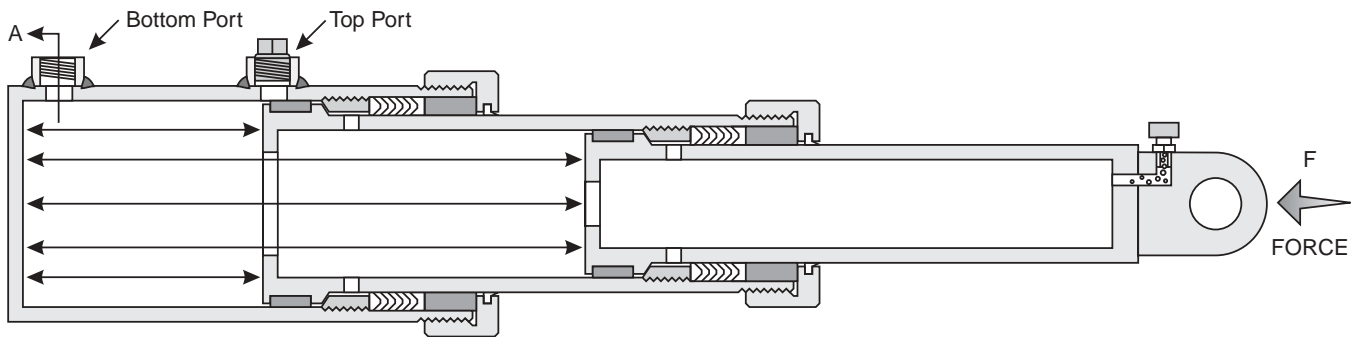


So at a given PSI (pressure) and GPM (gallons per min.) the cylinder will develop less force and increase in speed as it changes to the next moving stage.



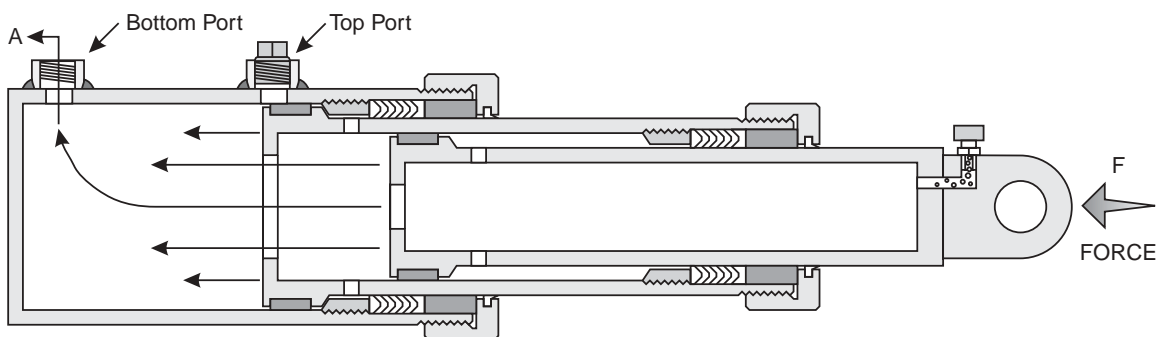
## Single Acting Telescopic Cylinder Operation

### Retracting

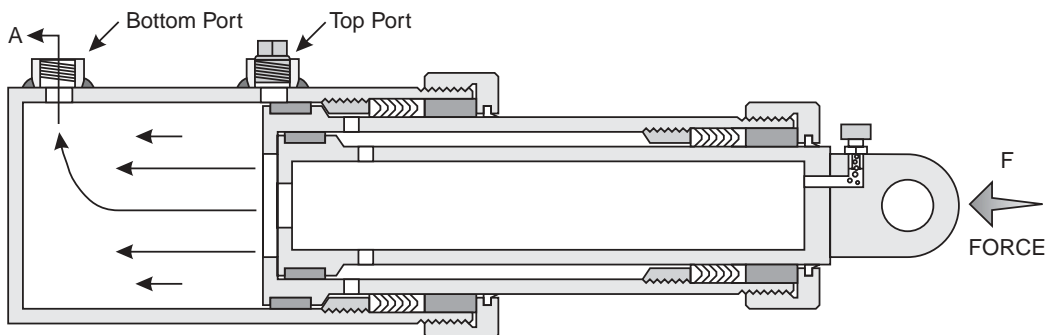


#### To Retract:

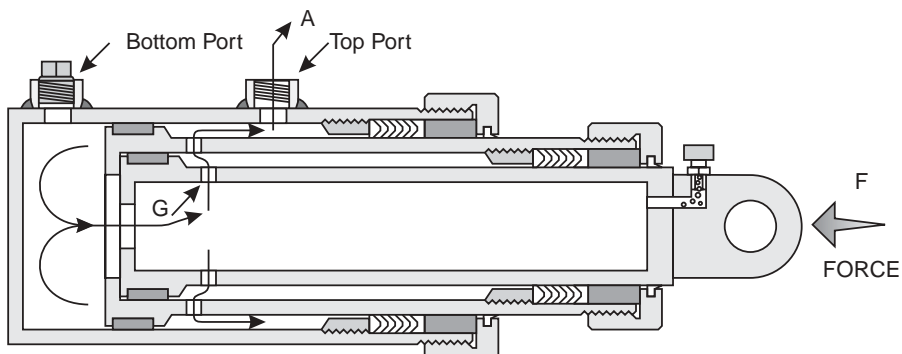
A single acting cylinder must be retracted by gravity or mechanical means (F).



Under normal operating conditions the plunger or smallest diameter sleeve is pushed closed first, forcing oil out through port (A), then the next smallest, etc.



**Note:** If the top port is used, the speed of the cylinder may be reduced because of the oil flow restriction as the oil passes thru the transfer holes (G).



## **Safety Precautions for Single-Acting Telescopic Cylinders**

---

### **WARNING!**

**Telescopic cylinders commonly installed on dumping vehicles are devices intended to provide only a lifting force. The cylinder is not a structural member, and is not designed for, nor intended to provide stability to the dumping vehicle. Rollover or lateral tilt can cause the cylinder to bend, buldge or separate causing the dump body to drop suddenly, resulting in severe injury or death and/or damage to the unit and cylinder, if the following warnings are not observed.**

Hydraulic cylinders are not to be used as a stabilizer on a dump body or dump trailer. The hydraulic cylinder will not prevent the dump body or trailer from rollover or lateral tilt. The cylinder is strictly a lifting device and is not a structural member of the unit. Cylinders are not to be used as a means of stabilizing the unit.

The hydraulic cylinder mounted in the unit should be free to find its own trajectory line of extension, free of any lateral loading of the plungers. Misalignment of the top or bottom mountings, or mounting pins too tight, may cause scoring of the plungers, leaking, or improper sequencing which could cause the unit to upset.

The hydraulic cylinder will not withstand lateral or side pressure when the unit is leaning. Only activate the cylinder when the tractor and trailer are in a straight line (not jack-knifed). A jackknife position of the tractor with the trailer is not recommended when dumping. In a jackknifed position, the upper coupler pivots on bearings, contributing nothing to dump stability. When the tractor and trailer are straight, the coupler bearings are normally 34 inches apart, assisting in stabilizing the dump.

Do not activate the cylinder while on unlevel or soft ground, or during heavy crosswinds. Doing so may cause the unit to upset. Uneven terrain, causing the trailer wheels to be 3 1/2 inches to 4 inches higher than the other side, puts the top of the body 12 inches to 14 inches off center when the cylinder is fully extended. On fresh fill, loaded trailer wheels may sink on one side, again setting up potential tip over. On road construction, the crown is also critical on spread application, as in dumping on a slope. A 4 inch plus, height differential of wheels on an axle 8 feet wide, is another rollover potential. Do not attempt dumping operations in high gusty wind conditions. If possible, raise the dump body directly into the wind.

A blown tire or a severely under inflated tire can cause dump instability, when dumping. Always check tires visually for cuts or punctures by nails and metal. Make sure all tires are inflated properly. Proper tire inflation also improves wear and fuel economy.

Do not activate the cylinder while personnel or equipment are alongside or behind the dump body or trailer.

A hung load is commodity that does not discharge when a dump body is raised to an elevated position. This condition exists due to surface adhesion between the commodity and the interior of the dump body. To avoid a tip over due to a hung load, the driver should be warned by an observer or be aware of the material's moisture content, if this condition exists, immediately lower the dump body.

The operator should stay at the controls during the entire dumping operation. An operator who fails to stay at the controls will never control the body when it starts to lean over for a tip over. If a problem exists, and the body starts to lean, the operator should immediately lower the dump body or trailer and check and remedy any potential problems, then resume dumping the load. It is important to slowly position the cylinder control valve into the hold position to avoid subjecting the cylinder to a high pressure.

Do not overload the unit. The load must be distributed evenly during loading or unloading to avoid rollover and lateral tilt. Loads stuck while the cylinder is partially or completely extended increases the hazard of rollover and lateral tilt. Lower the dump body or trailer entirely with the cylinder control valve partially open (avoid lowering the dump body or trailer with the cylinder control valve completely open). Then unload the dump body or trailer manually or with an alternative mechanical aid.

Overloading is a very common occurrence that aggravates all the above conditions that cause a tip over.

## ***Safety Precautions for Single-Acting Telescopic Cylinders***

---

### **WARNING!**

**Shock pressure can cause severe injury or death and/or damage to the unit and cylinder.**

Do not use the cylinder to loosen loads stuck in the dump body or trailer. Lower the dump body or trailer entirely with the cylinder control valve partially open (avoid lowering the dump body or trailer with the cylinder control valve completely open). Then unload the dump body or trailer manually or with an alternative mechanical aid.

Humping is a rapid acceleration / deceleration method used to loosen a hung load from a trailer. If the load is off center and the trailer is moved, a tip over may occur. Also, serious damage to the hoist may occur if an extreme humping motion is used to get a sticky load out of the body.

Do not move the truck and jam the brakes while the cylinder is partially or fully extended to loosen loads stuck in the dump body or trailer. Pulling forward (or backing up) and hitting the brakes, or lowering the body part way and then quickly engaging the valve in the "HOLD" or "RAISE" position will cause a tremendous pressure spike. This pressure spike may bulge or split one of the larger stages of the cylinder. Lower the dump body or trailer entirely with the cylinder control valve partially open (avoid lowering the dump body or trailer with the cylinder control valve completely open). Then unload the dump body or trailer manually or with an alternative mechanical aid.

Do not move the truck until the dump body or trailer is lowered completely.

### **WARNING!**

**Over pressurizing the cylinder can cause severe injury or death and/or damage to the unit and cylinder.**

Do not operate a cylinder at pressures above factory recommended operating pressures (Normally 2,000 P.S.I. unless otherwise approved).

### **WARNING!**

**Worn or damaged hydraulic hoses can cause severe injury or death and/or damage to the unit and cylinder.**

Hydraulic hoses should be checked regularly and replaced if worn out or damaged.

### **NOTICE!**

Do not drive the unit while the P.T.O. or hydraulic pump is engaged.

The hydraulic oil should be checked and changed regularly to avoid contamination leading to internal cylinder damage.

A damp to light film of oil on each plunger indicates a good cylinder operation. A small accumulation of oil may be noticed on the plunger at the head nuts after many cycles. This should not be mistaken for packing leakage.

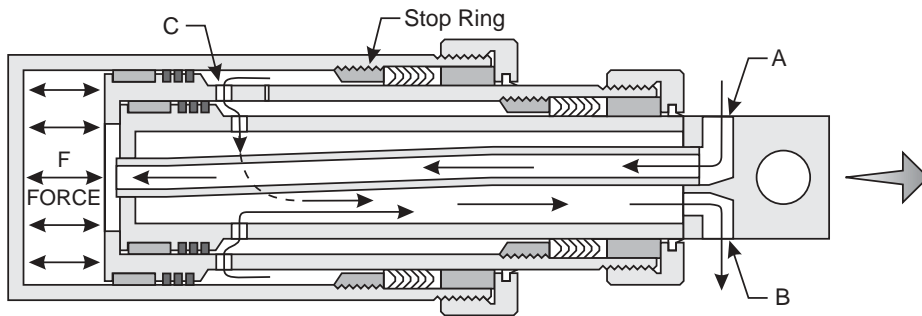
Cylinder should be free of entrapped air. It is advisable to bleed air from the cylinder weekly to free entrapped air. This will result in a smoother operation.

The cylinder should float in the pin mountings. The cylinder should be installed with 1/8" to 3/16" of clearance between the pin and the pin hole if the mounting eye is wider than 5", or with 1/16" to 1/8" clearance if the mounting eye is less than 5" wide. There should be a clearance of 1/8" to 1/4" per side on eyes less than 5" wide and 1/4" to 1/2" clearance per side on eyes in excess of 5" wide. This is to allow the body to sway slightly while dumping, without putting a side load on the cylinder. The cylinder plunger or one of the sleeves should be extended a minimum of 1/4" when the dump body is in the down position.

The cylinder end mounts should be lubricated regularly.

## Double Acting Telescopic Cylinder Operation

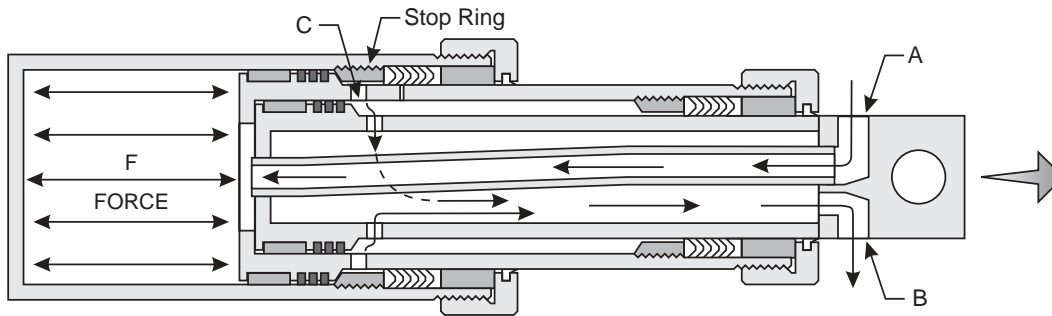
### Extending



#### To Extend:

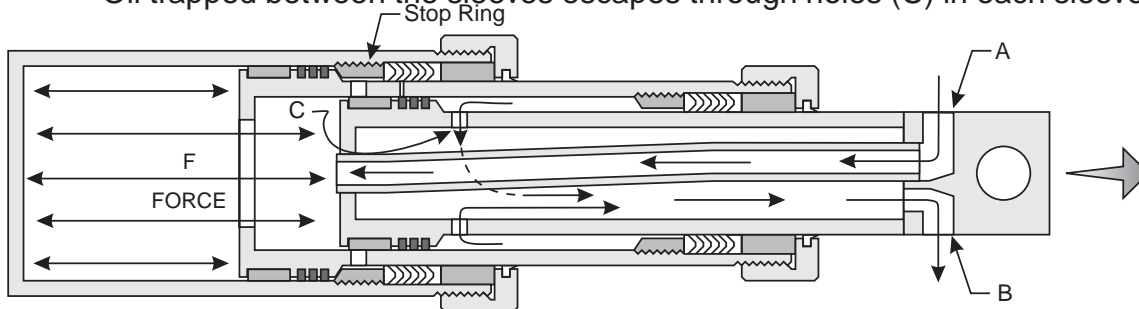
High pressure oil is directed by the control valve into port A. The oil passes through the transfer tube in the rod to the base of the cylinder.

The pressure acts on the effective area (area of the largest piston) and extends all stages to the first stop ring. The next stage then begins to extend.

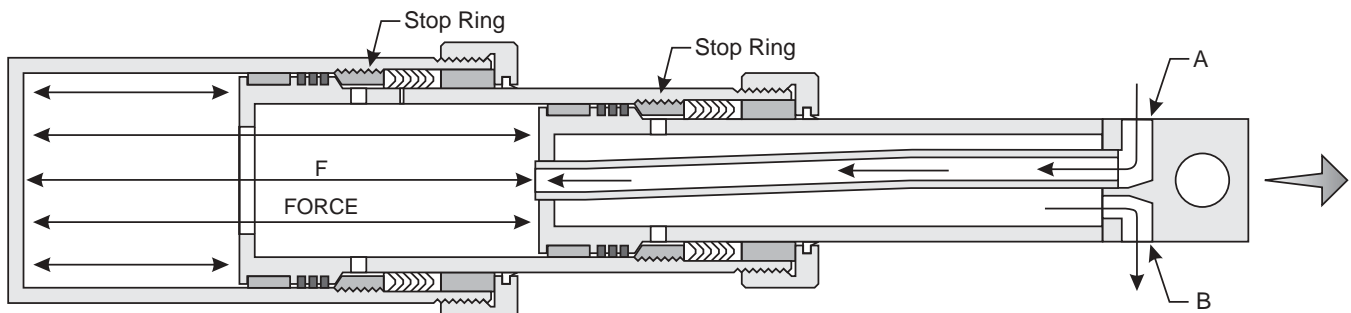


The effective area of each stage is figured from the inside diameter of the next largest stage. Each stage extends in its turn to the stop ring. So at a given PSI (pressure) and GPM (gallons per min.) the cylinder will develop less force and increase in speed as it changes to the next moving stage.

Oil trapped between the sleeves escapes through holes (C) in each sleeve and returns to



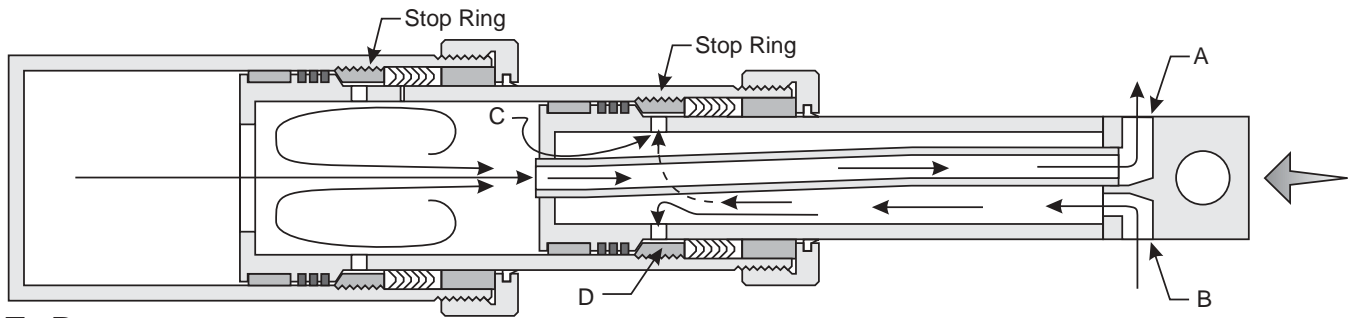
the tank through port B.





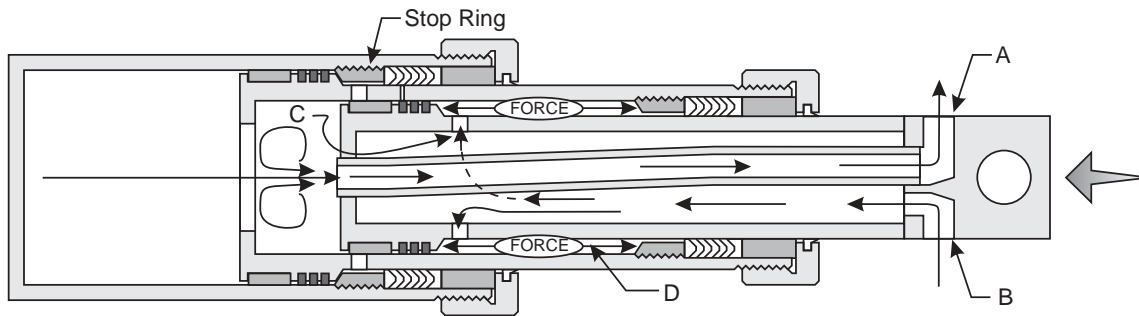
## Double Acting Telescopic Cylinder Operation

### Retracting

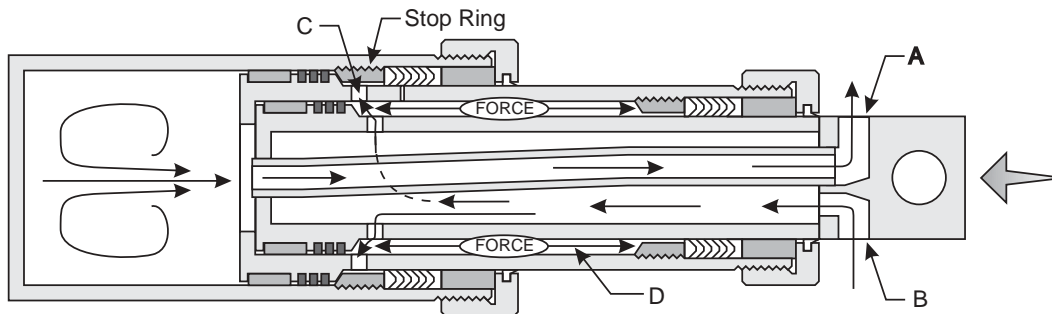


#### To Retract:

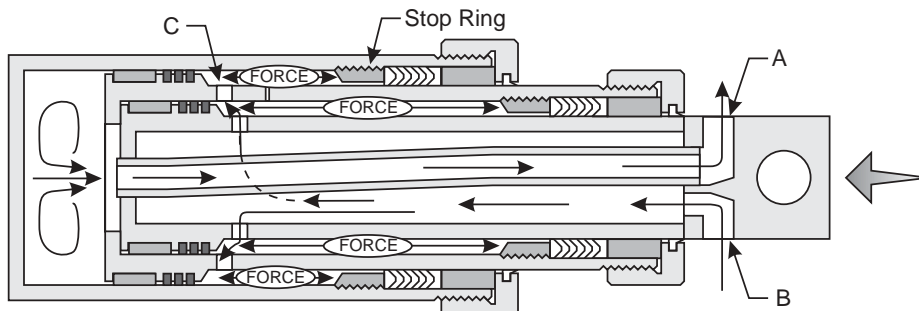
High pressure oil is directed by the control valve into port B. The pressure is applied to the effective area (D) of the plunger which retracts first. Each stage from the smallest to the largest



retracts in its turn, however, THE EFFECTIVE AREA FOR RETRACTING EACH STAGE IS THE AREA (D) OF THE PLUNGER.



Oil inside the cylinder is forced out of port A. Because of the area differential, the flow into port B must be multiplied by this differential to determine the flow out of port A. It may be necessary to install a dump-to-tank valve to speed up the retracting cycle.



Equip your vehicle with  
 **Commercial Hydraulics**  
the world's best hydraulic cylinders

## **Safety Precautions for Double-Acting Telescopic Cylinders**

---

### **WARNING!**

**Rollover or lateral tilt can cause severe injury or death and/or damage to the unit and cylinder.**

The hydraulic cylinder will not prevent the unit from rollover or lateral tilt. The cylinder is strictly a lifting device and is not a structural member of the unit. Cylinders are not to be used as a means of stabilizing the unit.

The hydraulic cylinder mounted in the unit should be free to find its own trajectory line of extension and retraction so as not to cause improper sequencing and excessive wear to the plungers and internal components. Misalignment could cause the unit to upset. On longer stroke cylinders mounted horizontally, supports should be added to the center of the extended cylinder to increase the column strength of the cylinder.

The hydraulic cylinder will not withstand lateral pressure when the unit is leaning. Only activate the cylinder when the tractor and trailer are in a straight line (not jack-knifed). Do not activate the cylinder while on unlevel or soft ground, or during heavy crosswinds. Doing so may cause the unit to upset.

Do not activate the cylinder while personnel or equipment are alongside or behind the unit.

On roll-off units, lower the container with the control valve partially open (avoid lowering the container with the control valve completely open) to prevent pressure build-up in the reeving cylinders as gravity pulls the container to the ground.

### **WARNING!**

**Shock pressure can cause severe injury or death and/or damage to the unit and cylinder.**

A double-acting telescopic cylinder should be fully retracted when not in use.

Do not extend the cylinder until it has been fully retracted. A partially extended cylinder with pressure relieved may drift out of position. This can happen if a cylinder experiences vibration, such as an ejector or push out cylinder does in a refuse body. If this happens and the cylinder is then extended, the out of position plunger or sleeves will rapidly reposition themselves and possibly cause high pressure oil to be trapped on the retract side of the cylinder. This could cause a stage / sleeve to bulge and or the packing and bearings to be blown out from under a head nut.

On roll-off units, do not pull a container onto the hoist until the lift cylinder(s) are completely extended. If the lift cylinders are not completely extended when a container is being pulled onto the hoist, the lift cylinders may be pulled open by the weight of the load. Then as the container is pulled over center, the cylinders will be forced closed until they hit the column of oil inside the cylinders causing a sudden pressure surge. If the lift cylinders are pulled open by the load, they should be extended with the control valve to fill them with oil before pulling the container on the rest of the way. Care should be taken if moving roll-off unit with tilt cylinders extended, avoiding sudden stops or jolts.

On roll-off units, care must be taken if a unit is moved with the lift cylinders extended. Avoid sudden stops or jolts.

On roll-off units dropping off a loaded container, feather control valve to avoid any pressure surges in the reeving / cable cylinders as gravity pulls the container to the ground.

On roll-off units, if the container is not evenly loaded and is heavy on one side, the lift cylinders may mis-stage. When the plunger / sleeves attempt to correct themselves, there may be a sudden pressure surge, possibly damaging the cylinder.

Check the cylinder operation to ensure the plungers extend in sequence with the largest diameter plunger moving first, then the next largest, etc. When retracting, the smallest plunger should move first, then the next smallest, etc. Mis-staging could cause the unit to upset and/or damage the cylinder due to excessive pressure build-up.

## ***Safety Precautions for Double-Acting Telescopic Cylinders***

---

### **WARNING!**

**Over pressurizing the cylinder can cause severe injury or death and/or damage to the unit and cylinder.**

Do not operate a cylinder at pressures above factory recommended operating pressures (Normally 2,000 P.S.I. unless otherwise approved).

Hydraulic hoses should be checked regularly and replaced if worn out or damaged.

### **NOTICE!**

Do not operate a packer / ejector cylinder with a misaligned blade. If the packer / ejector blade is bent, damaged, or if the blade slide shoes or guide track assembly are worn out, this can cause excessive side loading to the cylinder damaging it internally or bending a plunger or sleeve.

If the hydraulic system uses quick disconnects (such as on a transfer trailer) or holding / lock type valves, make sure they are properly connected. If not, oil may become trapped in the cylinder causing an excessive pressure build up and damage to the cylinder. This is particularly true if there is a blockage on the retract side of the cylinder and the cylinder is then extended. This could internally intensify the pressure 10 times or more inside the cylinder. (Example; The pump develops 2,000 P.S.I. trying to extend the cylinder, oil pressure trapped on the retract side of the cylinder could see 20,000 P.S.I.)

A double-acting telescopic cylinder normally requires at least 15 G.P.M. oil flow to retract properly. Make sure the hydraulic pump is developing the required flow.

Most double-acting telescopic cylinders will self bleed themselves of air. Upon installation of a new cylinder this will require cycling the cylinder approximately 10 times to the complete extend and retract positions with no load against it. Check to make sure stages sequence properly. When extending, the largest stage should move first then the next largest, etc. and when retracting, the smallest should move first then the next smallest, etc.

The hydraulic oil should be checked and changed regularly to avoid contamination leading to internal cylinder damage.

Grease the pin mountings regularly.

### **WARNING!**

**Before working on a telescopic cylinder mounted on a truck or trailer unit, use supports or holding devices that will absolutely prevent the body from accidentally lowering. Place control valve in the “LOWER” position to assure that all pressure has been relieved from the cylinder.**

## **Repair Kits**

### **For Standard Parker Single-acting, Dump Body Cylinders.**

Parker's genuine replacement parts are available in kits to rebuild or repack our dump body cylinders. These parts are the same as originally installed.

As with all hydraulic repairs, be sure your shop is properly equipped and that the work area is clean.

**Rebuilding kits consist of:**

- |                        |                    |
|------------------------|--------------------|
| 1. Wiper Rings         | 5. Piston Bearings |
| 2. Packing Assemblies  | 6. Set Screws      |
| 3. Gland Bearing Rings | 7. Nylon Balls     |
| 4. Wave Springs        |                    |

**Repacking kits consist of:**

- |                |                       |
|----------------|-----------------------|
| 1. Wiper Rings | 2. Packing Assemblies |
|----------------|-----------------------|

**Ordering Information**

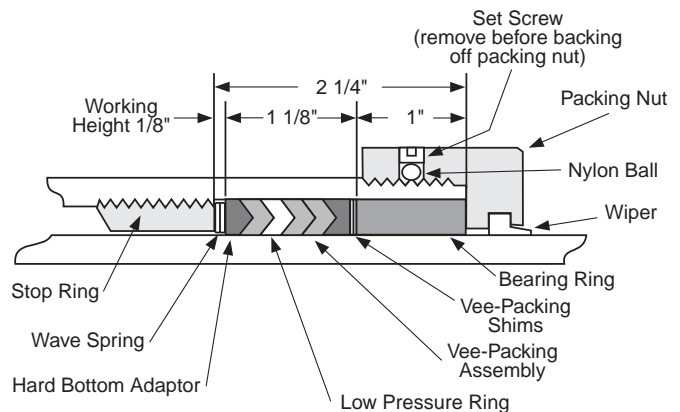
Please order by part number

Cylinder Model	Rebuild Kit Number		Repack Kit Number	
S53 Series	A300-253	375-1804-017	A300-11	391-1804-020
S62 Series	A300-256	375-1804-020	A300-262	375-1804-026
S63 Series	A300-254	375-1804-018	A300-104	391-1804-109
S64 Series	A300-257	375-1804-021	A300-230	391-1804-237
S73 Series	A300-255	375-1804-019	A300-238	375-1804-002
S74 Series	A300-258	375-1804-022	A300-239	375-1804-003
S84 Series	A300-259	375-1804-023	A300-49	391-1804-054
S85 Series	A300-260	375-1804-024	A300-22	391-1804-060
S95 Series	A300-261	375-1804-025	A300-240	375-1804-004

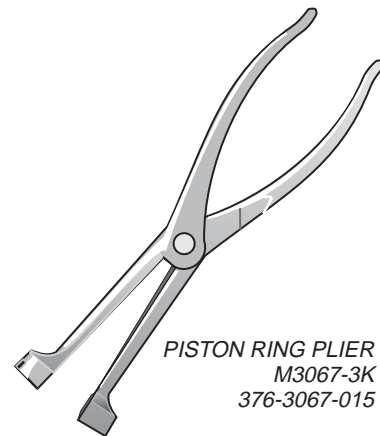
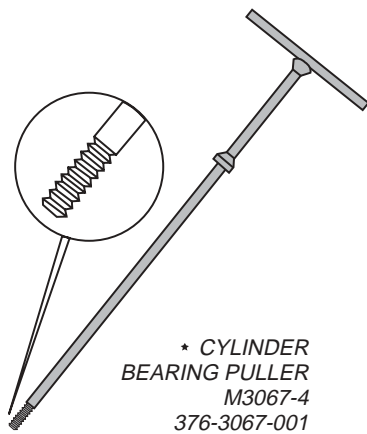
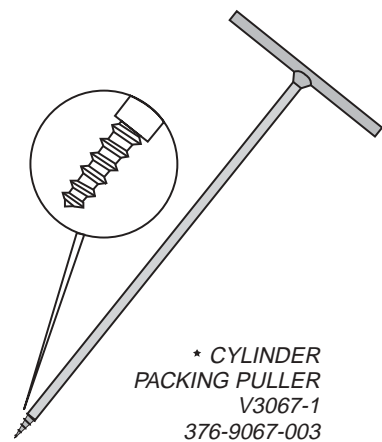
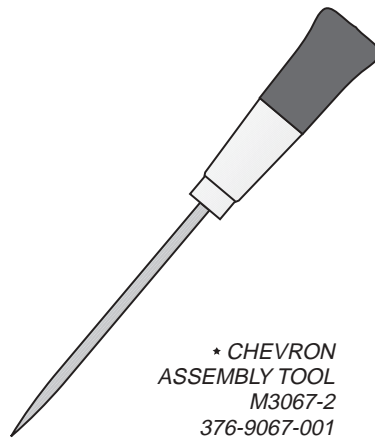
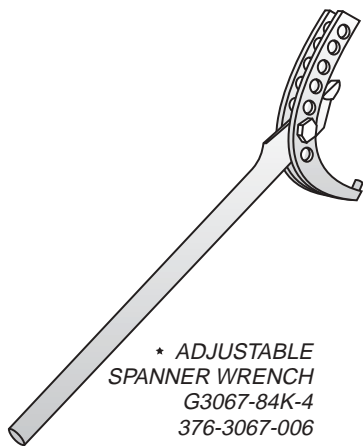
**Cylinder Packing Installation**

Remove shims from packing set and measure packing height under finger pressure. Add one shim for each 1/32" that the packing measures under 1-1/8". Measure depth to top of stop ring from top of tube. This dimension should be 2-1/4", however, it may vary slightly due to seating of the stop ring. Add one shim to the packing set for every 1/32" that this dimension measures over 2-1/4" or remove one shim from the packing set for every 1/32" that this dimension measures under 2-1/4". Install wave spring with gap edge against top of the cylinder stop ring. Soak packing in hydraulic oil for a few minutes. (Check bottom adaptor. Only hard type can be used with the wave spring). Install packing, one ring at a time, in the proper sequence as shown in the sketch. Note: The soft, low pressure ring must be in the second position from the pressure side. Installed packing height need not be checked because wave spring will vary this dimension.

Installation of bearing and packing nut will compress wave spring for proper packing pre-load. Pull down tight against tube.

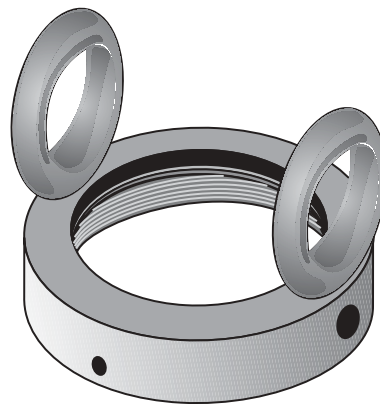


## Hydraulic Cylinder Required Service Tools

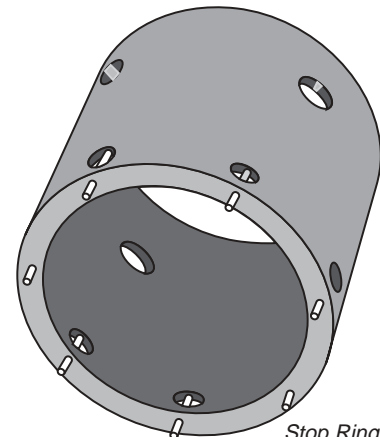


### Tools Required

Proper tools make the job of servicing cylinders easier and faster and reduce the possibility of damaging the finely machined surfaces. We recommend that you have the tools shown on this page prior to attempting service on Commercial telescopic cylinders. Tools with an \* are required for all cylinders regardless of size. Lifting rings and stop ring wrenches must be ordered to fit the specific sleeve in the cylinder.



Lifting Ring  
BC3067 Series



Stop Ring Wrench  
BA3067 Series

Sleeve or Main O.D. Eng # , Part Number

3 3/4" BC3067-1, 376-3067-008

4 3/4" BC3067-2, 376-3067-009

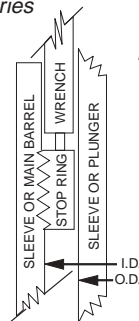
5 3/4" BC3067-3, 376-3067-010

6 3/4" BC3067-4, 376-3067-011

7 7/8" BC3067-5, 376-3067-012

9 3/8" BC3067-6, 376-3067-013

11 1/8" BC3067-7, 376-3067-014



Sleeve or Main I.D. Plunger O.D. Eng # , Part Number

3 1/4" 2 3/4" BA3067-1, 376-6067-047

4 1/4" 3 3/4" BA3067-2, 376-6067-048

5 1/4" 4 3/4" BA3067-3, 376-6067-049

6 1/4" 5 3/4" BA3067-4, 376-6067-050

7 1/4" 6 3/4" BA3067-5, 376-6067-051

8 7/16" 7 7/8" BA3067-6, 376-6067-052

9 7/8" 9 3/8" BA3067-7, 376-6067-053

## **Normal Maintenance Items**

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Packing, wipers and bushings are considered normal maintenance or service items. These items are subject to contamination from external and internal foreign materials, many of which are abrasive in nature, causing abnormal wear or damage to the parts, to the extent that replacements are required.

### **WARNING!!**

***Before working on a telescopic cylinder mounted on a truck or trailer unit, use supports or holding devices that will absolutely prevent the body from accidentally lowering. Place control valve in the "Lower" position to assure that all pressure has been relieved from the cylinder.***

**Because of our self-compensating Packing design, Standard Commercial Hydraulics Cylinders require no packing adjustment. For Commercial Packing Assembly Installation Procedure see Service Repair Kit Page.**

### **Procedure for Adjusting Telescopic Cylinder Head Nuts. (For Cylinder designs using no Wave Springs and/or no U-Seals)**

1. Loosen set screw (or set screws) in head nut that holds in packing of leaking stage.
2. Lightly tap head nut around circumference with a hammer.
3. Back head nut off 1/2 to 1 full turn using a spanner or chain wrench.  
(Note: If stage rotates when head nut is turned, hold stage with a strap wrench.)
4. Cycle cylinder 2 to 3 times to reset chevron vee packing.
5. Retighten head nut approximately 1/2 turn further than it was when it was loosened.
6. Tighten set screws.

### **Procedure for Mis-Staging or Mis-Sequencing Cylinder.**

1. Loosen set screws in head nut that holds in packing which fits over stage that is sticking.
2. Lightly tap head nut around circumference with a hammer.
3. Back head nut off 1/2 turn using a spanner or chain wrench.
4. Cycle cylinder, if cylinder still mis-stages, back head nut off another 1/2 turn.
5. Cycle cylinder, if cylinder still mis-stages, tighten the head nut of the next stage that is extending.
6. Tighten set screws.

### **Bleeding Air from Single-Acting Telescopic Cylinders.**

For smooth operation of these cylinders, it is advisable to bleed the air from the cylinder weekly.

Manual bleeding is accomplished by:

1. Empty the dump body of any material.
2. Remove the cover plate from the dog house of the dump body to access the bleeder valve.
3. Fully extend the cylinder, raising the EMPTY dump bed.
4. Lower the dump to within 1 foot from resting on the frame.
5. With the fingers, turn the bleeder valve in a counterclockwise direction. This opens the valve and allows the air to escape from the cylinder.
6. When a steady stream of oil comes from the bleeder, turn the valve in a clockwise direction until it is closed.

**If these procedures fail to correct the problem, please contact an  
Authorized Service Center for Instructions.**



## Hydraulic Oil Recommendations

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All cylinder parts, with the exception of a few items, are lubricated by the hydraulic oil in the circuit. Particular attention must be paid to keep the oil in the circuit clean. Whenever there is a hydraulic component failure (cylinder, pump, valve), and there is a reason to feel that metal particles may be in the system, the oil must be drained, the entire system flushed clean, and any filter screens thoroughly cleaned or replaced. New oil should be supplied for the entire system. Oil suitable and recommended for use in circuits involving Commercial cylinders should meet the following specifications:

***These suggestions are intended as a guide only.  
Obtain your final oil recommendations from your oil supplier.***

### Viscosity Recommendations:

Optimum operating viscosity is considered to be about 100 SSU.

\* 50 SSU minimum @ operating temperature  
7500 SSU maximum @ starting temperature

\* 150 to 225 SSU @ 100° F. (37.8° C.) (generally)  
44 to 48 SSU @ 210° F. (98.9° C.) (generally)

### Other Desirable Properties:

Viscosity Index: 90 minimum

Aniline point: 175 minimum

### Additives Usually Recommended:

Rust and Oxidation (R & O) Inhibitors  
Foam Depressant

### Other Desirable Characteristics:

Stability of physical and chemical characteristics.

High demulsibility (low emulsibility) for separation of water, air and contaminants.

Resistant to the formation of gums, sludges, acids, tars and varnishes.

High lubricity and film strength.

### General Recommendations:

A good quality hydraulic oil conforming to the characteristics listed above is essential to the satisfactory performance and long life of any hydraulic system.

Oil should be changed on regular schedules in accordance with the manufactures recommendations and the system periodically flushed.

Oil operating temperature should not exceed 200° F. (93° C.) with a maximum of 180° F. (82° C.) generally recommended. 120° F. to 140° F. (50° C. to 60° C.) is generally considered optimum. High temperatures result in rapid oil deterioration and may point out a need for an oil cooler or a larger reservoir. The nearer to optimum temperature, the longer the service life of the oil and the hydraulic components.

Reservoir size should be large enough to hold and cool all the fluid a system will need, yet it should not be wastefully large. Minimum required capacity can vary anywhere between 1 and 3 times pump output. The reservoir must be able to hold all of the fluid displaced by retracted cylinders when the system is not operating, yet provide space for expansion and foaming.

Oil poured into the reservoir should pass through a 100 mesh screen. Pour only clean oil from clean containers into the reservoir.

*Never use Crank Case Drainings, Kerosene, Fuel Oil, or any Non-Lubricating Fluid, such as Water.*

### Approximate SSU at . . .

Oil Grade	100° F. (37.8° C.)	210° F. (98.9° C.)
SAE 10	150	43
SAE 20	330	51

### Normal Temperatures:

0° F. (-18° C.) to 100° F. (37.8° C.) ambient  
100° F. (37.8° C.) to 180° F. (82.2° C.)  
system

Be sure the oil you use is recommended for the temperature you expect to encounter.

## ***Telescopic Cylinder Disassembly***

---

### **Start Disassembly...**

Open the air release valve, remove the port pipe plugs and drain all of the oil out of the cylinder.

We recommend draining the oil from the cylinder before hoisting it to the vertical work stand position. It is easiest to drain oil when the cylinder is in a horizontal position and with the port down and open. Rotate the last plunger so the bleeder hole is on top and open. If you don't drain the oil, oil will squirt out as each tube is removed.

### **Step 2 ...**

Firmly secure the cylinder in place with the rod end up to a sturdy workbench or a suitable stand that has access to an overhead crane.



### **Step 3 ...**

Remove the grease fitting and air release valve with an open end wrench or an adjustable crescent wrench.



### **Step 4 ...**

Remove pipe plugs on double-acting telescopic cylinders with an adjustable crescent wrench.



### **Step 5 ...**

Clean head nut thread area, spray with WD-40 (penetrating oil).

### **Step 6 ...**

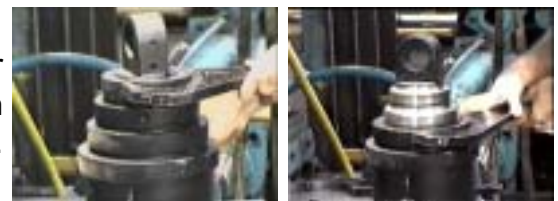
Remove set screws from all packing nuts with a 1/8" Allen wrench.



### **Step 7 ...**

Remove all packing nuts with adjustable spanner wrench, G3067-84K-4, Starting with the smallest thru the largest.

If the nut will not move, a sharp rap with a blunt chisel or rod may be required to jar the nut loose. If using a punch to break loose head nut, be careful not to damage threads.



### **Step 8 ...**

Remove and discard old nylon slugs, which were in packing nuts.

### **Step 9 ...**

Remove the wiper seal from the packing nut. Discard the old wiper seal.



### **Step 10 ...**

Clean the thread and bearing area with a solvent and a clean, lintless rag.

## ***Telescopic Cylinder Disassembly***

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### **Step 11 ...**

Remove all bearing rings with two bearing ring pullers M3067-4.



### **Step 12 ...**

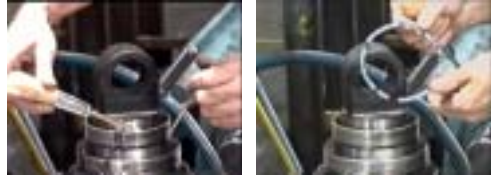
Remove all packing with packing puller V3067-1.

Or extend the plunger or sleeve out about one foot. Wrap masking tape around a clean area on the plunger or sleeve. Push plunger or sleeve back into and past the packing and pull out. Packing will usually pop out, if not, repeat the process.



### **Step 13 ...**

Remove wave spring from packing recess with a narrow screwdriver.



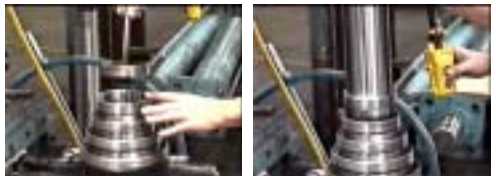
### **Step 14 ...**

Remove stop rings from all stages with stop ring wrenches BA3067 series. If the stop ring will not move, a sharp rap may be required to jar the ring loose. If the sleeve containing the stop ring turns during removal, it should be held with a nylon strap wrench P3067.



### **Step 15 ...**

Removal of the plunger or sleeve will lift out the stop ring and expose the piston bearing ring. Use lifting ring tool series BC3067 to lift out the sleeves.



### **Step 16 ...**

Remove piston bearing ring by hand.

### **Step 17 ...**

Remove piston rings on double-acting cylinders with piston ring plier M3067-3K and remove piston bearing ring or rings by hand.



### **Step 18 ...**

Repeat with remaining sleeves

## Telescopic Cylinder Assembly

### Assembly...

All bores in the packing area and plunger outside diameters must be free of tool marks and scratches. Polish with a fine paper, crocus cloth or a Scotch Brite pad. All parts should be clean and free of any contamination.

#### Start Assembly...

Starting with the largest sleeve,

Assemble piston bearings to all sleeves and plunger by hand.

Note; use bronze piston bearing on largest sleeve if piston passes port.

Assemble piston rings on double-acting cylinders using piston ring pliers M3067-3K.

Note; stagger cast iron piston rings.

Next, lubricate the piston bearing with grease.

#### Step 2...

Place the sleeve into the assembly using the proper lifting ring in the BC3067 series.

#### Step 3...

Lubricate the stop ring with grease and slide it onto the sleeve with its wrench holes up.

Slide threaded stop ring onto the sleeve and lower into the assembly.

Thread the stop ring into the assembly with the proper stop ring wrench in the BA3067 series. Turn the stop ring wrench counter-clockwise slowly for several turns, until a subtle "click" is heard or a slight settling of the wrench is felt. This indicates that the start points of the internal and external threads are aligned for engagement.

Next, turn the wrench clockwise until the stop ring bottoms out.

Bottom out stop ring with a sharp rap. If sleeve turns during assembly, it must be held with strap wrench P3067.

Measure stop ring depth. The stop ring should bottom out at a depth of 2 ¼".

Note; Check if Beveled or Non-beveled Stop Rings and Overlap Collars. Do not use a Beveled Stop Ring with Non-Beveled Overlap Collar or visa versa.

#### Step 4...

Install wave spring with gap edge against top of the cylinder stop ring.

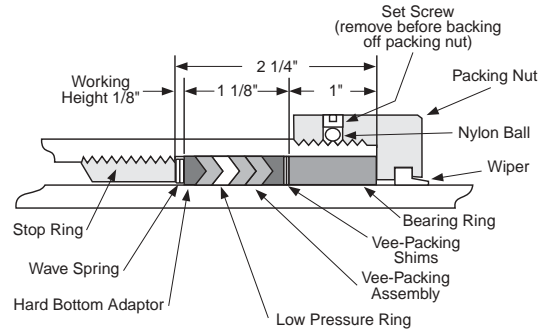




## Telescopic Cylinder Assembly

### Step 5...

Remove shims from packing set and measure packing height under finger pressure. Add one shim for each  $1/32$ " that the packing measures under  $1-1/8$ ". Measure depth to top of stop ring from top of tube. This dimension should be  $2-1/4$ ", however, it may vary slightly due to seating of the stop ring. Add one shim to the packing set for every  $1/32$ " that this dimension measures over  $2-1/4$ " or remove one shim from the packing set for every  $1/32$ " that this dimension measures under  $2-1/4$ ".



### Step 6...

Soak packing in hydraulic oil for a few minutes. (Check bottom adapter. Only hard type can be used with the wave spring). Install packing, one ring at a time, in the proper sequence as shown in the sketch. Note: The soft, low pressure ring must be in the second position from the pressure side. Installed packing height need not be checked because wave spring will vary this dimension. Installation of bearing and packing nut will compress wave spring for proper packing pre-load. Pull down tight against tube.

### Step 7...

Install gland bearing ring with tapped holes showing.

### Step 8...

Install new wiper seals in all packing nuts.

### Step 9...

Apply anti-seize compound to the sleeve threads.

### Step 10...

Install packing nut and tighten with the adjustable spanner wrench G3067-84K-4, if packing height is proper packing nut will bottom out.

### Step 11...

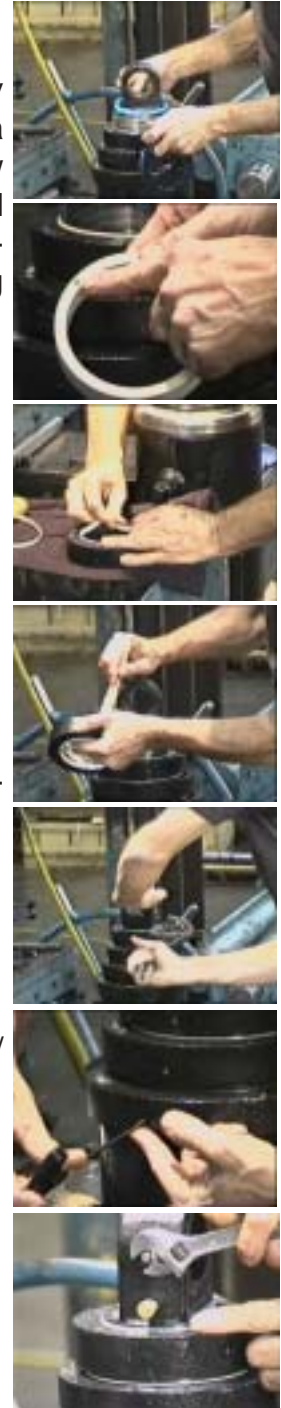
Repeat steps 1 through 10 for remaining sleeves and plunger.

### Step 12...

Install new nylon balls and set screws into all packing nuts and tighten with  $1/8$ " Allen wrench.

### Step 13...

Install air release or pipe plugs as applicable.



## **Standard Test Procedure for Hydraulic Cylinders**

---

### **1) Function Test**

Once the Cylinder is placed on the test stand and hydraulic lines attached, the cylinder will be cycled its full stroke a minimum of three (3) full cycles.

The cylinder will be rejected if it functions erratically. Erratic function is excessive chatter, slapstrick, stalling and uncorrectable misstaging.

### **2) Proof Pressure Test**

After the function test is performed the cylinder will be extended fully and pressure held for a minimum of thirty (30) seconds. This pressure will be 2500 psi or a pressure indicated on the assembly print. The cylinder will be rejected for external leakage or structural deformation. If the cylinder is double acting, it will be fully retracted and pressure held for a minimum of thirty (30) seconds. The pressure will be 2500 psi or a pressure indicated on the assembly print. The cylinder will be rejected for external leakage or structural deformation.

### **3) Internal Bypass Test**

This test will be performed on all double acting cylinders and can be done in conjunction with the Proof Pressure Test. The cylinder will be fully extended and pressure held at 2500 psi. The retract line will be removed and piston seal bypass will be determined by the flow out of this cylinder port. Excessive bypass will be a cause for cylinder rejection. The cylinder will be fully retracted and pressure held at 2500 psi. The extend line will be removed and the piston bypass will be determined by the flow out of this cylinder port. The cylinder will be rejected for excessive flow. When making this test the hydraulic line should be completely removed from the cylinder port, and the open line from the valve should be plugged or capped since a slight back pressure in the tank return line would spill oil from the line if not plugged.

Pass/Fail criteria if not noted on Assembly drawing is as follows:

Cast Iron Rings Normal Maximum leakage 1 GPM.

Bypass = 1/2 cubic inch per inch of bore diameter per minute.

Extend bypass would be 1/2 cubic inch per inch of plunger piston ring OD per minute.

Retract bypass would be 1/2 cubic inch per inch of piston ring OD per minute of each stage added together.

Example SD73 Series;

Extend bypass;  $1/2 \times 5.25 = 2.62$  cubic in / min.

Retract bypass;  $(1/2 \times 7.25) + (1/2 \times 6.25) + (1/2 \times 5.25) = 9.38$  cubic in / min.

Soft Seals Maximum leakage 5 drops per minute.

### ***Please Note***

#### ***Before Installing a New Cylinder in an old application***

*Has the problem been corrected that caused the original cylinder to fail?*

*Is the hydraulic fluid clean of all contamination, water, and entrapped air?*

*Are the hydraulic system relief valve pressures set and operating properly?*

*Is the mechanism or unit the cylinder is operating in good mechanical condition?*

## **Storage and Installation**

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### **STORAGE**

It pays to keep spare hydraulic cylinders on hand for use when you need them. But, you must know and follow these recommended storage practices or the cylinders can be ruined. Hydraulic cylinders, though often large and unwieldy, are precision machines with finely finished parts and close tolerances. And they're expensive. So handle them with care.

For optimum storage life, hydraulic cylinders should be kept in an environment that is protected from excessive moisture and temperature extremes. A hot, dry desert climate with cold nights, for example, must be accommodated when choosing the storage area. Daytime heat quickly bakes oil out of sealing materials, which causes leaks and rapid wear when the cylinder is placed in service. Cooling at night causes water condensation and corrosion damage to wear surfaces. Storage areas that allow exposure to rain, snow and extreme cold must like wise be avoided.

It's best to store cylinders indoors if possible. But indoors or out, be sure that plugs or closures are properly installed in all ports to keep out moisture and dirt. However, overtightening of port plugs should be avoided. Widely varying temperatures and tightly closed ports may cause pressure inside the cylinder to build up to the point where the piston moves far enough to expose the rod to corrosion or contamination. Try to choose a storage location where the cylinders are protected from physical damage. Even a little ding from a falling bar or forklift tine can cause trouble later.

Cylinders, Particularly large ones, should be stored closed in a vertical position with the rod end down. Be sure they're blocked securely to keep them from toppling. Storing with the rod ends down keeps oil on the seals, which protects them from drying out. This is more critical with fabric and butyl seals than with urethane sealing materials. Storing single-acting cylinders with the rod end up can cause port closures to pop open and leak, exposing the sleeves to corrosion damage and contamination. Storing with the rod end down also discourages the temptation to lift a cylinder by the rod eye – a dangerous practice. If horizontal storage cannot be avoided, the rod or cylinder should be rolled into a new position every two months or so to prevent drying, distortion and deterioration of the seals. Don't forget that a cylinder can be a major source of contamination. A small scratch or nick on the sleeve will quickly shred packing and contaminate the system. Store cylinders carefully and keep them clean.

The following procedures should be followed in order to prevent oxidation and maintain the surfaces of a mounted hydraulic cylinder during idle periods. These idle periods may include; inventory units, demo units, out of service units, etc.

- All machined surfaces left expose should be coated with a light film of grease, if not oxidation will occur.
- If oxidation is present, apply a light coat of oil to the surfaces.
- Buff surfaces with 320 or 400 grit sandpaper. Do not buff surfaces up and down the length, buff only around the circumference.
- If after buffing, the surfaces show evidence of oxidation damage i.e., pitting, the cylinder should be inspected by an authorized service center for evaluation.
- Operation of a hydraulic cylinder with surface damage will shorten the longevity and preclude any warranty express or implied.

### **INSTALLATION**

• Cleanliness is an important consideration, and Parker cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, the piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations. One small foreign particle can cause premature failure of the cylinder or other hydraulic system components. If oxidation is present, apply a light coat of oil to the surfaces.

• Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear.

• Cylinders operating in an environment where air drying material are present such as fast- drying chemicals, paint, or welding splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

## Front Mount Dump Body Stroke & Lifting Calculations

**Note: This guide is for use to determine approximate stroke and lifting requirements for a Front Mount Dump Body, they should not be used for Frameless Type Trailers, Underbody, Telescopic Farm (slant forward or rearward), or Scissor Type Hoists. Final dimensions and calculations should be determined by an engineering drawing.**

Formula for Calculating Initial Required Cylinder Force to Lift a Load

$$\frac{\text{Load (lbs)} \times "A"}{"B"} = \text{Initial required cylinder force}$$

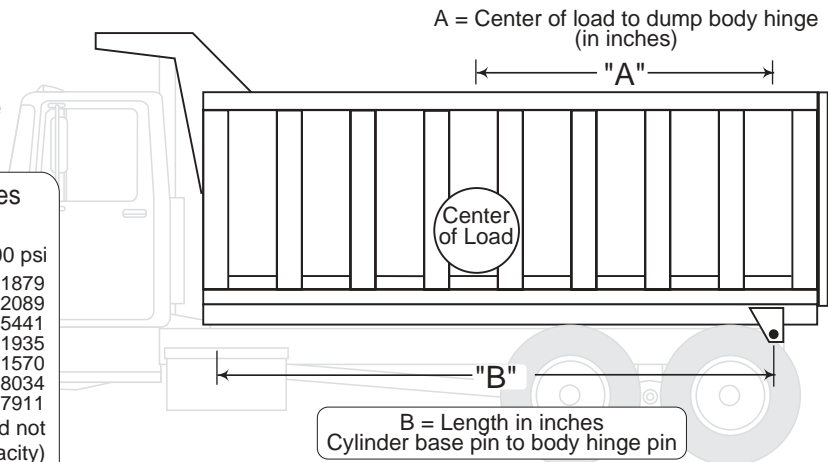
Example

$$\frac{50,000\# \times 85"}{166"} = 25,603\# \text{ of force to start the lift}$$

### Commercial Telescopic Lifting Capacities

Stage O.D. inches	System operating pressure			
	800 psi	1000 psi	1500 psi	2000 psi
2.75"	4752	5940	8909	11879
3.75"	8836	11045	16567	22089
4.75"	14176	17721	26581	35441
5.75"	20774	25967	38951	51935
6.75"	28628	35785	53677	71570
7.90"	39213	49017	73525	98034
9.37"	55165	68956	103434	137911

Note: For a good design, initial pressure should not exceed 800 psi at start of lift. Effective force (capacity) is only that of the sleeve / stage which is moving and will decrease as cylinder changes to the next moving sleeve. The effective force will also be reduced if the



Formula for Calculating the Required Cylinder Stroke for a Dump Angle

$$"B" \times "D" = \text{Approximate Stroke}$$

Example

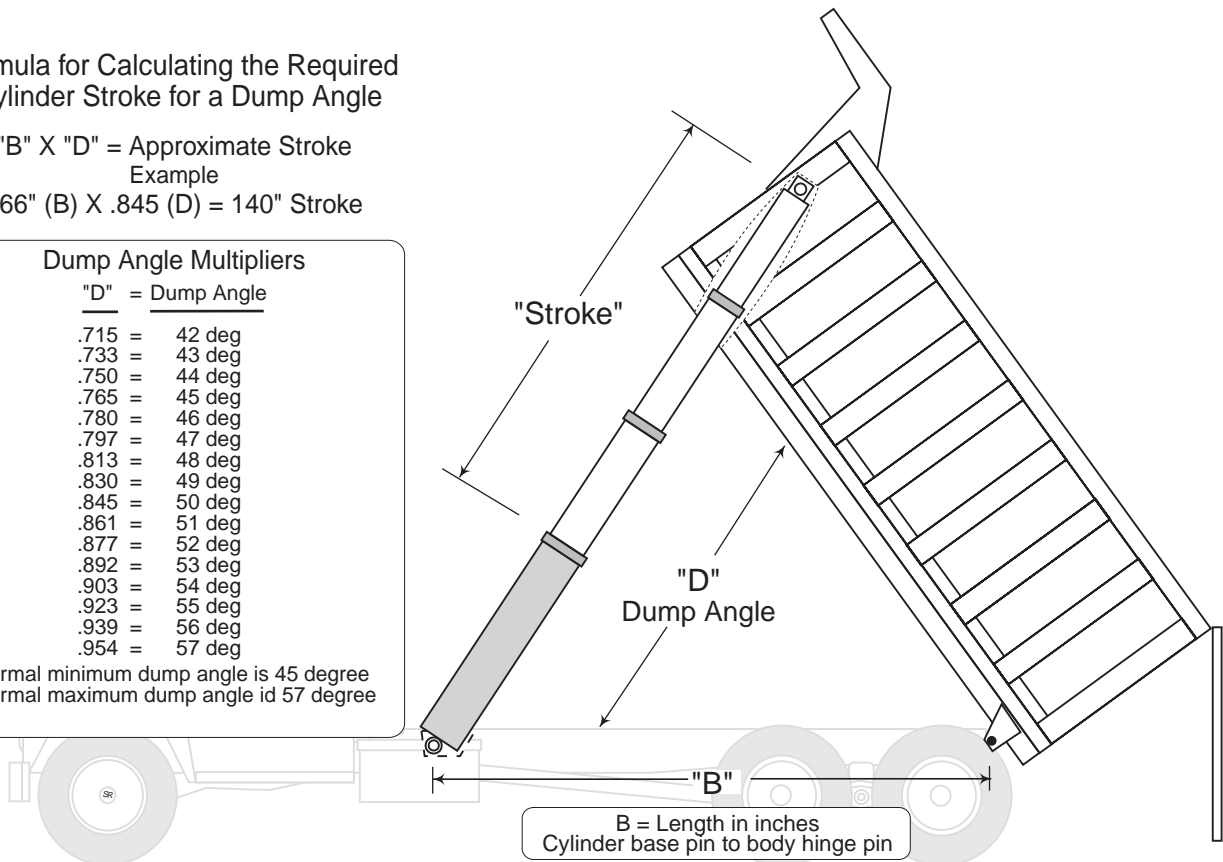
$$166" (B) \times .845 (D) = 140" \text{ Stroke}$$

### Dump Angle Multipliers

"D" = Dump Angle

.715 =	42 deg
.733 =	43 deg
.750 =	44 deg
.765 =	45 deg
.780 =	46 deg
.797 =	47 deg
.813 =	48 deg
.830 =	49 deg
.845 =	50 deg
.861 =	51 deg
.877 =	52 deg
.892 =	53 deg
.903 =	54 deg
.923 =	55 deg
.939 =	56 deg
.954 =	57 deg

Normal minimum dump angle is 45 degree  
Normal maximum dump angle is 57 degree





## Commodities & Materials Approximate Weights

### Approximate Weights of Materials

Material	lbs. / cu. yd.	tons / cu. yd.	Material	lbs. / cu. yd.	tons / cu. yd.
Andesite stone	4887	2.44	Earth & sand, wet	3240	1.62
Ashes	1080	0.52	Fire Brick	3915	1.95
Asphalt	2700	1.35	Fire Clay	3510	1.75
Asphaltum	2349	1.17	Garbage	1150	0.57
Basalt rock	4887	2.44	Gravel, dry	2970	1.48
Brick, soft clay	2718	1.35	Gravel, out of water	1620	0.81
Brick, hard clay	3397	1.69	Granite	4536	2.26
Brick, pressed	3806	1.9	Lime, quick, loose	1431	0.71
Brick, paving	4246	2.12	Lime, quick, shaken	1485	0.70
Block, paving	3694	1.84	Limestone, solid	4536	2.26
Bluestone	2970	1.48	Limestone, loose	2592	1.29
Cement, natural	1512	0.75	Marble, solid	4455	2.22
Cement, Portland	2430	1.21	Marble, loose	2592	1.29
Cement, Portland, set	4941	2.47	Mortar, set	2781	1.39
Cement, Rosendale	1863	0.93	Mud, dry	2430	1.21
Cinders	1080	0.54	Mud, packed	3105	1.55
Clay, dry	1701	0.85	Mud, wet	2916	1.45
Clay, wet	2970	1.48	Pitch	1863	0.93
Clay & gravel, dry	2700	1.35	Plaster of Paris	2646	1.32
Coal, anthracite	1536	0.76	Powder, blasting	1682	0.84
Coal, bituminous	1275	0.64	Quartz	4374	2.18
Coke	837	0.42	Rubbish	199.8	0.09
Concrete, cinders	2970	1.48	Sand, dry, loose	2619	1.30
Concrete, gravel	4104	2.05	Sand, wet	3186	1.59
Concrete, limestone	4050	2.02	Sandstone	4023	2.01
Concrete, sandstone	3915	1.95	Slag, bank	1890	0.94
Concrete, trap rock	4185	2.09	Slag, screenings	2700	1.35
Crushed stone	2700	1.35	Slag, machine	2592	1.29
Earth, dry, loose	1890	0.94	Slag, sand	1485	0.74
Earth, damp, loose	2106	1.05	Shale	4374	2.18
Earth, damp packed	2592	1.29	Slate	4725	2.31
Earth & gravel, dry	2700	1.35	Tar	1674	0.83
Earth & gravel, wet	3240	1.62	Tile	2970	1.43
Earth & sand, dry	2709	1.35	Trap stone	5849	2.52

### Steel & Aluminum Gauge, Thickness and Weight

#### Steel

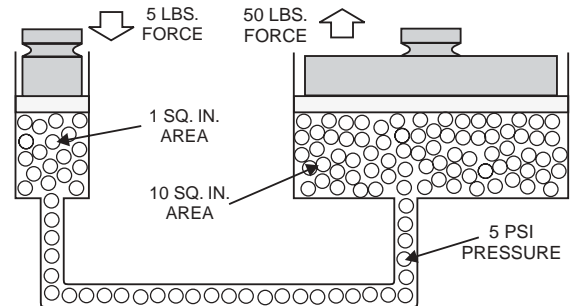
3/8"	0.375	15.320 lbs. per sq. ft.
1/4" (approx. 3 Ga.)	0.250	10.200 lbs. per sq. ft.
3/16" (approx. 7 Ga.)	0.188	7.650 lbs. per sq. ft.
8 Ga.	0.164	6.875 lbs. per sq. ft.
9 Ga.	0.149	6.250 lbs. per sq. ft.
10 Ga.	0.134	5.625 lbs. per sq. ft.
11 Ga.	0.120	5.000 lbs. per sq. ft.
12 Ga.	0.105	4.375 lbs. per sq. ft.
13 Ga.	0.090	3.750 lbs. per sq. ft.
14 Ga.	0.075	3.125 lbs. per sq. ft.

#### Aluminum

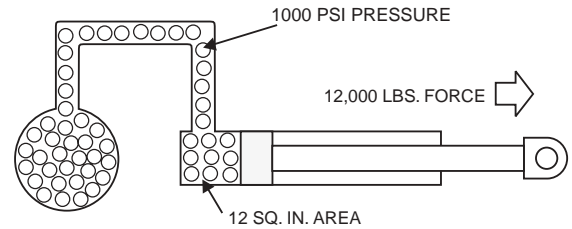
3/8"	0.375	5.18 lbs. per sq. ft.
1/4"	0.250	3.53 lbs. per sq. ft.
3/16"	0.188	2.65 lbs. per sq. ft.
5/32"	0.156	2.25 lbs. per sq. ft.

## Hydraulic Theory

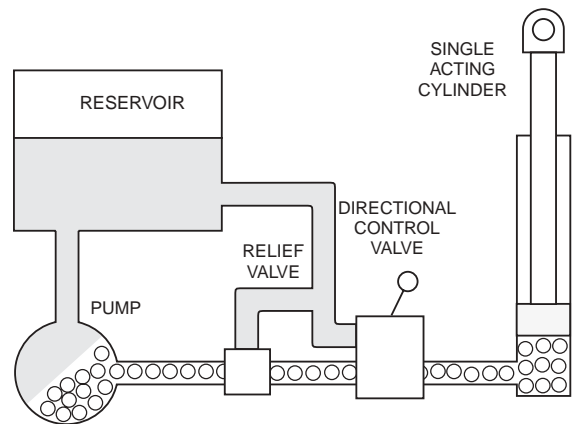
The basis for all hydraulic systems is expressed by Pascal's law which states that the pressure exerted anywhere upon an enclosed liquid is transmitted undiminished, in all directions, to the interior of the container. This principle allows large forces to be generated with relatively little effort. As illustrated, a 5 pound force exerted against a 1 inch square area creates an internal pressure of 5 psi. This pressure, acting against the 10 square inch area develops 50 pounds of force.



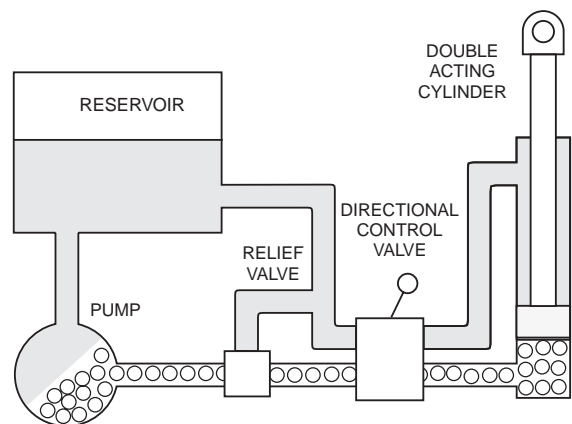
In a basic hydraulic circuit, the force exerted by a cylinder is dependent upon the cylinder bore size and the pump pressure. (There is no force generated unless there is resistance to the movement of the piston). With 1000 psi pump pressure exerted against a 12 square inch piston area (approximately 4" dia.), a force of 12,000 pounds is developed by the cylinder. The speed at which the piston will move is dependent upon the flow rate (gpm) from the pump and the cylinder area. Hence, if pump delivery is 1 gallon per minute (231 cu. in./min.) the cylinder piston will move at a rate of 19.25 in./min. (231 cu. in. ÷ 12 sq. in./min.).



The simplest hydraulic circuit consists of a reservoir, pump, relief valve, 3-way directional control valve, single acting cylinder, connectors and lines. This system is used where the cylinder piston is returned by mechanical force. With the control valve in neutral, pump flow passes through the valve and back to the reservoir. With the valve shifted, oil is directed to the piston side of the cylinder, causing the piston to move, extending the rod. If the valve is returned to neutral, the oil is trapped in the cylinder, holding it in a fixed position, while pump flow is returned to the reservoir. Shifting the valve in the opposite direction permits the oil to pass through the valve back to the reservoir. The relief valve limits the system pressure to a pre-set amount. Relief valves are commonly incorporated into the directional control valve.



A hydraulic system using a double acting cylinder and a 4-way valve differs from a single acting cylinder system in that the cylinder can exert force in both directions. With the control valve in neutral, flow is returned to the reservoir. When shifted in one direction, oil is directed to the piston side of the cylinder, causing the cylinder to extend. Oil from the rod side passes through the valve back to the reservoir. If the valve is shifted to neutral, oil in the cylinder is trapped, holding it in a fixed position. When the valve is shifted in the opposite position, oil is directed to the rod side of the cylinder, causing the cylinder to retract. Oil from the piston side passes through the valve back to the reservoir. Cylinder extend force is the result of pressure (psi) times the piston area (minus any force resulting from the pressure acting against the rod side of the piston). Retract force is a result of the pressure (psi) times the area difference between the rod and the piston (minus any force resulting from pressure acting against the piston side of the cylinder).

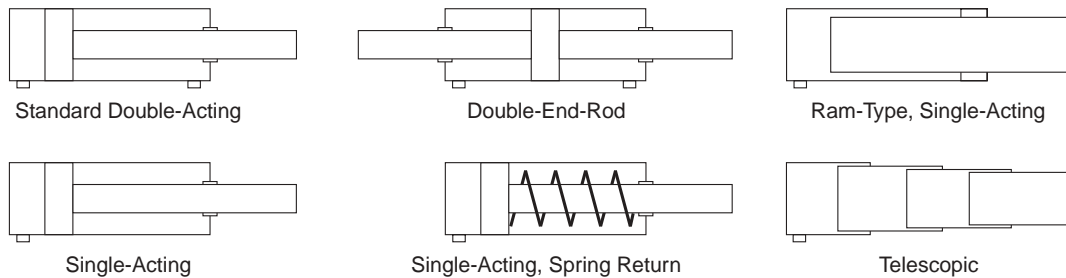


All of the systems described above are open center systems due to the oil flowing through the control valve back to the tank. Most systems are this type. Closed center systems use control valves with the inlet port blocked and variable displacement pumps. With the control valve in neutral, the pump is "de-stroked" to zero flow.

## Designing With Cylinders

The function of a cylinder in a fluid power system is to convert energy in the fluid stream into an equivalent amount of mechanical energy. Its power is delivered in a straight-line, push-pull motion.

**Graphic Symbols:** Following diagram illustrates standard ANSI (American National Standards Institute) graphic symbols for use in circuit diagrams. Six of the more often used are shown:

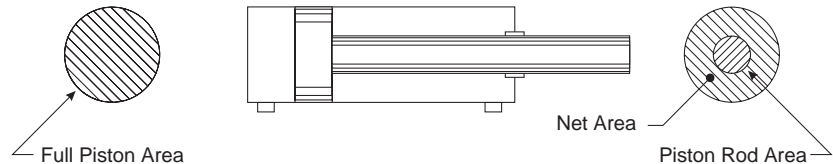


Standard ANSI (American National Standards Institute) Graphic Symbols for Use in Circuit Diagrams.

The standard double-acting cylinder with piston rod out one end, is used in the majority of applications. It develops force in both directions of piston travel. The double-end-rod type is a variation of the standard cylinder but having a piston rod extending out both end caps. It is occasionally used where it is necessary to have equal area on both sides of the piston, such as a steering application, or where one of rod extensions is to be used for mounting a cam for actuation of a limit switch, or for mounting a stroke limiting stop. The single-acting cylinder develops force in one direction, and is retracted by the reactive force from the load or an internal or external spring. The single-acting ram is a construction often used on fork lift mast raise, or a refuse body tailgate raise, or a high tonnage press cylinders. The telescoping cylinder is built in both single-acting and double-acting types. Its purpose is to provide a long stroke with a relatively short collapsed length. The single-acting telescopic is a construction often used to raise dump trucks and dump trailers. The double-acting telescopic is a construction often used in garbage bodies to pack and eject the load.

### Force Produced by a Cylinder:

A standard double-acting cylinder has three significant internal areas. The full piston area when exposed to fluid pressure, produces force to extend the piston rod. The amount of this force, in pounds, is calculated by multiplying piston square inch area times gauge pressure, in PSI.

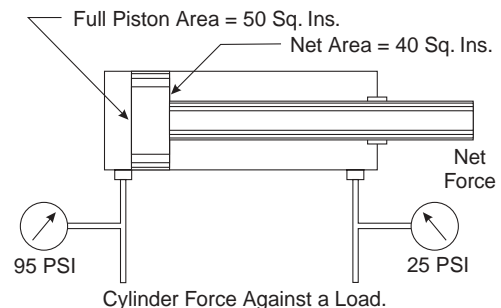


Significant Areas in a Double-Acting Cylinder, Single-End-Rod Type.

The "net" area on the front side of the piston is less than full piston area because part of the piston surface is covered by the rod. Net area is calculated by subtracting rod area from full piston area. Because net area is always less than piston area, cylinder force for rod retraction is always less than can be developed for extension when working at the same pressure.

**Cylinder Force Against a Load:** The force which a cylinder can exert against a load is determined by making two calculations. First, extension force is calculated according to piston area and PSI pressure against it. Then, the opposing force on the opposite side of the piston is calculated the same way. Net force against a load is the difference between the two.

*Caution! It is incorrect, on a single-end-rod cylinder to calculate cylinder net force as piston area times  $\Delta P$  (pressure drop, psid) across the piston. This is true only for double-end-rod cylinders which have equal areas on both sides of the piston.*



Cylinder Force Against a Load.

Example: The extension force is 95 PSI x 50 sq. in. = 4750 lbs. The opposing force on the rod side is 25 PSI x 40 sq. in. = 1000 lbs. Therefore, the net force which the cylinder can exert against a load in its extension direction is 4750 - 1000 = 3750 lbs. In making cylinder force calculation we sometimes assume that the opposite side of the piston is at atmospheric pressure, and that the counter-force is zero. On some kinds of loads this can lead to serious error.

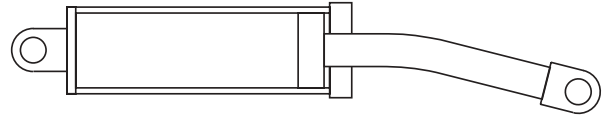
Note: Most designers try to eliminate back pressure to get full extend force, but there will always be back pressure.

## Designing With Cylinders

Standard catalog cylinder models are not designed to take any appreciable side load on the piston rod. They must be mounted so the rod is not placed in a bind at any part of the stroke. If the direction of the load changes during the stroke, hinge mounting must be used on both the rod end and rear end. Use guides on the mechanism, if necessary, to assure that no side load is transmitted to the cylinder rod or piston.

### Rod Buckling

Column failure or buckling of the rod may occur if the cylinder stroke is too long relative to the rod diameter. The exact ratio of rod length to rod diameter at which column failure will occur cannot be accurately calculated, but the "Column Strength" table in this manual shows suggested safe ratios for normal applications.

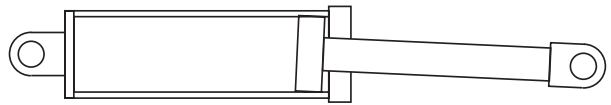


### Tension and Compression Failures

All standard cylinders have been designed with sufficiently large piston rods so failure will never occur either in tension or compression, provided the cylinder is operated within the manufacturers pressure rating.

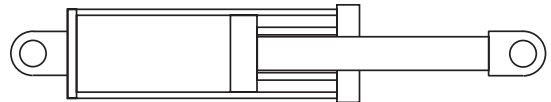
### Rod Bearing Failure

Rod bearing failures usually occur when the cylinder is at maximum extension. Failures occur more often on hinge or trunnion mount cylinders, in which the rear support point is located considerably behind the rod bearing. If space permits, it is wise to order cylinders with longer stroke than actually required, and not permit the piston to approach to the front end while under full load.



### Stop Collar

On those application where it is necessary to let the piston "bottom out" on the front end, the cylinder may be ordered with a stop collar. The stop collar should be especially considered on long strokes if the distance between support exceeds 10 times the rod diameter, if the maximum thrust is required at full extension, and if the cylinder has a rear flange, clevis, tang, or trunnion mounting.



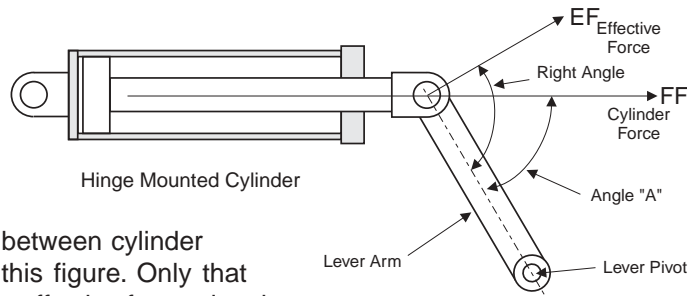
### MINIMUM PISTON ROD DIAMETER

Figures in body of chart are suggested minimum rod diameters, in inches.

Load, Pounds	Exposed Length of Piston Rod, Inches / Rod Diameter, Inches							
	10"	20"	40"	60"	70"	80"	100"	120"
1,000			3/4	1				
1,500			13/16	1-1/16				
2,000		5/8	7/8	1-1/8	1-1/4	1-3/8		
3,000		11/16	15/16	1-3/16	1-3/8	1-1/2		
4,000		3/4	1	1-1/4	1-7/16	1-9/16	1-7/8	
6,000	13/16	7/8	1-1/8	1-3/8	1-9/16	1-5/8	1-7/8	
8,000	15/16	1	1-3/16	1-1/2	1-5/8	1-3/4	2	2-1/4
10,000	1	1-1/8	1-5/16	1-9/16	1-3/4	1-7/8	2-1/8	2-3/8
15,000	1-3/16	1-1/4	1-7/16	1-3/4	1-3/4	2	2-1/4	2-1/2
20,000	1-3/8	1-7/16	1-5/8	1-7/8	2	2-1/8	2-7/16	2-3/4
30,000	1-11/16	1-3/4	1-7/8	2-1/8	2-1/4	2-3/8	2-11/16	3
40,000	2	2	2-1/8	2-3/8	2-1/2	2-5/8	2-7/8	3-1/4
60,000	2-3/8	2-7/16	2-1/2	2-3/4	2-3/4	2-7/8	3-1/4	3-1/2
80,000	2-3/4	2-3/4	2-7/8	3	3	3-1/4	3-1/2	3-3/4
100,000	3-1/8	3-1/8	3-1/4	3-3/8	3-1/2	3-1/2	3-3/4	4
150,000	3-3/4	3-3/4	3-7/8	4	4	4-1/8	4-3/8	4-1/2
200,000	4-3/8	4-3/8	4-3/8	4-1/2	4-3/4	4-3/4	4-7/8	5
300,000	5-3/8	5-3/8	5-3/8	5-1/2	5-1/2	5-1/2	5-3/4	6

## Cylinder Working a Rotating Lever:

A cylinder working a hinged lever can exert its maximum force on the lever only when the lever axis and cylinder axis are at right angles. When Angle "A" is greater or less than a right angle, only part of the cylinder force is effective on the lever. The cylinder force is found by multiplying the full cylinder force times the sine (sin) of the least angle between cylinder and lever axes. Cylinder Force, FF, is horizontal in this figure. Only that portion, EF, which is at right angles to the lever axis is effective for turning the lever. The value of EF varies with the acute angle "A" between the cylinder and lever axis.



Example: Find the effective force exerted by a 3-inch bore cylinder against a lever when the cylinder is operating at 3000 PSI and when its axis is at an angle of 55 degrees with the lever axis.

First, find the full force developed by the cylinder:  $FF$  (full force) = 7.07 (piston area) x 3000 PSI = 21,210 lbs.

Next, find the effective force at 55°:  $EF$  (effective force) = 21,210 x 819 (sin 55°) = 17,371 lbs.

Since maximum cylinder force is delivered in the right angle position, the hinge points for the cylinder and lever should be located, if possible, so the right angle falls close to the lever position which requires the greatest torque (force).

Note: The working angles on a hinged units, such as a dump truck, refuse body packer blade, or a crane, are constantly changing, it may be necessary to construct a rough model on a sheet of paper, to exact scale, with cardboard arms and thumbtack hinge pins. This will show the point at which the greatest cylinder thrust is needed. An exact calculation can then be made for this condition.

**POWER FACTOR TABLE**  
Trigonometric Sines and Cosines

Angle, Degrees	Sine (sin)	Cosine (cos)	Angle, Degrees	Sine (sin)	Cosine (cos)	Angle, Degrees	Sine (sin)	Cosine (cos)
1	0.0175	0.9998	31	0.5150	0.8572	61	0.8746	0.4848
2	0.0349	0.9994	32	0.5299	0.8480	62	0.8829	0.4695
3	0.0523	0.9986	33	0.5446	0.8387	63	0.8910	0.4540
4	0.0698	0.9976	34	0.5592	0.8290	64	0.8988	0.4384
5	0.0872	0.9962	35	0.5736	0.8192	65	0.9063	0.4226
6	0.1045	0.9945	36	0.5878	0.8090	66	0.9135	0.4067
7	0.1219	0.9925	37	0.6018	0.7986	67	0.9205	0.3907
8	0.1392	0.9903	38	0.6157	0.7880	68	0.9272	0.3746
9	0.1564	0.9877	39	0.6293	0.7771	69	0.9336	0.3584
10	0.1736	0.9848	40	0.6428	0.7660	70	0.9397	0.3420
11	0.1908	0.9816	41	0.6561	0.7547	71	0.9455	0.3256
12	0.2079	0.9781	42	0.6691	0.7431	72	0.9511	0.3090
13	0.2250	0.9744	43	0.6820	0.7314	73	0.9563	0.2924
14	0.2419	0.9703	44	0.6947	0.7193	74	0.9613	0.2756
15	0.2588	0.9659	45	0.7071	0.7071	75	0.9659	0.2588
16	0.2756	0.9613	46	0.7193	0.6947	76	0.9703	0.2419
17	0.2924	0.9563	47	0.7314	0.6820	77	0.9744	0.2250
18	0.3090	0.9511	48	0.7431	0.6691	78	0.9781	0.2079
19	0.3256	0.9455	49	0.7547	0.6561	79	0.9816	0.1908
20	0.3420	0.9397	50	0.7660	0.6428	80	0.9848	0.1736
21	0.3584	0.9336	51	0.7771	0.6293	81	0.9877	0.1564
22	0.3746	0.9272	52	0.7880	0.6157	82	0.9903	0.1392
23	0.3907	0.9205	53	0.7986	0.6018	83	0.9925	0.1219
24	0.4067	0.9135	54	0.8090	0.5878	84	0.9945	0.1045
25	0.4226	0.9063	55	0.8192	0.5736	85	0.9962	0.0872
26	0.4384	0.8988	56	0.8290	0.5592	86	0.9976	0.0698
27	0.4540	0.8910	57	0.8387	0.5446	87	0.9986	0.0523
28	0.4695	0.8829	58	0.8480	0.5299	88	0.9994	0.0349
29	0.4848	0.8746	59	0.8572	0.5150	89	0.9998	0.0175
30	0.5000	0.8660	60	0.8660	0.5000	90	1	0

## Cylinders on Cranes and Beams:

Example 1: Calculation to find cylinder force required to handle 15,000 lbs. when the beam is in the position shown.

First find the force F2 at right angles to the beam which must be present to support the 15,000 lb. load.

$$F2 = W \times \cos 50^\circ = 15,000 \times .643 = 9,645 \text{ lbs.}$$

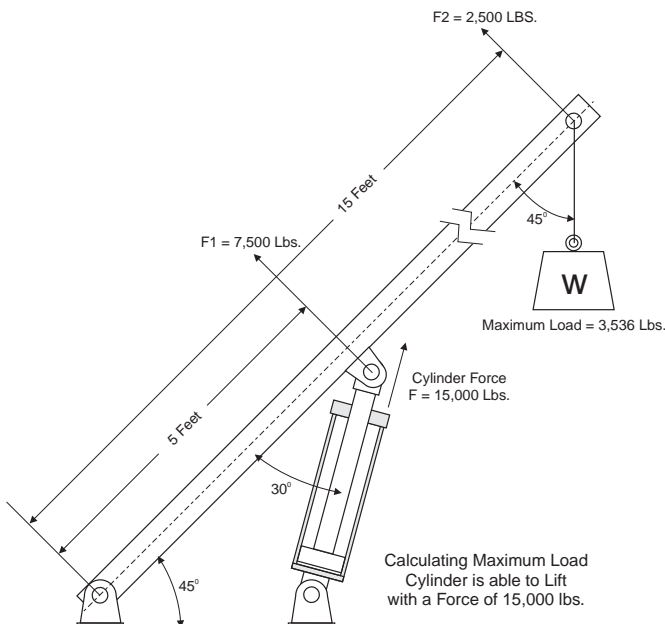
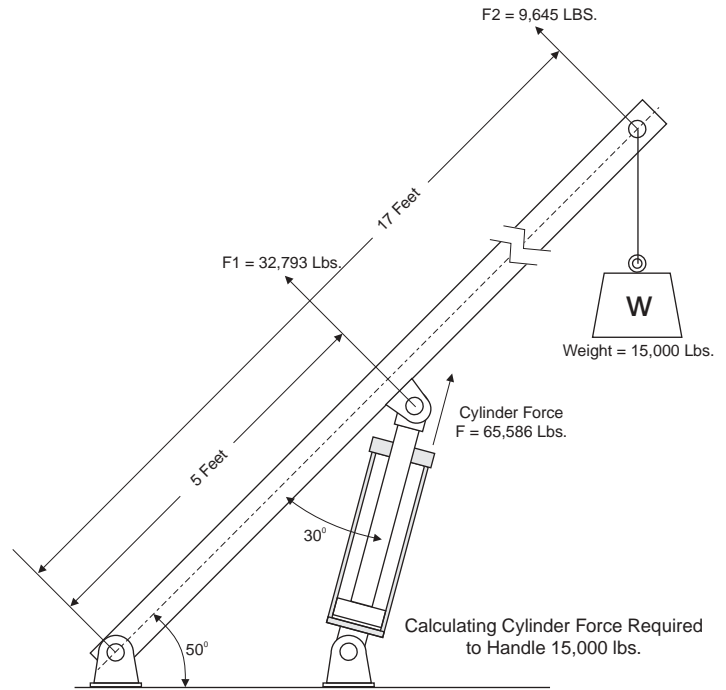
Next, find the force F1, also at right angles to the beam, which must be produced by the cylinder to support the 15,000 lb. load. This is calculated by proportion. F1 will be greater than F2 in the same ratio that arm length 17 feet is greater than arm length 5 feet.

$$\text{Arm length ratio of } 17 \div 5 = 3.4.$$

Therefore,  $F1 = 9,645 \times 3.4 = 32,793 \text{ lbs.}$

Finally, calculate the cylinder force, at an angle of  $30^\circ$  to the beam, which will produce a force of 32,793 lbs. at its rod hinge point at right angles to the beam.

$$F \text{ (cylinder force)} = F1 \div \sin 30^\circ = 32,793 \div .500 = 65,586 \text{ lbs.}$$



Example 2: Calculation to find maximum load that can be lifted with a cylinder force of 15,000 lbs. when the beam is in the position shown.

First, translate the cylinder thrust, F, of 15,000 lbs. into 7,500 lbs. at right angles to the beam using power factor of 0.500 (sin) from the power factor table, for a  $30^\circ$  angle.

Next, translate this to F2, 2,500 lbs. at the end of beam where the weight is suspended. This is done with simple proportion by the length of each arm from the base pivot point. F2 is 1/3rd F1 since the lever arm is 3 times as long.

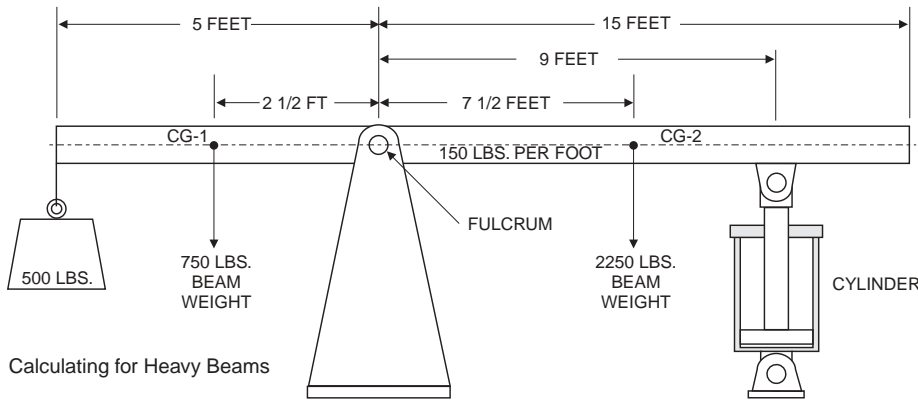
Finally, find the maximum hanging load that can be lifted, at a  $45^\circ$  angle between beam and load weight, using sin (power factor) for  $45^\circ$ :

$$W = F2 \div \sin 45^\circ = 2500 \div 0.707 = 3535 \text{ lbs.}$$



### Calculations for a Heavy Beam:

On a heavy beam it is necessary to calculate not only for concentrated loads such as the suspended weights and cylinder thrust, but to figure in the weight of the beam itself. If the beam is uniform, so many pounds per foot of length, the calculation is relatively easy. In the example shown in figure "B", the beam has a uniform weight of 150



lbs. per foot, is partially counterbalanced by a weight of 500 lbs. on the left side of the fulcrum, and must be raised by the force of a cylinder applied at a point 9 feet from the right side of the fulcrum.

The best method of solution is to use the principle of moments. A moment is a torque force consisting of (so many) pounds applied at a lever distance of (so many) feet or inches. The solution here is to find how much cylinder thrust is needed to just balance the beam. Then, by increasing the hydraulic cylinder

thrust 5 to 10% to take care of friction losses, the cylinder would be able to raise the beam.

Using the principle of moments, it is necessary to calculate all of the moment forces which are trying to turn the beam clockwise, then calculate all the moment forces trying to turn the beam counter-clockwise, then subtract the two. In this case they must be equal to balance the beam.

Clockwise moment due to the 15 feet of beam on the right side of the fulcrum: This can be considered as a concentrated weight acting at its center of gravity 7 1/2 feet from the fulcrum.  $\text{Moment} = 150 \text{ (lbs. per foot)} \times 15 \text{ feet} \times 7 \frac{1}{2} \text{ feet} = 16,875 \text{ foot pounds.}$

Counter-clockwise moment due to the 5 feet of beam on the left side of the fulcrum:  $150 \text{ (lbs. per foot)} \times 5 \text{ feet} \times 2 \frac{1}{2} \text{ feet (CG distance)} = 1875 \text{ foot pounds.}$

Counter-clockwise moment due to hanging weight of 500 pounds:  $500 \times 5 \text{ feet} = 2500 \text{ foot lbs.}$

Subtracting counter-clockwise from clockwise moments:  $16,875 - 1875 - 2500 = 12,500 \text{ foot pounds}$  that must be supplied by the cylinder for balance condition. To find cylinder thrust:  $12,500 \text{ foot pounds} \div 9 \text{ feet (distance from fulcrum)} = 1388.8 \text{ pounds.}$

Remember when working with moments, that only the portion of the total force which is at right angles to the beam is effective as a moment force. If the beam is at an angle to the cylinder or to the horizontal, then the effective portion of the concentrated or distributed weight, and the cylinder thrust, can be calculated with the power factors (refer to chart).



## ***Designing With Cylinders Telescopic Cylinders***

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The great advantage telescopic cylinders have over conventional rod-type cylinders is their ability to provide an exceptionally long stroke from a compact initial package. The collapsed length of typical telescopic cylinders varies between 20% to 40% of their extended length. Thus, when mounting space is limited and the application needs a long stroke, a telescopic cylinder is a natural solution.

For example, a dump body needs to be tilted 60 degrees in order to empty completely. If the body or trailer is fitted with a conventional rod-type cylinder - with a one-piece barrel and stroke long enough to attain that angle - the dump body could not return to a horizontal orientation for highway travel because of the cylinder's length, even when fully retracted. A telescopic cylinder easily solves this problem.

Telescopic hydraulic cylinders are relatively simple devices, but their successful application requires an understanding of this component's idiosyncrasies. Knowledge of how telescopic cylinders work and which special application criteria to consider will enable you to design them safely and economically into equipment.

### **Main and Stages**

As the name infers, Telescopic cylinders are constructed like a telescope. Sections of DOM (drawn over mandrel) steel tubing with successively smaller diameters nest inside each other. The largest diameter section is called the *main* or *barrel*; the smaller-diameter sections that move are called *stages*; The smallest stage is also called the *plunger*. The maximum practical number of moving stages seems to be six. Theoretically, cylinders with more stages could be designed but their stability problem would be daunting.

Telescopic cylinders normally extend from the largest stage to the smallest. This means the largest stage - with all the smaller stages nested inside it - will move first and complete its stroke before the next stage begins to move. This procedure will continue for each stage until the smallest-diameter stage is fully extended. Conversely, when retracting, the smallest-diameter stage will retract fully before the next stage starts to move. This continues until all stages are nested back in the main.

### **Basic Cylinder Types**

As with conventional cylinders, the two basic types of telescopic hydraulic cylinders are *single-* and *double-acting*.

Single-acting telescoping cylinders extend under hydraulic pressure and rely on gravity or some external mechanical force for retraction. Single-acting cylinders are used in applications where some form of load is always on the cylinders. The classic single-acting telescopic applications are dump trucks and dump trailers. Pressurized oil extends the telescopic cylinder to raise one end of the dump body and expel its load. When pressure is released, the weight of the dump body forces oil out of the cylinder and it retracts.

Double-acting telescopic cylinders are powered hydraulically in both directions. They can be used in applications where neither gravity nor external force is available. They are well suited to noncritical positioning applications requiring out-and-back movement of a substantial load. A classic application is the packer-ejector cylinder in refuse vehicles and transfer trailers. The horizontally mounted cylinder pushes a platen to compress the load, then must retract with the platen so more material can be added. Gravity cannot help, so a double-acting cylinder is used.

### **Bearings and Seals**

Each stage is supported within each successively larger stage by at least two bearings. One is at the bottom outside diameter or *piston end* of the stage, and the other is at the top internal diameter or *packing section* of the next larger stage. The distance between these two bearings determines the degree by which one stage overlaps the next. Generally, this distance or overlap must increase as overall stroke increases in order to resist deflection caused by the weight of extended stages and the load.

There are several designs for sealing telescopic cylinders. One of the most common designs for sealing telescopic cylinders is the use of several hinged chevron vee seals and / or one-piece, multi-lip seals with hinged lips molded in place. These seals are held in place by a stop ring or snap ring and packing nut and they use guide bearings on the sleeve piston. The internal diameter "ID" of each stage is sealed against the outer diameter "OD" of the next smaller stage nested inside it. The style and placement of these seals varies among cylinder manufactures. The style of seal also depends on its particular function. Zero-leakage, multiple-lip soft seals are usually found in the internal diameter at the packing section of the main and moving stages. Low-leakage hard seals are found on the piston end of double-acting telescopic cylinders. These piston seals allow the cylinder to retract under pressure.

Another design used on some single-acting telescopic cylinders, is the use of soft, zero leakage seals on the piston, which in turn use the full bore of the next larger stage as the effective area for extend force. These same seals contain the oil in the cylinder. The upper end of the cylinder, where the soft seals normally would be found, now contains a bearing for guidance. If any type of seal is used in the upper end of this telescopic cylinder design, it is usually a wiper/seal combination to exclude contaminants from entering the cylinders. With either type, the many sealing surfaces must compensate for normal deflection of stages as the cylinder extends.

## ***Designing With Cylinders Telescopic Cylinders***

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The cylinder design with the bearing on the piston and the seal on the other end is called a *displacement-type cylinder*. The single-acting design with a seal on the piston and a bearing at what normally would be the packing end approaches the classification of ram-type cylinder. Performance is similar to a double-acting rod-type cylinder with pressurized oil being supplied only to the piston side. All the telescopic stages would stroke in this way.

### **Double-Acting Telescopic Cylinders**

Normally extension of a double-acting telescopic cylinder occurs in the same manner as with the single-acting type.

Retraction of double-acting telescopic cylinders is made possible by sealing each moving stage's piston area outside diameter with the next larger stage's inside diameter and building internal oil-transfer holes into each moving stage. The oil-transfer holes are located just above the pistons in the body of the stage. The retraction port normally is located in the top of the smallest stage. Oil flows through this port and into the smallest stage. The oil-transfer hole allows oil to enter and pressurize the volume between the next stage's internal diameter and the smaller stage's outer diameter. Pressure in this volume generates the force to move or retract the smaller stage into the larger stage.

Once this stage is fully retracted, the oil-transfer hole in the next larger stage is exposed to allow oil flow for it to retract. This retraction process continues automatically until all stages have retracted into the main. The seal on each stage selects the areas against which pressure will work.

Locating the retract port on the top of the smallest stage is the simplest way to design a double-acting telescopic cylinder, but this port location typically requires an arrangement of hoses, hose protection, and hose reels to deliver oil to the moving stage. To avoid having fluid power ports spaced far apart when the cylinder is fully extended, most double-acting telescopic cylinder designs locate both fluid ports in the smallest stage or plunger. The cylinder is then mounted so that the smallest stage or plunger is stationary and the larger and heavier stages would be the ones that move as the cylinder extends.

In some instances a double-acting telescoping cylinder can be designed where both ports are located in the stationary main barrel. Cylinder size (diameter and stroke) and the number of moving stages determine whether this is possible. If it is, the more-complicated internal passages for oil flow require a double wall and or a special trombone type telescopic design.

Piston seals on double-acting telescoping cylinders are normally manufactured from a hard substance such as cast iron, ductile iron or glass-reinforced nylon. The hard seals are needed to limit abrasion between the oil transfer holes and ports over which they must pass.

### **Single- and Double-Acting Combinations**

There are a few unusual types of telescoping cylinders designed for specific applications. For example, a manufacturer of oil well equipment uses a type composed of both single- and double-acting stages to position a work-over rig. The work-over rig is a derrick or tower that is transported horizontally to the well site on a trailer. There, telescopic cylinders extend to swing the rig into a vertical position. When the rig's work is done, the telescopic cylinder pulls the rig to begin the transition from vertical back to horizontal. However, once the rig has started to tilt, no more pull force is needed because of the rig's weight and gravity will continue to retract the cylinder. In other words, the cylinder needs hydraulic power for the first part of its retraction stroke, but then operates as a single-acting unit.

In this type of design, the smallest moving stage is designed to be double-acting; the others are single-acting. The small stage can then provide push force to raise the rig, and pull force to start it back down. It is not unusual to design this type cylinder as a *skip-a-sleeve design*. Skip-a-sleeve design is as its name implies, a sleeve or stage is skipped during design. Normally a telescopic stage diameter increases approximately every inch, example; sleeve diameter may be 3.75" fits into a 4.25" bore, 4.75" fitting into 5.25" bore, etc. In a skip-a-sleeve design, a sleeve is removed to increase the effective area and the retract force of the smallest sleeve or plunger, example; plunger diameter is 2.75" and fits into the 4.25" bore of the 4.75" sleeve, thus increasing effective area and retract force.

### **Constant-Thrust / Constant-Speed**

A special telescopic cylinder - known as a *constant-thrust/constant-speed cylinder* - is configured so that all moving stages will extend at the same time, providing an overall constant speed as well as a constant push force throughout its stroke when extending or retracting. This type of cylinder has been used to drive a drill head in underground mining, where such performance parameters are necessary and space is at a premium. The more-complicated design accomplishes the required action by trapping oil internally, matching extend and retract areas, and limiting the number of moving stages.

### Design Considerations

Three familiar formulas determine the general operating characteristics of telescoping cylinders and can be manipulated to calculate the cylinder size required for a given cycle time or load. These formulas are:

$$F = A \times P$$

where:

F - force, lb

A - area, in<sup>2</sup>

P - operating pressure, psi

$$S = 19.2 Q/A$$

where:

S - speed, fpm

Q - flow rate, gpm

$$T = V/231Q$$

where:

T - cycle time, min

V - cylinder volume (area X stroke), in<sup>3</sup>

The basic formulas for force, speed, and cycle time that apply to conventional rod-type cylinders also can be used with telescopic cylinders. To successfully apply these formulas, the designer must know which of the multiple areas and diameters to use. To calculate the force of any stage, you must decide which area will be substituted into the formulas. This area is determined by the placement of the seals that describe the boundaries of the area.

For example: the extend area of a double-acting stage is determined by the seals on the pistons. Thus, the appropriate area would be calculated from the internal diameter of the next larger stage. On retraction, the area of any double-acting stage is the difference between that stage's outside diameter and the inside diameter of the next larger stage.

Designers must remember that the extend area for each stage is different, so the extend force for each stage also is different. The differences in areas mean that in an application with a constant-displacement pump supplying the hydraulic system, each stage will move at a different speed. This speed difference for each stage also holds true during retraction of double-acting telescopic cylinders because each stage's retract area is different.

In both types of telescopic cylinders, the smallest stage determines the force capacity of the cylinder. This stage will usually have the smallest extend and retract area. During extension, this stage will generate the cylinder's minimum force; during retraction, this stage normally generates the maximum force. A double-acting telescopic cylinder can exert no more retraction force than the smallest retract area provides.

After determining the effective diameter of each stage, volume can be approximated by dividing stroke by the number of stages and multiplying the quotient by each effective area. The sum of these volumes equals the approximate volume of oil to extend the cylinder. Reservoir volume should equal the cylinder's extended volume plus an initial volume of oil to fill the fully retracted cylinder and an adequate reserve for make-up oil.

Pump capacity is determined by applying the formula for speed to solve for Q (flow rate, gpm) in each stage. Inlet porting at the cylinder must be sized to accommodate the required flow for a given extension speed, of course.

### Special Design Considerations

Designers should *never* treat the telescopic cylinders as structural members. These cylinders should be used to generate work forces - not to stabilize the structure. They should be considered no more rigid than the columns of oil they contain. Telescopic cylinders always should be provided with mechanical support members.

Fully extended, long stroke telescopic cylinders can become very long, slender columns, making them susceptible to buckling. The structure of a telescopic cylinder can be considered as special as a stepped column with different diameter elements, each having a different moment of inertia. Additional overlap can help stabilize such a cylinder, but more overlap increases collapsed length as well as overall column length. Sometimes a cylinder diameter larger than required for the load may be needed to keep the cylinder safe under column loading.

As stated earlier, single-acting telescopic cylinders are extended by pressure and retracted by gravity or an external force. The extend speed is determined by the pump flow and flow capacity of the control valve. The retract speed is a function of the load on the cylinder and the ability of the hydraulic fluid to return to tank. Retraction speed can be controlled by metering return-oil flow through the control valve. Light loads and restricted flow slow down the retraction stroke. Most single-acting telescopic cylinders will not retract under their own weight. This is a result of several variables, including friction of the internal seals, attitude of the cylinder, and the type of mounting. A rigid mount with a low attitude may cause enough binding so that light loads cannot force the cylinder to retract.

As with any type of cylinder, heavy side loads should be avoided. Because of telescopic cylinder's multiple moving stages, side loading can cause internal binding that could result in mis-staging and possible stalling of the cylinder's movement. Because the overlap of each successive stage must be designed and manufactured with running and machining tolerances, these areas can act like hinges, allowing some movement. Longer overlap helps limit this movement, but cannot eliminate it. This is a Catch 22 design situation: the longer the overlap, the longer the cylinder's collapsed length.

### **Flow, Pressure Control**

A three-way, three-position valve can provide raise, lower and hold control for a single-acting cylinder. Retraction speed of single-acting cylinders may be controlled by manually metering flow through the valve's return port. As an alternative, some systems use an orifice in the return line, valve, or cylinder port that is sized to limit flow and, thus, limit retraction speed.

Four-way, three-position valving is needed to perform the same control functions on double-acting types. The additional pathway provides a route to tank for oil displaced from the plunger end.

### **Dealing with Intensification**

Due to its construction, double-acting telescopic cylinders will act as pressure intensifiers during extension and flow multipliers during retraction. These two phenomenon are directly related to the large difference in effective area between the extend and retract side of each stage piston. This ratio can be as high as 10:1, or even greater. During extension of a double-acting telescopic cylinder, hydraulic oil is pumped into the extend port and exhausted out the retract port. If exhaust flow is impeded or restricted, the retract side of the cylinder can be pressurized to a level equal to the extend pressure multiplied by the differential area ratio. A dead block of exhaust flow can produce pressures high enough to destroy the cylinder. If any type of holding or check valve is installed in the retract line or on the retract port, the pressure intensification phenomenon can become dangerous. In the case of a 10:1 stage, a 2000 psi main pressure would result in an intermediate plunger pressure of 20,000 psi if flow from plunger is dead blocked. A similar, though less hazardous condition often results when the plunger side outlet line is reduced for design reasons or as the result of clogging or misconnection. The circuit must be designed so that these valves open before (or simultaneously with) the application of extend pressure to the cylinder.

When a double-acting cylinder retracts, the opposite occurs. Oil is pumped into the retract port and exhausted through the extend port. The exhaust flow will be equal to the retract flow multiplied by the differential area ratio. With a 10:1 ratio, a 20-gpm retract flow becomes a 200-gpm exhaust flow. If the extend lines or valves are too small and flow is restricted, backpressure can occur in the cylinder to slow the retract speed. If the backpressure equals the pump's retract pressure, the cylinder will stall and not retract.

Telescopic cylinder manufacturers attempt to size the ports to eliminate or reduce the potential for this phenomenon, but designers should size other components in the hydraulic circuit with this in mind. Most problems relating to these phenomenon result from increasing pump flow or downsizing lines, connectors, or control valves after the cylinder has been specified for operation with larger components.

### **Seal Bypass**

Piston seals in double-acting telescopic cylinders normally are manufactured from a hard substance, such as cast iron, ductile iron, or glass reinforced nylon. Hard seals are needed to resist abrasion when the seals slide across the transfer holes. However, these seals are not as efficient as soft urethane or rubber seals, so small amounts of oil can bypass them. This bypass flow actually can cause a cylinder to stall if pump flow is less than the seal's allowable leakage rate. This may become a problem if the cylinder is required to stroke at low speeds. Consequently, loading should be limited to a level slightly below the cylinder's rated force at a given pressure.

Bypass leakage also can allow a cylinder to drift in either direction while holding a load. Drift is extremely hazardous if the cylinder is holding a load on the retract area. If a piston drifts past the internal transfer holes in a stage, the retract oil will rapidly transfer to the extend area - causing the cylinder to extend abruptly. This is possible because the retract oil volume is less than the extend volume, due to the large differential area ratio. Therefore, a double-acting telescoping cylinder should not be expected to hold a load on retraction.

### **Summary**

It should now be evident that specifying telescoping cylinders requires knowledge beyond that of conventional cylinders. The best insurance to guard against unforeseen problems — especially for those lacking familiarity with telescoping cylinders — is to draw from the experience of manufacturer's application engineers.

Manufacturer's of telescopic cylinders can (and have) altered their designs to suit a variety of special application considerations. Their application engineers should be eager to provide assistance in selecting or designing the right cylinder for your specific application, and advising about circuitry to operate it safely and efficiently.

## Formulas

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### CYLINDER FORMULAS

Thrust or force of any cylinder:

$$F = A \times P$$

$$P = F \div A$$

$$A = F \div P$$

F = Force or thrust, in pounds

A = Piston area in square inches (  $.7854 \times D^2$  )

P = PSI (Gauge pressure in pounds per square inch)

$$\text{HP} = \frac{\text{Pounds of push (or pull)} \times \text{Distance (in feet)}}{550 \times \text{Time (in seconds)}}$$

HP = Horsepower

Circle Formula:

$$A = D \times D \times .7854$$

$$A = D^2 \times 0.7854$$

$$A = \pi \times R^2$$

$$A = \pi \times D^2 \div 4$$

$$\text{Circumference} = 2 \times R \times \pi$$

$$\text{Circumference} = \pi \times D$$

$$D = \sqrt{A/.7854}$$

A = Area in<sup>2</sup> (Area sq. in.)

R = Radius (1/2 of Diameter)

D = Diameter, inches

$\pi = 3.14$

Hydraulic Cylinder Piston travel speed:

$$V1 \text{ (in/min)} = \text{CIM} \div A$$

$$V2 \text{ (ft/min)} = Q \times 19.25 \div A$$

$$V3 \text{ (ft/sec)} = Q \times 0.3208 \div A$$

$$Q \text{ (GPM)} = 3.117 \times V3 \text{ (ft/sec)} \times A$$

$$Q \text{ (GPM)} = \text{CIM} \div 231$$

V1 = Velocity or piston travel speed, inches per minute

V2 = Velocity or piston travel speed, feet per minute

V3 = Velocity or piston travel speed, feet per second

CIM = Flow rate in cubic inches per minute (in<sup>3</sup>)

A = Effective area in square inches (in<sup>2</sup>)

Q = GPM Gallons per minute

1 Gallon = 231 in<sup>3</sup> (cubic inch)

Volume required to move a piston a given distance:

$$V = A \times L$$

V = Volume in cubic inches (in<sup>3</sup>)

A = Area in square inches (in<sup>2</sup>)

L = Length or stroke in inches

Regenerative Cylinder

$$\text{Extend Speed} = \frac{\text{Rod Volume}}{\text{Flow Rate}} \text{ in}^3$$

$$\text{Area to Retract} = \text{Area to extend} - \text{Rod Area}$$

$$\text{Cylinder Ratio} = \frac{\text{Area to extend}}{\text{Area to retract}}$$

Note:

Ratio can be used to calculate pressure intensification and flow intensification.

Effective force of a cylinder working at an angle to direction of the load travel:

$$F = T \times \sin A$$

T = Total cylinder force, in pounds

F = Part of the force which is effective, in pounds

A = Least angle, in degrees, between cylinder axis and load direction.

Moment Arm Equations / Levers:

$$F \times D_f = W \times D_w$$

$$F = \frac{W \times D_w}{D_f}$$

$$W = \frac{F \times D_f}{D_w}$$

$$D_f = \frac{W}{F} \times D_w$$

$$D_w = \frac{F}{W} \times D_f$$

F = Cylinder force

Df = Cylinder force distance to pivot

W = Weight or Load Force

Dw = Weight or Load Force distance to pivot

Toggle Force:

$$T = \frac{F \times A}{2 \times B}$$

T = Toggle Force

F = Cylinder Force

A = Distance cylinder centerline to toggle

B = Remaining stroke

Force for piercing or shearing sheet metal:

$$F = P \times T \times \text{PSI}$$

F = Force required, in pounds

P = Perimeter around area to be sheared, in inches

T = Sheet thickness in inches

PSI = Shear strength rating of the material in pounds per square inch.

P.O. Check Application:

$$\text{Release PSI} = \frac{\text{Cap End Area} \times \text{Max. W.P.} - \text{Load}}{\text{Rod End Area}}$$

Max. W.P. = Pressure Rating of Components

$$\text{Ratio} = \frac{\text{Max Working PSI}}{\text{Release PSI}}$$

Example;

2 to 1 Ratio = 1 square inch (in<sup>2</sup>) at 1000 psi working pressure will open when a Release pressure of 500 psi is applied to a 2 square inches (in<sup>2</sup>) area.



## Formulas

### HYDRAULIC PUMP EQUATIONS

Horsepower Required to Drive Hydraulic Pump:

$$\text{HP} = \text{PSI} \times \text{GPM} \div 1714$$

$$\text{HP} = (\text{PSI} \times \text{GPM}) \div (1714 \times \text{EFFICIENCY})$$

HP = Horsepower  
PSI = Gauge pressure in pounds per square inch  
GPM = Oil flow in gallons per minute  
EFFICIENCY = Efficiency of hydraulic pump

*Important:*

As all systems are less than 10% efficient an efficiency factor must be added to the calculated input horsepower.

*Example:*

Input hp = 10 gpm x 1500 psi ÷ 1714 (constant) = 8.75  
hp x 0.85 (efficiency) = required input 10 hp

*Rule of thumb:*

For every 1 HP of drive, the equivalent of 1 GPM @ 1500 PSI can be produced.

*Rule of thumb:*

To idle a pump when it is unloaded will require about 5% of its full rated horsepower.

*Note:*

1 hp = 33,000 ft lbs per min or 33,000 lbs raised 1 ft in 1 min  
1 hp = 550 ft. lbs. per second  
1 hp = 746 Watts or 0.746 kw  
1 hp = 42.4 Btu per min  
1 hp = 2545 Btu per hour  
BTU = The energy to raise one pound of water one degree Fahrenheit.

Flow Formulas:

$$\text{GPM (theoretical)} = \text{RPM} \times \text{CIR} \div 231$$

GPM = Oil flow in gallons per minute  
CIR = Cubic Inch (in<sup>3</sup>) per Revolution  
RPM = Pump revolutions per minute

$$\text{Volume required (gpm)} = \frac{\text{Volume Displaced} \times 60}{\text{Time (s)} \times 231}$$

$$\text{Flow rate (gpm)} = \frac{\text{Velocity (ft/s)} \times \text{Area (in}^2\text{)}}{0.3208}$$

*Note:*

Fluid is pushed or drawn into a pump  
Pumps do not pump pressure, their purpose is to create flow. (Pressure is a result of resistance to flow).

Torque and horsepower relations:

$$\text{T} = \text{HP} \times 63025 \div \text{RPM}$$

$$\text{HP} = \text{T} \times \text{RPM} \div 63025$$

$$\text{RPM} = \text{HP} \times 63025 \div \text{T}$$

T = Torque, inch-lbs  
RPM = Speed, revs / minute  
HP = Horsepower

*Note:*

For Torque in foot-lbs use 5252 in place of 63025

*Note:*

Work (in lbs) = force (lbs) x distance (in)

Power = Force x Distance ÷ Time

$$\text{Theoretical Pressure} = \text{T} \times 6.28 \div \text{CIR}$$

T = Torque, inch-lbs  
CIR = Cubic Inch (in<sup>3</sup>) per Revolution

Pump Efficiencies:

$$\text{Volumetric Efficiency} = \frac{\text{Actual GPM} \times 100}{\text{Theoretical Flow}}$$

$$\text{Mechanical Efficiency} = \frac{\text{Actual PSI} \times 100}{\text{Theoretical Pressure}}$$

$$\text{Overall Efficiency} = \frac{\text{Output HP} \times 100}{\text{Input HP}}$$

$$\text{Overall Efficiency} = \text{Mech. Eff.} \times \text{Volumetric Eff.}$$

Theoretical Flow = RPM x CIR ÷ 231  
Theoretical Pressure = T x 6.28 ÷ CIR  
Input HP = PSI x GPM ÷ 1714  
Output HP = T x RPM ÷ 63025

T = Torque, inch-lbs  
CIR = Cubic Inch (in<sup>3</sup>) per Revolution  
GPM = Flow in gallons per minute  
PSI = Gauge pressure in pounds per square inch  
RPM = Pump revolutions per minute

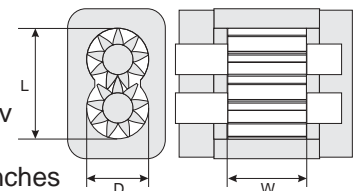
Gear Displacement Calculation:

The volumetric displacement of a gear pump or motor can be approximated by measurement of the internal parts and substituting the values in the following formula:

$$\text{V} = 6.03 \times \text{W} \times (2 \times \text{D} - \text{L}) \times (\text{L} - \text{D} \div 2)$$

Where

V = displacement in in<sup>3</sup>/rev  
W = gear width in inches  
D = gear tip diameter in inches  
L = dimension across both gears when meshed in inches



## Formulas

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### HYDRAULIC MOTOR EQUATIONS

Note: Hydraulic motors are typically classified as high speed motors (500 - 10,000 rpm) or low speed motors (0 - 1,000) rpm.

Relationship between displacement and torque of a hydraulic motor:

$$\begin{aligned}T &= \text{HP} \times 63025 \div \text{RPM} \\ \text{HP} &= T \times \text{RPM} \div 63025 \\ \text{RPM} &= \text{HP} \times 63025 \div T\end{aligned}$$

Note:

For Torque in foot-lbs use 5252 in place of 63025

$$\begin{aligned}T &= \text{CIR} \times \text{PSI} \div 6.28 \\ \text{CIR} &= T \div \text{PSI} \times 6.28 \\ \text{PSI} &= T \times 6.28 \div \text{CIR}\end{aligned}$$

$$\begin{aligned}T &= (\text{GPM} \times \text{PSI} \times 36.77) \div 6.28 \\ \text{GPM} &= (T \div \text{PSI} \div 36.77) \times 6.28 \\ \text{PSI} &= (T \div \text{GPM} \div 36.77) \times 6.28\end{aligned}$$

Note:

Divide PSI by Mechanical Efficiency if required.  
For Torque in foot-lbs use 75.36 in place of 6.28

T = Torque, inch-lbs  
CIR = Cubic Inch (in<sup>3</sup>) per Revolution  
GPM = Flow in gallons per minute  
PSI = Pressure difference across motor  
RPM = Pump revolutions per minute  
HP = Horsepower

Torque General Info:

$$\text{Torque} = \text{Radius} \times \text{Load}$$

$$\text{Torque (in lbs)} = \text{Lever Length (in.)} \times \text{Pull (lbs.)}$$

$$\text{Radius} = 1/2 \text{ of Diameter}$$

$$\text{Circumference} = 3.14 \times \text{Diameter}$$

$$\text{Foot Pound} = \text{Inch Pound} \div 12$$

$$\text{Inch Pound} = \text{Foot Pound} \times 12$$

Motor Speed:

$$\begin{aligned}\text{GPM} &= \text{RPM} \times \text{CID} \div 231 \\ \text{RPM} &= \text{GPM} \times 231 \div \text{CID} \\ \text{CID} &= \text{GPM} \div \text{RPM} \times 231\end{aligned}$$

$$\text{Speed} = (336 \times \text{MPH}) \div \text{Wheel Diameter (in.)}$$

Side load on pump or motor shaft:

$$F = (\text{HP} \times 63024) \div (\text{RPM} \times R)$$

F = Side load, in pounds, against shaft  
R = Pitch radius of sheave on pump shaft, in inches;  
HP = Driving power applied to shaft.

Motor Efficiencies:

$$\text{Volumetric Efficiency} = \frac{\text{Actual Speed} \times 100}{\text{Theoretical Speed}}$$

$$\text{Mechanical Efficiency} = \frac{\text{Actual Torque} \times 100}{\text{Theoretical Torque}}$$

$$\text{Overall Efficiency} = \frac{\text{Output HP} \times 100}{\text{Input HP}}$$

$$\text{Overall Efficiency} = \text{Mech. Eff.} \times \text{Volumetric Eff.}$$

Theoretical Speed = GPM x 231 ÷ CIR  
Theoretical Torque (in lbs) = CIR x PSI ÷ 6.28  
Input HP = PSI x GPM ÷ 1714  
Output HP = T x RPM ÷ 63025

T = Torque, inch-lbs  
CIR = Cubic Inch (in<sup>3</sup>) per Revolution  
GPM = Flow in gallons per minute  
PSI = Pressure difference across motor  
RPM = Pump revolutions per minute

Note:

For Torque in foot-lbs use 5252 in place of 63025

Draw Bar Pull, Moving a load up an incline:

$$F = L \times \sin$$

F = Force  
W = Weight or load  
sin = Sin of incline or angle

Rule of thumb:

Grades less than or equal to 10° use the degree of the angle. Grades greater than 10° use sin.

$$\text{Grade (\% of Slope)} = \text{Rise} \div \text{Run}$$

Draw Bar Pull, Friction:

$$F = W \times M$$

F = Force  
W = Weight or load  
M = Coefficient of friction

Draw Bar Pull, Moving a load up an incline with friction:

$$\begin{aligned}\text{F to move load} &= (W \times \sin) + (W \times \cos \times M) \\ \text{F to hold load} &= (W \times \sin) - (W \times \cos \times M)\end{aligned}$$

F = Force  
W = Weight or load  
M = Coefficient of friction  
sin = Sin of incline or angle  
cos = Cosine of incline or angle



## Formulas

Velocity of oil flow in pipe:

$$V = \text{GPM} \times 0.3208 \div A$$

$$A = \text{GPM} \times 0.3208 \div V$$

$$\text{GPM} = A \times V \div 0.3208$$

V = Oil velocity in feet per second

GPM = Flow in gallons per minute

A = Inside area of pipe in square inches.

*Rule of thumb:*

Pump suction lines 2 to 4 feet/second

Pressure lines up to 500 PSI - 10 to 15 fps

Pressure lines 500 to 3000 PSI - 15 to 20 fps

Pressure lines over 3000 PSI - 25 fps

All oil lines in air-over-oil system - 4 fps

fps = feet per second

Barlow formula (hoop stress):

$$P = 2 \times t \times S \div D$$

P = Working pressure in PSI with a 4:1 Design Factor

t = Wall thickness, in inches

S = Allowable stress (12,500 with a 4:1 Design Factor)

D = Outside diameter, in inches.

$$D = \sqrt{A/.7854}$$

Atmosphere:

Atmospheric pressure is 14.7 psi at sea level

One Bar is equal to 14.5 psi (Atmos. - 1.01 Bar)

The pressure created by one foot of water is .433 psi

$$\text{Atmospheric Ratio} = 14.7 \div \text{PSI} = 33.9 \div (X)$$

Atmospheric will lift water 33.9 feet

$$1 \text{ inch Hg} = .491 \text{ psi}$$

$$14.7 \text{ psi} = 29.92 \text{ hg}$$

$$Y \text{ inch Hg Absolute} = (29.92 - Y) \times .491 = \text{PSI}$$

$$\text{PSI} = \text{lbs} \div \text{in}^2$$

Hg = Inches of mercury

Filtration:

$$1 \text{ Micron} = .000039''$$

$$149 \text{ Micron} = 100 \text{ Mesh}$$

$$74 \text{ Micron} = 200 \text{ Mesh}$$

$$44 \text{ Micron} = 325 \text{ Mesh}$$

$$\text{Beta } 75 = 98.7\%$$

$$\text{Beta } 100 = 99\%$$

$$\text{Beta } 200 = 99.5\% \text{ Gas}$$

$$\text{Beta Ratio} = \text{Upstream Count} \div \text{Downstream Count}$$

$$\text{Efficiency Percent (\%)} = 1 - (1 \div \text{Beta Ratio}) \times 100$$

Gas Formulas:

$$\text{PSIG (PSI Gage)} = \text{PSIA} - 14.7$$

$$\text{PSIA (PSI Absolute)} = \text{PSIG} + 14.7$$

*Isothermal (Boyle's Law for behaviour of Gases)*

$$P_1 \times V_1 = P_2 \times V_2$$

P<sub>1</sub> = Pre-charge Pressure + 14.7

V<sub>1</sub> = Initial Gas Volume

P<sub>2</sub> = System Pressure + 14.7

V<sub>2</sub> = Compressed Gas Volume

P<sub>1</sub>, V<sub>1</sub> are initial pressure and volume; P<sub>2</sub> and V<sub>2</sub> are final conditions.

*Note:*

Isothermal operation occurs when compression or expansion is slow enough to allow transfer of heat out of or into the accumulator.

*Adiabatic*

$$P_1 \times V_1 \times T_2 = P_2 \times V_2 \times T_1$$

$$P_1 \times V_1 \div T_1 = P_2 \times V_2 \div T_2$$

P<sub>1</sub> = Pre-charge Pressure + 14.7

V<sub>1</sub> = Initial Gas Volume

P<sub>2</sub> = System Pressure + 14.7

V<sub>2</sub> = Compressed Gas Volume

T<sub>1</sub> = Initial Temp. Absolute (Rankine)

T<sub>2</sub> = Increased Temp. Absolute (Rankine)

T<sub>1</sub>, P<sub>1</sub> and V<sub>1</sub> are initial temperature, pressure and volume and, T<sub>2</sub>, P<sub>2</sub> and V<sub>2</sub> are final conditions.

*Note:*

Adiabatic operation occurs when compression or expansion is rapid so that there is no transfer of heat. The adiabatic equation is used where compression or expansion occurs in less than 1 minute.

*Rule of thumb:*

Compressibility of hydraulic oil: Volume reduction is approximately 0.5% for every 1000 PSI pressure.

Compressibility of water: Volume reduction is about 0.3% for every 1000 PSI pressure.

$$\text{Rankine} = \text{Fahrenheit} + 460$$

$$\text{Kelvin} = \text{Celsius} + 278$$

$$\text{Celsius to Fahrenheit} = (C + 17.78) \times 1.8 = \text{Fahrenheit}$$

$$\text{Fahrenheit to Celsius} = F - 32 \div 1.8 = \text{Celsius}$$

$$\text{Initial Gas Volume} - \text{Compressed Gas} = \text{Usual Oil}$$

## Formulas

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### Reservoir Cooling:

$$\text{HP Radiated} = \text{Sq. Ft.} \times \text{TD} \div 1000$$

$$\text{Sq. Ft.} = \text{HP} \times 1000 \div \text{TD}$$

$$\text{TD} = \text{HP} \times 1000 \div \text{Sq. Ft.}$$

HP = Power radiating capacity expressed in horsepower

Sq. Ft. = Surface area, in square feet

TD = Temperature difference (Delta) in °F between oil and surrounding air.

If the tank is half full, divide the answer by 2.

If the tank is stainless steel (CRES), divide the answer by 2.

If the tank is aluminum, multiply the answer by 2.8.

$$1 \text{ HP} = 2545 \text{ BTU}$$

$$1 \text{ HP} = 746 \text{ Watts}$$

BTU = the energy to raise one pound of water one degree Fahrenheit

### *Rule of thumb:*

Each watt will raise the temperature of 1 gallon of oil by 1 °F per hour.

### Reservoir Heating:

$$\text{BTU's to heat a reservoir} = \text{Oil volume (ft}^3\text{)} \times 62.4$$

$$\text{Specific Heat (.5)} \times \text{Specific Gravity (.89)} \times \text{Temp.}$$

$$\text{Delta (Differential)}$$

$$\text{BTU} \div 2545 = \text{HP per Hour}$$

$$\text{HP} \times 746 = \text{Watts}$$

### *Note:*

The following applies to petroleum based hydraulic fluids.

Hydraulic oil serves as a lubricant and is practically non-compressible. It will compress approximately 0.5% at 1000 psi.

The weight of hydraulic oil may vary with a change in viscosity, however, 55 to 58 lbs/ft<sup>3</sup> covers the viscosity range from 150 SUS to 900 SUS @ 100 degrees F.

Pressure at the bottom of a one foot column of oil will be approximately 0.4 psi.

To find the pressure at the bottom of any column of oil, multiply the height in feet by 0.4.

Atmospheric pressure equals 14.7 psia at sea level.

psia (pounds per square inch absolute).

Gauge readings to not include atmospheric pressure unless marked psia.

### Energy Formulas:

$$1 \text{ Kw} = 1.3 \text{ hp}$$

$$1 \text{ hp} = 550 \text{ ft lbs/s}$$

$$\text{Hydraulic hp} = \text{gpm} \times \text{psi} \div 1714$$

$$\text{Torque (in lbs)} = \text{psi} \times \text{disp. (in}^3\text{/rev)} \div 6.28$$

$$\text{Torque (in lbs)} = \text{hp} \times 63025 \div \text{Rpm}$$

$$\text{hp} = \text{Torque (ft lbs)} \times \text{rpm} \div 5252$$

$$\text{Btu (per hour)} = \Delta\text{psi} \times \text{gpm} \times 1.5$$

## Formulae in SI Metric Units

---

Familiar fluid power formulae in English units are shown in the left column. When the industry converts to SI (International) units, these formulae will take the form shown in the right column.

### English Units

### Metric Units

#### Torque, HP, Speed Relations in Hydraulic Pumps and Motors

$$T = HP \times 5252 \div RPM$$

$$HP = T \times RPM \div 5252$$

$$RPM = HP \times 5252 \div T$$

T = Torque, foot-lbs.

RPM = Speed, revs/min

HP = Horsepower

$$T = Kw \times 9543 \div RPM$$

$$Kw = T \times RPM \div 9543$$

$$RPM = Kw \times 9543 \div T$$

T = Torque, Nm (Newton-meters)

RPM = Speed, revs/min

Kw = Power in kilowatts

#### Hydraulic Power Flowing Through the Pipes

$$HP = PSI \times GPM \div 1714$$

HP = Horsepower

PSI = Gauge pressure, lbs/sq. inch

GPM = Flow, gallons per minute

$$Kw = Bars \times dm^3/min \div 600$$

Kw = Powers in kilowatts

Bars = System pressure

dm<sup>3</sup>/min = Flow, cu. dm/minute

#### Force Developed by an Air or Hydraulic Cylinder

$$T = A \times PSI$$

T = Force or thrust, in lbs.

A = Piston area, square inches

PSI = Gauge pressure, lbs/sq. inch

$$N = A \times Bars \times 10$$

N = Cylinder force in Newtons

A = Piston area, sq. centimeters

Bars = Gauge pressure

#### Travel Speed of a Hydraulic Cylinder Piston

$$S = V \div A$$

S = Travel speed, inches/minute

V = Vol. of oil to cyl., cu.in/min

A = Piston area, square inches

$$S = V \div 6A$$

S = Travel speed, meter/sec

V = Oil flow dm<sup>3</sup>/minute

A = Piston area, square centimeters

#### Barlow's Formula - Burst Pressure of Pipe & Tubing

$$P = 2t \times S \div O$$

P = Burst pressure, PSI

t = Pipe wall thickness, inches

S = Tensile str., pipe material, PSI

O = Outside diameter of pipe, inches

$$P = 2t \times S \div O$$

P = Burst pressure, bars

t = Pipe wall thickness, mm

S = Tensile str., pipe material, bars

O = Outside diameter of pipe, mm

#### Velocity of Oil Flow in Hydraulic Lines

$$V = GPM \times 0.3208 \div A$$

V = Velocity, feet per second

GPM = Oil flow, gallons/minute

A = Inside area of pipe, sq. inches

$$V = dm^3/min \div 6A$$

V = Oil velocity, meters/second

dm<sup>3</sup>/min = Oil flow, cu.dm/minute

A = Inside area of pipe, sq.cm.

#### Recommended Maximum Oil Velocity in Hydraulic Lines

fps = feet per second

Pump suction lines - 2 to 4 fps

Pres. lines to 500 PSI - 10 to 15 fps

Pres. lines to 3000 PSI - 15 to 20 fps

Pres. lines over 3000 PSI - 25 fps

Oil lines in air/oil system - 4 fps

mps = meters per second

Pump suction lines - .6 to 1.2 mps

Pres. lines to 350 bar - 3 to 4½ mps

Pres. lines to 200 bar - 4½ to 6 mps

Pres. lines over 200 bar - 7½ mps

Oil lines in air/oil system - 1¼ mps

## **Equivalent Values & U.S. / Metric Conversions**

---

### **LENGTH**

1 micron ( $\mu$ ) = 0.00004 inch (in.)  
1 millimeter (mm) = 0.039 in.  
1 centimeter (cm) = 0.3937 in.  
1 decimeter (dm) = 0.3281 foot (ft.)  
1 meter (m) = 39.37 in.  
= 3.281 ft.  
= 1.0937 yards (yds.)

### **AREA - SQUARE**

1 square millimeter = 0.00155 square inch (sq. in.)  
1 square centimeter = 0.155 sq. in.  
1 square decimeter = 15.5 sq. in.  
= 0.10764 square feet (sq. ft.)

### **AREA - CUBIC**

1 cubic centimeter = 0.061 cubic inch (in.<sup>3</sup>)  
= 0.0002642 U.S. liquid gallons  
1 cubic decimeter = 61.023 in.<sup>3</sup>

### **LIQUID MEASURE**

1 milliliter (ml) = 0.0338176 ounce (oz.)  
1 deciliter (dl) = 3.381 oz.  
1 liter (l) = 1.0569 quarts (qt.)  
= 0.26417 gallon (gal.)  
1 drop = 0.05 cubic centimeter (cc)  
= 0.00169 oz.

### **WEIGHT**

1 gram (g) = 0.0353 ounce (oz.)  
1 kilogram (kg.) = 2.2046 pounds (lb.)  
1 metric ton = 0.9842 U.S. ton

### **TEMPERATURE**

$^{\circ}\text{Celsius} = 5/9 (^{\circ}\text{Fahrenheit} - 32)$

### **FLOW - LIQUID**

1 liter/minute (lpm) = 0.2642 U.S. gallon/minute (gpm)

### **FORCE**

1 Newton (N) = 0.225 pound (lb.)

### **FREQUENCY**

1 cycle/second (cps) = 1 Hertz (H)

### **ABSOLUTE VISCOSITY**

1 centipoise (@ 0.9 specific gravity) = 5.35 SUS

### **POWER**

1 kilowatt (kw) = 1.34 horsepower (HP)  
1 horsepower (HP) = 33,000 foot-pounds (ft. lbs.)/minute  
= 550 foot-pounds (ft. lbs.)/second  
= 42.4 BTU/minute  
= 746 watts

### **PRESSURE**

1 bar = 14.5 pounds per square inch (psi) — above atmospheric  
= 33.8 foot water column  
= 42 foot oil column  
= 29.92 inches of mercury (in. Hg)  
1 millimeter of mercury (mm Hg) = 0.03937 in. Hg — below atmospheric  
1 psi = 2.0416 in. Hg  
= 27.71 in. water  
1 foot column of water = 0.433 psi  
1 foot column of oil = 0.390 psi

### **TORQUE**

1 Newton-meter (Nm) = 8.88 pound-inches (lb.-in.)

### **VELOCITY**

1 meter per second (m/s) = 3.28 feet/second (fps)



## Conversion Factor Tables

To convert	→	→	→	→	Into	→	→	→	→	→	Multiply by
Into	←	←	←	←	To convert	←	←	←	←	←	Divide by
Unit					Unit						Factor
					Symbol						
Atmospheres					Atm	bar				bar	1.01325
Atmospheres					Atm	inches of mercury				in Hg	29.92
Atmospheres					Atm	mm of mercury				mm Hg	760
Atmospheres					Atm	pounds/square inch				psi	14.7
bar					bar	pounds/square inch				psi	14.5
British thermal unit					Btu	calorie				cal	252
British thermal unit					Btu	joule				J	1054.35
British thermal unit					Btu	foot pounds				ft-lbs	777.65
British thermal unit/hr					Btu/hr	kilowatts				kW	0.000293071
centimetres					cm	inches				in	0.3937
centimetres per sec					cm/sec	feet per minute				ft/min	1.969
centimetres per sec					cm/sec	feet per second				ft/sec	0.03281
Celsius					°C	Fahrenheit				°F	(F-32) ÷ 1.8
centiStokes					cSt	Saybolt				SUS	4.635 (>52 cSt)
cubic centimetres					cm <sup>3</sup>	cubic inches				in <sup>3</sup>	0.06102
cubic feet					cu ft	gallons US				US gal	7.481
cubic feet					cu ft	cubic metres				m <sup>3</sup>	0.0283168
cubic inches					in <sup>3</sup>	cubic centimetres				cm <sup>3</sup>	16.3871
cubic inches					in <sup>3</sup>	gallons US				US gal	0.004329
cubic yards					yd <sup>3</sup>	cubic metres				m <sup>3</sup>	0.7646
degrees					(angle)	°radians				rad	0.0174533
Fahrenheit					°F	Celsius				°C	(C x 1.8) + 32
feet					ft	metres				m	0.3048
feet of water					ft H <sub>2</sub> O	bar				bar	0.0298907
feet of water					ft H <sub>2</sub> O	pounds/square inch				psi	0.4335
feet of water					ft H <sub>2</sub> O	inches of mercury				in Hg	0.8826
feet of oil (sg = 0.87)						pounds/square inch				psi	0.377
feet of oil (sg = 0.87)						inches of mercury				in Hg	0.768
feet per minute					ft/min	centimetres per sec				cm/sec	0.5080
feet per second					ft/sec	centimetres per sec				cm/sec	30.48
feet per minute					ft/min	miles per hour				mph	0.01136
feet per second					ft/sec	miles per hour				mph	0.6818
fluid ounces UK					UK fl oz	cubic centimetres				cm <sup>3</sup>	28.413
fluid ounces US					US fl oz	cubic centimetres				cm <sup>3</sup>	29.5735
foot pounds per min					ft-lbs/min	horsepower				hp	0.0003030
foot pounds per sec					ft-lbs/sec	horsepower				hp	0.001818
foot pounds per min					ft-lbs/min	watts				W	81.3492
foot pound					ft-lb	kilogram metre				kgm	0.1383
foot pound					ft-lb	Newton metre				Nm	0.1356
foot pound					ft-lb	joule				J	1.35582
gallons US					US gal	cubic inches				in <sup>3</sup>	231
gallons US					US gal	gallons UK				UK gal	0.8327
gallons US					US gal	litres				l	3.78531
gallons US					US gal	cubic feet				cu ft	0.1337
gallons UK					UK gal	litres				l	4.54596
gallons UK					UK gal	gallons US				US gal	1.201
horsepower					hp	British thermal unit/min				Btu/min	42.44
horsepower					hp	foot pounds per min				ft-lbs/min	33
horsepower					hp	foot pounds per sec				ft-lbs/sec	550
horsepower					hp	kilowatts				kW	0.7457
horsepower					hp	Pferde Starke				PS	1.014
horsepower					hp	poncelet					0.7604

## Conversion Factor Tables

To convert	→	→	→	→	Into	→	→	→	→	→	Multiply by
Into	←	←	←	←	To convert	←	←	←	←	←	Divide by
Unit					Unit						Factor
inches					centimetres					cm	2.54
inches					millimetres					mm	25.4
inch pounds					kilogram/metre					kgm	0.01152
inch pounds					Newton metre					Nm	0.1130
inches of mercury					Pascal					Pa	3386 (32° F)
inches of mercury					pounds/square inch					psi	0.4912
inches of mercury					millibar					mbar	33.8639
kilogram					pound					lb	2.205
kilogram					Newton					N	9.80665
kilogram metre					Newton metre					Nm	9.80665
kilogram metre					inch pounds					in-lbs	86.80
kilogram metre					foot pound					ft-lb	7.233
kilogram per square centimetre					bar					bar	0.980665
kilopascals					bar					bar	0.01
kilometres					miles						0.6214
kilometres					feet					ft	3281
litres					gallons UK					UK gal	0.2199
litres					gallons US					US gal	0.2642
metric horse power					kilowatts					kW	0.735499
microinches					microns					mm	0.0254
miles					kilometres					km	1.609
millimetres mercury					millibar					mbar	1.33322
Newton					pound					lb	0.2248
Newton metre					foot pound					ft-lb	0.7376
Newton metre					inch pounds					in-lbs	8.851
Newtons per square centimetre					bar					bar	0.1
Newtons per square metre					bar					bar	0.00001
Pascals					bar					bar	0.00001
pint UK					litres					l	0.568245
pint US					litres					l	0.473163
pounds					grams					g	453.6
pounds					Newton					N	4.448
pounds/square inch					Atmospheres					Atm	0.06804
pounds/square inch					bar					bar	0.06895
pounds/square inch					inches of mercury					in Hg	2.036
pounds/square inch					feet of water					ft H <sub>2</sub> O	2.307
pounds/square inch					feet of oil (sg=0.87)						2.65
pounds/cubic foot					Kilograms/cubic metre					kg-m <sup>3</sup>	16.02
square inches					square centimetres					cm <sup>2</sup>	6.5416
square feet					square metres					m <sup>2</sup>	0.09290304
Saybolt					centiStokes					cSt	See below
32 – 99 SUS											cSt = 0.2253 x SUS – (194.4 ÷ SUS)
100 – 240 SUS											cSt = 0.2193 x SUS – (134.6 ÷ SUS)
>240 SUS											cSt = SUS ÷ 4.635



## Troubleshooting Hints

### Troubleshooting Hints:

Many of the failures in a hydraulic system show similar symptoms: a gradual or sudden loss of pressure or flow, resulting in loss of power or speed in the cylinders or hydraulic motors. In fact, the cylinders may stall under light loads or may not move at all. Often the loss of power is accompanied by an increase in pump noise, especially as the pump tries to build up pressure.

Any one of the system's components - pump, relief valve, directional valve, or cylinder could be at fault.

By following an organized step-by-step testing procedure, the problem can be traced to a general area, then if necessary, each component in that area can be tested, repaired or replaced.

Familiarize yourself with the circuitry of the hydraulic system to be tested. Review of the Service Manual is critical to learn the circuitry and location of various components: reservoir, hydraulic pump, relief valve, control valves, cylinders and hydraulic motors. The Service Manual should also provide operating specifications on fluid temperature, relief valve setting and pump delivery at specific RPMs.

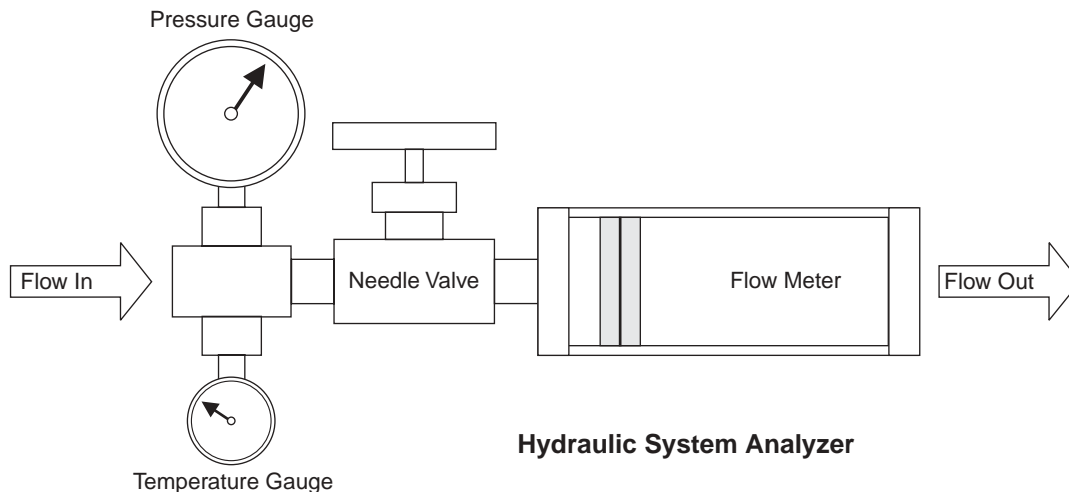
Check the obvious. Is there sufficient fluid in the reservoir? Is it dirty? Is the filtering system in proper condition? Are there any bent linkages or pinched hoses? Are quick couplers functioning properly?

Before you start troubleshooting a system, it is helpful to ask questions and find out about the problem:

1. Has the system been working fine and then it just quit and stopped working?
2. Has the system been working fine and then it started to slowly change in the way it works?
3. Does the system work fine when first started and then changes as it is used and as the system heats up?
4. Did the system stop working after something else was fixed or replaced?
5. Did the system ever work or work properly after it was assembled?

When troubleshooting a hydraulic system there are a few tools which will aid in finding and repairing a problem.

1. Pressure Gauge; To measure the System Pressure (P.S.I.).
2. Flow Meter; To measure Gallons per Minute (G.P.M.).
3. Temperature Gauge; To measure Heat.
4. Needle Valve; To Load / Restrict the System being tested.
5. And Your Senses;
  - A. Seeing; Is that suppose to be BENT?
  - B. Hearing; Is it suppose to be that LOUD?
  - C. Smell; Is it suppose to SMELL BURNT?
  - D. Touch; I can't it's too HOT!
  - E. Common; Do I want to get in there while it's WORKING? I DONT THINK SO!



With items 1, 2, 3, 4, and the necessary fittings and hoses, a Hydraulic System Analyzer can be built and most hydraulic system problems can be diagnosed and repaired.

Make sure the items are sized properly for the system being tested, don't use a 200 PSI Gauge in a 3000 PSI System or a 5 GPM Flow Meter or Needle Valve in a 50 GPM System. Verify and make sure that all the components are rated at, or exceed the pressures and flows being tested.

## Troubleshooting Hints

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**A Hydraulic Analyzer can be used to check the following:**

1. **Fluid Temperatures, using the temperature gauge provided.** Fluid should be flowing through the analyzer for several minutes to obtain an accurate reading.
2. **Flow rates, using the flow meter provided.** With the needle valve wide open, the monitor will show the rate at minimum pressure loss. The flow rate can be restricted by turning in on the needle valve from wide open to show the flow at various pressure loads.
3. **System or operating pressure, by referring to the pressure gauge.** To prevent possible component damage, always be sure the needle valve on your analyzer is in the wide open position prior to starting system and if possible, have a relief valve between pump and analyzer.

**Example Test for Hydraulic Pump Performance:**

1. With system off and needle valve on analyzer in wide open position, install the analyzer in the line with fluid to be flowing in the direction of the arrow on the flow monitor scale.
2. Tighten all fittings to prevent unnecessary leakage.
3. Allow fluid to flow through the analyzer by turning on system.
4. Check the system Service Manual to see what specifications the pump is rated at. Example: 15 gpm @ 1500 psi.
5. With full flow flowing through the analyzer, start turning in the analyzer needle valve, gradually restricting the flow and at the same time, increasing pressure load on the pump. When reaching the rated pressure of the system pump, determine if the pump is operating efficiently (proper flow rate) or if it may need replacing or rebuilding. If the system relief valve is set below test pressure, the relief may have to be increased slightly to test the pump. Be sure to turn the relief valve back to its previous setting when tests have been completed.

**Troubleshooting Heated Fluid:**

When analyzing a hydraulic system in which the fluid temperature is higher than normal, it should be kept in mind that hot fluid can produce unusual flow and operating characteristics. A flow monitor with a minimal sensitivity to temperature variation should be used. When fluid gets hot, the viscosity decreases (the fluid gets much thinner). This thinner fluid can pass through much smaller openings or, in other words, more fluid will pass through the same original opening.

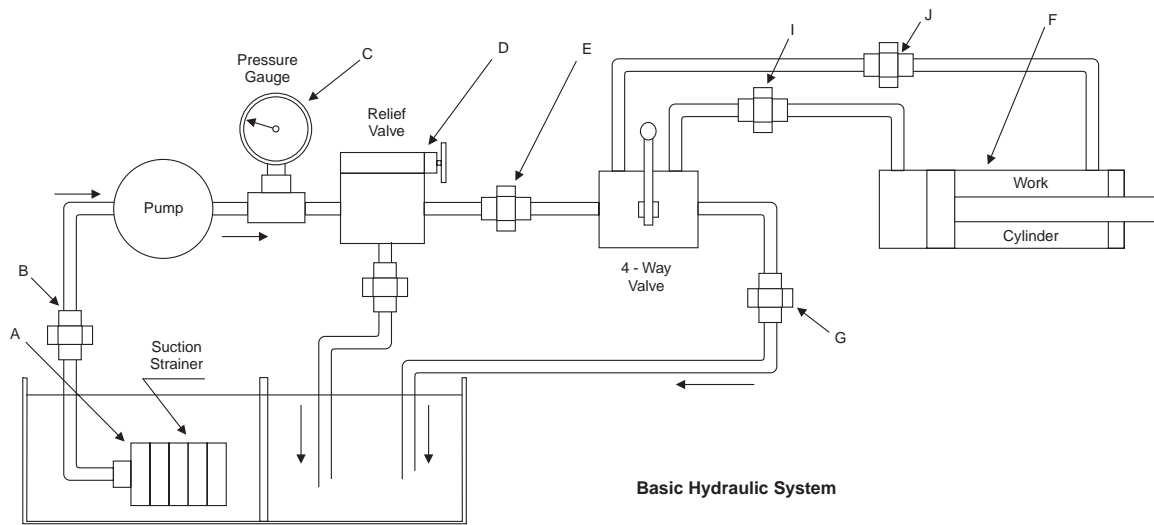
**When the System Heats Up:**

1. Pumps usually slip more fluid through standard clearances. High pressure settings usually cannot be obtained.
2. When the fluid thins down, the parts run closer together and wear faster. Particles of dirt which may not have been a problem with thicker fluid may now be very damaging.
3. Valves, cylinders and actuators will slip more fluid through standard clearances.

All-in-all, excessive heat in a system will not only cause excessive and faster wear, but the system will seem very sluggish because of the lack of fluid supply and operating pressure.

Knowing the potential of your analyzer, the effects of fluid temperature and pressure drop will always insure confidence in analyzing and troubleshooting any service problem areas. The analyzer is only as good as the operator and the less complicated the unit, the more it will be used.

### Basic Troubleshooting Steps:



#### Step 1 - Pump Suction Strainer...

Probably the field trouble encountered most often is cavitation of the hydraulic pump inlet caused by restriction due to a dirt build-up on the suction strainer. This can happen on a new as well as on an older system. It produces systems such as: increased pump noise, loss of high pressure and / or speed.

If the strainer is not located in the pump suction line it will be found immersed below the oil level in the reservoir, as at Point A. Some operators of hydraulic equipment never give the equipment any attention or maintenance until it fails. Under these conditions, sooner or later, the suction strainer will probably become sufficiently restricted to cause a breakdown of the whole system and damage to the pump.

The suction strainer should be removed for inspection and should be cleaned before reinstallation. Wire mesh strainers can best be cleaned with an air hose, blowing from inside out. They can also be washed in a solvent which is compatible with the reservoir fluid. Kerosene may be used for strainers operating in petroleum based fluid. Do not use gasoline or other explosive or flammable solvents. The strainer should be cleaned even though it may not appear to be dirty. Some clogging materials cannot be seen except by close inspection. If there are holes in the mesh or if there is mechanical damage, the strainer should be replaced.

When reinstalling the strainer, inspect all joints, as at Point B for possible air leaks, particularly at union joints. There must be no air leaks in the suction line. Check the reservoir oil level to be sure it covers the top of the strainer by at least 3" at minimum oil level, which is with all cylinders extended. If it does not cover to this depth there is danger of a vortex forming which may allow air to enter the system when the pump is running.

#### Step 2 - Pump and Relief Valve...

If cleaning the pump suction strainer does not correct the trouble, isolate the pump and relief valve from the rest of the circuit by disconnecting at Point E so that only the pump, relief valve, and pressure gauge remain in the pump circuit. Cap or plug both ends of the plumbing which was disconnected. The pump is now deadheaded into the relief valve. Back out relief valve pressure adjustment. Start the pump and watch for pressure buildup on the gauge while tightening the adjustment on the relief valve. If full pressure can be developed, obviously the pump and relief valve are operating correctly, and the trouble is to be found further down the line. If full pressure cannot be developed in this test, continue with Step 3.

#### Step 3 - Pump or Relief Valve?...

If high pressure cannot be obtained in Step 2 by running the pump against the relief valve, further testing must be conducted to see whether the fault lies in the pump or in the relief valve. Proceed as follows:

If possible, disconnect the reservoir return line from the relief valve at Point H. Attach a short length of hose to the relief valve outlet. Hold the open end of this hose over the reservoir filler opening so the rate of oil flow can be observed. Start the pump and run the relief valve adjustment up and down while observing the flow through the hose. If the pump is bad, there will probably be a full stream of oil when relief valve adjustment is backed off, but this flow will diminish or stop as the adjustment is increased. If a flowmeter is available, the flow can be measured and compared with the pump catalog rating.

## ***Troubleshooting Hints***

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If a flowmeter is not available, the rate of flow on small pumps can be measured by discharging the hose into a bucket while timing with the sweep hand on a watch. For example, if a volume of 10 gallons is collected in 15 seconds, the pumping rate is 40 GPM, etc.

If the gauge pressure does not rise above a low value, say 100 PSI, and if the volume of flow does not substantially decrease as the relief valve adjustment is tightened, the relief valve is probably at fault, and should be cleaned or replaced as instructed in Step 5.

If the oil flow substantially decreases as the relief valve adjustment is tightened, and if only a low or moderate pressure can be developed, this indicates trouble in the pump. Proceed to Step 4.

### **Step 4 - Pump...**

If a full stream of oil is not obtained in Step 3, or if the stream diminishes as the relief valve adjustment is tightened, the pump is probably at fault. Assuming that the suction strainer has already been cleaned and the inlet plumbing has been examined for air leaks, as in Step 1, the oil is slipping across the pumping elements inside the pump. This can mean a worn-out pump, or too high an oil temperature. High slippage in the pump will cause the pump to run considerably hotter than the oil reservoir temperature. In normal operation, with a good pump, the pump case will probably run about 20° F above the reservoir temperature. If greater than this, excess slippage, caused by wear, may be the cause.

Check also for slipping belts, sheared shaft pin or key, broken shaft, broken coupling, or loosened set screw.

### **Step 5 - Relief Valve...**

If the test of Step 3 has indicated the trouble to be in the relief valve, D, the quickest remedy is to replace the valve with another one known to be good. The faulty valve may later be disassembled for inspection and cleaning. Pilot operated relief valves have small orifices which may be blocked with accumulations of dirt. Blow out all passages with an air hose and run a small wire through orifices. Check also for free movement of the spool. In a relief valve with pipe connections in the body, the spool may bind if pipe fittings are over tightened. If possible, test the spool for bind before unscrewing threaded connections from the body, or, screw in fittings tightly during inspection of the valve.

### **Step 6 - Cylinder...**

If the pump will deliver full pressure when operating across relief valve in Step 2, both pump and relief valve can be considered good, and the trouble is further downstream. The cylinder should be tested first for worn out or defective seals.

Run the cylinder to one end of its stroke. Disconnect the fluid line which was allowing oil to exhaust from the cylinder. Plug or cap the valve side of this disconnected line to avoid oil spillage caused by any back pressure in the tank return line. Attach a hose to the cylinder fitting where the fluid line was disconnected. Place open end of attached hose into a barrel or bucket. Start the pump and activate the valve to continue to stroke the cylinder the same direction. With the cylinder at the end of its stroke, check for any oil flowing from hose into barrel. If flow is excessive the cylinder may need repaired or replaced. Pistons with metal rings can be expected to have a small amount of leakage across the rings, and even those "leaktight" soft seals may have a small bypass during break in of new seals or after the seals are well worn. After checking, reinstall the lines and run the piston to the opposite end of the barrel and repeat the test. Occasionally a cylinder will leak at one point in its stroke due to a scratch or dent in the barrel. Check suspected positions in mid stroke by installing a positive stop at the suspected position and run the piston rod against it for testing. Once in a great while a piston seal may leak intermittently. This is usually caused by a soft packing or O-ring moving slightly or rolling into different positions on the piston, and is more likely to happen on cylinders of large bore.

### **Step 7 - Directional Control Valve...**

If the cylinder has been tested (Step 6) and found to have reasonably tight piston seals, the 4-way valve should be checked next. Although it does not often happen, an excessively worn valve spool can slip enough oil to prevent build-up of maximum pressure. Symptoms of this condition are a loss of cylinder speed together with difficulty in building up to full pressure even with the relief valve adjusted to a high setting. This condition would be more likely to occur with high pressure pumps of low volume output, and would develop gradually over a long period of time.

### **Other Components**

Check other components such as by-pass flow controls, hydraulic motors, etc. Solenoid 4-way valves of the pilot operated type with tandem or open center spools may not have sufficient pilot pressure to shift the spool.

## Troubleshooting Hints

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### System Inoperative:

#### 1. Insufficient or No fluid in system.

Refill system with proper grade and type of fluid.  
Filter new oil being added as recommended.  
Refill oil reservoir with cylinders in closed position.  
If refilled while cylinders are extended the reservoir may over flow when or as the cylinders retract.  
Check for leaks.

#### 2. Pump is not engaged.

Is pump shaft turning?  
Check if PTO (power take off) is engaged.  
Variable control mechanism out of adjustment.  
Adjust to machine service manual specifications.

#### 3. Slipping or broken pump drive.

Check pump drive mechanism (drive key, flex coupler) for damage.  
Check for proper alignment or tension.

#### 4. Pump inlet line plugged.

Drain oil and replace filter or filter element.  
Check for clogged oil strainers.  
Oil lines dirty or collapsed.  
Check if correct inlet hose is used, inner liner may be collapsed.  
Never use a pressure type hose as a pump inlet suction hose.  
Check if supply shut off or gate valve is closed.  
Check in reservoir for other possible obstructions.

#### 5. Pump speed too slow.

Check minimum drive speed.  
May be too slow to prime pump.

#### 6. Wrong fluid in system.

Oil viscosity too heavy for pump to pick up a prime.  
Drain complete system. Add new fluid of proper viscosity.

#### 7. Air leaks at intake. Pump not priming.

Circuit must be tested at inlet connections.  
At pump intake piping joints, test by pouring oil on joints while listening for a change in sound of operation.  
Determine where air is being drawn into line connection and tighten.  
At pump shaft, Test by pouring oil on shaft seal while listening for a change in sound of operation.  
Follow manufacturer's recommendation when changing seals.  
Air drawn in through intake pipe opening.  
Check to be certain suction and return lines are well below oil level in reservoir. Add oil to reservoir if necessary.

#### 7. Worn or dirty pump.

Clean, repair or replace.  
Check alignment.  
Check for contaminated oil.  
Drain and flush system.

#### 8. Pump driven in wrong direction of rotation.

Most pump assemblies will have an arrow showing correct rotation.  
On gear type pumps, the pressure port / output will be on the side where the gears come together and mesh.  
Check to assure correct pump rotation was applied during assembly.

#### 9. Leakage.

Check all components, particularly the relief valve for proper settings.  
Refer to technical manuals.

#### 10. Broken or badly worn components (pump, valves, cylinders, etc.).

Examine and test for internal or external leakage.  
Analyze the conditions that brought on the failure and correct them.  
Repair or replace the faulty components according to technical manual specifications.

#### 11. Excessive load.

Check unit specifications for load limits.

### System Develops No Pressure:

#### 1. Pump not delivering fluid.

Follow the remedies mentioned above.

#### 2. Incorrect valve position or setting.

Check and engage valve.  
Install pressure gauge and adjust to correct pressure.

#### 3. Vanes in vane pump sticking.

Check for burrs or metal particles that might hold vanes in their slots.  
Repair or replace if necessary.  
Clean system if contaminants are found.

#### 4. Fluid recirculating back to reservoir and not going to functions.

Mechanical failure of some other part of the system, especially a relief valve.

If contamination is involved, clean and refill with proper fluid.

#### 5. Piston pump or valve broken, or stuck open allowing fluid to return to inlet side.

Disassemble the pump, determine the cause and correct it.  
Repair according to technical manual instructions.

### System Operates Erratically:

#### 1. Air in system.

Check suction side for leaks. Repair.

#### 2. Cold oil.

Allow ample warm-up period.  
Operate only at recommended operating temperature ranges.

#### 3. Wrong fluid viscosity.

Oil viscosity too heavy.



## Troubleshooting Hints

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Drain complete system. Add new fluid of proper viscosity.

### 4. Pump speed too slow.

Increase engine speed.

Check manual for recommendations.

### 5. Dirty or damaged components.

Clean or repair as necessary.

### 6. Restriction in filters or lines.

Clean and/or replace elements or lines.

### 7. Internal pump parts are sticking.

Dismantle and repair according to technical manual instructions.

Look for burrs on parts or metal particles in fluid.

If contaminants are the cause, clean and refill with proper fluid.

### 8. Distance between internal parts has increased due to wear.

Dismantle and repair.

If wear is abnormal, determine the cause by checking the operation and maintenance records as well as by examining the pump and system.

### System Operates Slowly:

#### 1. Oil viscosity too high, cold oil.

Allow oil to warm up before operating machine.

#### 2. Low pump drive speed.

Increase engine speed (check manual for recommendations).

If clutch or belt-driven, check for proper tension.

#### 3. Low oil level.

Check reservoir and add oil as necessary.

#### 4. Air in system.

Check suction side for leaks. repair.

#### 5. Badly worn pump, valves, cylinders, etc.

Repair or replace as needed.

#### 6. Restriction in filters or lines.

Clean and/or replace elements or lines.

#### 7. Improper adjustments.

Check orifices, relief, unloading, flow control valves, etc.

Adjust per manual.

#### 8. Oil leaks.

Tighten fittings, replace seals or damaged lines.

### System Operates Too Fast:

#### 1. Wrong size or incorrectly adjusted restrictor or flow control.

Replace or adjust as necessary.

#### 2. Engine running too fast.

Reduce engine speed.

### Overheating of Oil in System:

#### 1. Oil passing thru relief valve for excessive time.

Return control valve to neutral when not in use.

System stalling under load, etc.

Fluid viscosity too high.

#### 2. Relief or unloading valve set too high.

Install pressure gauge and adjust to correct pressure.

#### 3. Incorrect oil, low oil, dirty oil.

Use recommended oil, fill reservoir, clean oil, replace filter element.

#### 4. Engine running too fast.

Reduce engine speed.

#### 5. Excessive component internal leakage.

Check stall leakage past pump, valve, motor, cylinder or other components.

Repair or replace component as necessary.

#### 6. Restriction in filters or lines.

Check if line I.D.'s are too small causing high velocity.

Check if valvings too small, causing high velocity.

Clean and/or replace elements or lines.

#### 7. Malfunctioning oil cooler / heat exchanger.

Check if water is shut off, if water cooled.

Check for clogging.

Clean repair.

#### 8. Insufficient heat radiation.

Check for proper air circulation around reservoir.

Ambient temperature too high for system design.

Clean dirt and mud from reservoir and components.

#### 9. Reservoir sized too small.

Increase reservoir size.

Add oil cooler or heat exchanger.

#### 10. Reservoir assembled without or insufficient baffling.

Add baffling to allow fluid time to cool.

### Foaming of Oil:

#### 1. Incorrect oil, low oil, dirty oil.

Replace, clean or add as needed.

#### 2. Air leaks.

Check suction line and component seals for suction leaks. Repair or replace.

#### 3. Return of tank line not below fluid level.

Repair or replace.

#### 4. Inadequate baffles in reservoir.

#### 5. Lack of anti-foaming additives in oil.

Replace fluid with proper grade.

### Noisy Pump:

#### 1. Air leak in intake, or air is being drawn through the inlet line.

Repair or make sure the inlet line is submerged in fluid in the reservoir.

To check for leaks, pour fluid around the joints and listen for a change in sound of operation.

#### 2. Low oil level, incorrect oil, foamy oil.

Check if oil viscosity too high or operating temperature too low.

Replace, clean or add proper grade and type of fluid as needed.

With rare exception all return lines should be below



## Troubleshooting Hints

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fluid level in reservoir

**3. Pump inlet line or inlet screen is restricted or clogged.**

Clean or replace as needed.

**4. Reservoir breather vent clogged.**

Clean or replace as needed.

**5. Worn or damaged pump.**

Check and correct cause of parts failure.  
Repair or replace as needed.

**6. Pump speed too fast.**

Operate pump within recommended speed.

**7. Drive coupling mis-aligned.**

Align unit and check condition of seals and bearings.  
Misalignment will cause wear and subsequent high noise level in operation.

**8. Relief or unloading valve set too high.**

Use reliable gauge to check operating pressure.  
Relief valve may have been set too high with a damaged pressure gauge.  
Check unloading devices to see that they are properly controlling the pump delivery.

### Excessive Pump Wear:

**1. Abrasive contaminants or sludge in the fluid.**

Check for the cause of contaminants.  
Replace or repair worn parts according to service manual.  
Install or change fluid filter.  
Replace fluid with recommended grade and quality.

**2. Viscosity of fluid too low or too high.**

Replace fluid with proper grade and type.

**3. Sustained high pressure above maximum pump rating.**

Check for possible relief valve malfunction or other parts failure.

**4. Air leaks or restriction in system causing cavitation.**

Eliminate any leaks in system.

**5. Drive shaft misaligned.**

Check and correct according to technical manual specifications.

### Leaky Pump or Motor:

**1. Damaged or worn shaft seal.**

Check and replace.  
Check for misalignment.  
Check that chemicals in fluid are not destroying packing or seals

**2. Loose or damaged parts.**

Tighten or replace.

### Internal Pump Parts Breakage:

**1. Excessive pressure above maximum limits for**

**pump.**

Check for parts malfunction and cause.  
Repair according to machine technical manual.

**2. Seizure due to lack of fluid.**

Check reservoir fluid level, as well as fluid inlet line for restriction.

Check for plugged inlet filter or strainer.

**3. Abrasive contaminants in fluid are getting past the filter.**

Check for plugged inlet filter or strainer.  
Check for malfunctioning filter bypass valve.

**4. Excessive torquing of housing bolts.**

Replace damaged parts.  
Torque to proper specifications.

### Load Drops with Control Valve in Neutral:

**1. Leaking cylinder seals or fittings.**

Replace worn parts.

**2. Control valve not centering when released.**

Check linkage.  
Check spool for binding.

### Control Valve Sticking (Binding):

**1. Valve linkage misaligned.**

Repair.

**2. Tie-bolts too tight (stack valves).**

Loosen and retighten as necessary.

**3. Valve damaged.**

Repair or replace.

### Control Valve Leaks:

**1. Tie-bolts too loose (stack valves).**

Tighten as necessary.

**2. Seals damaged or worn.**

Replace.

### Relief Valve Noisy:

**1. Relief valve setting too close to operating pressure.**

Install pressure gauge and adjust to correct pressure.

**2. Worn or scored poppet and seat.**

Replace.

**3. Spring in relief valve broken.**

Replace spring and adjust to correct pressure.

### Cylinder Seal Leakage:

**1. Slow, Uniform Leakage:**

- A. Poor low-pressure sealability (especially if a lip seal).
- B. Too little initial interference (if squeeze-type seal).
- C. Loss of interference or squeeze due to wear or compression set.
- D. Seal shrinkage after installation (possibly chemically induced, or a result of leaching of plasticizers

ers

by solvent action).

E. Possible omission or failure of static seal(s).

F. Microscopic debris lodges under seal lip (lint, fiber,

## Troubleshooting Hints

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etc.).

G. Scored lip due to passage of sharp particle under seal, leaving cut or nick.

H. Seal lip is nicked or cut during installation (note whether leak starts immediately after seal installation).

I. Non-repetitive overheating hardens compound (which loses its ability to conform to dynamic surface deviations).

J. Off-center alignment puts all clearance on one side, all compression on the other (due to bearing

wear, excessive side loads, etc.).

K. Check *static* surfaces of dynamic seal (groove surfaces). They may have problems F, G, or H hidden from view, and without self-cleaning tendency.

### 2. Gradually Increasing Leakage:

A. Progressive wear.

B. Increasing compression set.

C. Progressive tear or erosion from initial nick.

D. Fine score mark on dynamic surface progressively abrades seal lip.

### 3. Sudden Copious Leakage:

A. Extruded seal.

B. Torn seal lip (see 1-D, -E, -F, -G, -H, & -I, and 2-D).

C. Twisted seal.

D. Dramatic bearing failure due to excessive side load, shock, etc.

E. Spiral failure.

F. Massive infusion of contamination (due to incorrect fluid added to system, or to upstream introduction of dirt or wear debris).

G. Slow rod leakage builds up behind tight wiper, then dumps . . . giving *appearance* of catastrophic seal failure. If leak rate continues, look for slow leak or erratic leak causes. If high leak rate continues, look for true catastrophic leak origin.

H. Reverse-pressure blowout of piston seal due to pressure trap or failure of opposed seal.

### 4. Erratic (start-stop) Leakage:

A. Cold start-up shrinks seal; friction/fluid heating restores size.

B. Intermittent eccentric loading.

C. Fibrous contamination working its way past seal lips.

D. Unstable seal (twists and returns, cocks, etc.) *usually* caused by shock loading.

E. Rod seal leaks slowly, tight wiper periodically dumps accumulated leakage (see 3-G).

F. Fluid viscosity changes as temperature cycles (e.g., forklift truck alternately entering and leaving cold storage area).

### 5. Stick-slip Operation:

A. Worn-away, low friction surface treatment.

B. Breakdown of fluid lubricity due to contamination or deterioration of fluid.

C. Viscosity change due to temperature.

D. Excessive burnishing of dynamic surface to finer finish destroys ability of surface to maintain lube film (e.g., may go from 12 RMS to 4 RMS).

### 6. Seizing:

A. Seal and bearing swell due to incompatible fluid and compound (possibly running hotter than temperature at which fluid is compatible).

B. Thermal expansion of compound.

C. Pressure trap between dual squeeze seals or incorrectly installed lip seals.

D. Wedging of seal or backup device into extrusion gap (if used, it is usually the backup device that extrudes).

E. In low-pressure systems, shock or other factors cock, cant or misorient the seals in grooves.

F. Bent rod, cocked head, etc.

### 7. Scored Rod or Ram:

A. Internally generated contamination.

B. Externally introduced rod dirt, dirty makeup or disassembly/ reassembly dirt.

C. Misoriented exclusion devices (wiper/scrapper); eccentric installation.

D. Misaligned (eccentric) loads cock ram into metal-to-metal contact with head.

E. Wiper in vertical ram forms catch-all pocket.

### 8. Drift:

A. Inspect valve for leakage and full closure *before* disassembly. (disconnect return line on valve and inspect visually for leakage).

B. See problems 1 and 2 as applied to piston seals.

C. Misapplied cast-iron rings in a "hold" cylinder (right ring in the wrong job).

D. In "retract-mode" creep, check rod seal as well as piston seal.

E. Static internal seal may provide leakage path past piston.

### 9. Increasing Cylinder Drag:

A. Seal swell caused by improper (incompatible) *installation* lubricant (e.g., EPR seal lubed with petro-based grease or oil).

B. Packing of contaminants into wiper groove of vertical ram.

C. Thermal expansion of bearings and/or seals.

D. Apparent drag increase due to undetected flow restriction in supply or return line . . . or bypassing of pressure though improperly closing valve . . . or obstructed check valve, etc.

E. Cocked or twisted seal bypassing fluid and wedging into extrusion gap.

### 10. Increasing Cylinder/Rod Temperature:

A. See causes for problem 9. In their earlier stages, these problems may appear as hotter-running cylinders.

## Troubleshooting Hints

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- B. Internal leakage “throttling” past seal can cause rapid heating.
- C. Decreased lubricity of fluid can boost friction and heating (hotter fluid has lower viscosity, etc.). Contaminated or deteriorated fluid can cause same cycle.
- D. Diluted fluid can boost friction, etc.
- E. Condensation in reservoirs can emulsify or hit cylinder as slugs of fluid with near-zero lubricity. Also, hot water can *swell* compounds such as urethanes, increasing friction.

### 11. Telescopic sleeve undersized, out of round or bulged.

- A. Check with micrometers to see if sleeve/tube is within specifications.

### Cylinder will not Operate or Move:

#### 1. Pump or PTO is not engaged, system not receiving fluid.

Engage pump, correct pump flow problem.

#### 2. Control valve not engaged.

Engage valve, check for linkage alignment and damage.

#### 3. Pressure too low.

Check pressure at cylinder to make sure it is to circuit requirements.

#### 4. Cylinder bypassing internally.

Check for internal scoring, damaged or worn seals, internal cracks.

#### 5. Cylinder overloaded for rated capacity.

Reduce load.

#### 6. Cylinder too small or not rated for application.

Install correct cylinder.

#### 7. Piston rod broken at piston end.

Disassemble and replace piston rod.

#### 8. Hose quick disconnect not attached.

Check if hose quick disconnect is connected properly.

### Cylinder not Holding Load or Drifts:

#### 1. Cylinder bypassing internally.

Check for internal scoring, damaged or worn seals, internal cracks.

Pressurize one side of cylinder and disconnect fluid line at opposite port. Observe leakage. One to three cubic inches per minute is considered normal for piston rings. Virtually no leak with soft seals on piston. Replace cylinder barrel or seals as required.

#### 2. Other circuit leaks.

Check for leaks thru operating valve and correct. Correct leaks in connecting lines.

#### 3. Incorrect Valving.

Open center valve with conventional single rod cylinder will creep if restriction on tank port is sufficiently high. Use tandem type valve spool configuration or with pump dumped through one cylinder port with the

other blocked.

Closed center valve can cause similar results except creep will be according to amount of clearance flow in the valve. Proper notching of valve spool can prevent building up pressure in cylinder lines between cycles.

Spools with pressure blocked and cylinder ports completely relaxed will also prevent drift if no moving element is not affected by gravity or vibration.

Pilot operated check valves can positively lock fluid in cylinder lines. Care must be exercised to insure adequate pilot pressure when rod differential may cause intensification.

### Cylinder operates erratically or chatters:

#### 1. Telescopic cylinder sleeves mistaging.

Check for tight seals or bearings.

#### 2. Excessive friction due to damaged or improper / misaligned mounting.

Repair or replace as needed.

#### 3. Cylinder sized too close to load requirements.

Reduce load or install larger cylinder.

#### 4. Large difference between static and kinetic friction.

Install speed control valves to provide back pressure to control stroke.

### Oil Spilling Out of Tank:

#### 1. Oil is foaming.

(Refer to Foaming of Oil section)

#### 2. Oil reservoir filled while cylinders were extended.

Fill while cylinders in the retract or closed position.

### Foreign Matter Sources in the Circuit:

#### 1. Pipe scale not properly removed.

Lines need cleaned and flushed before installation.

#### 2. Sealing compound (pipe dope, teflon tape) allowed to get inside fittings.

Use care when applying sealants.

#### 3. Improperly screened fill pipes and air breathers.

Repair or replace as required.

#### 4. Burrs inside piping components.

Deburr before installation.

#### 5. Tag ends of packing coming loose.

Check if packing is system compatible.

Replace packing.

#### 6. Seal extrusions from pressure higher than compatible with the seal or gasket.

Replace seal or gasket with compatible item.

#### 7. Human element.

Not protecting components while being repaired.

Repaired components not properly protected while stored. (Rust and other contaminants.)

Lines left open and unprotected.

#### 8. Wipers or boots damage or not provided.

Check cylinders or rams.

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## Troubleshooting Hints

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Add or replace where necessary.

### Preventing repeat failures:

When a hydraulic system (pump or cylinder or other major component) has a failure, implementing this 13-step checklist can help prevent repeat failures.

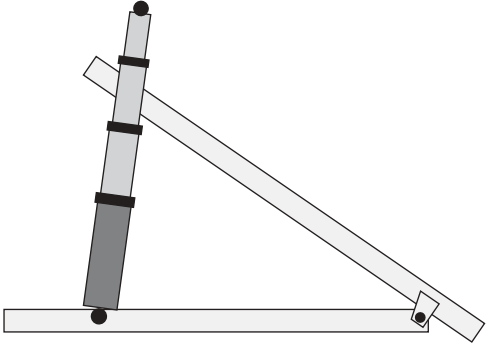
1. Determine cause of failure.
2. Eliminate cause of failure.
3. Retract all cylinders and drain tank.
4. Flush tank. Using diesel fuel under pressure, flush tank thoroughly and wipe with clean cloths.
5. Install new filter elements.
  - A. Check to make sure filter is 10 microns or better.
  - B. If machine does not have filtration, install a 10 micron filter on the return line.
6. Install new component.
7. Fill the tank with new oil.
  - A. Be sure recommended oil is used.
  - B. NOTE; You're filling the system, not just the oil supply tank. Pump failure due to lack of oil can result if filling is not done correctly.  
Keep a close check on the oil level as you complete the following steps.
8. Disconnect all lines to cylinders and/or motors at the cylinder or motor. Be sure all implements are securely blocked and all accumulators are bled before disconnecting lines. NOTE; It may be necessary to remove, inspect, and flush the fittings that are connected to the pump, valves, and/or cylinders to remove any foreign objects that may have become lodged or stuck inside them.
9. Activate each circuit by moving control valve handle so lines are flushed with new oil. This flushes the lines and valves from pump to all cylinders and motors.  
Be sure to check oil level, and add new oil if necessary.
10. Connect lines to blind end of cylinders and all fluid motors. Leave rod end disconnected and with engine at one-fourth throttle, activate circuits slowly until cylinder bottoms out. New oil will be put in the blind end of the cylinder and old dirty oil flushed out the rod end. Do this for all cylinders on the machine.
11. Connect lines to rod end of cylinders. Again, check oil level and add new oil as required.
12. Operate all cylinders and motors alternately for 30 minutes at normal operating speed.
13. Change filter element, check oil level and add oil as needed.

The above procedure, if followed, will allow you to install a new pump or cylinder with confidence, knowing that you'll get satisfactory life. Cutting short these steps can cause premature hydraulic component failure; a pump, nor a cylinder will run long on a contaminated system.

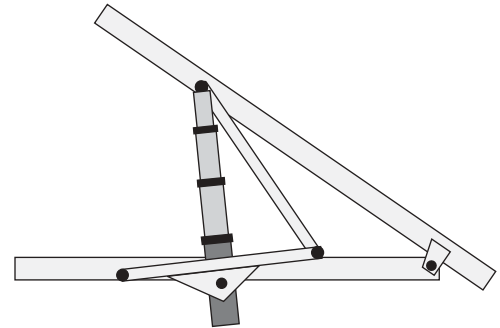
In nearly all cases, a replacement component will fail in a shorter time than the original preceding it unless the system is thoroughly cleaned.

In addition, to ensure good service from your equipment, the hydraulic system must be properly maintained, including frequent oil level checks, daily inspection for leaks, filter element and oil changes at recommended intervals (using correct filters and recommended grade of oil), and finally, practicing good operating techniques.

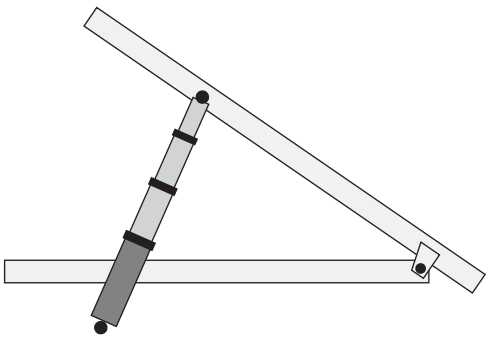
**Dump Hoist Type Identification Chart**



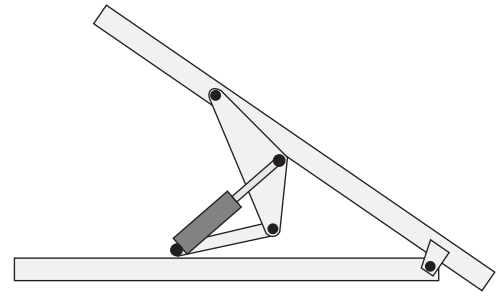
**FRONT MOUNT TELESCOPIC**  
HEAD LIFT OR BOTTOM LIFT



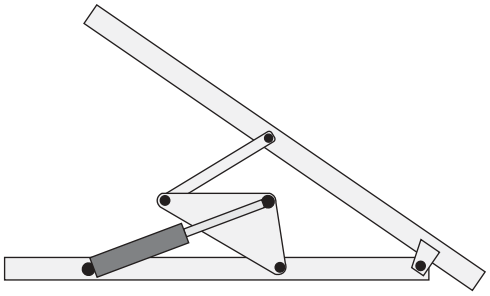
**TELESCOPIC SCISSOR**  
HINGE FORWARD OR REARWARD



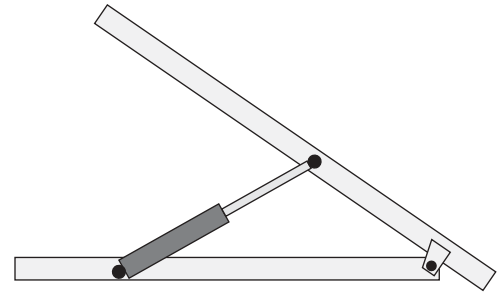
**UNDERBODY TELESCOPIC**  
SLANT FORWARD OR SLANT REARWARD



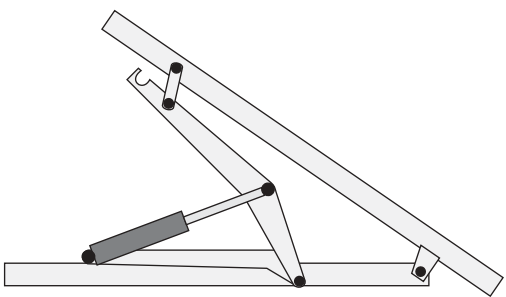
**SINGLE STAGE SCISSOR**



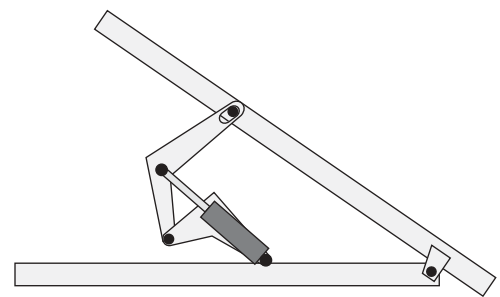
**UNDER BODY ARM HOIST**



**UNDER BODY DIRECT LIFT**



**UNDER BODY ARM - SCISSOR**

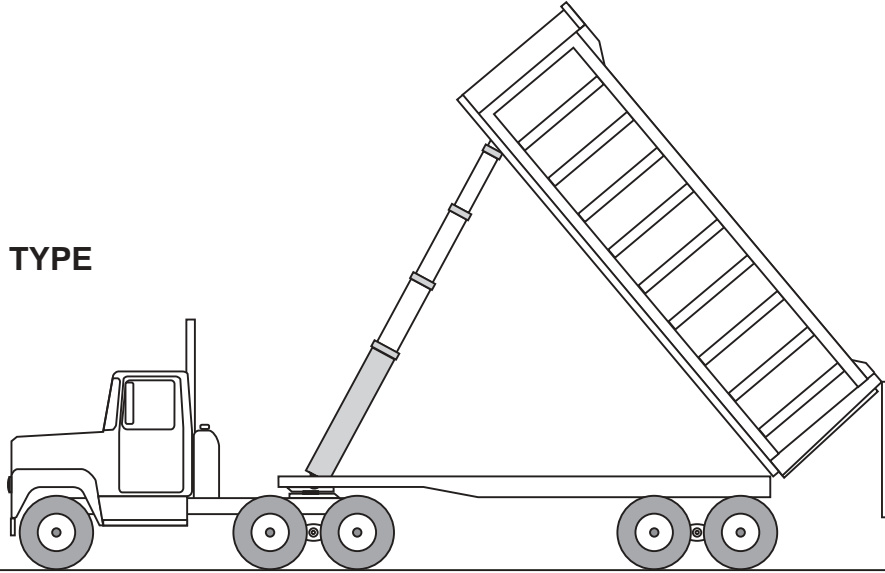


**LOST MOTION SCISSOR**

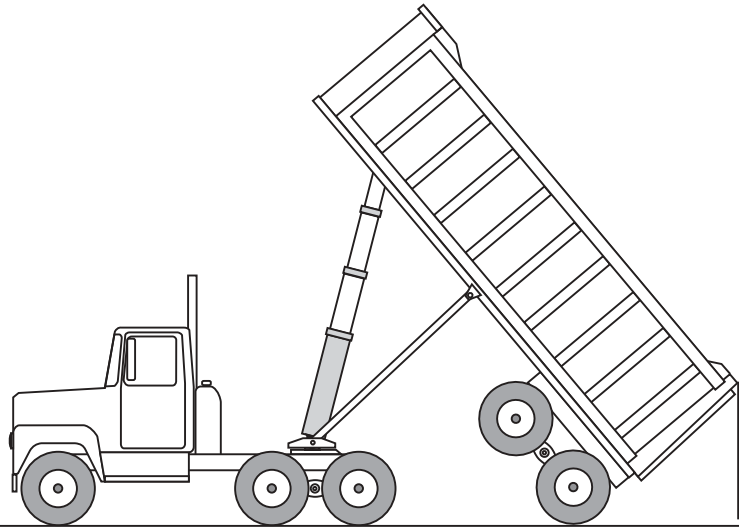
# Dump Trailer Type Identification Chart

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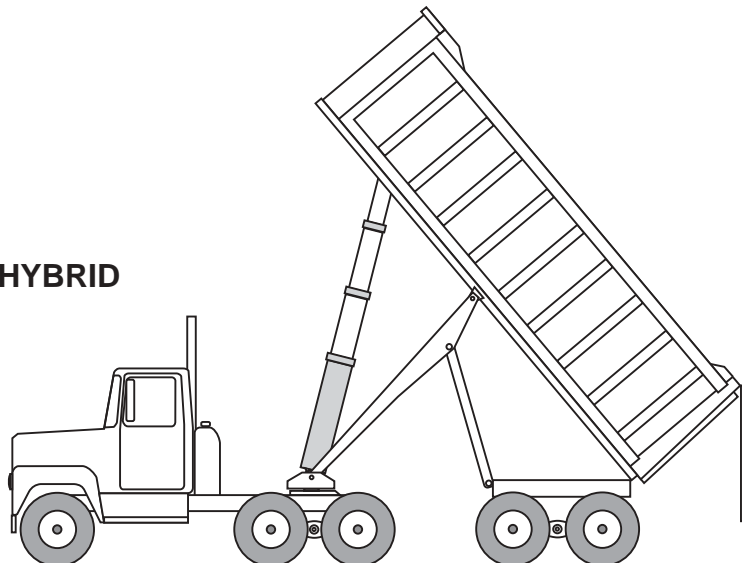
**FRAME TYPE**



**FRAMELESS**

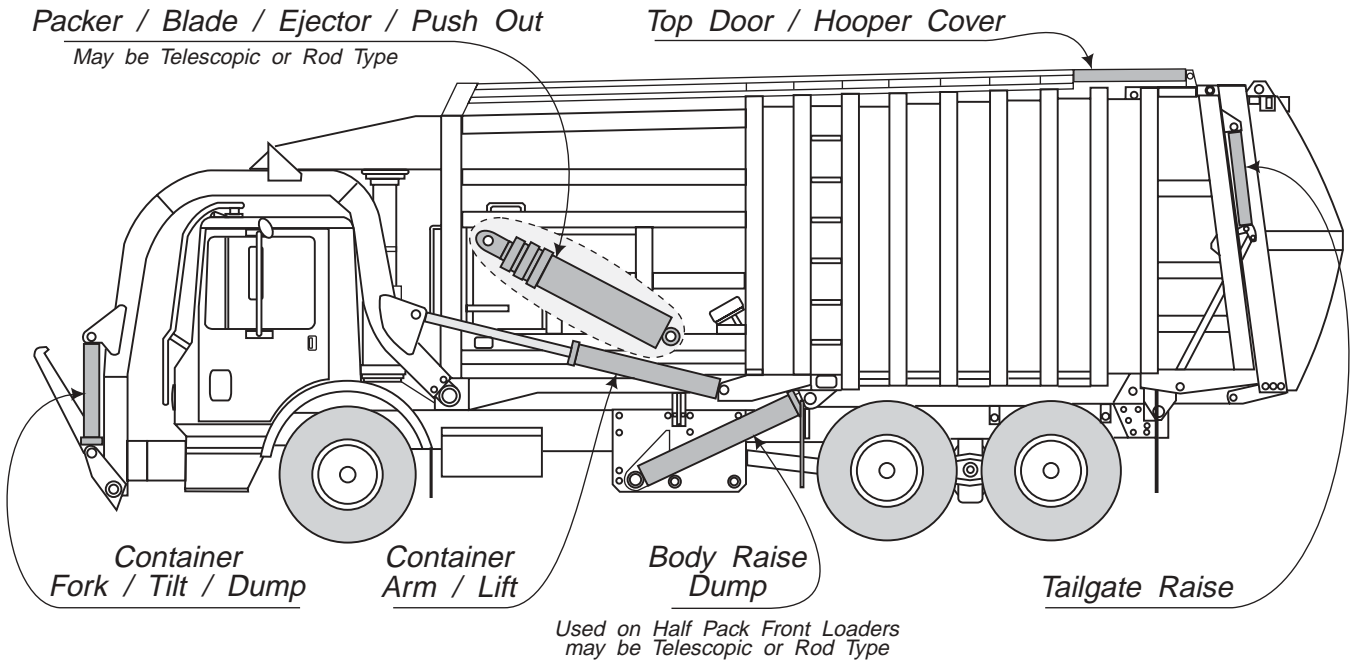


**FRAMELESS HYBRID**

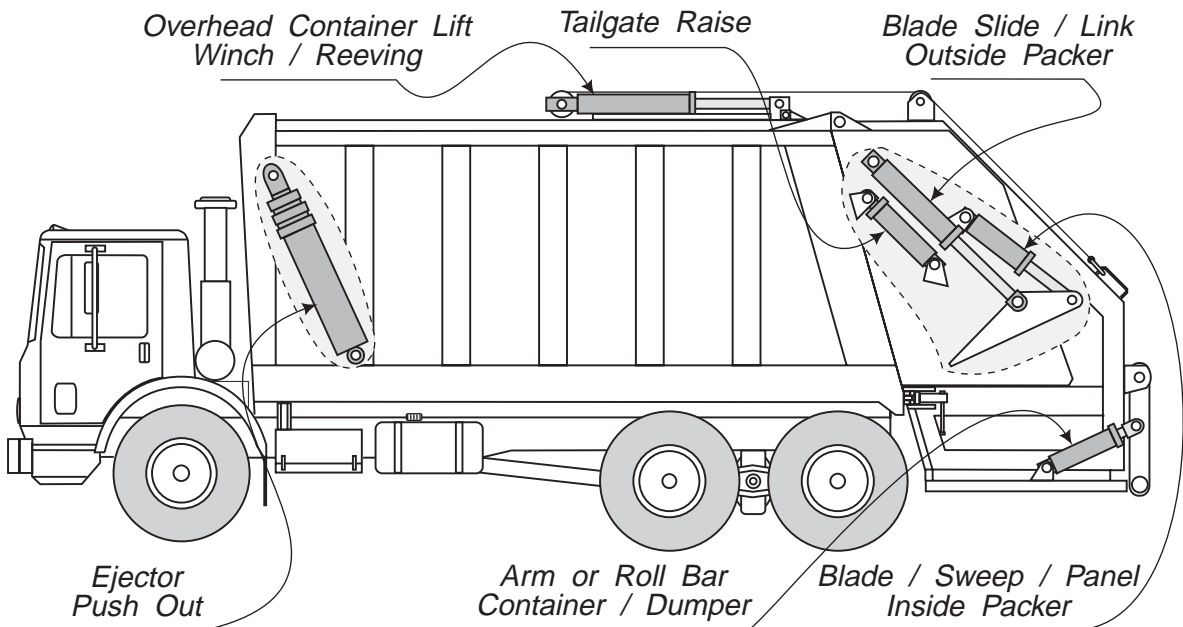




**Front Loader Refuse Bodies**

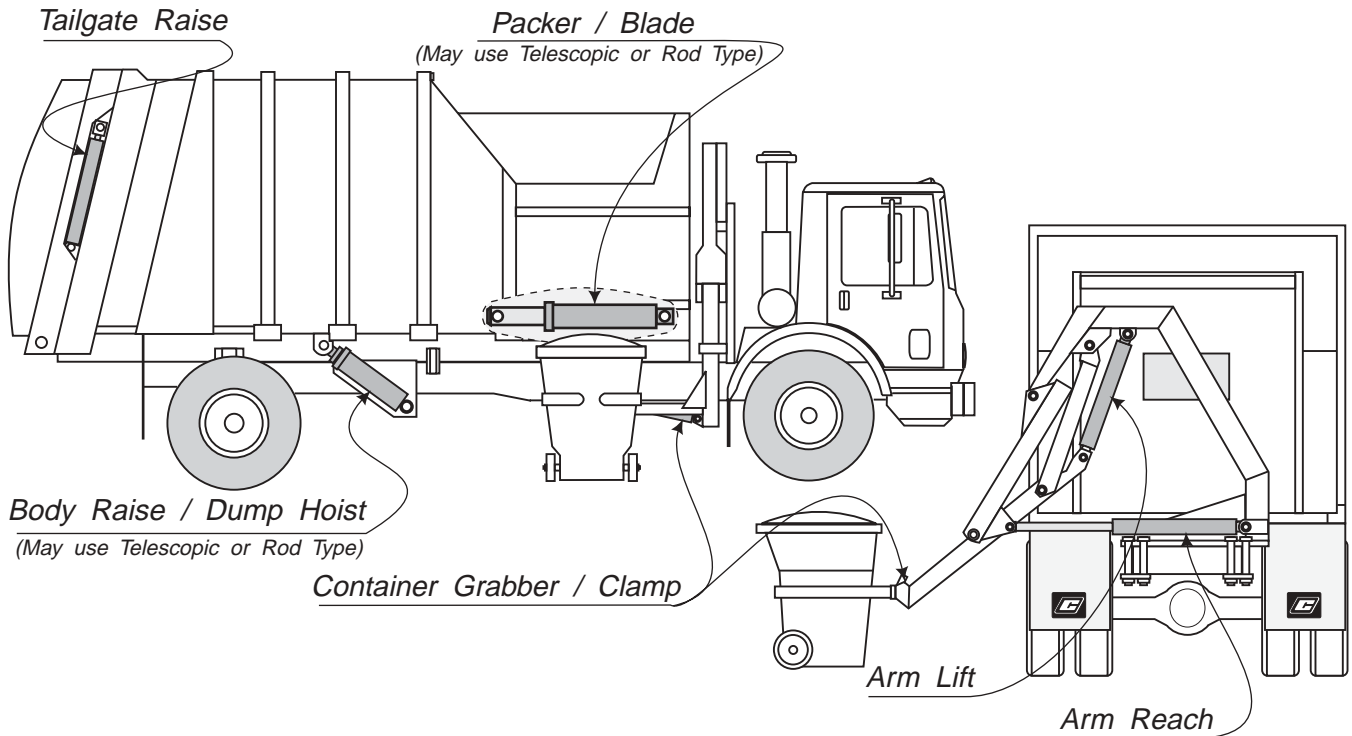


**Rear Loader Refuse Bodies**

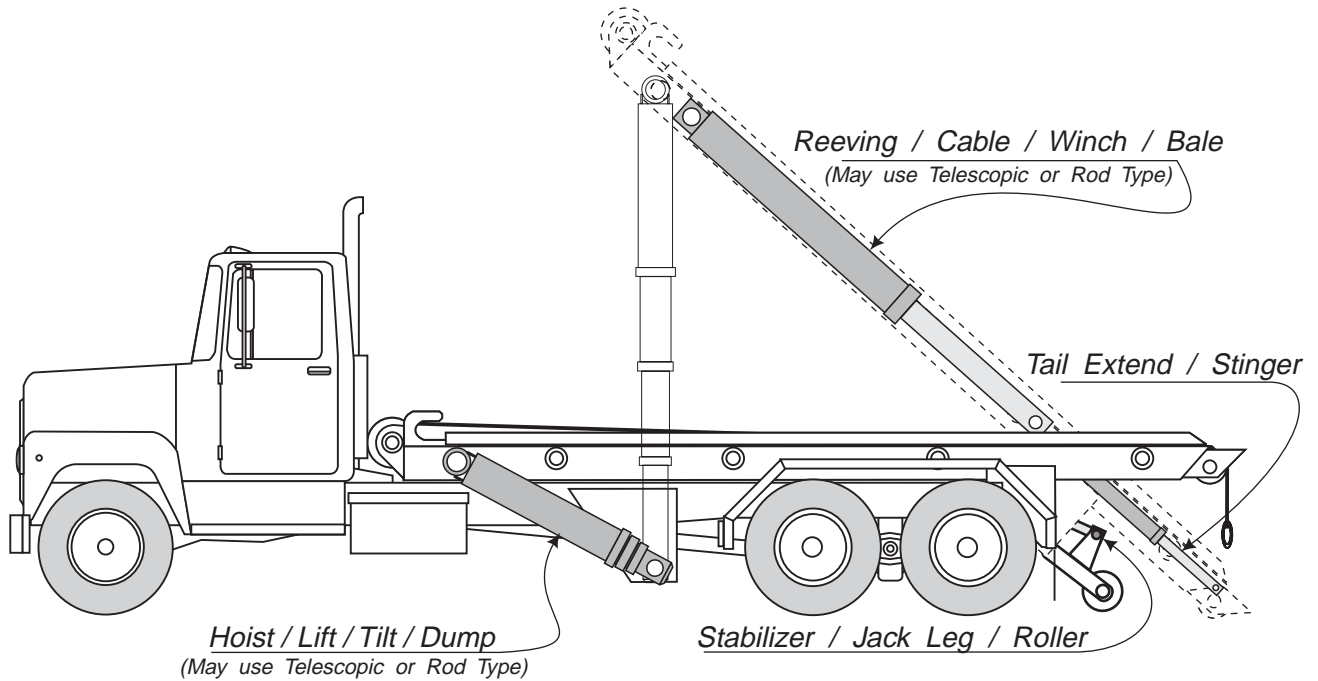


Crossover and Application Data is for Reference Only.  
 No Other Conditions are Expressed or Implied.

### Side Loader Refuse Bodies



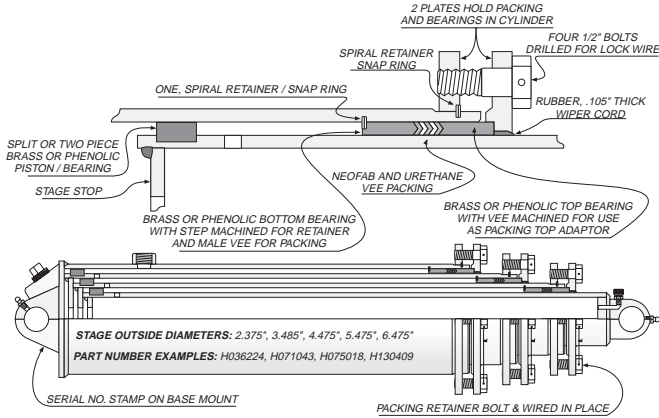
### Roll-Off & Tilt Frame Hoists



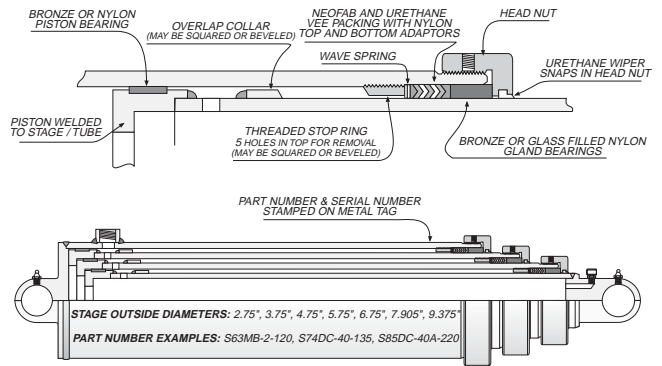
Crossover and Application Data is for Reference Only.  
No Other Conditions are Expressed or Implied.

# Dump Cylinder Identification Drawings

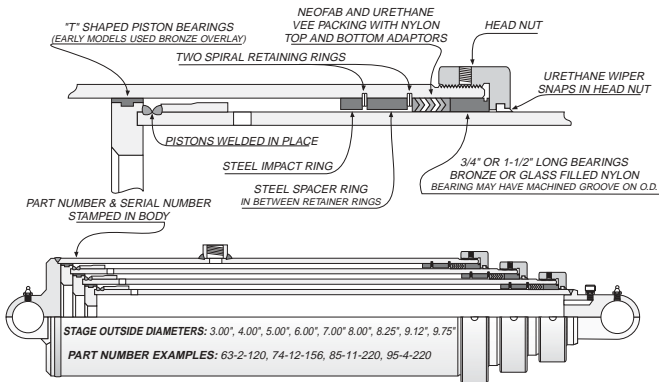
## ANTHONY



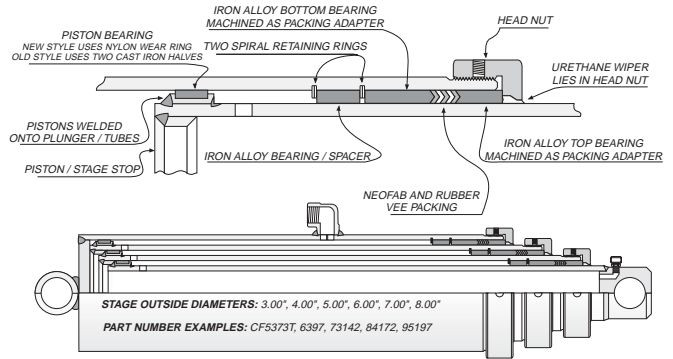
## COMMERCIAL



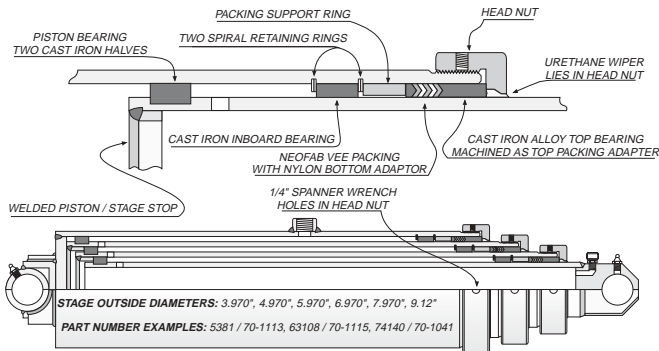
## CUSTOM HOIST



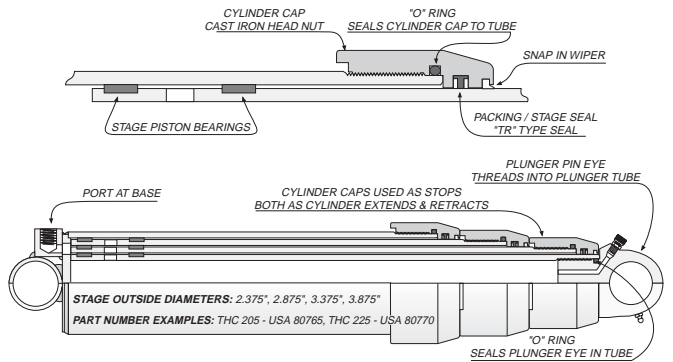
## FONTAINE



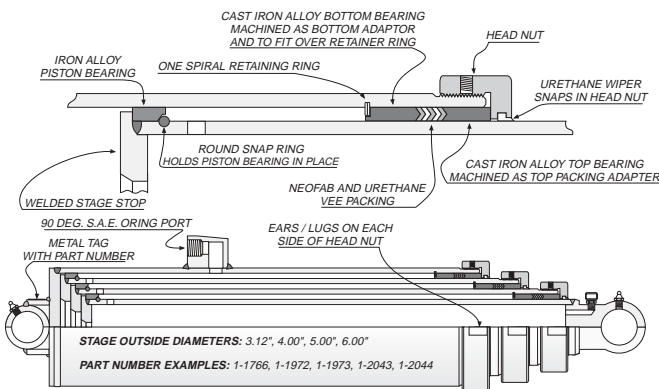
## PEABODY GALION



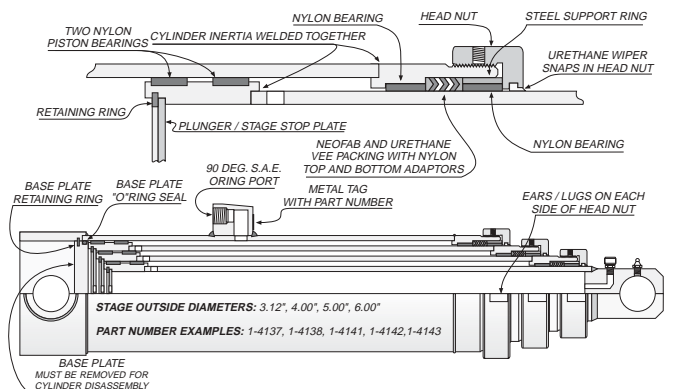
## GLENCO / FARMHAND



## HEIL "OLD STYLE" HPT SERIES

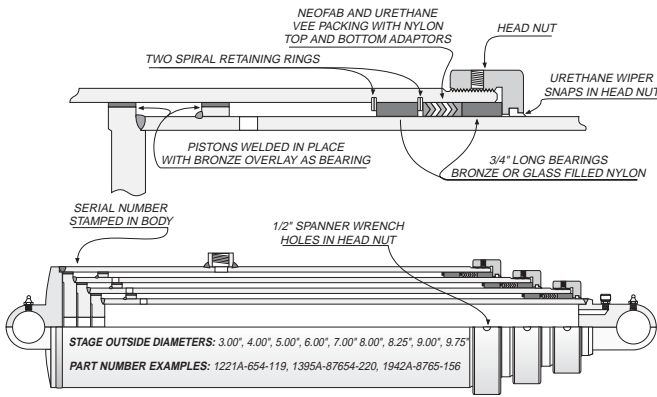


## HEIL "NEW STYLE" HPT SERIES

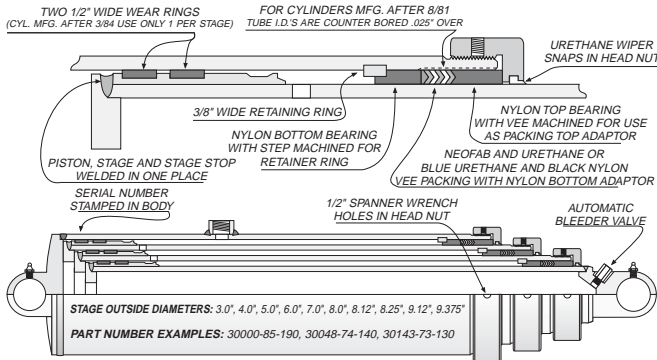


# Dump Cylinder Identification Drawings

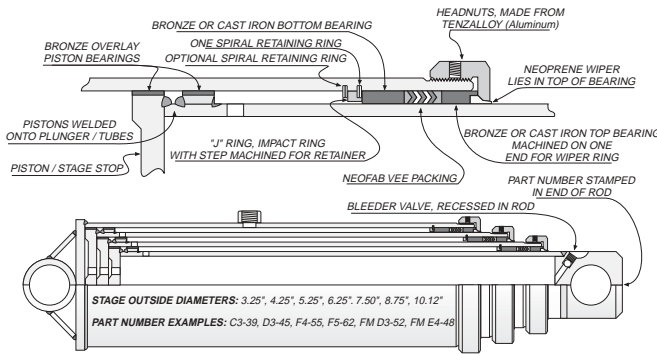
## HYCO 900 - 2000 SERIES (MFG. PRIOR TO 6/74)



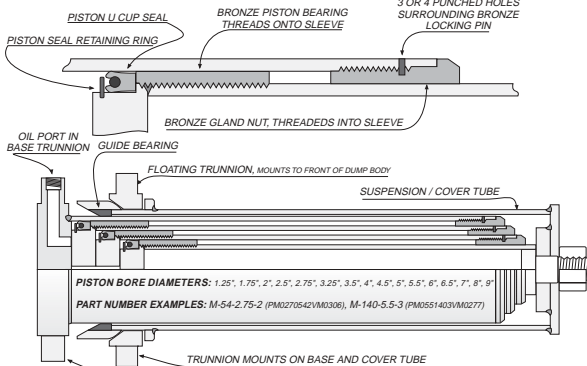
## HYCO 30,000 SERIES (OLD STYLE MFG. FROM 8/76 TO 7/81) (NEW STYLE MFG. FROM 8/81 TO PRESENT)



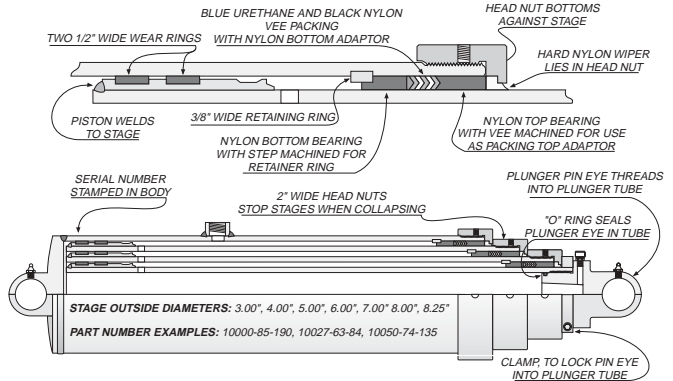
## JOHNSON



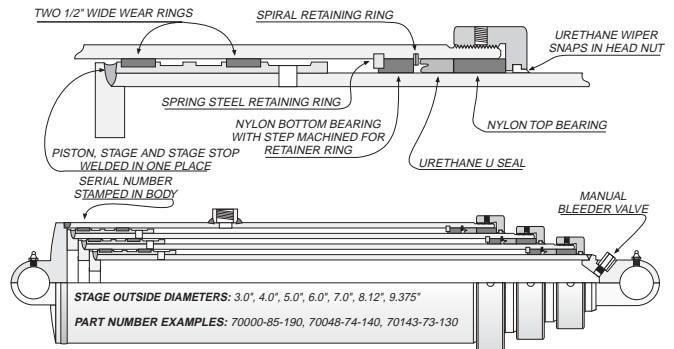
## MAILHOT / "M" MODEL COVER TUBE DESIGN



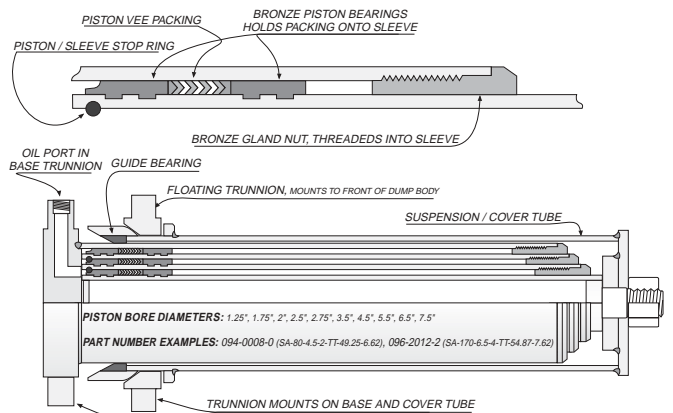
## HYCO 10,000 SERIES (MFG. FROM 7/74 TO 8/76)



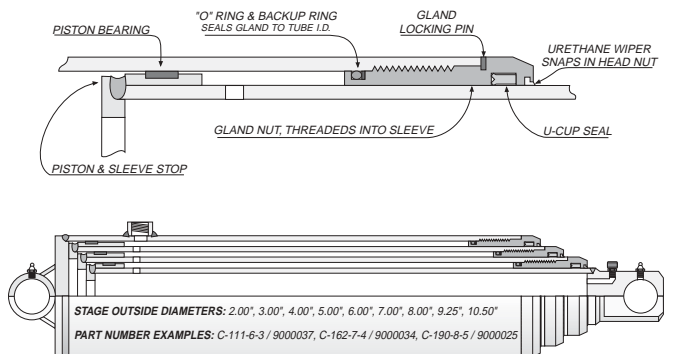
## HYCO 70,000 SERIES



## LESSARD / DRASSEL COVER TUBE DESIGN

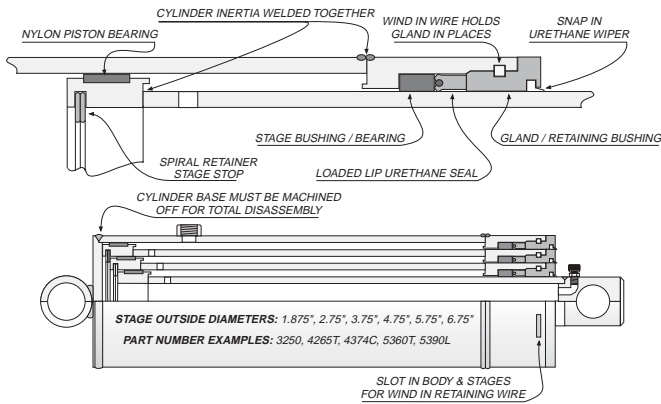


## MAILHOT / "C" MODEL

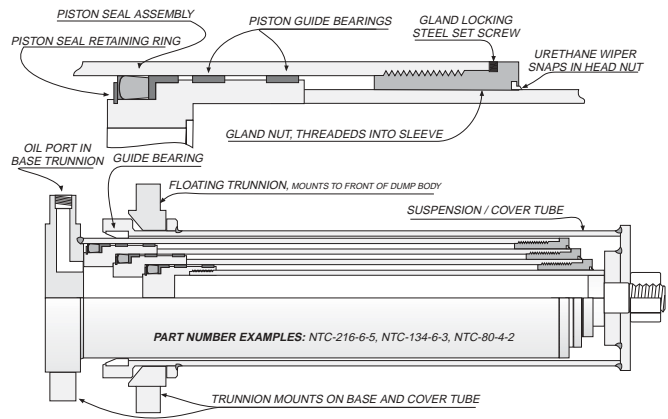


# Dump Cylinder Identification Drawings

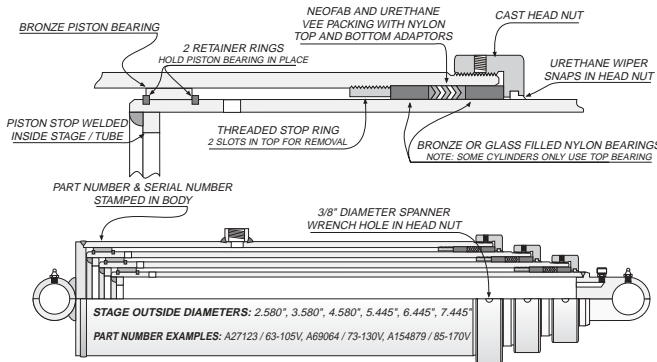
## MARION MFG.



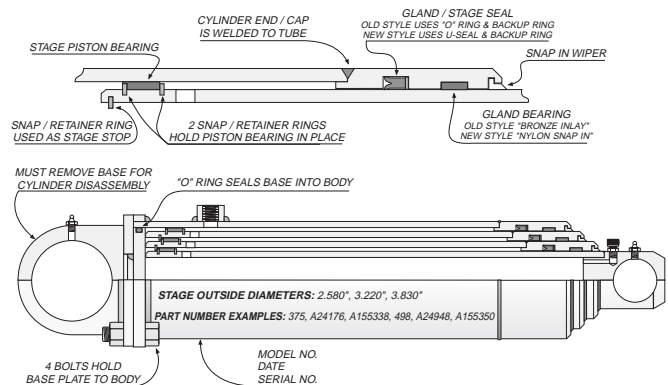
## NORDIC / NORD-SEN METAL INDUSTRIES



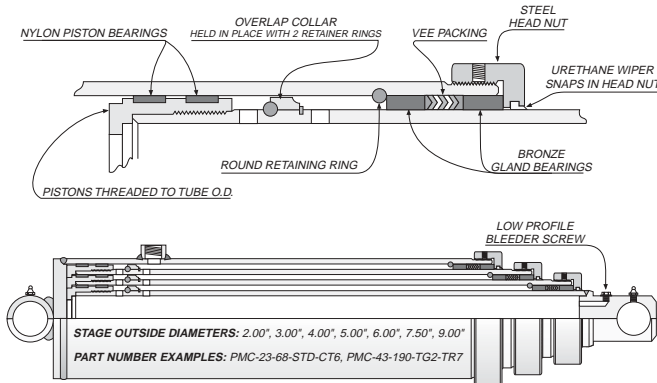
## PERFECTION



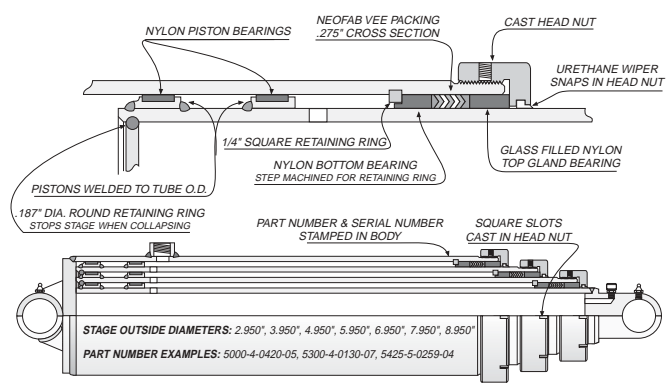
## PERFECTION FARM HOISTS



## PRINCE



## WARD CO





# Quick Reference Guide

## Accurate

A-17	D72CC-48-85
A-18	D62CC-36-68
A-19	D52CB-31-6
HH-1	<b>D62LB-5-80</b>
HH-2	<b>D72LB-9-80</b>
HP-HH001	<b>D62LB-5-80</b>
HP-HH002	<b>D72LB-9-80</b>
HP-HH004	SD73DB-5-120
HP-HH007	D52CB-31-6
HP-HH008	D62DB-8-79
HP-HH011	SD73DB-5-120
HP-HH012	SD73DB-5-120
MF-51	<b>D72LB-9-80</b>
MF-51-N	D62DB-8-79

## American Roll-Off / Automated Waste

110-100	SD63CC-16-92
110-200	SD63CC-16-110
110-300	SD63CC-16-110
110-450	D62CB-20-80.88
110-460	D62CC-58-80.88
110-500	D72CB-14-83.62
110-510	D72CC-53-80.88
110-730	D30LL-6-36
110-800	D35LC-1-80
110-870	D35LC-1-60
ARU6088	D62CC-58-80.88
B611	D62CB-18-78

## Anthony Midwest Body

H070105	<b>S63DC-44-111</b> CM26
H0701052	<b>S63DC-44-111</b> CM26
H071043	S73DC-40-110 CM23
H0710432	S73DC-40-110 CM26
H075018	<b>S73DC-40-124</b> CM23
H0750182	<b>S73DC-40-124</b> CM26
H130409	<b>S63DC-47-140</b> CM26

## Atlas

B519	SD63CC-16-92
B532C	SD63CC-16-110

## Benton Harbor

A89646	D70LN-2-90
A89811	D70DC-2-81
A89876	D40BB-1-48
A89998	D60BB-3-4.81
A90336	D60LN-2-80
A90337	D60DN-2-90
A90614	D70LN-2-75
A90643	D40BB-2-90
A90723	D50BB-3-52
A90772	D30BB-1-37
A91321	D60LN-2-75
P89645	D70LN-2-80
P89647	D70LN-2-108
P89648	D60DB-7-72
P91189	D60DC-9-78

## Challange Cook

5054854	D4048
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## Commercial / Parker

A4455	D40DD-22-15
B3151	D35CC-17-21.62
B3152	D45CC-11-26.94
B4100	D25LD-2-90
B4103	D45CC-15-41.50
B4663	D50CB-3-42
B4768	B5387
B4777	D30CD-10-28
B4957	D20LL-4-17.50
B4996	D35LD-4-20
B5007	D35DD-3-16
B5109	D40CB-7-42
B5217	D35DB-2-14.25
B5389	D35DD-3-16
B5420	<b>D62LB-5-80</b>

## Commercial / Parker

B5423	D30LL-7-16
B5424	D35LL-8-16
B5461	D30CD-9-20
B5501	D35DD-1-17.88
B5546	D25LL-14-42
B5550	D45LD-7-45.38
B5551	D35LD-5-19
B5552	D25LL-9-36
B5553	D25LL-15-71.50
B5670	D45CC-12-44
B5740	D30DD-12-9.12
B5782	D45CC-7-46
B5790	D25LL-15-84
B5946	D40DD-17-42
B5947	D40DD-19-22.50
B5998	C3850
B6002	D45DD-7-34.50
B6047	D50DD-23-52.75
B6048	D30CD-11-21.25
B6223	B6347
B6390	D25LL-8-38
B6419	D60CC-33-65.75
B6548	D50DD-21-39.50
C3666	D60CC-34-35
C3667	D60CC-29-35
C3804	B5806
C3805	D50CB-8-27
C3807	D40CD-9-24
C3808	D40CD-10-24
C3811	D25LD-3-94
C3813	D50CE-2-43.75
C3840	D25LL-12-16
C3842	D35CC-18-36.88
C3843	D50CC-22-20
C3844	D50CC-23-36
C3863	D40LB-1-35.31
C3865	D40DB-3-28.5
C3869	D25LD-3-66
C3870	D60DC-7-42.62
C3873	D25CC-10-14.12
C3877	S35CC-2-24.75
C3879	D55CB-5-49.88
C3880	D60DD-14-79
C3881	D70DD-6-79
C3882	D60CF-3-32.38
C3884	D40CL-2-39.38
C3919	D45CD-3-49.12
C3924	D40CD-11-15
C3925	D50DC-3-45
C3926	D40CD-8-22
C3933	D45CC-14-41.50
C4101	D40CD-14-25
C4102	D30CL-2-25.25
C4109	D40DD-10-21.62
C4155	D60CC-26-78
C4208	C5220
C4337	D35BB-1-80
C4435	D30LD-2-33.38
C4436	D30DD-4-89
C4439	D30CL-2-25.25
C4444	D60DB-7-72
C4469	D40CC-16-24.81
C4477	D40DD-10-21.62
C4481	D25DD-3-63
C4489	C5219
C4497	C5220
C4622	D45CC-15-41.50
C4793	D55CC-6-63
D3728	D60DD-4-69
D3783	D4143
D3787	D4143
D3809	D40CE-3-24
D3855	D60DB-20-63
D4088	D55DB-2-63
D4094	D60DC-10-30.50
D4250	B5473
D4398	D35CC-16-26
D4434	D45CD-3-49.12

## Commercial / Parker

D4437	D35LD-2-16.5
D4448	D40DD-16-22.50
D4478	D35LD-3-23.25
D4479	D60DB-16-67.5
D4480	D40LD-2-16.5
D4482	D55CC-3-49.13
D25LL-7-38	D25LL-8-38
D30DD-8-23	D30DD-9-23
D30LC-1-31.5	D30LC-2-31.5
D35DL-1-26.31	D35DL-2-26.31
D42CB-13-21	D40CB-8-21
D42CB-14-21	D40CB-8-21
D45CC-2-35	D4048
D45CD-1-49.13	D45CD-3-49.12
D45CE-2-41.50	D45CC-14-41.50
D45LD-4-24	D45LD-6-24
D50AB-2-10	D50AB-4-10
D50BB-1-52	D50BB-3-52
D50BB-2-52	D50BB-3-52
D50CB-5-40	D50CB-6-40
D50DB-6-54	D50DB-12-54
D55CC-1-49.13	D55CC-3-49.13
D60CC-23-78	D60CC-26-78
D60CC-24-78	D60CC-26-78
D60CC-28-35	D60CC-34-35
D60DB-1-67.5	D60DB-16-67.5
D60DB-2-58	D60DB-14-58
D60DB-3-108	D60DB-12-108
D60DB-4-72	D60DB-7-72
D60DB-6-108	D60DB-12-108
D60DB-11-67.5	D60DB-16-67.5
D60DC-1-42.62	D60DC-7-42.62
D60DC-7-42.62	D60DC-7-42.62
D60DD-5-69	D60DD-4-69
D60DD-6-69	D60DD-4-69
D60DD-11-79	D60DD-14-79
D60DN-1-90	D60DN-2-90
D60LN-1-75	D60LN-2-75
D62DB-5-15	D62DB-9-15
D62DB-7-72	D60DB-7-72
D62DC-10-30	D60DC-10-30.50
D62DD-6-69	D60DD-4-69
D62LB-2-81	<b>D62LB-5-80</b>
D62LB-3-79	<b>D62LB-5-80</b>
D62LB-3-80	D62LB-3-80
D62MI-1-80	<b>D62LB-5-80</b>
D62MT-2-80	<b>D62LB-5-80</b>
D70CC-5-78	D70CC-7-78
D70CC-7-78	D70CC-7-78
D70DB-1-115	D70DB-2-115
D70DD-5-79	D70DD-6-79
D70LN-1-80	D70LN-2-80
D72DB-3-15	D72DB-7-15
D72DB-3-25	D72DB-7-25
D72DB-4-15	D72DB-7-15
D72DB-4-25	D72DB-7-25
D72DB-4-25-1	D72DB-7-25-1
D72DB-10-79	D70DD-6-79
D72LB-1-80	<b>D72LB-9-80</b>
D72LB-3-80	D72LB-3-80
D72LB-5-80	<b>D72LB-9-80</b>
D72LB-6-81	<b>D72LB-9-80</b>
D72LP-1-80	D70LN-2-80
D72MI-1-80	<b>D72LB-9-80</b>
D72MI-2-92	D72LB-8-92
D72MT-1-80	<b>D72LB-9-80</b>
D84DA-1-25	D84DB-7-25
D84DB-3-25	D84DB-7-25
D84DB-4-25	D84DB-7-25
D84DB-4-25-1	D84DB-7-25-1
D84DB-5-25	D84DB-7-25
D84DB-5-25-1	D84DB-7-25-1
S42MB-1-86	S42MB-3-90
S42MB-1-90	S42MB-3-90
S52DB-5-55	S52DB-6-55
S53DB-1-103	S53DB-8-103
S53DB-3-75	<b>S53DC-14-72</b> CM25
S53DB-CP242-63	S53DB-7-63

Crossover and Application Data is for Reference Purpose Only. No Other Conditions are Expressed or Implied.

Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.

Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.





# Quick Reference Guide

## Commercial / Parker

S53DB-CP279-63	S53DB-7-63
S53DC-3-72	<b>S53DC-14-72</b>
S53DC-3-84	<b>S53DC-14-84</b>
S53DC-4-107	S53DC-11-107
S53DC-4-126	S53DC-11-126
S53DC-5-107	S53DC-11-107
S53DC-5-126	S53DC-11-126
S53DC-6-99	S53DC-15-99
S53DC-6-105	S53DC-15-105
S53DC-6-120	S53DC-15-120
S53DC-6-123	S53DC-15-123
S53DC-8-84	<b>S53DC-14-84</b> CM8
S53DC-8-104	S53DC-11-104
S53DC-8-120	S53DC-11-120
S53DC-8-130	S53DC-11-130
S53DC-9-72	<b>S53DC-14-72</b>
S53DC-9-84	<b>S53DC-14-84</b>
S53DC-10-72	<b>S53DC-14-72</b>
S53DC-10-84	<b>S53DC-14-84</b>
S53DC-12-84	<b>S53DC-14-84</b> CM8
S53DC-12-104	S53DC-11-104
S53DC-12-120	S53DC-11-120
S53DC-12-130	S53DC-11-130
S53DC-19-90	S53DB-12-90
S53DC-CP403-80	S53DC-16-80.75
S53MB-1-120	S53MB-3-120
S53MC-CP686-166	S53MC-38-166
S62CC-15-69	S62CC-30-69
S63CC-22-80	S63DC-47-77
S63CC-22-111	<b>S63DC-44-111</b>
S63CC-22-123	<b>S63DC-44-123</b>
S63DC-3-111	<b>S63DC-44-111</b>
S63DC-5-82	<b>S63DC-47-82</b> CM11
S63DC-6-82	<b>S63DC-47-82</b> CM11
S63DC-22-80	S63DC-47-77
S63DC-22-87	S63DC-47-92
S63DC-22-90	S63DC-47-92
S63DC-22-95	S63DC-47-104
S63DC-22-111	<b>S63DC-44-111</b>
S63DC-22-123	<b>S63DC-44-123</b>
S63DC-23-108	<b>S63DC-44-111</b>
S63DC-23-128	<b>S63DC-47-130</b>
S63DC-26-111	<b>S63DC-44-111</b>
S63DC-27-111	<b>S63DC-44-111</b> CM9
S63DC-28-120	<b>S63DC-47-120</b> CM45
S63DC-30-111	<b>S63DC-44-111</b>
S63DC-30-123	<b>S63DC-44-123</b>
S63DC-31-107	<b>S63DC-47-107</b> CM37
S63DC-31-126	<b>S63DC-44-123</b> CM37
S63DC-32-120	S63DC-45-120
S63DC-32-126	S63DC-45-126
S63DC-32-138	<b>S63DC-45-138</b>
S63DC-32-162	S63DC-45-162
S63DC-33-105	<b>S63DC-47-107</b>
S63DC-33-120	<b>S63DC-47-120</b>
S63DC-33-132	<b>S63DC-47-130</b>
S63DC-34-86	S63DC-47-86
S63DC-37-82	<b>S63DC-47-82</b>
S63DC-41-120	<b>S63DC-47-120</b> CM9
S63DC-41-130	<b>S63DC-47-130</b> CM9
S63DC-41-140	<b>S63DC-47-140</b> CM9
S63DC-46-107	<b>S63DC-47-107</b> CM37
S63DC-46-126	<b>S63DC-44-123</b> CM37
S63DC-48-120	<b>S63DC-47-120</b> CM9
S63DC-48-130	<b>S63DC-47-130</b> CM9
S63DC-48-140	<b>S63DC-47-140</b> CM9
S63DC-50-105	<b>S63DC-47-107</b>
S63DC-50-120	<b>S63DC-47-120</b>
S63DC-50-132	<b>S63DC-47-130</b>
S63DC-52-77	S63DC-47-77
S63DC-53-86	S63DC-47-86
S63DC-70-66	S63DC-75-66
S63DC-72-130	<b>S63DC-47-130</b>
S63DC-CP577-66	S63DC-75-66
S63MB-1-120	S63MB-9-120
S63MB-1-140	S63MB-8-140
S63MB-2-120	S63MB-9-120
S63MB-5-108	S63MB-11-108

## Commercial / Parker

S63MB-8-120	S63MB-9-120
S64DB-1-135	<b>S64DB-6-135</b>
S64DB-1-156	<b>S64DB-6-156</b>
S64DB-2-135	<b>S64DB-6-135</b>
S64DB-2-156	<b>S64DB-6-156</b>
S64DB-3-135	<b>S64DB-6-135</b>
S64DB-3-156	<b>S64DB-6-156</b>
S64DB-4-135	<b>S64DB-6-135</b>
S64DB-4-156	<b>S64DB-6-156</b>
S64DB-5-135	<b>S64DB-6-135</b>
S64DB-5-156	<b>S64DB-6-156</b>
S64DC-1-157	S64DC-7-157
S64DC-2-157	S64DC-7-157
S64DC-4-156	<b>S64DC-9-156</b>
S64DC-5-156	<b>S64DC-9-156</b>
S64DD-1-157	S64DC-7-157
S64MB-1-140	S64MB-4-140
S71CC-40-32	S71CC-42-32
S73CC-17-110	S73DC-40-110
S73CC-18-119	<b>S73DC-40-120</b> CM38
S73CC-20-119	<b>S73DC-40-120</b> CM11
S73CC-20-124	<b>S73DC-40-124</b> CM11
S73CC-22-110	S73DC-40-110
S73CC-22-124	<b>S73DC-40-124</b>
S73DB-1-142	<b>S73DC-40-140</b> CM23
S74DC-3-134	<b>S74DC-40-135</b>
S74DC-5-135	S74DC-41-135
S74DC-6-135	<b>S74DC-40-135</b>
S73DC-22-110	S73DC-40-110
S73DC-22-124	<b>S73DC-40-124</b>
S73DC-30-110	S73DC-40-110
S73DC-30-124	<b>S73DC-40-124</b>
S73DC-30-129	<b>S73DC-41-129</b>
S73DC-30-140	<b>S73DC-40-140</b>
S73DC-32-129	<b>S73DC-41-129</b>
S73DC-32-140	<b>S73DC-40-140</b>
S73DC-35-120	<b>S73DC-40-120</b>
S74CC-22-120	S74DC-40A-120
S74CC-22-134	<b>S74DC-40-135</b>
S74CC-22-161	<b>S74DC-40-161</b>
S74DC-22-120	S74DC-40A-120
S74DC-22-134	<b>S74DC-40-135</b>
S74DC-22-161	<b>S74DC-40-161</b>
S74DC-30-120	S74DC-40A-120
S74DC-30-135	<b>S74DC-40-135</b>
S74DC-30-138	<b>S74DC-40-135</b>
S74DC-30-140	S74DC-40A-140
S74DC-30-156	<b>S74DC-40-156</b>
S74DC-30-161	<b>S74DC-40-161</b>
S74DC-32-131	S74DC-41-135
S74DC-40-120	S74DC-40A-120
S74DC-40-140	S74DC-40A-140
S74DC-42-135	<b>S74DC-40-135</b>
S74DC-42-156	<b>S74DC-40-156</b>
S74DC-42-161	<b>S74DC-40-161</b>
S74DC-CP607-84	S74DC-70-84
S74MB-2-154	S74MB-3-154
S83CC-21-160	S83DC-40-160
S83CC-22-160	S83DC-40-160
S83DC-6-134	S83DC-26-134
S83DC-21-160	S83DC-40-160
S83DC-22-160	S83DC-40-160
S83DC-25-160	S83DC-40-160
S83DC-26-134	S83DC-26-134
S83DC-30-139	S83DC-40-139
S83DC-30-160	S83DC-40-160
S83DC-32-139	S83DC-40-139
S83DC-33-139	S83DC-40-139
S84CC-22-134	S84DC-40-140
S84CC-22-149	S84DC-40-148
S84CC-22-155	<b>S84DC-40-161</b>
S84CC-22-172	<b>S84DC-40-180</b>
S84CC-22-183	S84DC-40-188
S84CC-23-183	<b>S84DC-40-180</b>
S84CC-4-183	S84DC-40-188
S84CC-6-134	S84DC-40-140
S84CC-6-149	S84DC-40-148
S84CC-6-183	<b>S84DC-40-180</b>

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S84CC-8-166	<b>S84DC-40-161</b> CM38
S84CC-8-183	<b>S84DC-40-180</b> CM38
S84DC-4-134	S84DC-40-140
S84DC-4-149	S84DC-40-148
S84DC-4-183	S84DC-40-188
S84DC-7-183	<b>S84DC-40-180</b>
S84DC-8-134	S84DC-40-140
S84DC-8-149	S84DC-40-148
S84DC-22-134	S84DC-40-140
S84DC-22-149	S84DC-40-148
S84DC-22-155	<b>S84DC-40-161</b>
S84DC-22-161	<b>S84DC-40-161</b>
S84DC-22-172	<b>S84DC-40-180</b>
S84DC-22-183	<b>S84DC-40-180</b>
S84DC-25-134	S84DC-40-140
S84DC-25-149	S84DC-40-148
S84DC-25-161	<b>S84DC-40-161</b>
S84DC-25-183	<b>S84DC-40-180</b>
S84DC-30-134	S84DC-40-140
S84DC-30-149	S84DC-40-148
S84DC-30-161	<b>S84DC-40-161</b>
S84DC-30-183	<b>S84DC-40-180</b>
S84DC-40-134	S84DC-40-140
S84DC-40-149	S84DC-40-148
S84DC-45-134	S84DC-40-140
S84DC-45-149	S84DC-40-148
S84DC-45-183	<b>S84DC-40-180</b>
S84DC-46-134	S84DC-40-140
S84DC-46-149	S84DC-40-148
S84DC-46-183	<b>S84DC-40-180</b>
S84DC-47-148	S84DC-40-148
S85CB-3-220	<b>S85DC-40A-220</b> CM1
S85CC-7-197	<b>S85DC-40-197</b>
S85CC-7-220	<b>S85DC-40A-220</b>
S85CC-8-197	S85DC-40-197
S85CC-9-200	<b>S85DC-40-197</b> CM46
S85CC-9-220	<b>S85DC-40A-220</b> CM46
S85CC-9-235	<b>S85DC-40-235</b> CM46
S85CC-22-183	<b>S85DC-40-190</b>
S85CC-22-190	<b>S85DC-40-190</b>
S85CC-22-197	S85DC-40-197
S85CC-22-220	<b>S85DC-40A-220</b>
S85CC-22-235	<b>S85DC-40-235</b>
S85CC-22-250	<b>S85DC-40-250</b>
S85CC-23-220	<b>S85DC-40A-220</b> CM2
S85CC-23-235	<b>S85DC-40-235</b> CM4
S85CC-24-166	S85DC-51-160
S85DB-1-200	S85DC-40-197
S85DB-1-220	<b>S85DC-40A-220</b> CM46
S85DB-1-235	<b>S85DC-40-235</b> CM46
S85DB-1-250	<b>S85DC-40-250</b> CM46
S85DB-1-260	<b>S85DC-40A-265</b> CM46
S85DB-2-235	<b>S85DC-40-235</b> CM22
S85DB-3-200	S85DC-40-197
S85DB-3-220	<b>S85DC-40A-220</b> CM46
S85DB-3-235	<b>S85DC-40-235</b> CM46
S85DB-3-250	<b>S85DC-40-250</b> CM46
S85DB-3-260	<b>S85DC-40A-265</b> CM46
S85DC-5-175	S85DC-40-170
S85DC-5-197	S85DC-40-197
S85DC-5-220	<b>S85DC-40A-220</b>
S85DC-7-200	S85DC-40-197
S85DC-7-220	<b>S85DC-40A-220</b>
S85DC-7-235	<b>S85DC-40-235</b>
S85DC-7-250	<b>S85DC-40-250</b>
S85DC-8-220	<b>S85DC-40A-220</b>
S85DC-8-235	<b>S85DC-40-235</b>
S85DC-10-197	S85DC-40-197
S85DC-10-220	<b>S85DC-40A-220</b>
S85DC-12-220	<b>S85DC-40A-220</b>
S85DC-13-210	<b>S85DC-40A-220</b>
S85DC-22-176	S85DC-40-170
S85DC-22-183	<b>S85DC-40-190</b>
S85DC-22-190	<b>S85DC-40-190</b>
S85DC-22-197	S85DC-40-197
S85DC-22-220	<b>S85DC-40A-220</b>
S85DC-22-235	<b>S85DC-40-235</b>
S85DC-22-250	<b>S85DC-40-250</b>

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 Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.  
 Note: In some applications, modifications may be required for proper cylinder installation.  
 Note: Bold / Highlighted Items are Standard Warehouse Cylinders.



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S85DC-23-220	<b>S85DC-40A-220</b> CM4
S85DC-23-235	<b>S85DC-40-235</b> CM4
S85DC-25-183	<b>S84DC-40-180</b>
S85DC-25-190	<b>S85DC-40-190</b>
S85DC-25-250	<b>S85DC-40-250</b>
S85DC-30-190	<b>S85DC-40-190</b>
S85DC-30-197	S85DC-40-197
S85DC-30-220	<b>S85DC-40A-220</b>
S85DC-30-235	<b>S85DC-40-235</b>
S85DC-30-250	<b>S85DC-40-250</b>
S85DC-35-190	S85DC-64-190
S85DC-35-220	S85DC-64-220
S85DC-35-235	S85DC-64-235
S85DC-35-250	S85DC-64-250
S85DC-36-190	S85DC-64-190
S85DC-36-220	S85DC-64-220
S85DC-36-235	S85DC-64-235
S85DC-36-250	S85DC-64-250
S85DC-36-265	S85DC-64-265
S85DC-36-280	S85DC-64-285
S85DC-40-220	<b>S85DC-40A-220</b>
S85DC-40-265	<b>S85DC-40A-265</b>
S85DC-45-200	S85DC-40-197
S85DC-45-220	<b>S85DC-40A-220</b>
S85DC-45-235	<b>S85DC-40-235</b>
S85DC-45-250	<b>S85DC-40-250</b>
S85DC-46-200	S85DC-40-197
S85DC-46-220	<b>S85DC-40A-220</b>
S85DC-46-235	<b>S85DC-40-235</b>
S85DC-46-250	<b>S85DC-40-250</b>
S85DC-47-235	<b>S85DC-40-235</b>
S85DC-47-250	<b>S85DC-40-250</b>
S85DC-50-190	S85DC-64-190
S85DC-50-220	S85DC-64-220
S85DC-50-235	S85DC-64-235
S85DC-50-250	S85DC-64-250
S85DC-50-265	S85DC-64-265
S85DC-50-280	S85DC-64-285
S85DC-52-190	S85DC-64-190
S85DC-52-220	S85DC-64-220
S85DC-52-235	S85DC-64-235
S85DC-52-250	S85DC-64-250
S85DC-52-265	S85DC-64-265
S85DC-52-280	S85DC-64-285
S85DC-55-190	S85DC-64-190
S85DC-55-220	S85DC-64-220
S85DC-55-235	S85DC-64-235
S85DC-55-250	S85DC-64-250
S85DC-55-265	S85DC-64-265
S85DC-55-280	S85DC-64-285
S85DC-56-190	S85DC-64-190
S85DC-56-220	S85DC-64-220
S85DC-56-235	S85DC-64-235
S85DC-56-250	S85DC-64-250
S85DC-56-265	S85DC-64-265
S85DC-56-280	S85DC-64-285
S85DC-59-190	S85DC-64-190
S85DC-59-220	S85DC-64-220
S85DC-59-235	S85DC-64-235
S85DC-59-250	S85DC-64-250
S85DC-59-265	S85DC-64-265
S85DC-59-285	S85DC-64-285
S85DC-59A-265	S85DC-64-265
S85DC-61-190	S85DC-64-190
S85DC-61-220	S85DC-64-220
S85DC-61-235	S85DC-64-235
S85DC-61-250	S85DC-64-250
S85DC-61-265	S85DC-64-265
S85DC-61-285	S85DC-64-285
S85MB-2-197	S85MC-48-200
S85MB-3-190	S85MC-48-200 CM53
S85MB-3-220	S85MC-48-220 CM53
S85MC-3-200	S85MC-48-200
S85MC-3-220	S85MC-48-220
S85MC-3-235	<b>S85MC-48-235</b>
S85MC-3-250	S85MC-48-250
S85MC-5-200	S85MC-48-200
S85MC-22-200	S85MC-48-200

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S85MC-25-220	S85MC-48-220
S85MC-35-220	S85MC-48-220
S85MC-45-200-15.5	S85MC-48-200
S85MC-45-220-15.5	S85MC-48-220
S85MC-45-235-15.5	<b>S85MC-48-235</b>
S85MC-45-250-15.5	S85MC-48-250
S85MC-46-170-15.5	S85MC-48-170
S85MC-46-200-15.5	S85MC-48-200
S85MC-46-220-15.5	S85MC-48-220
S85MC-46-235-15.5	<b>S85MC-48-235</b>
S85MC-46-250-15.5	S85MC-48-250
S85MC-46-265-15.5	<b>S85MC-48-265</b>
S85MC-46-280-15.5	S85MC-48-280
S95CC-22-190	S95DC-40-190 CM4
S95CC-22-220	S95DC-40-220 CM4
S95CC-22-235	S95DC-40-235 CM4
S95CC-22-250	S95DC-40-250 CM4
S95DC-22-190	S95DC-40-190 CM4
S95DC-22-235	S95DC-40-235 CM4
S95DC-22-250	S95DC-40-250 CM4
S95DC-25-190	S95DC-40-190 CM4
S95DC-25-235	S95DC-40-235 CM4
S95DC-25-250	S95DC-40-250 CM4
S95DC-30-220	S95DC-40-220 CM4
S95DC-30-235	S95DC-40-235 CM4
S95DC-30-250	S95DC-40-250 CM4
S95DC-30-300	S95DC-40A-300
S95DC-31-260	S95DC-40-265
S95DC-40-300	S95DC-40A-300
S95DC-40-320	S95DC-40A-320
S95DC-40-340	S95DC-40A-340
S95DC-41-260	S95DC-40-265
SA53DB-1-63	S53DB-2-63
SA53DB-3-110	S53DC-11-107 CM25
SA53DB-3-120	S53DC-11-120 CM25
SA73DC-2-139	<b>S73DC-40-140</b>
SA74DC-3-161	<b>S74DC-40-161</b>
SA83DC-1-139	S83DC-40-139
SA85DC-1-197	S85DC-40-197
SD42CC-8-111	SD42CC-19-111
SD42CC-10-111	SD42CC-19-111
SD42CC-13-111	SD42CC-19-111
SD43CC-4-106	SD53CC-25-106
SD52CC-19-111	<b>SD52CC-24-111</b>
SD52CC-26-72	SD52CC-27-72
SD52CC-CP326-72	SD52CC-27-72
SD52CC-CP543-92	SD52CC-25-92.5
SD52DC-6-119	SD52DC-12-119
SD52DC-8-119	SD52DC-12-119
SD52DC-8-140	SD52DC-12-140
SD52DC-9-140	SD52DC-12-140
SD52DC-10-119	SD52DC-12-119
SD52DC-10-140	SD52DC-12-140
SD52DC-CP627-55	SD52DC-CP627-55
SD53CC-26-155	SD53CC-36-155
SD53CC-28-182	SD53CC-38-182
SD53CC-31-151	SD53CC-38-151.5
SD53CC-31-170	SD53CC-38-170.12
SD53CC-31-182	SD53CC-38-182
SD53CC-32-151.5	SD53CC-38-151.5
SD53CC-32-170.12	SD53CC-38-170.12
SD53CC-32-182	SD53CC-38-182
SD53CC-CP236-155	SD53CC-36-155
SD53CD-1-182	SD53CD-2-182
SD62CB-11-79	SD62CB-12-79
SD62CB-11-94	SD62CB-12-94
SD62CB-11-114	SD62CB-12-114
SD62CB-CP325-84	SD62DB-3-84
SD62CC-CP001-82	SD62CC-20-82
SD63CB-5-132	SD63CB-12-132
SD63CB-5-167	<b>SD63CB-12-167</b>
SD63CB-6-118	SD63CB-11-118
SD63CB-7-132	SD63CB-12-132
SD63CB-7-167	<b>SD63CB-12-167</b>
SD63CB-8-132	SD63CB-12-132
SD63CB-8-167	<b>SD63CB-12-167</b>
SD63CB-8-197.44	SD63CB-12-197
SD63CB-14-118	SD63CB-11-118

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SD63CB-15-132	SD63CB-12-132
SD63CB-15-167	<b>SD63CB-12-167</b>
SD63CB-15-197	SD63CB-12-197
SD63CC-20-167	SD63CC-23-167
SD63CC-22-124	SD63CC-28-124
SD63CC-24-124	SD63CC-28-124
SD63CC-40-164	SD63CC-41-164
SD63CC-40-181	SD63CC-41-181
SD63DB-4-120	SD63DB-14-120
SD63DB-5-120	SD63DB-14-120
SD63DB-9-120	SD63DB-14-120
SD63DB-13-120	SD63DB-14-120
SD63DC-70-101	SD63DC-71-101
SD63DC-70-81	SD63DC-71-81
SD63DC-CP155-80	SD63DC-7-80
SD63DC-CP167-88	SD63DC-7-88
SD63DC-CP441-61	SD63DC-7-61
SD63DD-1-164	D4145
SD63DD-2-164	D4145
SD64CC-3-102	SD64CC-5-107
SD64CC-6-132	SD64CC-7-132
SD64CC-6-152	SD64CC-7-152
SD64CC-CP542-118	SD64CC-7-118
SD64DC-2-156	SD64DC-3-156
SD73CC-9-120	SD73CC-25-120
SD73DB-4-120	SD73DB-5-120
SD73DB-7-115	SD73DB-8-115
SD74CC-14-163	SD74CC-13-162.88
SD74CC-4-135	SD74CC-12-135
SD74CC-7-135	SD74CC-12-135
SD74CC-9-131	SD74CC-11-131
SD74DB-8-144	SD74DB-6-144
SD74DB-CP448-200	SD74DB-9-200
SD74DC-7-109	SD74DC-9-109
SD74DC-CP135-119	SD74DC-7-119
SD74DC-CP186-109	SD74DC-9-109
SD83CB-5-117	<b>SD83CB-16-117</b>
SD83CB-6-117	<b>SD83CB-16-117</b>
SD83CB-7-117	<b>SD83CB-16-117</b>
SD83CB-13-117	<b>SD83CB-16-117</b>
SD83CB-15-117	<b>SD83CB-16-117</b>
SD83CC-5-132	SD83CC-24-132
SD83CC-5-156	SD83CC-24-156
SD83CC-16-126	SD83CC-27-126
SD83CC-25-126	SD83CC-27-126
SD83CC-26-126	SD83CC-27-126
SD83GF-1-156	SD83GF-2-156
SD83LF-3-177	SD83LF-5-177
SD83LF-4-177	SD83LF-5-177
SD84CC-5-144	SD84CC-20-144
SD84CC-5-178	SD84CC-20-178
SD84CC-6-135	SD84CC-21-135
SD84CC-17-178	SD84CC-20-178
SD84DD-1-168	SD84DD-2-168
SD84MC-3-152	SD84MC-18-152
SD84MC-3-176	SD84MC-18-176
SD84MC-4-152	SD84MC-18-152
SD84MC-4-176	SD84MC-18-176
SD84MC-6-152	SD84MC-21-152
SD84MC-6-176	SD84MC-21-176
SD84MC-7-285	SD84MC-19-285
SD84MC-7-340	SD84MC-19-340
SD84MC-8-152	SD84MC-18-152
SD84MC-8-176	SD84MC-18-176
SD84MC-9-152	SD84MC-18-152
SD84MC-9-176	SD84MC-18-176
SD84MC-10-285	SD84MC-19-285
SD84MC-10-340	SD84MC-19-340
SD84MC-11-406	SD84MC-20-406
SD84MC-12-406	SD84MC-20-406
SD84MC-13-152	SD84MC-21-152
SD84MC-13-176	SD84MC-21-176
SD84MC-14-152	SD84MC-18-152
SD84MC-16-406	SD84MC-23-406
SD85CC-12-348	SD85CC-19-348
SD85CC-13-156	SD85CC-20-156
SD85CC-14-156	SD85CC-20-156
SD85CC-17-348	SD85CC-19-348

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SD85CC-17-378	SD85CC-19-378
SD85CC-23-236	SD85CC-24-236
SD85CC-6-156	SD85CC-20-156
SD85DC-1-380	SD85DC-2-380
SD85DC-1-440	SD85DC-2-440
SD85DC-CP199-163	SD85DC-7-163
SD85MC-3-221	<b>SD85MC-15-220</b>
SD85MC-4-221	<b>SD85MC-15-220</b>
SD85MC-8-220	<b>SD85MC-15-220</b>
SD85MC-9-220	<b>SD85MC-15-220</b>
SD85MC-11-220	SD85MC-16-220
SD85MC-14-241	SD85MC-18-241
SD94CC-1-176	SD94CC-7-176
SD94CC-2-176	SD94CC-7-176
SD94CC-3-176	SD94CC-7-176
SD94CC-4-190	SD94CC-8-190
SD94CC-6-190	SD94CC-9-190
SD95CC-1-160	SD95CC-3-160
SD95MC-1-220	SD95MC-5-220
SD95MC-2-220	SD95MC-6-220
SD95MC-3-239	SD95MC-7-239
SD95MC-4-239	SD95MC-7-239
SD96CC-1-199	SD96CC-3-199
SD96MC-3-288	SD96MC-4-288
SD96MC-5-384	SD96MC-8-384
SD96MC-6-412	SD96MC-5-412
SD96MC-6-456	SD96MC-5-456
SD96MC-6-480	SD96MC-5-480

## Crane Carrier

67-191	SD96MC-4-288
67-207	SD85MC-18-241
67-218	SD95MC-7-239
67-228	SD63CC-15-108
67-234	SD95MC-7-239
67-247	SD74CC-10-161
67-249	SD96MC-4-288
67-250	SD85MC-18-241
67-260	SD63CC-15-116
74-270	SD74CC-10-161

## Crysteel

107439	<b>S74DC-40-161</b>
107450	<b>S73DC-41-129</b>
107455	S73DC-40-150
107548	S73DC-40-150
403013	<b>S74DC-40-161</b>
403108	<b>S73DC-41-129</b>
403109	S73DC-40-150
403110	<b>S74DC-40-161</b>
T73129	<b>S73DC-41-129</b>
T73147	S73DC-40-150
T74167	<b>S74DC-40-161</b>

## Custom Hoist

32-29-43	S32DB-1-43 CM72
42-1-90	S42MB-3-90
42-21-53	<b>S42DB-5-51</b> CM72
42-38-50	S42MB-6-50
42-38-51	S42MB-6-50
42-38-60	M42MB-60
42-44-60	S42MB-5-60
42-60-43	M52CB-43-P
42-75-43	S42DB-5-43 CM72
42-75-50	<b>S42DB-5-51</b> CM72
42-76-43	M42DB-43-P
43-2-74	S43MB-1-75
43-5-72	<b>S43DB-2-75</b> CM72
43-5-75	<b>S43DB-2-75</b> CM72
52-46-88	S52DC-7-88
53-2-60S	<b>S53DC-14-72</b> CM4
53-2-72	<b>S53DC-14-72</b> CM4
53-2-72S	<b>S53DC-14-72</b> CM4
53-2-74	<b>S53DC-14-72</b> CM4
53-2-84	<b>S53DC-14-84</b> CM4
53-2-88	<b>S53DC-14-84</b> CM4
53-2-90	<b>S53DC-14-84</b> CM4
53-2-104	<b>S53DC-11-104</b> CM4

## Custom Hoist

53-2-105	S53DC-11-104 CM4
53-2-126	S53DC-11-126 CM4
53-2-130	S53DC-11-130 CM4
53-3-120	S53MB-3-120
53-3-130	S53MB-3-130
53-3-140	S53MB-3-140
53-5-110	S53DC-11-107
53-12-99	S53DC-15-99
53-12-122	S53DC-15-123
53-14-67	S53MB-5-74
53-14-74	S53MB-5-74
53-52-120	S53DC-15-120
53-52-130	S53DC-11-130 CM2
53-59-99	S53DC-15-99
53-59-105	S53DC-15-105
53-59-122	S53DC-15-123
53-59-128	S53DC-15-123
53-71-63	S53DB-2-63
53-72-104	S53DC-11-104 CM4
53-72-105	S53DC-11-104 CM4
53-72-130	S53DC-11-130 CM4
53-73-74	S53MB-5-74
53-73-89	S53MB-5-90
53-80-120	S53DC-18-64.75
53-97-63	S53DB-2-63
53-110-71	S53DC-60-71
53-110-81	S53DC-60-81
53-110-108	S53DC-60-108
53-111-71	S53DB-9-71
53-111-83	S53DB-9-82
53-111-90	S53DB-9-92
53-111-92	S53DB-9-92
53-120-65	S53DC-18-64.75
53-120-81	S53DC-16-80.75
53-131-110	S53DC-11-107
53-131-130	S53DC-11-126
53-139-72	<b>S53DC-14-72</b>
53-139-84	<b>S53DC-14-84</b>
53-139-104	S53DC-11-104
53-139-130	S53DC-11-130 CM4
53-147-105	S53DC-11-104 CM4
53-147-130	S53DC-11-130 CM4
53-149-99	S53DC-15-99
53-403-120	S53MB-3-120
53-403-140	S53MB-3-140
53-459-105	S53DC-15-105
53-459-122	S53DC-15-123
53-459-128	S53DC-15-123
53-531-110	S53DC-11-107
53-531-130	S53DC-11-126
53-539-84	<b>S53DC-14-84</b>
53-703-120	S53MB-3-120
53-703-140	S53MB-3-140
53-759-105	S53DC-15-105
53-759-122	S53DC-15-123
53-759-128	S53DC-15-123
53-771-63	S53DB-2-63
53-810-71	S53DC-60-71
53-810-81	S53DC-60-81
53-810-108	S53DC-60-108
53-831-110	S53DC-11-107
53-831-130	S53DC-11-126
53-839-72	<b>S53DC-14-72</b>
53-839-84	<b>S53DC-14-84</b>
53-839-104	S53DC-11-104
53-892-84	<b>S53DC-14-84</b>
53-892-106	S53DC-11-104
63-1-80	S63DC-47-77 CM43
63-1-84	S63DC-47-86 CM43
63-1-88	S63DC-47-86 CM43
63-1-104	S63DC-47-104 CM43
63-1-105	S63DC-47-104 CM43
63-1-120	<b>S63DC-47-120</b> CM45
63-1-130	<b>S63DC-47-130</b> CM43
63-1-137	<b>S63DC-47-130</b> CM43
63-1-138	<b>S63DC-47-130</b> CM43
63-2-72S	S63DC-47-77 CM2
63-2-74S	S63DC-47-77 CM2

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63-2-84	S63DC-47-86
63-2-84S	S63DC-47-86
63-2-87	S63DC-47-86 CM2
63-2-88	S63DC-47-86 CM2
63-2-90	S63DC-47-86 CM2
63-2-92S	S63DC-47-92
63-2-93	S63DC-47-92
63-2-99S	S63DC-47-104 CM2
63-2-100S	<b>S63DC-47-107</b> CM2
63-2-102	S63DC-47-104 CM2
63-2-104	S63DC-47-104
63-2-105	S63DC-47-104 CM2
63-2-106	<b>S63DC-47-107</b> CM2
63-2-108	<b>S63DC-47-107</b>
63-2-111S	<b>S63DC-44-111</b>
63-2-120	<b>S63DC-47-120</b>
63-2-126	<b>S63DC-44-123</b>
63-2-130	<b>S63DC-47-130</b> CM2
63-2-132	<b>S63DC-47-130</b>
63-2-137	<b>S63DC-47-130</b> CM2
63-2-140	<b>S63DC-47-140</b>
63-2-150	S63DC-47-150
63-2-156	S63DC-47-150
63-4-96	S63MB-11-108
63-4-104	S63MB-11-108
63-4-120	S63MB-9-120
63-4-126	S63MB-9-120
63-4-140	S63MB-8-140
63-4-150	S63MB-8-150
63-4-160	S63MB-8-160
63-5-107	<b>S63DC-47-107</b> CM38
63-5-125	<b>S63DC-47-126</b> CM38
63-8-80	S63DC-47-77 CM11
63-8-82	<b>S63DC-47-82</b> CM11
63-8-86	S63DC-47-86 CM11
63-8-104	S63DC-47-104 CM11
63-8-111	<b>S63DC-44-111</b> CM11
63-8-123	<b>S63DC-44-123</b> CM11
63-8-130	<b>S63DC-47-126</b> CM11
63-8-140	<b>S63DC-47-140</b> CM11
63-10-120	S63DC-45-120
63-10-127	S63DC-45-126
63-21-108	<b>S63DC-47-107</b> CM36
63-21-120	<b>S63DC-47-120</b> CM36
63-22-108	<b>S63DC-47-107</b> CM36
63-22-120	<b>S63DC-47-120</b> CM36
63-23-98	S63DC-47-104 CM36
63-27-121	S63DC-45-120
63-27-125	S63DC-45-126
63-27-139	<b>S63DC-45-138</b>
63-27-160	S63DC-45-162
63-44-108	<b>S63DC-47-107</b> CM2
63-44-120	<b>S63DC-47-120</b> CM2
63-44-126	<b>S63DC-44-123</b>
63-44-130	<b>S63DC-47-130</b> CM2
63-44-140	<b>S63DC-47-140</b> CM2
63-53-130	<b>S63DC-47-130</b> CM2
63-54-120	<b>S63DC-47-120</b> CM2
63-54-78S	S63DC-47-77 CM2
63-83-108	S63DC-60-106
63-83-126	S63DC-60-125
63-105-97	S63DC-47-92 CM17
63-105-110	<b>S63DC-47-107</b> CM17
63-105-126	<b>S63DC-44-123</b> CM63
63-105-142	<b>S63DC-47-140</b> CM17
63-105-144	<b>S63DC-47-140</b> CM17
63-129-80	S63DC-60-79.12
63-129-92	S63DC-60-92
63-129-107	S63DC-60-106
63-129-126	S63DC-60-125
63-130-80	S63DC-54-79.31
63-130-80S	S63DC-54-79.31
63-130-92	S63DC-61-92
63-153-130	S63DC-45-126
63-153-140	<b>S63DC-45-138</b>
63-157-80	S63DC-47-77 CM22
63-171-121	S63DC-45-120
63-171-125	S63DC-45-126

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Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.

Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.





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63-172-108	S63DC-60-106
63-172-126	S63DC-60-125
63-179-88	S63DC-47-86 CM43
63-179-104	S63DC-47-104 CM43
63-180-88	S63DC-47-86 CM2
63-180-104	S63DC-47-104
63-180-108	<b>S63DC-47-107</b>
63-180-111S	<b>S63DC-44-111</b>
63-180-126	<b>S63DC-44-123</b>
63-180-130	<b>S63DC-47-130</b>
63-180-137	<b>S63DC-47-130</b>
63-182-104	S63MB-11-108
63-182-126	S63MB-9-120
63-182-140	S63MB-8-140
63-182-160	S63MB-8-160
63-183-107	<b>S63DC-47-107</b> CM38
63-183-125	<b>S63DC-47-126</b> CM38
63-184-111	<b>S63DC-44-111</b> CM11
63-184-123	<b>S63DC-44-123</b> CM11
63-184-140	<b>S63DC-47-140</b> CM11
63-185-98	S63DC-47-104 CM36
63-186-121	S63DC-45-120
63-186-125	S63DC-45-126
63-186-139	<b>S63DC-45-138</b>
63-186-160	S63DC-45-162
63-189-126	<b>S63DC-44-123</b>
63-189-130	<b>S63DC-47-130</b> CM2
63-189-140	<b>S63DC-47-140</b> CM2
63-191-130	<b>S63DC-47-130</b> CM2
63-202-121	S63DC-45-120
63-202-125	S63DC-45-126
63-202-139	<b>S63DC-45-138</b>
63-402-108	<b>S63DC-47-107</b>
63-402-120	<b>S63DC-47-120</b>
63-402-132	<b>S63DC-47-130</b> CM2
63-553-130	S63DC-45-126
63-553-140	<b>S63DC-45-138</b>
63-579-104	S63DC-47-104 CM43
63-580-126	<b>S63DC-44-123</b>
63-582-140	S63MB-8-140
63-702-104	S63DC-47-104
63-702-108	<b>S63DC-47-107</b>
63-702-120	<b>S63DC-47-120</b>
63-702-126	<b>S63DC-47-126</b>
63-702-132	<b>S63DC-47-130</b>
63-702-140	<b>S63DC-47-140</b>
63-702-84	S63DC-47-86
63-882-140	S63MB-8-140
63-886-121	S63DC-45-120
63-886-125	S63DC-45-126
63-886-139	<b>S63DC-45-138</b>
64-5-156	<b>S64DC-9-156</b>
64-8-156	<b>S64DC-9-156</b>
64-35-135	<b>S64DB-6-135</b>
64-35-156	<b>S64DB-6-156</b>
64-40-156	<b>S64DC-9-156</b>
64-435-135	<b>S64DB-6-135</b>
64-435-156	<b>S64DB-6-156</b>
64-440-156	<b>S64DC-9-156</b>
64-463-156	S64MB-5-156
64-735-135	<b>S64DB-6-135</b>
64-735-156	<b>S64DB-6-156</b>
64-767-156	<b>S64DC-9-156</b>
73-1-110	S73DC-40-110 CM23
73-1-127	<b>S73DC-40-124</b> CM23
73-1-142	<b>S73DC-40-140</b> CM23
73-2-120	<b>S73DC-40-120</b>
73-2-150	S73DC-40-150
73-3-110	S73DC-40-110
73-3-115	S73DC-40-110
73-3-120	<b>S73DC-40-120</b>
73-3-130	<b>S73DC-41-129</b>
73-3-140	<b>S73DC-40-140</b>
73-3-150	S73DC-40-150
73-9-110	S73DC-40-110 CM11
73-9-125	<b>S73DC-40-124</b> CM11
73-9-129	<b>S73DC-40-124</b> CM11

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73-15-130	<b>S73DC-41-129</b>
73-15-135	<b>S73DC-41-129</b>
73-21-120	<b>S73DC-40-120</b> CM4
73-22-120	<b>S73DC-40-120</b> CM4
73-25-110	S73DC-40-110 CM4
73-25-120	<b>S73DC-40-120</b> CM4
73-25-126	<b>S73DC-40-124</b> CM4
73-26-120	<b>S73DC-40-120</b>
73-26-140	<b>S73DC-40-140</b>
73-26-150	S73DC-40-150
73-28-120	<b>S73DC-40-120</b>
73-28-130	<b>S73DC-41-129</b>
73-28-132	<b>S73DC-41-129</b>
73-28-140	<b>S73DC-40-140</b>
73-28-150	S73DC-40-150
73-29-108S	S73DC-40-110
73-29-110S	S73DC-40-110
73-29-120	<b>S73DC-40-120</b>
73-29-120S	<b>S73DC-40-124</b>
73-29-124	<b>S73DC-40-124</b>
73-29-124S	<b>S73DC-41-129</b> CM2
73-29-130	<b>S73DC-41-129</b>
73-29-142	<b>S73DC-40-140</b>
73-35-110	S73DC-40-110
73-50-130	<b>S73DC-41-129</b>
73-55-110	S73DC-40-110
73-55-120	<b>S73DC-40-120</b>
73-55-126	<b>S73DC-40-124</b>
73-57-104	S73DC-60-103
73-57-125	S73DC-60-125
73-57-141	S73DC-60-142
73-57-145	S73DC-60-142
73-78-104	S73DC-60-103
73-78-125	S73DC-60-125
73-78-142	S73DC-60-142
73-81-114	S73DC-40-110 CM26
73-81-129	<b>S73DC-40-124</b> CM26
73-94-140	<b>S73DC-40-140</b>
73-116-140	<b>S73DC-40-140</b>
73-122-150	S73DC-40-150
73-157-141	S73DC-60-142
73-100-110	S73DC-40-110
73-101-130	<b>S73DC-41-129</b>
73-102-150	S73DC-40-150
73-104-124	<b>S73DC-40-124</b>
73-104-130	<b>S73DC-41-129</b>
73-105-140	S74DC-40A-140
73-108-130	<b>S73DC-41-129</b>
73-109-120	<b>S73DC-40-120</b>
73-429-120	<b>S73DC-40-120</b>
73-457-104	S73DC-60-103
73-457-125	S73DC-60-125
73-457-141	S73DC-60-142
73-457-145	S73DC-60-142
73-500-110	S73DC-40-110
73-504-130	<b>S73DC-41-129</b>
74-1-118	S74DC-40A-120
74-1-120	S74DC-40A-120
74-1-124S	<b>S74DC-40-135</b>
74-1-126	S74DC-40A-120
74-1-135	<b>S74DC-40-135</b>
74-1-137	<b>S74DC-40-135</b>
74-1-138	<b>S74DC-40-135</b>
74-1-140	S74DC-40A-140
74-1-140S	S74DC-40A-140
74-1-144	S74DC-40A-140
74-1-146	S74DC-40A-140
74-1-156	<b>S74DC-40-156</b>
74-1-160	<b>S74DC-40-156</b>
74-1-161	<b>S74DC-40-161</b>
74-1-163	<b>S74DC-40-161</b>
74-1-167	<b>S74DC-40-161</b>
74-1-174	<b>S84DC-40-170</b>
74-1-176	<b>S84DC-40-170</b>
74-1-180	<b>S74DC-40-180</b>
74-3-135	<b>S74DC-40-135</b> CM9

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74-3-156	<b>S74DC-40-156</b> CM9
74-3-182	<b>S74DC-40-180</b>
74-7-120	S74DC-40A-120 CM38
74-7-135	S74DC-41-135
74-7-144	S74DC-40A-140 CM38
74-7-164	<b>S74DC-40-161</b> CM38
74-7-166	<b>S74DC-40-161</b> CM38
74-10-123	S74DC-40A-120 CM11
74-10-135	<b>S74DC-40-135</b> CM11
74-10-142	S74DC-40A-140 CM11
74-10-156	<b>S74DC-40-156</b> CM11
74-12-120	S74DC-40A-120
74-12-137	S74DC-40A-140
74-12-144	S74DC-40A-140
74-12-156	<b>S74DC-40-156</b>
74-12-161	<b>S74DC-40-161</b>
74-12-167	<b>S74DC-40-161</b>
74-15-135	<b>S74DC-40-135</b>
74-15-140	S74DC-40A-140
74-15-156	<b>S74DC-40-156</b>
74-15-161	<b>S74DC-40-161</b>
74-16-135	<b>S74DC-40-135</b> CM4
74-21-140	S74DC-40A-140 CM2
74-21-156	<b>S74DC-40-156</b> CM4
74-22-140	<b>S74DC-40-135</b> CM4
74-22-156	<b>S74DC-40-156</b> CM4
74-27-135	<b>S74DC-40-135</b> CM4
74-27-156	<b>S74DC-40-156</b> CM4
74-28-120	S74DC-40A-120
74-28-137	<b>S74DC-40-135</b>
74-28-161	<b>S74DC-40-161</b>
74-28-174	<b>S84DC-40-170</b>
74-31-135	<b>S74DC-40-135</b> CM4
74-31-167	<b>S74DC-40-161</b> CM4
74-34-120	S74DC-40A-120 CM4
74-34-137	<b>S74DC-40-135</b> CM2
74-34-144	S74DC-40A-140 CM4
74-34-156	<b>S74DC-40-156</b> CM4
74-34-167	<b>S74DC-40-161</b> CM4
74-36-167	S74MB-5-167
74-37-135	<b>S74DC-40-135</b>
74-37-140	S74DC-40A-140
74-37-160	<b>S74DC-40-156</b>
74-46-150	S74MB-3-154
74-46-154	S74MB-3-154
74-46-170	S74MB-3-172
74-63-140	S74DC-60-139.75
74-63-165	S74DC-60-165.75
74-65-154	S74MB-3-154
74-65-170	S74MB-3-172
74-69-140	S74DC-60-139.75
74-71-154	S74MB-3-154
74-80-140	S74DC-60-139.75
74-80-166	S74DC-60-165.75
74-98-120	S74DC-40A-120
74-98-140	S74DC-40A-140
74-98-167	<b>S74DC-40-161</b>
74-99-135	S74DC-41-135
74-99-166	<b>S74DC-40-161</b> CM38
74-100-135	<b>S74DC-40-135</b> CM11
74-100-142	S74DC-40A-140 CM11
74-101-161	<b>S74DC-40-161</b>
74-101-167	S74DC-40-167
74-102-120	S74DC-40A-120
74-102-137	<b>S74DC-40-135</b>
74-103-120	S74DC-40A-120 CM4
74-103-137	<b>S74DC-40-135</b> CM2
74-103-167	<b>S74DC-40-161</b> CM4
74-104-167	S74MB-5-167
74-107-150	S74MB-3-154
74-107-172	S74MB-3-172
74-401-135	<b>S74DC-40-135</b>
74-401-140	S74DC-40A-140
74-401-156	<b>S74DC-40-156</b>
74-401-161	<b>S74DC-40-161</b>
74-401-180	<b>S74DC-40-180</b>
74-498-120	S74DC-40A-120
74-498-140	S74DC-40A-140

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74-499-135	S74DC-41-135
74-504-167	S74MB-5-167
74-701-135	<b>S74DC-40-135</b>
74-701-140	S74DC-40A-140
74-701-156	<b>S74DC-40-156</b>
74-701-161	<b>S74DC-40-161</b>
74-701-180	<b>S74DC-40-180</b>
83-4-135	S83DC-26-134
83-4-140	S83DC-40-139
83-4-150	S83DC-51-150
83-4-170	<b>S84DC-40-180</b>
84-1-156	S84DC-31-156 CM11
84-2-140	S84DC-40-140
84-2-150	S84DC-40-148
84-2-156	S84DC-31-156
84-2-160	S84DC-31-156
84-2-165	<b>S84DC-40-161</b>
84-2-170	<b>S84DC-40-170</b>
84-2-174	<b>S84DC-40-170</b>
84-2-181	<b>S84DC-40-180</b>
84-2-188	S84DC-40-188
84-2-190	S84DC-40-188
84-4-140	S84DC-40-140
84-4-166	<b>S84DC-40-161</b>
84-4-180	<b>S84DC-40-180</b>
84-7-180	<b>S84DC-40-180</b> CM21
84-13-135S	S84DC-40-140
84-13-140	S84DC-40-140
84-13-148	S84DC-40-148
84-13-150	S84DC-40-148
84-13-150S	S84DC-31-156
84-13-156	S84DC-31-156
84-13-156S	<b>S84DC-40-161</b>
84-13-160	S84DC-31-156
84-13-161	<b>S84DC-40-161</b>
84-13-166	<b>S84DC-40-161</b>
84-13-170	<b>S84DC-40-170</b>
84-13-180	<b>S84DC-40-180</b>
84-13-183	<b>S84DC-40-180</b>
84-13-190	S84DC-40-188
84-14-188	S84DC-40-188 CM9
84-17-150	S84DC-40-148 CM49
84-17-170	<b>S84DC-40-170</b> CM49
84-17-180	<b>S84DC-40-180</b> CM49
84-20-140	S84DC-40-140
84-20-150	S84DC-40-148
84-20-175	<b>S84DC-40-170</b>
84-21-140	S84DC-40-140
84-21-156	S84DC-31-156
84-22-140	S84DC-40-140
84-22-156	S84DC-31-156
84-23-156	S84DC-31-156
84-23-170	<b>S84DC-40-170</b>
84-23-190	S84DC-40-188
84-24-140	S84DC-40-140
84-50-140	S84DC-60-140
84-50-162	S84DC-60-161
84-50-164	S84DC-60-161
84-51-188	S84DC-40-188 CM9
84-65-165	<b>S84DC-40-161</b>
84-66-148	S84DC-40-148
84-66-156	S84DC-31-156
84-66-160	S84DC-31-156
84-66-161	<b>S84DC-40-161</b>
84-66-166	<b>S84DC-40-161</b>
84-66-170	<b>S84DC-40-170</b>
84-66-180	<b>S84DC-40-180</b>
84-66-183	<b>S84DC-40-180</b>
84-68-150	S84DC-40-148 CM49
84-69-156	S84DC-31-156
84-72-188	S84DC-40-188 CM9
84-466-148	S84DC-40-148
84-466-156	S84DC-31-156
84-466-160	S84DC-31-156
84-466-161	<b>S84DC-40-161</b>
84-466-166	<b>S84DC-40-161</b>
84-466-170	<b>S84DC-40-170</b>

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84-466-180	<b>S84DC-40-180</b>
84-466-183	<b>S84DC-40-180</b>
85-2-160	S85DC-51-160
85-2-166	S85DC-51-160
85-2-170	S85DC-40-170
85-2-190	<b>S85DC-40-190</b>
85-2-195	S85DC-40-197
85-2-200	S85DC-40-197
85-2-200S	S85DC-40-197
85-2-220	<b>S85DC-40A-220</b>
85-2-225	<b>S85DC-40A-220</b>
85-2-235	<b>S85DC-40-235</b>
85-2-250	<b>S85DC-40-250</b>
85-2-260	<b>S85DC-40A-265</b>
85-2-265	<b>S85DC-40A-265</b>
85-2-270	<b>S85DC-40A-265</b>
85-2-280	S85DC-40-280
85-2-285	S85DC-40-285
85-3-203	S85DC-40-197 CM46
85-3-235	<b>S85DC-40-235</b> CM46
85-3-260	<b>S85DC-40A-265</b> CM46
85-3-265	<b>S85DC-40A-265</b> CM46
85-3-280	S85DC-40-280
85-4-190	<b>S85DC-40-190</b> CM49
85-4-220	<b>S85DC-40A-220</b> CM49
85-4-260	<b>S85DC-40A-265</b> CM49
85-4-265	<b>S85DC-40A-265</b> CM49
85-5-190	<b>S85DC-40-190</b>
85-5-220	<b>S85DC-40A-220</b>
85-5-265	<b>S85DC-40A-265</b>
85-5-285	S85DC-40-285
85-6-162	S85DC-51-160
85-6-190	<b>S85DC-40-190</b>
85-6-220	<b>S85DC-40A-220</b>
85-6-235	<b>S85DC-40-235</b>
85-6-250	<b>S85DC-40-250</b>
85-6-265	<b>S85DC-40A-265</b>
85-9-162	S85DC-51-160
85-9-166	S85DC-51-160
85-11-162	S85DC-51-160
85-11-170	S85DC-40-170
85-11-190	<b>S85DC-40-190</b>
85-11-200	S85DC-40-197
85-11-220	<b>S85DC-40A-220</b>
85-11-235	<b>S85DC-40-235</b>
85-11-250	<b>S85DC-40-250</b>
85-11-265	<b>S85DC-40A-265</b>
85-11-280	S85DC-40-280
85-11-285	S85DC-40-285
85-14-190	S85MC-48-200
85-14-200	S85MC-48-200
85-14-220	S85MC-48-220
85-14-235	<b>S85MC-48-235</b>
85-14-240	<b>S85MC-48-235</b>
85-14-250	S85MC-48-250
85-14-265	<b>S85MC-48-265</b>
85-14-280	S85MC-48-280
85-16-162	S85DC-51-160
85-16-220	<b>S85DC-40A-220</b>
85-16-235	<b>S85DC-40-235</b>
85-16-250	<b>S85DC-40-250</b>
85-20-170	S85DC-40-170
85-20-190	<b>S85DC-40-190</b>
85-20-220	<b>S85DC-40A-220</b>
85-20-235	<b>S85DC-40-235</b>
85-20-250	<b>S85DC-40-250</b>
85-20-265	<b>S85DC-40A-265</b>
85-20-285	S85DC-40-285
85-28-170	S85DC-40-170
85-28-190	<b>S85DC-40-190</b>
85-28-220	<b>S85DC-40A-220</b>
85-28-235	<b>S85DC-40-235</b>
85-28-250	<b>S85DC-40-250</b>
85-28-265	<b>S85DC-40A-265</b>
85-28-289	S85DC-40-285
85-34-162	S85DC-51-160
85-34-170	S85DC-40-170
85-34-190	<b>S85DC-40-190</b>

## Custom Hoist

85-34-200	S85DC-40-197
85-34-220	<b>S85DC-40A-220</b>
85-34-235	<b>S85DC-40-235</b>
85-34-250	<b>S85DC-40-250</b>
85-34-265	<b>S85DC-40A-265</b>
85-34-280	S85DC-40-280
85-35-220	<b>S85DC-40A-220</b> CM54
85-35-235	<b>S85DC-40-235</b> CM54
85-43-280	S85DC-40-280
85-53-265	<b>S85DC-40A-265</b>
85-54-190	S85MC-48-200
85-54-200	S85MC-48-200
85-54-220	S85MC-48-220
85-54-240	<b>S85MC-48-235</b>
85-54-250	S85MC-48-250
85-63-190T	S85MC-48-200
85-63-200T	S85MC-48-200
85-63-220T	S85MC-48-220
85-63-235T	<b>S85MC-48-235</b>
85-63-240T	<b>S85MC-48-235</b>
85-63-250T	S85MC-48-250
85-63-265T	<b>S85MC-48-265</b>
85-63-280T	S85MC-48-280
85-63-285T	S85MC-48-280
85-66-195	S85DC-40-197
85-66-265	<b>S85DC-40A-265</b>
85-66-270	<b>S85DC-40A-265</b>
85-66-280	S85DC-40-280
85-66-285	S85DC-40-285
85-67-203	S85DC-40-197 CM46
85-67-265	<b>S85DC-40A-265</b> CM46
85-68-260	<b>S85DC-40A-265</b> CM49
85-68-265	<b>S85DC-40A-265</b> CM49
85-69-265	<b>S85DC-40A-265</b>
85-70-265	<b>S85DC-40A-265</b>
85-70-280	S85DC-40-280
85-70-285	S85DC-40-285
85-73-285	S85DC-40-285
85-75-265	<b>S85DC-40A-265</b>
85-77-265	<b>S85DC-40A-265</b>
85-77-280	S85DC-40-280
85-81-200T	S85MC-48-200 CM1
85-81-220T	S85MC-48-220 CM1
85-81-235T	<b>S85MC-48-235</b> CM1
85-81-250T	S85MC-48-250 CM1
85-81-265T	<b>S85MC-48-265</b>
85-402-170	S85DC-40-170
85-402-190	<b>S85DC-40-190</b>
85-402-197	S85DC-40-197
85-402-200	S85DC-40-197
85-402-220	<b>S85DC-40A-220</b>
85-402-235	<b>S85DC-40-235</b>
85-402-250	<b>S85DC-40-250</b>
85-453-265	<b>S85DC-40A-265</b>
85-463-170T	S85MC-48-170
85-463-200T	S85MC-48-200
85-463-220T	S85MC-48-220
85-463-235T	<b>S85MC-48-235</b>
85-463-250T	S85MC-48-250
85-463-265T	<b>S85MC-48-265</b>
85-463-280T	S85MC-48-280
85-463-285T	S85MC-48-280
85-466-265	<b>S85DC-40A-265</b>
85-466-280	S85DC-40-280
85-466-285	S85DC-40-285
8 1/4 4-10-150	S84DC-40-148 CM2
8 1/4 4-10-190	S84DC-40-188 CM2
8 1/4 4-11-150	S84DC-40-148 CM2
8 1/4 4-20-150	S84DC-40-148 CM2
8 1/4 4-4-150	S84DC-40-148 CM2
8 1/4 4-4-190	S84DC-40-188 CM2
8 1/4 5-20-190	S85DC-64-190
8 1/4 5-20-220	S85DC-64-220
8 1/4 5-20-235	S85DC-64-235
8 1/4 5-20-250	S85DC-64-250
8 1/4 5-20-265	S85DC-64-265
8 1/4 5-21-265	S85DC-64-265
8 1/4 5-26-265	S85DC-64-265

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 Note: Bold / Highlighted Items are Standard Warehouse Cylinders.



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8 1/4 5-26-270	S85DC-64-265
8 1/4 5-26-285	S85DC-64-285
8 1/4 5-404-220	S85DC-64-220
8 1/4 5-404-235	S85DC-64-235
8 1/4 5-404-250	S85DC-64-250
8 1/4 5-4-190	S85DC-64-190
8 1/4 5-4-220	S85DC-64-220
8 1/4 5-4-235	S85DC-64-235
8 1/4 5-4-250	<b>S85DC-40-250</b> CM2
8 1/4 5-4-265	S85DC-64-265
8 1/4 5-4-270	S85DC-64-265
8 1/4 5-4-285	S85DC-64-285
93-10-110	S93CC-CP112-110
95-2-235	S95DC-40-235
95-2-250	S95DC-40-250
95-2-260	S95DC-40-265
95-2-300	S95DC-40A-300
95-2-320	S95DC-40A-320
95-3-235	S95DC-40-235 CM9
95-3-250	S95DC-40-250 CM9
95-3-260	S95DC-40-265 CM9
95-4-190	S95DC-40-190
95-4-235	S95DC-40-235
95-4-236	S95DC-40-235
95-4-250	S95DC-40-250
95-4-250S	S95DC-40-250
95-4-285	S95DC-40-280
95-6-235	S95DC-40-235 CM42
95-6-250	S95DC-40-250 CM42
95-6-270	S95DC-40-265 CM42
95-11-190	S95DC-40-190
95-11-190S	S95DC-40-190
95-11-200	S95DC-40-190
95-11-235	S95DC-40-235
95-11-250	S95DC-40-250
95-11-260	S95DC-40-265
95-11-260S	S95DC-40-265
95-11-264S	S95DC-40-265
95-11-265	S95DC-40-265
95-11-265S	S95DC-40-265
95-11-270	S95DC-40-265
95-11-280	S95DC-40-280
95-11-285	S95DC-40-280
95-11-300	S95DC-40A-300
95-11-320	S95DC-40A-320
95-13-265	S95DC-40-265
95-20-235	S95DC-40-235
95-20-250	S95DC-40-250 CM42
95-22-190	S95DC-40-190
95-22-220	S95DC-40-220
95-22-235	S95DC-40-235
95-22-250	S95DC-40-250
95-22-285	S95DC-40-280
95-38-250	S95DC-40-250
95-38-265	S95DC-40-265
95-53-235	S95DC-40-235
95-53-250	S95DC-40-250
95-53-260	S95DC-40-265
95-53-300	S95DC-40A-300
95-53-320	S95DC-40A-320
95-54-260	S95DC-40-265 CM9
95-55-250	S95DC-40-250
95-55-285	S95DC-40-280
95-57-270	S95DC-40-265 CM42
95-61-250	S95DC-40-250
95-61-260	S95DC-40-265
95-61-260S	S95DC-40-265
95-61-265	S95DC-40-265
95-61-270	S95DC-40-265
95-61-280	S95DC-40-280
95-61-285	S95DC-40-280
95-61-300	S95DC-40A-300
95-61-320	S95DC-40A-320
95-63-265	S95DC-40-265
95-411-235	S95DC-40-235
95-461-250	S95DC-40-250
95-461-265	S95DC-40-265
95-461-280	S95DC-40-280

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95-461-300	S95DC-40A-300
95-461-320	S95DC-40A-320
96-11-285	S96DC-1-285
96-19-285	S96DC-1-285
96-20-285	S96DC-1-285
96-21-285	S96DC-1-285
9 3/4 5-4-190	S95DC-40-190
9 3/4 5-4-235	S95DC-40-235
9 3/4 5-4-250	S95DC-40-250
9 3/4 5-4-260	S95DC-40-265
9 3/4 5-4-265	S95DC-40-265
9 3/4 5-4-280	S95DC-40-280
9 3/4 5-4-300	S95DC-40A-300
9 3/4 5-11-190	S95DC-40-190 CM4
9 3/4 5-11-235	S95DC-40-235 CM4
9 3/4 5-11-250	S95DC-40-250 CM4
9 3/4 5-11-265	S95DC-40-265 CM4
9 3/4 5-11-300	S95DC-40A-300
9 3/4 5-411-190	S95DC-40-190 CM4
9 3/4 5-411-235	S95DC-40-235 CM4
9 3/4 5-411-250	S95DC-40-250 CM4
9 3/4 5-411-265	S95DC-40-265 CM4
9 3/4 5-411-300	S95DC-40A-300
DA2 1/2-16-66	D25LD-3-66
DA2 1/2-16-90	D25LD-2-90
DA2 1/2-38-94	D25LD-3-94
DA3 57-21	D30DD-7-21.12
DA3 72-25.5	C4438
DA3 81-25	D30CL-2-25.25
DA3 1/2-24-22	D35CC-17-21.62
DA3 1/2-65-16.5	D35LD-2-16.5
DA3 1/2-95-80	D35BB-1-80
DA4 13-24	D40CE-3-24
DA4 61-24	D40CD-10-24
DA4 87-24	D40CD-9-24
DA4 125-21	D40DD-10-21.62
DA4 126-28	D40DB-3-28.5
DA4 127-30	D40DL-2-30.38
DA4 142-21	C3847
DA4 153-24	D40CE-3-24
DA4 158-24	D40CE-3-24
DA4 162-15	D40CD-11-15
DA4 170-25	D40CD-14-25
DA4 1/2-21-26	C3850
DA4 1/2-22-27	D45CC-11-26.94
DA4 1/2-52-41	D45CC-14-41.50
DA4 1/2-87-41	D45CC-14-41.50
DA4 1/2-63-49	D45CD-3-49.12
DA5 47-27	D50CB-8-27
DA5 48-47	D3812
DA5 52-36	D50CC-23-36
DA5 53-20	D50CC-22-20
DA5 55-20	D50CC-22-20
DA5 69-43	D50CE-2-43.75
DA5 144-36	C3872
DA5 156-47	D3812
DA5 162-45	D50DC-3-45
DA5 1/2-24-24	C3878
DA5 1/2-33-54	C3563
DA5 1/2-35-63	D55DB-2-63
DA5 1/2-50-24	C3878
DA5 1/2-51-63	D55CC-6-63
DA6 5-58	D60DB-14-58
DA6 6-78	D60CC-26-78
DA6 14-76	D3838
DA6 36-76	D3838
DA6 39-78	D60CC-26-78
DA6 40-108	D60DB-12-108
DA6 68-79	D60DD-14-79
DA6 73-34	C3814
DA6 81-30	D60DC-11-30.50
DA6 96-72	D60DB-7-72
DA6 100-63	D60DB-20-63
DA6 140-79	D60DD-14-79
DA6 156-34	D60CF-3-32.38
DA6 157-30	D60DC-11-30.50
DA6 158-42	D60DC-7-42.62
DA6 171-69	D60DD-4-69

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DA6-205-30	D60DC-10-30.50
DA6-210-78	D60CC-26-78
DA6-215-108	D60DB-12-108
DA6-236-72	D60DB-7-72
DA6-258-58	D60DB-14-58
DA6-283-67	D60DB-16-67.5
DA6-288-42	D60DC-7-42.62
DA6-302-78	D60CC-26-78
DA6-365-72	D60DB-7-72
DA6-403-63	D60DB-20-63
DA6-406-30	D60DC-10-30.50
DA6 1/2-33-80	<b>D62LB-5-80</b>
DA7 5-108	D70CC-8-108
DA7 5-131	D70CC-8-131
DA7 36-115	D70DB-2-115
DA7 43-79	D70DD-6-79
DA7 78-79	D70DD-6-79
DA7 82-78	D70DB-6-79
DA7 107-80	D70LN-2-80
DA7 107-90	D70LN-2-90
DA7 121-78	D70CC-7-78
DA7 140-115	D70DB-2-115
DA7 144-80	D70LN-2-80
DA7 144-90	D70LN-2-90
DA7 182-108	D70CC-8-108
DA7 182-131	D70CC-8-131
DA7 196-115	D70DB-2-115
DA7 202-115	D70DB-2-115
DA7 241-80	D70LN-2-80
DA7 241-90	D70LN-2-90
DA7 250-152	DA7-250-152
DA7 255-80	D70LN-2-80
DA7 269-79	D70DD-7-79
DA7 1/4-1-80	<b>D72LB-9-80</b>
DA7 1/4-5-80	<b>D72LB-9-80</b>
DAT42-19-112	SD42CC-19-111
DAT42-24-112	SD42CC-19-111
DAT42-35-192	SD42CB-5-192
DAT42-44-192	SD42CB-5-192
DAT42-58-112	SD42CC-19-111
DAT43-4-106	SD53CC-25-106
DAT52-9-119	SD52CC-12-119
DAT52-9-140	SD52DC-12-140
DAT52-10-79	SD52CB-7-79
DAT52-24-112	<b>SD52CC-24-111</b>
DAT52-28-69	SD52CC-25-68.5
DAT52-28-82	SD52CC-25-82.5
DAT52-28-92	SD52CC-25-92.5
DAT52-28-97	SD52CC-25-96.5
DAT52-29-92	SD52CC-25-92.5
DAT52-32-119	SD52DC-12-119
DAT52-48-140	SD52DC-12-140
DAT52-57-79	SD52CB-7-79
DAT52-58-119	SD52DC-12-119
DAT52-61-112	<b>SD52CC-24-111</b>
DAT53-8-110	SD53CC-16-111
DAT53-53-117	SD53CC-30-117.25
DAT53-53-129	SD53CC-30-129
DAT53-105-110	SD53CC-16-111
DAT53-117-182	SD53CD-2-182
DAT53-125-182	SD53CC-38-182
DAT53-130-110	SD53CC-16-111
DAT53-162-182	SD53CC-38-182
DAT54-3-150	SD64CC-7-152
DAT54-4-118	SD64CC-7-118
DAT54-4-136	SD64CC-7-132
DAT54-5-135	SD64CC-7-132
DAT54-8-118	SD64CC-7-118
DAT54-8-136	SD64CC-7-132
DAT62-1-79	SD62CB-12-79
DAT62-1-94	SD62CB-12-94
DAT62-1-114	SD62CB-12-114
DAT62-2-79	SD62CB-12-79
DAT62-2-94	SD62CB-12-94
DAT62-2-114	SD62CB-12-114
DAT62-7-77	SD62DB-4-77
DAT62-16-82	SD62CC-20-82
DAT62-19-114	SD62CB-12-114

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DAT62-19-79	SD62CB-12-79
DAT62-23-92	SD62CC-22-92
DAT62-24-92	SD62CC-23-92
DAT62-27-78	SD62DB-2-78
DAT62-31-114	SD62CB-12-114
DAT62-31-79	SD62CB-12-79
DAT62-32-92	SD62CC-23-92
DAT62-34-92	SD62CC-23-92
DAT62-39-83	SD62CC-24-82.5
DAT62-39-97	SD62CC-24-96.5
DAT62-42-97	SD62CC-24-96.5
DAT62-45-97	SD62CC-24-96.5
DAT62-54-78	SD62DB-2-78
DAT62-55-114	SD62CB-12-114
DAT62-55-79	SD62CB-12-79
DAT62-55-94	SD62CB-12-94
DAT62-58-82	SD62CC-20-82
DAT62-59-77	SD62CC-24-77
DAT62-60-79	SD62CB-12-79
DAT63-2-118	SD63CB-11-118
DAT63-7-118	SD63CB-11-118
DAT63-9-73	SD63CC-11-73
DAT63-9-97	SD63CC-11-96
DAT63-14-120	SD63DB-14-120
DAT63-27-108	SD63DB-6-108
DAT63-27-132	SD63DB-7-132
DAT63-27-93	SD63DB-6-93
DAT63-28-73	SD63CC-11-73
DAT63-28-97	SD63CC-11-96
DAT63-30-120	SD63DB-10-120
DAT63-35-120	SD63DB-10-120
DAT63-37-120	SD63DB-14-120
DAT63-38-118	SD63CB-11-118
DAT63-44-110	SD63CC-16-110
DAT63-49-124	SD63CC-28-124
DAT63-51-118	SD63CB-11-118
DAT63-55-124	SD63CC-28-124
DAT63-63-120	SD63DB-14-120
DAT63-67-118	SD63CB-11-118
DAT63-79-93	SD63DB-6-93
DAT63-84-152	SD63DB-11-152
DAT63-86-124	SD63CC-28-124
DAT63-92-124	SD63CC-28-124
DAT63-95-133	SD63CB-12-132
DAT63-95-167	<b>SD63CB-12-167</b>
DAT63-111-129	SD63CC-27-129
DAT63-118-176	SD63CD-1-177
DAT63-120-118	SD63CB-11-118
DAT63-121-129	SD63CC-27-129
DAT63-122-129	SD63CC-27-129
DAT63-128-120	SD63DB-10-120
DAT63-139-124	SD63CC-28-124
DAT63-145-118	SD63CB-11-118
DAT63-146-120	SD63DB-14-120
DAT63-147-73	SD63CC-11-73
DAT63-147-97	SD63CC-11-96
DAT63-148-176	SD63CD-1-177
DAT63-151-152	SD63DB-11-152
DAT63-155-118	SD63CB-11-118
DAT63-157-118	SD63CB-11-118
DAT63-167-118	SD63CB-11-118
DAT63-173-120	SD63DB-10-120
DAT63-176-120	SD63DB-10-120
DAT63-182-108	SD63DB-6-108
DAT63-182-132	SD63DB-7-132
DAT63-182-93	SD63DB-6-93
DAT63-209-118	SD63CB-11-118
DAT63-225-140	SD63MB-12-140
DAT64-15-107	SD64CC-5-107
DAT64-15-123	SD64CC-3-126
DAT64-15-126	SD64CC-3-126
DAT64-15-147	SD64CC-3-147
DAT64-31-136	SD64CC-7-132
DAT64-35-150	SD64CC-7-152
DAT64-53-118	SD64CC-7-118
DAT64-54-107	SD64CC-5-107
DAT64-54-126	SD64CC-3-126
DAT64-54-147	SD64CC-3-147

### Custom Hoist

DAT72-8-77	SD72DB-2-76
DAT72-18-156	SD72AC-1-156
DAT72-22-156	SD72AC-1-156
DAT72-27-77	SD72DB-2-76
DAT72-29-156	SD72AC-1-156
DAT72-30-156	SD72AC-1-156
DAT73-6-115	SD73DB-8-115
DAT73-11-156	SD73GF-2-156
DAT73-12-120	SD73DB-5-120
DAT73-20-120	SD73CC-25-120
DAT73-36-115	SD73DB-8-115
DAT73-54-120	SD73DB-5-120
DAT73-64-115	SD73DB-8-115
DAT73-68-120	SD73DB-5-120
DAT73-77-120	SD73DB-5-120
DAT73-78-120	SD73CC-25-120
DAT74-6-131	SD74CC-11-131
DAT74-8-176	SD74DB-9-176
DAT74-8-200	SD74DB-9-200
DAT74-9-161	SD74DB-4-171
DAT74-11-144	SD74DB-6-144
DAT74-15-144	SD74DB-6-144
DAT74-19-176	SD74DB-9-176
DAT74-19-200	SD74DB-9-200
DAT74-21-171	SD74DB-4-171
DAT74-22-144	SD74DB-6-144
DAT74-28-163	SD74CC-13-162.88
DAT74-35-197	SD74DB-7-197
DAT74-35-198	SD74DB-7-197
DAT74-46-163	SD74CC-13-162.88
DAT74-51-168	SD74CC-15-167.50
DAT74-57-144	SD74DB-6-144
DAT74-66-168	SD74CC-15-167.50
DAT74-70-176	SD74DB-9-176
DAT74-70-200	SD74DB-9-200
DAT74-72-132	SD74CC-11-131
DAT74-73-144	SD74DB-6-144
DAT74-74-198	SD74DB-7-197
DAT74-110-171	SD74DB-4-171
DAT74-111-161	SD74DB-4-171
DAT74-113-144	SD74DB-6-144
DAT83-6-126	SD83CC-27-126
DAT83-24-120	SD83CC-29-120
DAT83-24-165	SD83CC-29-165
DAT83-27-126	SD83CC-27-126
DAT84-11-145	SD84CC-20-144
DAT84-11-178	SD84CC-20-178
DAT84-13-152	SD84MC-21-152
DAT84-13-176	SD84MC-21-176
DAT84-14-152	SD84MC-18-152
DAT84-14-176	SD84MC-18-176
DAT84-16-340	SD84MC-19-340
DAT84-17-135	SD84CC-21-135
DAT84-18-406	SD84MC-20-406
DAT84-19-406	SD84MC-23-406
DAT84-23-135	SD84CC-21-135
DAT84-28-406	SD84MC-20-406
DAT84-29-406	SD84MC-23-406
DAT84-33-135	SD84CC-21-135
DAT84-35-340	SD84MC-19-340
DAT84-38-145	SD84CC-20-144
DAT84-38-178	SD84CC-20-178
DAT84-40-178	SD84CC-20-178
DAT84-43-145	SD84CC-20-144
DAT84-43-178	SD84CC-20-178
DAT84-49-168	SD84DD-2-168
DAT84-50-145	SD84CC-20-144
DAT84-50-178	SD84CC-20-178
DAT84-51-152	SD84MC-18-152
DAT84-51-176	SD84MC-18-176
DAT84-57-145	SD84CC-20-144
DAT84-57-178	SD84CC-20-178
DAT84-58-406	SD84MC-20-406
DAT84-61-178	SD84CC-20-178
DAT84-68-152	SD84MC-21-152
DAT84-68-176	SD84MC-21-176
DAT84-70-406	SD84MC-23-406
DAT84-71-406	SD84MC-20-406

### Custom Hoist

DAT84-73-135	SD84CC-21-135
DAT85-9-384	SD85MC-20-384
DAT85-10-156	SD85CC-20-156
DAT85-11-348	SD85CC-19-348
DAT85-13-224S	SD85DB-6-224
DAT85-13-248	SD85DB-6-248
DAT85-13-272	SD85DB-6-272
DAT85-15-384	SD85MC-20-384
DAT85-18-380	SD85DC-2-380
DAT85-19-152	SD85CC-20-156
DAT85-20-236	SD85CC-24-236
DAT85-25-348	SD85CC-19-348
DAT85-25-378	SD85CC-19-378
DAT85-26-220	SD85MC-16-220
DAT85-27-220	<b>SD85MC-15-220</b>
DAT85-29-384	SD85MC-20-384
DAT85-30-378	SD85CC-19-378
DAT85-33-220	SD85DB-5-220
DAT85-36-378	SD85CC-19-378
DAT85-37-384	SD85MC-21-384
DAT85-45-384	SD85MC-20-384
DAT85-46-220	SD85MC-16-220
DAT85-47-220	<b>SD85MC-15-220</b>
DAT85-50-348	SD85CC-19-348
DAT85-51-378	SD85CC-19-378
DAT85-53-384	SD85MC-20-384
DAT85-55-378	SD85CC-19-378
DAT85-56-384	SD85MC-21-384
DAT85-58-348	SD85CC-19-348
DAT85-61-380	SD85DC-2-380
DAT85-64-384	SD85MC-20-384
DAT85-65-380	SD85DC-2-380
DAT85-65-440	SD85DC-2-440
DAT85-70-378	SD85CC-19-378
DAT85-71-384	SD85MC-20-384
DAT85-72-378	SD85CC-19-378
DAT85-83-236	SD85CC-24-236
DAT85-84-378	SD85CC-19-378
DAT85-85-378	SD85CC-19-378
DAT85-92-220	SD85DB-5-220
DAT85-93-220	SD85MC-16-220
DAT85-94-220	<b>SD85MC-15-220</b>
DAT85-97-156	SD85CC-20-156
DAT85-98-224S	SD85DB-6-224
DAT85-98-248	SD85DB-6-248
DAT85-98-272	SD85DB-6-272
DAT85-106-125	SD85CC-15-125
DAT85-112-236	SD85CC-24-236
DAT86-21-177	SD86CC-2-177
DAT86-23-169	SD86CC-1-171
DAT86-3-177	SD86CC-2-177
DAT94-7-190	SD94CC-8-190
DAT94-9-176	SD94CC-7-176
DAT94-18-176	SD94CC-7-176
DAT94-21-104	SD84CC-11-104
DAT95-15-303	SD85CC-24-304
DAT95-21-220	SD95MC-5-220
DAT95-22-220	SD95MC-5-220
DAT95-27-220	SD95MC-6-220
DAT95-32-160	SD95CC-3-160
DAT95-33-239	SD95MC-7-239
DAT95-34-220	SD95MC-6-220
DAT95-35-220	SD95MC-5-220
DAT95-36-220	SD95MC-5-220
DAT95-38-174	SD95DD-1-174
DAT95-38-220	SD95DD-1-220
DAT95-41-125	SD85CC-15-125
DAT95-42-303	SD85CC-24-304
DAT95-68-174	SD95DD-1-174
DAT95-68-220	SD95DD-1-220
DAT95-72-239	SD95MC-7-239
DAT96-3-384	SD96MC-8-384
DAT96-3-412	SD96MC-5-412
DAT96-3-416	SD96MC-5-412
DAT96-3-456	SD96MC-5-456
DAT96-4-198	SD96CC-3-199
DAT96-4-199	SD96CC-3-199
DAT96-6-384	SD96MC-8-384

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Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.

Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.



## Quick Reference Guide

### Custom Hoist

DAT96-6-412	SD96MC-5-412
DAT96-6-416	SD96MC-5-412
DAT96-6-456	SD96MC-5-456
DAT96-10-200	SD96CC-3-199
DAT96-15-412	SD96MC-5-412
DAT96-15-456	SD96MC-5-456
DAT96-15-480	SD96MC-5-480
DAT96-16-384	SD96MC-8-384
DAT96-16-412	SD96MC-5-412
DAT96-16-456	SD96MC-5-456
DAT96-16-480	SD96MC-5-480
DAT96-17-200	SD96CC-3-199
DAT96-28-456	SD96MC-5-456
DAT96-28-480	SD96MC-5-480
DAT96-29-456	SD96MC-5-456
DAT96-29-480	SD96MC-5-480
DAT96-37-412	SD96MC-5-412
DAT96-37-456	SD96MC-5-456
DAT96-37-480	SD96MC-5-480
DAT96-38-384	SD96MC-8-384
DAT96-38-412	SD96MC-5-412
DAT96-38-456	SD96MC-5-456
DAT96-38-480	SD96MC-5-480
DAT96-41-412	SD96MC-5-412
DAT96-41-456	SD96MC-5-456
DAT96-41-480	SD96MC-5-480
DAT96-44-170	SD86CC-1-171
DAT96-45-412	SD96MC-5-412
DAT96-45-456	SD96MC-5-456
DAT96-47-412	SD96MC-5-412
DAT96-47-456	SD96MC-5-456
DAT96-47-480	SD96MC-5-480
DAT96-48-384	SD96MC-8-384
DAT96-48-412	SD96MC-5-412
DAT96-48-456	SD96MC-5-456
DAT96-48-480	SD96MC-5-480
DAT96-49-456	SD96MC-5-456
DAT96-50-384	SD96MC-8-384
DAT96-50-412	SD96MC-5-412
DAT96-50-456	SD96MC-5-456
DAT96-50-480	SD96MC-5-480
DAT96-52-384	SD96MC-8-384
DAT96-52-412	SD96MC-5-412
DAT96-52-456	SD96MC-5-456
DAT96-52-480	SD96MC-5-480
DAT96-59-170	SD86CC-1-171
DAT9 3/4 4-2-176	SD94CC-7-176
DAT9 3/4 4H-3-190	SD94CC-8-190
DAT9 3/4 4H-4-176	SD94CC-7-176
DAT9 3/4 4H-5-176	SD94CC-7-176
DAT9 3/4 4H-8-189	SD94CC-8-190
DAT9 3/4 4H-9-176	SD94CC-7-176
DAT9 3/4 4H-10-190	SD94CC-8-190
DAT9 3/4 6-2-200	SD96CC-3-199
DAT9 3/4 6-3-200	SD96CC-3-199
DAT9 3/4 6-6-199	SD96CC-3-199
DAT9 3/4 6-7-199	SD96CC-3-199
DAT9 3/4 6-8-199	SD96CC-3-199
SA2 1/2-16-31	B5347
SA2 1/2-3-31	B5347
SA3-22-28	S31LC-1-28.56
SA3-24-28	S31LC-1-28.56
SA3 1/2-1-37	D35CC-18-36.88
SA3 1/2-16-25	S35CC-2-24.75
SA3 1/2-22-24	S35CC-3-24.38
SA4-10-39	D40CL-2-39.38

### Daybrook

90345593	S53DC-11-107
98045556	<b>S73DC-40-120</b> CM11
98045557	<b>S73DC-40-124</b> CM11

### Dempster

4AA90316	S52DB-6-55
AB12225	D25LL-12-16
AB12265	D25LL-12-16
AB12308	D25LL-12-16
AB13978	D25LL-12-16

### Dempster

AB15905	SD96CC-3-199
AB17393	AB17393
AB17404	SD85CC-19-348
AB17564	SD74CC-11-131
AB17924	SD63CC-11-96
AB19461	D3838
AB19473	SD94CC-9-190
AB19553	SD86CC-2-177
AB19600TH	C3814
AB19601TH	D50CB-8-27
AB19602TH	D35CC-18-36.88
AB19774TH	D40CE-3-24
AB19775TH	D3812
AB19868TH	D40CE-3-24
AB19869TH	D40CD-10-24
AB19890TH	D3812
AB26635TH	C3810
AB28805	SD63CD-1-177
AB29253	D25LL-12-16
AB29264	D40DD-17-42
AB29335	S52DC-7-88
AB29337	D40DD-19-22.50
AB29406	D35CD-10-20
BB5914	SD63CC-11-96
BB5918	SD63CC-11-73
BB5919	SD74CC-11-131
BB6087	SD63CC-11-96
BB6089	SD74CC-11-131
BB6199	SD63CC-11-96
BB6200	SD74CC-11-131
BB6201	SD63CC-11-73
BB6888	D35CC-18-36.88
BB6996	D50CB-8-27
BB6997	C3814
BB8000	D3812
BB8004	D40CD-10-24
BB8010	D40CE-3-24
BB8112	C3814
BB8133-1	C3814
BB8134-1	D50CB-8-27
BB8169	D40CD-10-24
BB8185	D3812
BB8206	D60CB-6-56.50
BB8235	D50CB-8-27
BB8281-1	D35CC-18-36.88
BB8374-1	D3812
BB8379-1	D40CE-3-24
BB8748-1	D40CD-10-24
BB9042	SD86CC-2-177
BB9290	D3838
CB3618	SD85CC-19-348
CB4748	S71CC-42-32
CB4753	SD96CC-3-199
CB5968	SD85CC-19-348
CB7015	SD53CC-16-111
CB7478	SD72AC-1-156
CB7599	SD96CC-3-199
CB7661	SD72AC-1-156
CB7770	SD63CC-11-96
CB7771	SD74CC-11-131
CB7772	SD63CC-11-73
CB7781	SD53CC-16-111
CB7877	SD72AC-1-156
CB7947	SD72AC-1-156
CB8217	SD96CC-3-199
CB8245	SD85CC-20-156
CB8321	SD85CC-19-348
DB1746	SD85CC-20-156
DB1747	SD85CC-20-156
DB1748	SD96CC-3-199
DB4752	SD85CC-20-156
DB4753	SD96CC-3-199
DB5801	SD96CC-3-199
DB7694	D3838
DB8042	D50CB-8-27
DB8043	C3810
DB8044	S35CC-4-37
DB8045	SD94CC-9-190

### Dempster

DB8142	D35CD-10-20
DB8286	D40DD-16-22.50
DB8439	D40DD-19-22.50
DB8491	D40DD-17-42
DB8809	S52DC-7-88
DB9135	S52DC-7-88
DB9350	SD74CC-11-131
DB9361	SD63CD-1-177
DB9467	D40DD-19-22.50

### Dreco

7000A025	SD93DC-1-177
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### East Mfg

501-25065-13	S85DC-64-265
501-25110-13	S73DC-40-110
501-25120-13	<b>S73DC-40-120</b>
501-25150-03	S73DC-40-150
501-25150-08	S73DC-40-150
501-25237-03	<b>S74DC-40-135</b>
501-25237-08	<b>S74DC-40-135</b>
501-25237-13	<b>S74DC-40-135</b>
501-25250-13	S73DC-40-150
501-25255-13	S73DC-40-150
501-25261-08	<b>S74DC-40-161</b>
501-25261-13	S74DC-51-161
501-25350-13	S83DC-51-150
501-25437-13	S84DC-40-140
501-25445-13	S84DC-40-148
501-25448-13	S84DC-40-148
501-25460-03	S84DC-31-156
501-25460-08	S84DC-31-156
501-25460-13	<b>S84DC-40-161</b>
501-25480-13	<b>S84DC-40-180</b>
501-25520-03	<b>S85DC-40A-220</b>
501-25520-08	<b>S85DC-40A-220</b>
501-25520-13	<b>S85DC-40A-220</b>
501-25535-03	<b>S85DC-40-235</b>
501-25535-08	<b>S85DC-40-235</b>
501-25535-13	<b>S85DC-40-235</b>
501-25550-03	<b>S85DC-40-250</b>
501-25550-08	<b>S85DC-40-250</b>
501-25550-13	<b>S85DC-40-250</b>
501-25562-13	S85DC-51-160
501-25565-03	<b>S85DC-40A-265</b>
501-25565-08	<b>S85DC-40A-265</b>
501-25565-13	<b>S85DC-40A-265</b>
501-25569-10	S95DC-40-250 CM22
501-25570-13	S85DC-40-170
501-25585-13	S85DC-40-285
501-25590-13	<b>S85DC-40-190</b>
501-25600-08	S95DC-40A-300
501-25600-13	S95DC-40A-300
501-25665-13	S95DC-40-265
501-25680-13	S95DC-40-280
73-150	S73DC-40-150
74-136	<b>S74DC-40-135</b>
85-190	<b>S85DC-40-190</b>
85-220	<b>S85DC-40A-220</b>
85-235	<b>S85DC-40-235</b>
85-250	<b>S85DC-40-250</b>
85-265	<b>S85DC-40A-265</b>
85-285	S85DC-40-285

### Edbro

058003223	S53DC-11-104
058003247	S53DC-11-120
058003401	<b>S63DC-47-107</b>
058003440	<b>S63DC-44-111</b>
058003488	<b>S63DC-47-140</b>
058003820	<b>S85DC-40-235</b>
TE11-3-2660	S53DC-11-104
TE11-3-2960	S53DC-11-120
TE14-3-2670	<b>S63DC-47-107</b>
TE14-3-2850	<b>S63DC-44-111</b>
TE14-3-3450	<b>S63DC-47-140</b>
TE18-5-6170	<b>S85DC-40-235</b>

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# Quick Reference Guide

## Energy

A277	D60DB-7-72
A3525	D70LN-2-80
A3646	D60LN-2-80
A3931	D35BB-1-80
A4260	D70LN-2-108
A5378	D60LN-2-75
A6092	D60DN-2-90
A6311	D50DB-2-54
A6314	D50DB-8-66
A6430	D60DB-7-72
A6488	D50DB-8-66
A8338	D60LN-2-80
A8752	D60LN-2-75

## Everlite

9055001	S85DC-54-265
9055008	<b>S85DC-40-250</b>
9055010	<b>S85DC-40A-220</b>
9055025	<b>S74DC-40-161</b>
9055039	<b>S84DC-40-161</b>

## Fontaine

5385	<b>S53DB-13-90</b>
53110	S53DC-11-107 CM27
6385	S63DC-47-86 CM17
6397	S63DC-47-92 CM17
63110	<b>S63DC-47-107 CM17</b>
63126	<b>S63DC-44-123 CM63</b>
63142	<b>S63DC-47-140 CM17</b>
73110	S73DC-40-110 CM20
73115	S73DC-40-110 CM20
73126	<b>S73DC-40-124 CM20</b>
73142	<b>S73DC-40-140 CM20</b>
84142	S84DC-40-140 CM20
84152	S84DC-40-148 CM20
84164	S84DC-31-156 CM20
84172	<b>S84DC-40-170 CM20</b>
84188	<b>S84DC-40-180 CM20</b>
85172	S85DC-51-160 CM18
85197	<b>S85DC-40-190 CM53</b>
DCH-31-351	<b>S85DC-40-190 CM53</b>
DCH-31-359	S85DC-51-160 CM18
DCH-31-374	S84DC-31-156 CM20
DCH-31-388	S84DC-40-148 CM20
DCH-31-413	<b>S84DC-40-170 CM20</b>
DCH-31-427	<b>S73DC-40-140 CM20</b>
DCH-31-433	<b>S73DC-40-124 CM20</b>
DCH-31-439	S73DC-40-110 CM20
DCH-31-462	S84DC-40-140 CM20
DCH-31-476	<b>S63DC-47-140 CM17</b>
DCH-31-483	<b>S63DC-44-123 CM63</b>
DCH-31-487	<b>S63DC-47-107 CM17</b>
DCH-31-491	S63DC-47-92 CM17
DCH-31-495	S63DC-47-86 CM17
DCH-31-499	S53DC-11-107 CM27
DCH-31-507	<b>S53DB-13-90</b>
DCH-31-519	<b>S84DC-40-180 CM20</b>
DCH-31-536	S73DC-40-110 CM20

## Foster

03481	D70DD-7-79
03998	D70LN-3-80
692101	D60BB-3-4.81

## Fruehauf

251147	<b>S84DC-40-170</b>
251147-2	<b>S84DC-40-170</b>
ECA-8950	S85MC-48-220
ECA-8951	<b>S85MC-48-235</b>
ECA-9287	S85MC-48-200
ECB-009287	S85MC-48-200
ECB-2353 X	<b>S85DC-40-235</b>
ECB-2353-1	<b>S85DC-40A-220</b>
ECB-2353-2	<b>S85DC-40-190</b>
ECB-2353-3	S84DC-40-148
ECB-2353-5	<b>S85DC-40-250 CM2</b>
ECB-2353-6	<b>S85DC-40-235 CM2</b>
ECB-2353-7	<b>S85DC-40A-220 CM2</b>

## Fruehauf

ECB-2353-8	<b>S85DC-40-190 CM2</b>
ECB-2353-9	<b>S85DC-40-250</b>
ECB-2353-10	S85DC-40-170
ECB-2353-12	S84DC-31-156
ECB-2353-13	<b>S73DC-40-120 CM4</b>
ECB-2353-14	<b>S74DC-40-156 CM4</b>
ECB-2353-15	<b>S63DC-47-120 CM36</b>
ECB-2353-17	S84DC-40-140
ECB-2353-18	S74DC-40A-140 CM4
ECB-2353-19	S84DC-40-148 CM2
ECB-2353-20	<b>S63DC-47-107 CM36</b>
ECB-2353-21	S63DC-47-104 CM36
ECB-2353-22	S84DC-40-140
ECB-2353-23	S95DC-40-250
ECB-2353-24	S95DC-40-265
ECB-2353-25	<b>S85DC-40-250</b>
ECB-2353-26	<b>S85DC-40-235</b>
ECB-2353-27	<b>S85DC-40A-220</b>
ECB-2353-28	S95DC-40-250
ECB-2353-29	<b>S85DC-40A-265</b>
ECB-2353-30	<b>S85DC-40-235 CM2</b>
ECB-2353-31	<b>S85DC-40-250 CM2</b>
ECB-2353-32	<b>S85DC-40A-265 CM2</b>
ECB-2353-33	S95DC-40-265
ECB-2353-35	S96DC-1-285
ECB-2353-37	<b>S85DC-40A-265 CM2</b>
ECB-2353-38	S84DC-40-148
ECB-2353-39	<b>S85DC-40A-265</b>
ECB-2353-41	<b>S63DC-47-120 CM36</b>
ECB-2353-42	<b>S85DC-40-190</b>
ECB-2353-43	<b>S85DC-40-190 CM2</b>
ECB-2353-44	<b>S85DC-40A-220 CM2</b>
ECB-2353-45	S96DC-1-285
ECB-2353-46	S95DC-40-250 CM42
ECB-2353-47	S95DC-40-220
ECB-2353-48	S95DC-40-235
ECB-2353-52	S95DC-40-280
ECB-2353-53	S95DC-40-250 CM42
ECB-2353-54	<b>S85DC-40-190</b>
ECB-2353-55	<b>S85DC-40A-220</b>
ECB-2353-56	S85DC-64-190
ECB-2353-57	S85DC-64-220
ECB-2353-101	<b>S85DC-40A-220</b>
ECB-2353-706	<b>S85DC-40-235</b>
ECBH2353-X	<b>S85DC-40-235</b>
ECBH2353-1	<b>S85DC-40A-220</b>
ECBH2353-2	<b>S85DC-40-190</b>
ECBH2353-3	S84DC-40-140
ECBH2353-5	<b>S85DC-40-250 CM2</b>
ECBH2353-6	<b>S85DC-40-235 CM2</b>
ECBH2353-9	<b>S85DC-40-250</b>
ECBH2353-10	S85DC-40-170
ECBH2353-12	S84DC-40-148
ECBH2353-29	<b>S85DC-40A-265</b>
ECBH2353-54	<b>S85DC-40-190</b>
ECBH2353-55	<b>S85DC-40A-220</b>
ECBH2353-58	S85DC-40-197
ECC-3366-1	<b>S63DC-47-107 CM16</b>
ECC-3366-2	<b>S63DC-47-120 CM16</b>
ECC-3366-3	<b>S63DC-47-130 CM16</b>
ECE-7681-2	<b>S73DC-40-120 CM4</b>
ECE-7681-3	<b>S74DC-40-156 CM4</b>
ECE-7681-4	<b>S63DC-47-120 CM36</b>
ECE-7681-6	S74DC-40A-140 CM4
ECE-7681-7	<b>S63DC-47-107 CM36</b>
ECE-7681-8	S74DC-40A-140 CM4
MCU-007401-140	S74DC-40A-140
MCU-008413-170	<b>S84DC-40-170</b>
MCU-008502-190	<b>S85DC-40-190</b>
MCU-008520-250	<b>S85DC-40-250</b>
MCU-574DC4-16	<b>S74DC-40-161</b>
MHC-030656	S53MB-3-120
MHC-030657	S95DC-40-235 CM42
MHC-030663	S84DC-31-156
MHC-030665	S95DC-40-190 CM42
MHC-030666	<b>S84DC-40-170</b>
MHC-030667	SD63DB-14-120
MHC-030668	S95DC-40-220 CM42

## Fruehauf

MHC-030671	<b>S74DC-40-135 CM4</b>
MHC-030673	S63MB-8-140
MHC-030676	<b>S85DC-40A-265</b>
MHC-030680	S74DC-41-135
MHC-030682	S74DC-40A-120 CM4
MHC-030684	S95DC-40-250 CM42
MHC-030685	S63MB-11-108
MHC-030686	<b>S85DC-40-190</b>
MHC-030692	<b>S73DC-40-140 CM4</b>
TWC-1391-X	<b>S85DC-40-235</b>
TWC-1391-1	<b>S85DC-40A-220</b>
TWC-1391-2	<b>S85DC-40-190</b>
TWC-1391-3	S84DC-40-148
TWC-1391-5	S85DC-64-250
TWC-1391-6	S85DC-64-235
TWC-1391-7	S85DC-64-220
TWC-1391-8	S85DC-64-190
TWC-1391-9	<b>S85DC-40-250</b>
TWC-1391-10	S85DC-40-170
TWC-1391-12	S84DC-31-156
TWC-1391-13	<b>S73DC-40-120 CM4</b>
TWC-1391-14	<b>S74DC-40-156 CM4</b>
TWC-1391-15	<b>S63DC-47-120 CM36</b>
TWC-1391-17	S84DC-40-140
TWC-1391-18	S74DC-40A-140 CM2
TWC-1391-19	S84DC-40-148 CM2
TWC-1391-20	<b>S63DC-47-107 CM36</b>
TWC-1391-21	S63DC-47-104 CM36
TWC-1391-22	S84DC-40-140
TWC-1391-23	S95DC-40-250
TWC-1391-24	S95DC-40-235
TWC-1391-25	S95DC-40-190
TWC-1391-27	<b>S85DC-40A-220</b>
TWC-1391-29	<b>S85DC-40A-265</b>
TWC-1391-35	S96DC-1-285
TWC-1391-37	S85DC-64-265
TWC-1391-38	S84DC-40-148
TWC-1391-46	S95DC-40-250 CM42
TWC-1391-47	S95DC-40-220
TWC-1391-48	S95DC-40-235
TWC-1392-X	<b>S85DC-40-235</b>
TWC-1392-2	<b>S85DC-40-190</b>
TWC-1392-3	S84DC-40-148
TWC-1392-9	<b>S85DC-40-250</b>
TWC-1411-1	S84DC-31-156
TWC-1411-2	<b>S73DC-40-120 CM4</b>
TWC-1411-3	<b>S74DC-40-156 CM4</b>
TWC-1411-4	<b>S63DC-47-120 CM36</b>
TWC-1411-5	S84DC-40-140
TWC-1411-6	<b>S74DC-40-135 CM4</b>
TWC-1411-7	<b>S63DC-47-107 CM36</b>

## G & H Mfg

020210	D70DD-6-79
50393	D70DD-6-79
7X116GH22778	7X116GH22778
A2610	D50CD-4-30
A2902	A2902
A4456	D45DD-8-16.75
FA1001	D60DD-14-79
FA1002	D70DD-6-79
H1234	D50CD-4-30
H1235	D40DD-22-15
H1238	D45DD-8-16.75
H3121	H3121
H3291	D60DD-14-79
H3292	D70DD-6-79
H3930	H3930
H5176	D70DD-6-79
P1331	D60DD-14-79
PH-020-168	D60DD-14-79
PH-020-201	D70DD-6-79
PH-020-803	D50CD-4-30

## Galbreath

1031	D35BB-1-80
1039	D60DB-7-72
1040	D60LN-2-80

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Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.





## Quick Reference Guide

### Galbreath

1043	D60DB-7-72
1054	D70LN-2-80
1111	SD63CB-11-118
1119	D40BB-2-80
1124	D70LN-2-108
1126	D60DB-7-72
1163	D70LN-2-108
1656	D35BB-1-60
1944	SD52CB-7-79
2419	SD62CB-12-114
2420	SD62CB-12-79
2452	D70LN-2-75
2455	D70LN-2-90
2460	D70LN-2-80
2461	D70LN-2-108
2463	D70LN-2-90
2464	D35BB-1-80
2476	D60LN-2-80
2477	D60LN-2-75
2494	SD62CB-12-94
3062	D60LN-2-80
3074	D35BB-1-80
3091	D60BB-3-4.81
3106	D60BB-3-4.81
3116	SD62CB-12-114
3130	D70LN-2-108
3131	SD62CB-12-94
3139	SD62CB-12-114
3242	SD62CB-12-94
3412	D60DB-7-72
3421	D50DB-2-54
3429	D35BB-1-60
3467	D50DB-8-66
3511	D50DB-8-66
3520	D50DB-8-66
3653	S31CB-1-32
3759	D50DB-2-54
3760	D50DB-8-66
3890	D35CD-8-32
3891	D40CD-7-29.50
3902	SD62CB-12-114
3903	SD62CB-12-94
3904	SD85DB-6-248
4073	SD85DB-6-272
4163	SD85DB-6-272
4164	SD74DB-9-200
4191	D35BB-1-60
4271	D50DB-2-54
4272	D50DB-8-66
4297	SD74DB-9-176
4298	SD85DB-6-224
4299	SD85DB-6-248
4321	D50DB-8-66
4322	D60DB-7-56
4383	SD74DB-9-200
4516	SD63CB-14-136
4585	SD63CB-14-173
4635	D35BB-1-60
4636	D35BB-1-80
4815	D60LN-2-80
4893	SD74DB-9-176
7392	D60BB-3-4.81
8425	D50DB-12-54
8433	D60LN-2-75
8973	SD62CB-12-79
8976	SD63DB-15-84
9009	D50DB-8-66
9015	D50DB-5-54
9016	D50DB-12-54
9321	D60DN-2-90
9498	SD42CB-5-192
9500	D60BB-3-4.81
9566	D70DC-2-81
9780	D40BB-1-48
9846	D70LN-2-90
9848	SD42CB-5-192
9872	D60BB-3-4.81
9889	D60LN-2-80

### Galbreath

9892	D60DN-2-90
9900	D40BB-2-80
9920	D60DB-7-72
9921	D70LN-2-80
9922	D70LN-2-108
9923	D40BB-2-90
9924	D70LN-2-75
9932	D50BB-3-52
9933	D30BB-1-37
A1002	S84DC-40-188
A1011	<b>S84DC-40-170</b>
A1056	SD85CC-19-378
A1206	<b>S85DC-40A-265</b>
A1213	D60DC-9-78
A1245	D60LN-2-75
A1430	S84DC-31-156
A1453	D60DC-9-78
A1456	SD63CB-14-173
A1465	SD63CB-14-173
A1527	D60DB-7-72
A1528	D70DC-2-81
A1529	D70LN-2-80
A1536	S84DC-40-148
A1537	<b>S84DC-40-170</b>
A1538	<b>S85DC-40-190</b>
A1539	<b>S85DC-40A-220</b>
A1540	<b>S85DC-40-235</b>
A1541	<b>S85DC-40-250</b>
A1542	<b>S85DC-40A-265</b>
A1587	S95DC-40A-300
A1594	SD85DC-2-460
A1606	SD63CB-11-118
A1717	D70LN-2-80
A1745	SD63CB-11-118
A1793	D60DB-7-72
A1825	S84DC-40-148
A1826	<b>S84DC-40-170</b>
A1827	<b>S85DC-40-190</b>
A1828	<b>S85DC-40A-220</b>
A1829	<b>S85DC-40-235</b>
A1830	<b>S85DC-40-250</b>
A1831	<b>S85DC-40A-265</b>
A1888	D30BB-1-37
A1889	D40BB-1-48
A1890	D50BB-3-52
A1891	D60BB-3-4.81
A1896	D70LN-2-75
A1897	D70LN-2-80
A1898	D70LN-2-90
A1899	D70LN-2-108
A1905	S95DC-40-235
A1922	D50DB-2-54
A1961	S95DC-40-220
A1968	D70LN-2-80
A1969	D70LN-2-90
A2077	D50BB-3-52
A2078	SD74DB-9-200
A2079	SD74DB-9-176
A2081	S31CB-1-32
A2082	D60DN-2-90
A2083	SD62CB-12-114
A2084	D60LN-2-75
A2152	D50BB-3-52
A2189	D35CD-8-32
A2190	D40CD-7-29.50
A2193	D40BB-2-80
A2194	D40BB-2-90
A2198	D50DB-5-54
A2200	D50DB-12-54
A2201	D50DB-8-66
A2202	SD52CB-7-79
A2203	D60LN-2-80
A2207	D60DB-7-56
A2212	SD62CB-12-79
A2213	SD62CB-12-94
A2214	SD63CB-14-136
A2215	SD63CB-14-173
A2216	SD63DB-15-84

### Galbreath

A2226	SD85DB-6-224
A2227	SD85DB-6-248
A2228	SD85DB-6-272
A2349	S85DC-40-285
A2452	D70LN-2-75
A2564	S95DC-40-250
A2650	D50BB-3-45
A2651	D30BB-1-28
A2858	D50DB-12-54
A2870	S85DC-40-285
A2887	D30BB-1-16
A2932	D60LN-2-90
A3081	D30BB-1-37
A3089	D35BB-1-60
A3091	D35BB-1-80
A3101	D40BB-1-48
A3103	D40BB-2-90
A3109	D50BB-3-52
A3111	D50DB-5-54
A3113	D50DB-8-66
A3115	D60BB-3-4.81
A3117	D60LN-2-75
A3119	D60LN-2-80
A3121	D60DN-2-90
A3123	D60DC-9-78
A3137	D60DB-7-72
A3143	D70LN-2-108
A3145	D70LN-2-75
A3147	D70LN-2-80
A3149	D70LN-2-90
A3151	D70DC-2-81
A3161	S31CB-1-32
A3163	SD42CB-5-192
A3165	SD52CB-7-79
A3167	SD62CB-12-114
A3169	SD62CB-12-79
A3171	SD62CB-12-94
A3173	SD63CB-11-118
A3175	SD63CB-14-136
A3177	SD63CB-14-173
A3179	D50BB-3-45
A3181	D40BB-2-80
A3183	D50DB-12-54
A3185	SD85DB-6-248
A3191	SD63DB-15-84
A3279	D50DB-2-54
A3377	SD62CB-12-114
A3379	SD42CB-12-79
A3381	SD62CB-12-94
A3383	SD63CB-11-118
A3385	SD63CB-14-136
A3387	SD63CB-14-173
B1043	D60DB-7-72
B2455	D70LN-2-90
B2460	D70LN-2-80
B2461	D70LN-2-108

### Garwood

206-4754-2	S73DC-40-110
206-5357	S62CC-30-69
207-2368	D50CC-22-20
207-2369	D50CC-23-36
207-3611	SD63DB-6-108
207-3613	SD63DB-6-93
207-3614	SD63DB-7-132
207-9064	SD74DB-4-171
207-9197	D50CC-22-20
207-9209	D50CC-23-36
207-9470	D50CC-22-20
207-9490	D50CC-23-36

### Georgia Hydraulics

GHC-D-80AC	D3812
GHC-D-80AC3	D3812
GHC-D-80F	D40CD-10-24
GHC-D-80TDC4	D40CE-3-24
GHC-D-80TDCT	D40CE-3-24

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## Quick Reference Guide

### Godwin

5384-C	<b>S53DC-14-84</b>
5384-H	<b>S53DC-14-84</b>
63123-C	<b>S63DC-44-123</b>
63120-H	<b>S63DC-44-123</b>
73124-C	<b>S73DC-40-124</b>
73120-H	<b>S73DC-40-124</b>
74135-C	<b>S74DC-40-135</b>
74135-H	<b>S74DC-40-135</b>
G4250T	S42MB-6-50
G5390T	S53MB-5-90

### Great Bend

11915D	SD96MC-4-288
12743GB	SD95MC-7-239
13804GB	<b>SD85MC-15-220</b>
B3443	SD96MC-4-288

### Green Mfg

600-2570	C3878
600-2586	D50CC-23-36
600-2601	D50CC-23-36
600-2602	C3872
600-2728	D50CC-22-20
600-2809	D50CC-22-20
600-2810	D35CC-17-21.62
600-2812	D40CL-2-39.38
600-2813	C3850
600-2814	D45CC-11-26.94
600-2817	D40CD-9-24
600-2818	C3847
600-2830	D50CE-2-43.75
600-2831	D60DC-10-30.50
600-2832	S35CC-2-24.75
600-3193	D30LL-6-36
600-3194	D35LC-1-60
600-3195	D35LC-1-80

### Heil

1-1281	SD53CC-25-106
1-1344	SD64CC-7-132
1-1766	S53DC-15-105
1-1972	S53DC-15-99
1-1973	S53DC-15-120
1-1974	S53DC-15-123
1-2043	S63DC-45-120
1-2044	S63DC-45-126
1-2105	D30CL-3-18.44
1-2123	SD64CC-7-152
1-2298	<b>S63DC-45-138</b>
1-2624	S63DC-45-162
1-2634	S63DC-45-162
1-2928	D45CC-11-26.94
1-2931	D35CC-17-21.62
1-3008	B5347
1-3058	S53DC-15-120
1-3139	S53DC-15-123
1-3140	S53DC-15-99
1-3141	S53DC-15-105
1-3177	S63DC-45-120
1-3178	S63DC-45-126
1-3179	<b>S63DC-45-138</b>
1-3180	S63DC-45-162
1-3391	SD64CC-7-118
1-3484	S53DC-15-105
1-3513	D30CL-3-18.44
1-3623	B5347
1-3635	D45CC-11-26.94
1-3672	D35CC-17-21.62
1-3689	SD96CC-3-199
1-3690	D60DB-20-63
1-3692	D25LD-3-66
1-3693	D50CE-2-43.75
1-3695	D25LD-3-94
1-3705	D60DB-20-63
1-3717	D25LD-2-90
1-3727	D30CA-2-3.62
1-3778	D30CL-4-23.25
1-3809	D45CC-11-26.94

### Heil

1-3830	SD64CC-7-132
1-3834	SD53CC-25-106
1-3836	SD64CC-7-118
1-3843	SD64CC-7-152
1-3856	D35CC-17-21.62
1-3860	S53DC-15-123
1-3871	SD64CC-7-132
1-3878	<b>S63DC-47-130</b>
1-3887	S53DC-15-99
1-3888	S53DC-15-105
1-3889	S53DC-15-120
1-3890	S53DC-15-123
1-3891	S63DC-45-120
1-3892	S63DC-45-126
1-3893	<b>S63DC-45-138</b>
1-3902	D35CC-17-21.62
1-3921	D45CC-11-26.94
1-3983	S53DC-15-99
1-3984	S53DC-15-105
1-3985	S53DC-15-120
1-3986	S53DC-15-123
1-3998	S63DC-45-120
1-3999	S63DC-45-126
1-4000	<b>S63DC-45-138</b>
1-4001	S63DC-45-162
1-4017	D35CC-17-21.62
1-4018	D45CC-11-26.94
1-4050	SD64CC-7-132
1-4052	SD53CC-25-106
1-4053	SD64CC-7-118
1-4054	SD64CC-7-152
1-4070	B5347
1-4081	C3850
1-4093	D50CC-23-36
1-4094	D50CC-22-20
1-4100	D35CC-17-21.62
1-4101	D45CC-11-26.94
1-4105	D25CC-10-14.12
1-4108	C3847
1-4110	C3850
1-4123	C4438
1-4137	S53DC-15-99
1-4138	S53DC-15-105
1-4139	S53DC-15-120
1-4140	S53DC-15-123
1-4141	S63DC-45-120
1-4142	S63DC-45-126
1-4143	<b>S63DC-45-138</b>
1-4144	S63DC-45-162
1-4261	SD63DB-7-132
1-4266	SD63DB-6-108
1-4267	SD63DB-6-93
1-4270	SD74DB-4-171
1-4275	C3576
1-4276	C3602
1-4277	C3603
1-4283	D30CL-3-18.44
1-4297	C3875
1-4298	C3563
1-4299	C3563
1-4305	C4438
1-4309	D55CB-5-49.88
1-4327	C3603
1-4328	D60DB-20-63
1-4334	C3847
1-4338	C3576
1-4339	D25LD-3-66
1-4340	D50CE-2-43.75
1-4341	D40CD-9-24
1-4343	SD74DB-4-171
1-4347	C3878
1-4348	S35CC-2-24.75
1-4815	S53DC-15-120
1-4821	SD74DB-4-171
1-4824	C3872
1-4828	C3872
1-4864	D40CD-9-21.50
1-4868	D40CD-14-25

### Heil

1-4869	D50DC-3-45
1-4870	D30CL-2-25.25
1-4871	D45CC-14-41.50
1-4878	C3563
1-4880	S35CC-3-24.38
1-4881	SD53CD-2-182
1-4882	D55DB-2-63
1-4884	C3872
1-4887	C3878
1-4903	D40CD-8-22
1-4911	SD53CD-2-182
1-4915	D50CC-24-34.19
1-5088	B5162
1-5098	D45CC-15-41.50
1-5110	C3872
1-5111	C3878
1-5146	D55CC-6-63
1-5147	SD53CC-38-182
1-5149	SD53CC-38-151.5
1-5150	D45CC-15-41.50
1-6061	D55CB-6-52.88
1-6067	SD53CC-38-182
1-6069	D40CD-13-37
1-6070	D30CC-13-21.62
1-6076	SD53CC-38-182
1-6078	SD53CC-38-151.5
1-6094	D30CC-16-30.50
1-6096	SD53CD-2-182
1-6099	SD53CD-2-182
1-6142	D30CC-13-21.62
1-6153	D30CA-2-3.62
1-6155	S63DC-45-150
1-6159	B5743
1-6160	B5654
1-6161	B5653
1-6162	B5799
1-6163	B5866
1-6164	B5873
1-6169	B5655
1-6194	B5799
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1-6230	D55CC-6-63
1-6247	SD53CC-38-182
1-6252	SD53CC-38-151.5
1-6255	SD53CD-2-182
1-6256	SD53CD-2-182
1-6316	SD53CC-38-151.5
1-6317	SD53CC-38-170.12
1-6318	SD53CC-38-182
1-6330	B5655
1-6331	B5655
1-6369	D40CD-8-22
1-6370	D45CC-15-41.50
1-6384	D40CD-14-25
1-6386	D25LD-2-90
1-6388	D45CC-15-41.50
1-6399	B5799
1-6402	B5655
1-6403	B5799
1-6404	B5653
1-6405	B5866
1-6406	B5873
1-6407	B5654
1-6416	B5655
1-6456	D55CC-9-35.88
1-6457	D55CC-7-24
1-6521	B5162
1-6554	B5866
1-6560	D50CC-24-34.19
1-6570	D50LC-2-24.50
1-6581	B5873
1-6582	C3576
1-6610	C3872
1-6611	C3878
1-6669	D40CD-8-22
1-6670	D40CD-14-25

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Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.

Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.



## Quick Reference Guide

### Henderson Mfg

80960 ..... S74DC-40A-140

### Hilbilt / Commercial

SA63DB-1-110 ..... **S63DC-47-107** CM26  
 SA63DB-1-120 ..... **S63DC-47-120** CM26  
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 1139A-543-120 ..... S53MB-3-120  
 1139A-543-120T ..... S53MB-3-120  
 1139A-654-104 ..... S63MB-11-108  
 1139A-654-108 ..... S63MB-11-108  
 1139A-654-110 ..... S63MB-11-108  
 1139A-654-119 ..... S63MB-9-120  
 1139A-654-140 ..... S63MB-8-140  
 1139A-6543-140 ..... S64MB-4-140  
 1139A-7654-150 ..... S74MB-3-154  
 1139A-7654-154 ..... S74MB-3-154  
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 1221A-87654-166 ..... S85DC-40-170  
 1221A-87654-195 ..... **S85DC-40-190**  
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 1548A-654-119 ..... **S63DC-47-120** CM16  
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 9329-987654-199 ..... SD96CC-3-199  
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 9358-65-79 ..... SD62CB-12-79  
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 9406-8765-178 ..... SD84CC-20-178  
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 9420-7654-131 ..... SD74CC-11-131  
 9438-654-96 ..... SD63CC-11-96  
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 10002-74-156 ..... **S74DC-40-156** CM4  
 10002-74-175 ..... **S84DC-40-170**  
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 10003-63-120 ..... **S63DC-47-120** CM36  
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 10054-85-200T ..... S85MC-48-200 CM53  
 10054-85-220T ..... S85MC-48-220 CM53  
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 10098-74-140H ..... S74DC-40A-140 CM4  
 10098-74-156H ..... **S74DC-40-156** CM4  
 10099-63-108H ..... **S63DC-47-107** CM36  
 10099-63-120H ..... **S63DC-47-120** CM36  
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 20047-74-131 ..... SD74CC-11-131  
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 20070-85-380 ..... SD85DC-2-380  
 20070-85-440 ..... SD85DC-2-440  
 20074-916-456 ..... SD96MC-5-456  
 20079-85-348 ..... SD85CC-19-348  
 20080-73-120 ..... SD73DB-5-120  
 20085-73-156 ..... SD73GF-2-156  
 20089-42-112 ..... SD42CC-19-111  
 20099-64-132 ..... SD64CC-7-132  
 20099-64-152 ..... SD64CC-7-152

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# Quick Reference Guide

## Hyco

20124-63-120	SD63DB-14-120
20125-52-119	SD52DC-12-119
20126-52-140	SD52DC-12-140
20130-916-170	SD86CC-1-171
20134-62-114	SD62CB-12-114
20134-62-79	SD62CB-12-79
20134-62-94	SD62CB-12-94
20137-915-125	SD85CC-15-125
20138-914-104	SD84CC-11-104
20147-814-135	SD84CC-21-135
20155-64-134	SD64CC-7-132
20157-53-104	SD53CC-25-106
20158-64-118	SD64CC-7-118
20170-85-378	SD85CC-19-378
20171-62-82	SD62CC-20-82
20173-94-190	SD94CC-8-190
20179-85-348	SD85CC-19-348
20184-63-120	SD63DB-14-120
20189-63-132	SD63DB-7-132
20190-74-160	SD74DB-4-171
20190-74-171	SD74DB-4-171
20191-63-108	SD63DB-6-108
20192-63-93	SD63DB-6-93
20195-85-156	SD85CC-20-156
20212-63-110	SD63CC-16-110
20212-63-92	SD63CC-16-92
20214-74-144	SD74DB-6-144
20223-64-132	SD64CC-7-132
20223-64-152	SD64CC-7-152
20231-85-224	SD85DB-6-224
20231-85-248	SD85DB-6-248
20231-85-272	SD85DB-6-272
20234-63-118	SD63CB-11-118
20234-63-136	SD63CB-14-136
20234-63-173	SD63CB-14-173
20235-52-111	<b>SD52CC-24-111</b>
20237-62-114	SD62CB-12-114
20237-62-79	SD62CB-12-79
20237-62-94	SD62CB-12-94
20254-916-412	SD96MC-5-412
20254-916-456	SD96MC-5-456
20254-916-480	SD96MC-5-480
20258-915-160	SD95CC-3-160
20283-74-135	SD74CC-12-135
20283-74-164	20283-74-164
20298-63-173	SD63CB-14-173
20314-85-156	SD85CC-20-156
20318-63-118	SD63CB-11-118
20335-63-124	SD63CC-28-124
20348-62-114	SD62CB-12-114
20348-62-79	SD62CB-12-79
20348-62-94	SD62CB-12-94
20414-63-110	SD63CC-16-110
20414-63-92	SD63CC-16-92
20433-934-176	SD94CC-7-176
20462-85-384	SD85MC-20-384
20525-63-84	SD63DB-15-84
20528-74-163	SD74CC-13-162.88
20559-52-140	SD52DC-12-140
20565-85-378	SD85CC-19-378
20569-63-124	SD63CC-28-124
20577-63-167	<b>SD63CB-12-167</b>
20580-63-132	SD63CB-12-132
20597-916-170	SD86CC-1-171
20598-915-125	SD85CC-15-125
20601-63-120	SD63DB-14-120
20683-63-118	SD63CB-11-118
20697-52-140	SD52DC-12-140
20706-914-104	SD84CC-11-104
20738-63-118	SD63CB-11-118
20738-63-136	SD63CB-14-136
20738-63-173.50	SD63CB-14-173
21212-63-110	SD63CC-16-110
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30000-83-138	S83DC-40-139
30000-83-160	<b>S84DC-40-170</b>
30000-84-140	S84DC-40-140
30000-84-148	S84DC-40-148

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30000-84-164	<b>S84DC-40-161</b>
30000-84-168	<b>S84DC-40-161</b>
30000-84-170	<b>S84DC-40-170</b>
30000-84-175	<b>S84DC-40-170</b>
30000-84-180	<b>S84DC-40-180</b>
30000-84-188	S84DC-40-188
30000-84-190	S84DC-40-188
30000-85-160	S85DC-51-160
30000-85-165	S85DC-51-160
30000-85-170	S85DC-40-170
30000-85-190	<b>S85DC-40-190</b>
30000-85-195	<b>S85DC-40-190</b>
30000-85-200	S85DC-40-197
30000-85-220	<b>S85DC-40A-220</b>
30001-85-225	<b>S85DC-40A-220</b>
30001-85-235	<b>S85DC-40-235</b>
30001-85-250	<b>S85DC-40-250</b>
30001-85-260	<b>S85DC-40A-265</b>
30001-85-265	<b>S85DC-40A-265</b>
30001-85-270	<b>S85DC-40A-265</b>
30004-824-150	S84DC-40-148 CM2
30004-825-190	S85DC-64-190
30004-825-220	S85DC-64-220
30009-84-148	S84DC-40-148 CM21
30009-84-160	S84DC-31-156 CM21
30009-84-164	<b>S84DC-40-161</b> CM21
30009-84-180	<b>S84DC-40-180</b> CM21
30009-84-182	<b>S84DC-40-180</b> CM21
30009-85-195	<b>S85DC-40-190</b> CM21
30009-85-220	<b>S85DC-40A-220</b> CM21
30011-84-188	S84DC-40-188 CM9
30016-73-120	<b>S73DC-40-120</b> CM4
30016-73-130	<b>S73DC-41-129</b> CM4
30016-73-132	<b>S73DC-41-129</b> CM4
30016-73-140	<b>S73DC-40-140</b> CM4
30016-73-141	<b>S73DC-40-140</b> CM4
30016-73-150	S73DC-40-150 CM4
30016-73-151	S73DC-40-150 CM4
30016-74-120	S74DC-40A-120 CM4
30016-74-135	<b>S74DC-40-135</b> CM4
30016-74-136	<b>S74DC-40-135</b> CM4
30016-74-140	S74DC-40A-140 CM4
30016-74-156	<b>S74DC-40-156</b> CM4
30016-74-164	<b>S74DC-40-161</b> CM4
30016-74-166	<b>S74DC-40-161</b> CM4
30016-74-175	<b>S74DC-40-161</b> CM4
30016-74-178	<b>S84DC-40-170</b>
30016-74-176	<b>S84DC-40-170</b>
30016-74-180	<b>S74DC-40-180</b>
30017-63-108	<b>S63DC-47-107</b> CM16
30017-63-120	<b>S63DC-47-120</b> CM16
30017-63-129	<b>S63DC-47-130</b> CM16
30018-74-118	S74DC-40A-120
30018-74-138	S74DC-40A-140
30020-84-224T	<b>S85MC-48-235</b>
30020-85-190T	S85MC-48-200
30020-85-200T	S85MC-48-200
30020-85-204T	S85MC-48-200
30020-85-220T	S85MC-48-220
30020-85-225T	S85MC-48-220
30020-85-235T	<b>S85MC-48-235</b>
30021-63-104	S63DC-47-104 CM36
30021-63-108	<b>S63DC-47-107</b> CM36
30021-63-120	<b>S63DC-47-120</b> CM36
30021-63-126	<b>S63DC-44-123</b> CM36
30021-63-132	<b>S63DC-47-130</b> CM36
30021-63-138	<b>S63DC-47-140</b> CM36
30021-63-75	S63DC-47-77 CM36
30021-63-84	S63DC-47-86 CM36
30021-63-98	S63DC-47-92 CM36
30022-825-235	S85DC-64-235
30022-825-242	S85DC-64-250
30022-825-250	S85DC-64-250
30022-825-255	S85DC-64-250
30022-825-265	S85DC-64-265
30023-85-170	S85DC-40-170
30025-935-190	S95DC-40-190 CM42

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30025-935-220	S95DC-40-220 CM42
30025-935-235	S95DC-40-235 CM42
30025-935-240	S95DC-40-235 CM42
30025-935-250	S95DC-40-250 CM42
30025-935-255	S95DC-40-250 CM42
30025-935-265	S95DC-40-265 CM42
30025-935-270	S95DC-40-265 CM42
30029-825-270	<b>S85DC-40A-265</b> CM2
30034-85-220	<b>S85DC-40A-220</b> CM11
30038-915-220	S95DC-40-220 CM4
30038-915-235	S95DC-40-235 CM4
30038-915-250	S95DC-40-250 CM4
30038-915-265	S95DC-40-265 CM4
30039-53-63	S53DB-2-63
30041-84-156	S84DC-31-156
30041-84-190	S84DC-40-188
30042-85-235	<b>S85DC-40-235</b>
30042-85-250	<b>S85DC-40-250</b>
30043-85-200	S85DC-40-197 CM46
30043-85-205	S85DC-40-197 CM46
30043-85-220	<b>S85DC-40A-220</b> CM46
30044-85-235	<b>S85DC-40-235</b> CM46
30044-85-250	<b>S85DC-40-250</b> CM46
30044-85-260	<b>S85DC-40A-265</b> CM46
30048-73-120	<b>S73DC-40-120</b> CM38
30048-74-135	S74DC-41-135
30048-74-140	S74DC-40A-140 CM38
30048-74-164	<b>S74DC-40-161</b> CM38
30049-42-82T	S42MB-3-90
30049-42-83T	S42MB-3-90
30049-42-86T	S42MB-3-90
30049-42-90T	S42MB-3-90
30050-63-108T	S63MB-11-108
30050-63-120T	S63MB-9-120
30050-63-140T	S63MB-8-140
30050-64-140T	S64MB-4-140
30051-85-190	<b>S85DC-40-190</b> CM53
30051-85-215	<b>S85DC-40A-220</b> CM65
30057-53-72	<b>S53DC-14-72</b>
30057-53-78	<b>S53DC-14-72</b>
30057-53-84	<b>S53DC-14-84</b>
30057-53-90	<b>S53DC-14-84</b>
30058-74-154T	S74MB-3-154
30058-74-172T	S74MB-3-172
30060-85-235T	<b>S85MC-48-235</b>
30060-85-250T	S85MC-48-250
30060-85-265T	<b>S85MC-48-265</b>
30060-85-280	S85MC-48-280
30061-63-98	S63DC-47-104 CM36
30062-85-190T	S85MC-48-200 CM53
30062-85-200T	S85MC-48-200 CM53
30062-85-220T	S85MC-48-220 CM53
30063-85-170H	S85DC-40-170
30063-85-190H	<b>S85DC-40-190</b>
30064-73-120H	<b>S73DC-40-120</b> CM4
30064-74-140H	S74DC-40A-140 CM4
30064-74-156H	<b>S74DC-40-156</b> CM4
30064-75-170H	S85DC-40-170
30065-63-108H	<b>S63DC-47-107</b> CM36
30065-63-120H	<b>S63DC-47-120</b> CM36
30066-64-140H	S74DC-40A-140 CM4
30070-63-104	S63DC-47-104 CM43
30070-63-105	<b>S63DC-47-107</b> CM43
30070-63-108	<b>S63DC-47-107</b> CM43
30070-63-120	<b>S63DC-47-120</b> CM45
30070-63-84	S63DC-47-86 CM43
30071-73-126	<b>S73DC-40-124</b> CM9
30071-74-148	S74DC-40A-140 CM9
30072-53-120T	S53MB-3-120
30096-62-69	70096-62-69
30097-63-105	<b>S63DC-47-107</b>
30097-63-108	<b>S63DC-47-107</b>
30097-63-111	<b>S63DC-44-111</b>
30097-63-120	<b>S63DC-47-120</b>
30097-63-132	<b>S63DC-47-130</b>
30097-63-156	S63DC-47-150
30097-63-81	S63DC-47-86
30097-63-93	S63DC-47-86

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Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.

Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.



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30097-64-156	<b>S64DC-9-156</b>
30122-84-164	<b>S84DC-40-161</b> CM38
30122-84-188	<b>S84DC-40-188</b> CM38
30125-935-265	S95DC-40-265
30125-935-270	S95DC-40-265 CM42
30125-935-280	S95DC-40-280
30125-935-285	S95DC-40-280
30125-935-300	S95DC-40A-300
30129-63-108T	S63MB-11-108
30129-63-140T	S63MB-8-140
30129-63-144T	S63MB-8-140
30129-63-150T	S63MB-8-150
30129-64-140T	S64MB-4-140
30146-63-129	<b>S63DC-47-130</b>
30164-825-250	<b>S85DC-40-250</b> CM46
30178-825-260	<b>S85DC-40A-265</b> CM49
30181-53-104	S53DC-11-104
30181-53-120	S53DC-11-120
30195-73-108	S73DC-40-110
30195-73-110	S73DC-40-110
30195-73-120	<b>S73DC-40-120</b>
30195-73-123	<b>S73DC-40-120</b>
30195-73-126	<b>S73DC-40-124</b>
30195-73-130	<b>S73DC-41-129</b>
30195-73-140	<b>S73DC-40-140</b>
30195-73-150	S73DC-40-150
30195-74-120	S74DC-40A-120
30195-74-136	<b>S74DC-40-135</b>
30195-74-140	S74DC-40A-140
30195-74-156	<b>S74DC-40-156</b>
30195-74-161	<b>S74DC-40-161</b>
30195-74-167	<b>S74DC-40-161</b>
30205-74-156	<b>S74DC-40-156</b> CM4
30208-85-235	<b>S85DC-40-235</b>
30208-85-250	<b>S85DC-40-250</b>
30208-85-265	<b>S85DC-40A-265</b>
30231-53-104	S53DC-11-104
30231-53-108	S53DC-11-107
30231-53-123	S53DC-11-120
30238-63-138	<b>S63DC-45-138</b>
30238-63-162	S63DC-45-162
30251-63-120	S63DC-45-120
30251-63-126	S63DC-45-126
30251-63-138	<b>S63DC-45-138</b>
30251-63-162	S63DC-45-162
30252-53-105	S53DC-15-105
30252-53-120	S53DC-15-120
30252-53-123	S53DC-15-123
30252-53-126	S53DC-15-123
30252-53-135	S53DC-11-130 CM2
30252-53-81	<b>S53DC-14-84</b>
30252-53-87	<b>S53DC-14-84</b>
30252-53-99	S53DC-15-99
30278-915-190	S95DC-40-190 CM42
30278-915-220	S95DC-40-220 CM42
30278-915-235	S95DC-40-235 CM42
30278-915-250	S95DC-40-250 CM42
30278-915-265	S95DC-40-265 CM42
30279-53-72	<b>S53DC-14-72</b>
30279-53-84	<b>S53DC-14-84</b>
30279-53-90	<b>S53DC-14-84</b>
30305-83-150	S83DC-51-150
30305-84-137	S84DC-40-140
30305-84-156	S84DC-31-156
30305-84-160	S84DC-31-156
30305-85-160	S85DC-51-160
30305-85-190	<b>S85DC-40-190</b>
30305-85-220	<b>S85DC-40A-220</b>
30320-915-280	S95DC-40-280
30320-915-300	S95DC-40A-300
30324-85-285	S85DC-40-285
30337-85-190T	S85MC-48-200
30337-85-200T	S85MC-48-200
30337-85-204T	S85MC-48-200
30337-85-220T	S85MC-48-220
30337-85-225T	S85MC-48-220
30337-85-235T	<b>S85MC-48-235</b>
30338-915-190	S95DC-40-190

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30338-915-220	S95DC-40-220
30338-915-235	S95DC-40-235
30338-915-250	S95DC-40-250
30338-915-265	S95DC-40-265 CM4
30346-915-190	S95DC-40-190
30346-915-220	S95DC-40-220
30346-915-235	S95DC-40-235
30346-915-250	S95DC-40-250
30346-915-265	S95DC-40-265
30347-62-74	S62DC-9-74
30347-63-104	S63DC-47-104
30347-63-108	<b>S63DC-47-107</b>
30347-63-111	<b>S63DC-44-111</b>
30347-63-120	<b>S63DC-47-120</b>
30347-63-126	<b>S63DC-44-123</b>
30347-63-129	<b>S63DC-47-130</b>
30347-63-130	<b>S63DC-47-130</b>
30347-63-132	<b>S63DC-47-130</b>
30347-63-136	<b>S63DC-47-130</b>
30347-63-138	<b>S63DC-47-140</b>
30347-63-140	<b>S63DC-47-140</b>
30347-63-77	S63DC-47-77
30347-63-84	S63DC-47-86
30347-63-90	S63DC-47-86
30347-63-96	S63DC-47-92
30347-64-156	<b>S64DC-9-156</b>
30357-63-75	S63DC-47-77 CM36
30369-823-213	<b>S85DC-40-235</b> CM2
30384-53-135	S53DC-11-130 CM2
30387-74-135	<b>S74DC-40-135</b>
30387-74-140	S74DC-40A-140
30426-73-120	<b>S73DC-40-120</b>
30426-73-140	<b>S73DC-40-140</b>
30426-73-150	S73DC-40-150
30426-74-120	S74DC-40A-120
30426-74-136	<b>S74DC-40-135</b>
30426-74-156	<b>S74DC-40-156</b>
30426-74-161	<b>S74DC-40-161</b>
30433-85-285	S85DC-40-285
30434-915-285	S95DC-40-280
30441-916-285	S96DC-1-285
30449-63-105	<b>S63DC-47-107</b>
30449-63-123	<b>S63DC-44-123</b>
30470-64-132	<b>S64DB-6-135</b>
30470-64-135	<b>S64DB-6-135</b>
30493-73-125.25	S73DC-60-125
30494-73-14212	S73DC-60-142
30495-63-09169	S63DC-60-92
30496-53-89	S53MB-5-90
30497-53-74	S53MB-5-74
30498-53-81	S53DC-60-81
30499-63-10763	S63DC-60-106
30500-63-126	S63DC-60-125
30501-63-79	S63DC-54-79.31
30504-74-164	S74DC-60-165.75
30505-63-79.63	S63DC-60-79.12
30506-84-162	<b>S84DC-40-161</b>
30508-53-81	S53DC-16-80.75
30510-73-104	S73DC-60-103
30512-53-82	S53DB-9-82
30513-53-108	S53DC-60-108
30521-74-136	S74DC-41-135 CM8
30522-84-140	S84DC-60-140
30527-53-107	S53DC-60-108
30534-73-120	<b>S73DC-40-120</b>
30534-74-135	<b>S74DC-40-135</b>
30534-74-156	<b>S74DC-40-156</b>
30537-73-142	S73DC-60-142
30541-815-265	<b>S85DC-40A-265</b>
30541-85-235	<b>S85DC-40-235</b>
30541-85-240	<b>S85DC-40-235</b>
30541-85-265	<b>S85DC-40A-265</b>
30543-63-92	S63DC-60-92
30584-63-78	S63DC-47-77 CM71
30592-84-168	<b>S84DC-40-161</b>
30595-74-154	S74MB-3-154
30595-74-172	S74MB-3-172
30602-85-186	<b>S85DC-40-190</b>

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30602-85-216	<b>S85DC-40A-220</b>
30603-825-186	S85DC-64-190
30603-825-216	S85DC-64-220
30614-73-12525	S73DC-60-125
30616-73-142	S73DC-60-142
30620-63-126	S63DC-60-125
30621-84-162	<b>S84DC-40-161</b>
30622-84-140	S84DC-60-140
30642-53-71.12	S53DB-9-71
30779-64-157	S64DC-7-157
40026-85-220	SD85MC-16-220
40027-84-152	SD84MC-21-152
40027-84-176	SD84MC-21-176
40030-84-406	SD84MC-23-406
40041-85-220	SD85MC-16-220
40045-934-188	SD94CC-8-190
40047-84-152	SD84MC-21-152
40047-84-176	SD84MC-21-176
40050-84-406	SD84MC-23-406
40058-42-50T	S42MB-6-50
40062-53-74T	S53MB-5-74
40063-42-50T	S42MB-6-50
50009-53-189	SD53CC-35-189
50044-64-145	SD64DC-3-145
50044-64-146	SD64DC-3-145
50066-64-157	SD64DC-3-156
50138-53-182	SD53CC-38-182
60025-935-220	S95DC-40-220 CM42
60251-63-120	S63DC-45-120
60251-63-126	S63DC-45-126
60251-63-138	<b>S63DC-45-138</b>
60251-63-162	S63DC-45-162
60702-74-160	SD74CC-10-161
60726-63-102	SD63DC-71-101
60726-63-103	SD63DC-71-101
60727-63-82	SD63DC-71-81
60727-63-83	SD63DC-71-81
60803-53-156	SD53CC-36-155
70000-814-132	S84DC-40-140
70000-814-140	S84DC-40-140
70000-814-147	S84DC-40-148
70000-814-155	S84DC-31-156
70000-814-172	<b>S84DC-40-180</b>
70000-814-191	S84DC-40-188
70000-815-160	S85DC-51-160
70000-815-170	S85DC-40-170
70000-815-180	<b>S85DC-40-190</b>
70000-815-191	S85DC-40-197
70000-815-210	<b>S85DC-40A-220</b>
70000-815-235	<b>S85DC-40-235</b>
70000-815-250	<b>S85DC-40-250</b>
70000-815-265	<b>S85DC-40A-265</b>
70001-815-235	<b>S85DC-40-235</b>
70001-815-265	<b>S85DC-40A-265</b>
70009-814-173.50	<b>S84DC-40-180</b> CM21
70016-73-120	<b>S73DC-40-120</b> CM4
70016-73-130	<b>S73DC-41-129</b> CM4
70016-73-140	<b>S73DC-40-140</b> CM4
70016-74-120	S74DC-40A-120 CM4
70016-74-135	<b>S74DC-40-135</b> CM4
70016-74-140	S74DC-40A-140 CM4
70016-74-156	<b>S74DC-40-156</b> CM4
70016-74-167	<b>S74DC-40-161</b> CM4
70016-74-180	<b>S74DC-40-180</b>
70018-74-118	S74DC-40A-120
70018-74-138	S74DC-40A-140
70020-815-190T	S85MC-48-200
70020-815-210T	S85MC-48-220
70021-63-108	<b>S63DC-47-107</b> CM36
70021-63-120	<b>S63DC-47-120</b> CM36
70021-63-132	<b>S63DC-47-130</b> CM36
70021-63-75	S63DC-47-77 CM36
70021-63-84	S63DC-47-86 CM36
70022-814-172	<b>S84DC-40-180</b>
70022-815-210	<b>S85DC-40A-220</b> CM2
70022-815-235	<b>S85DC-40-235</b> CM2
70022-815-250	<b>S85DC-40-250</b> CM2
70022-815-265	<b>S85DC-40A-265</b> CM2

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70023-815-170	S85DC-40-170
70025-935-200	S95DC-40-190 CM42
70025-935-220	S95DC-40-220 CM42
70025-935-235	S95DC-40-235 CM42
70025-935-250	S95DC-40-250 CM42
70025-935-265	S95DC-40-265 CM42
70025-935-300	S95DC-40A-300 CM42
70025-935-320	S95DC-40A-320 CM42
70029-815-270	<b>S85DC-40A-265</b> CM2
70039-53-63	S53DB-2-63
70048-74-135	S74DC-41-135
70049-42-82T	S42MB-3-90
70049-42-90T	S42MB-3-90
70050-63-108T	S63MB-11-108
70050-63-111T	S63MB-11-108
70050-63-120T	S63MB-9-120
70050-63-140T	S63MB-8-140
70050-63-150T	S63MB-8-150
70050-63-160T	S63MB-8-160
70050-63-98T	S63MB-11-108
70050-64-140T	S64MB-4-140
70057-53-72	<b>S53DC-14-72</b>
70057-53-84	<b>S53DC-14-84</b>
70057-53-90	<b>S53DC-14-84</b>
70058-74-154T	S74MB-3-154
70058-74-172T	S74MB-3-172
70060-815-190T	S85MC-48-190
70060-815-220T	S85MC-48-220
70060-815-235T	<b>S85MC-48-235</b>
70060-815-250T	S85MC-48-250
70060-815-265T	<b>S85MC-48-265</b>
70060-815-280T	S85MC-48-280
70060-815-285T	S85MC-48-280
70061-63-98	S63DC-47-104 CM36
70064-74-140H	S74DC-40A-140 CM4
70064-74-156H	<b>S74DC-40-156</b> CM4
70072-53-120T	S53MB-3-120
70072-53-140T	S53MB-3-140
70096-62-69	70096-62-69
70125-935-250	S95DC-40-250
70125-935-265	S95DC-40-265
70125-935-280	S95DC-40-280 CM4
70129-63-108T	S63MB-11-108
70129-63-150T	S63MB-8-150
70175-73-129H	<b>S73DC-41-129</b> CM4
70195-73-108	S73DC-40-110
70195-73-110	S73DC-40-110
70195-73-120	<b>S73DC-40-120</b>
70195-73-124	<b>S73DC-40-124</b>
70195-73-130	<b>S73DC-41-129</b>
70195-73-140	<b>S73DC-40-140</b>
70195-74-135	<b>S74DC-40-135</b>
70195-74-140	S74DC-40A-140
70195-74-156	<b>S74DC-40-156</b>
70195-74-161	<b>S74DC-40-161</b>
70195-74-167	<b>S74DC-40-161</b>
70195-74-180	<b>S74DC-40-180</b>
70251-63-120	S63DC-45-120
70251-63-126	S63DC-45-126
70251-63-138	<b>S63DC-45-138</b>
70251-63-162	S63DC-45-162
70252-53-105	S53DC-15-105
70252-53-120	S53DC-15-120
70252-53-123	S53DC-15-123
70252-53-126	S53DC-15-123
70252-53-99	S53DC-15-99
70320-915-300	S95DC-40A-300
70320-935-220	S95DC-40-220
70320-935-280	S95DC-40-280
70337-815-200T	S85MC-48-200
70337-815-220T	S85MC-48-220
70338-935-220	S95DC-40-220
70338-935-235	S95DC-40-235
70338-935-250	S95DC-40-250 CM4
70346-935-220	S95DC-40-220
70346-935-235	S95DC-40-235
70346-935-250	S95DC-40-250
70346-935-265	S95DC-40-265

### Hyco

70347-62-74	S62DC-9-74
70347-63-104	S63DC-47-104
70347-63-108	<b>S63DC-47-107</b>
70347-63-111	<b>S63DC-44-111</b>
70347-63-120	<b>S63DC-47-120</b>
70347-63-123	<b>S63DC-44-123</b>
70347-63-126	<b>S63DC-44-123</b>
70347-63-130	<b>S63DC-47-130</b>
70347-63-132	<b>S63DC-47-130</b>
70347-63-140	<b>S63DC-47-140</b>
70347-63-77	S63DC-47-77
70347-63-84	S63DC-47-86
70347-63-88	S63DC-47-86
70347-63-96	S63DC-47-92
70347-64-156	<b>S64DC-9-156</b>
70372-62-74	S62DC-9-74
70387-74-135	<b>S74DC-40-135</b>
70387-74-140	S74DC-40A-140
70387-74-156	<b>S74DC-40-156</b>
70426-73-150	S73DC-40-150
70433-815-285	S85DC-40-285
70434-935-285	S95DC-40-280
70449-63-123	<b>S63DC-44-123</b>
70470-64-132	<b>S64DB-6-135</b>
70470-64-135	<b>S64DB-6-135</b>
70470-64-156	<b>S64DB-6-156</b>
70493-73-124.25	S73DC-60-125
70494-73-14212	S73DC-60-142
70498-53-81	S53DC-60-81
70500-63-107	S63DC-60-106
70501-63-79	S63DC-54-79.31
70504-74-162	S74DC-60-165.75
70508-53-81	S53DC-16-80.75
70508-63-81	S63DC-54-79.31
70512-53-82	S53DB-9-82
70521-74-136	S74DC-41-135 CM8
70534-74-156	<b>S74DC-40-156</b>
70541-815-210	<b>S85DC-40A-220</b>
70541-815-240	<b>S85DC-40-235</b>
70541-815-265	<b>S85DC-40A-265</b>
70595-74-154T	S74MB-3-154
70595-74-172T	S74MB-3-172
70603-815-180	<b>S85DC-40-190</b> CM2
70603-815-210	<b>S85DC-40A-220</b> CM2
70611-63-120	S63DC-45-120
70611-63-126	S63DC-45-126
70611-63-138	<b>S63DC-45-138</b>
70611-63-162	S63DC-45-162
70614-73-119	<b>S73DC-40-120</b> CM38
70616-73-136	S73DC-60-142
70620-63-126	S63DC-60-125
70679-53-123	S53DC-15-123
70802-815-180	<b>S85DC-40-190</b>
70803-815-200T	S85MC-48-200
70803-815-220T	S85MC-48-220
70803-815-240T	<b>S85MC-48-235</b>
70804-53-140T	S53MB-3-140
70805-64-156	<b>S64DB-6-156</b>
70807-63-120	S63DC-45-120
70809-815-235T	<b>S85MC-48-235</b>
70809-815-250T	S85MC-48-250
70817-73-114	<b>S73DC-40-120</b>
70821-63-91.88	S63DC-47-92
70828-53-123	S53DC-11-126
70832-63-80	S63DC-47-77 CM11
70848-53-84	<b>S53DC-14-84</b>
70853-64-140T	S64MB-4-140
70854-64-156	<b>S64DB-6-156</b>
70876-73-146.50	S73DC-40-150
3139-TM	D25LL-12-16
5275-78	D62CB-18-78
6127-BA	D25LD-3-66
6260-BA	C3810
6262-BA	D50CB-8-27
6312	D40CD-10-24
6313	D3812
6389-BA	D40LB-1-35.31
6390-BA	D60DC-7-42.62

### Hyco

6402	D50CB-8-27
6403	C3814
6404	D35CC-18-36.88
6410	D40CE-3-24
6412	D40CE-3-24
6443	C3812
7204-LM	D40CD-10-24
8159-BA	D40CD-13-37
8208-BA	D30CC-13-21.62
8218-BA	D30CA-2-3.62
8221-BA	B5655
8224-BA	B5799
8241-BA	B5655
8259-BA	B5873
8260-BA	B5799
8261-BA	B5866
8262-BA	B5655
8263-BA	B5653
8520-BA	D40LB-1-35.31
8525-BA	D30DD-7-21.12
8527-BA	D40DL-2-30.38
8530-BA	D60DB-16-67.5
8533-BA	D40DB-3-28.5
8534-BA	D25DD-3-63
8536-BA	D35LD-2-16.5
8540-BA	D40CB-7-42
8541-BA	D40DD-10-21.62
8550-BA	D35DL-2-26.31
8555-BA	D30LD-2-33.38
8560-BA	D45CD-3-49.12
8565-BA	D40CB-7-42
8567-BA	D60DC-8-60
8574-BA	D40LB-1-35.31
8575-BA	D40DB-3-28.5
8576-BA	D60DC-7-42.62
8578-BA	D30DD-7-21.12
8579-BA	D40DL-2-30.38
8582-BA	D35LD-3-23.25
8596-BA	D60DC-7-42.62
8597-BA	D40DB-3-28.5
8611-BA	D55CC-3-49.13
8612-BA	D30DD-4-89
8613-BA	D40LD-2-16.5
8629-BA	D35DB-2-14.25
8643-BA	D35LD-2-16.5
8644-BA	D45CD-3-49.12
8645-BA	D35LD-3-23.25
8646-BA	D30DD-9-23
8654-BA	D60DB-16-67.5
8664-BA	D40CC-16-24.81
8665-BA	D55CC-2-38.31
8671-BA	D40DB-3-28.5
8672-BA	D60DC-7-42.62
8673-BA	D35LD-2-16.5
8679-BA	D40DL-2-30.38
9021-BA	B5654
9185-BA	B5873
9189-BA	B5799
RCA-20001-01275	D20CL-2-12.75
RCA-25004-10050	D25CC-12-100.50
RCA-25005-08750	D25CC-12-87.50
RCA-30007-02862	D30LD-5-28.62
RCA-35007-02675	D35CD-9-26.75
RCA-35012-02675	D35CD-9-26.75
RCA-40019-02350	D40CL-3-23.50
RCA-40045-03269	S35CL-2-32.69
RCA-45002-04200	D45CL-2-42
RCA-45004-04425	D45CL-2-44.25
RCA-45005-04200	D45CC-13-42
RCA-45006-04225	D45CC-13-44.25
RCA-45007-04200	D45CC-13-42
RCA-45008-04200	D45CL-2-42
RCA-45009-04225	D45CC-13-44.25
RCA-45010-04425	D45CL-2-44.25

### Hyco / Lessard

193-A	S95DC-40-265 CM42
194-A	S95DC-40-235 CM42

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Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.

Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.





## Quick Reference Guide

### Hycó / Lessard

195-A	S95DC-40-190 CM42
196-A	S95DC-40-250 CM42
500-A	<b>S85DC-40-190</b>
500-B	<b>S85DC-40-190</b>
501-A	<b>S85DC-40A-220</b>
501-B	<b>S85DC-40A-220</b>
502-A	<b>S85DC-40-235</b>
502-B	<b>S85DC-40-235</b>
503-A	<b>S85DC-40-250</b>
503-B	<b>S85DC-40-250</b>
504-A	<b>S85DC-40A-265</b>
504-B	<b>S85DC-40A-265</b>
519-A	S84DC-40-148
519-B	S84DC-40-148
519-H	S84DC-40-148
520-A	<b>S84DC-40-180</b>
520-B	<b>S84DC-40-180</b>
520-H	<b>S84DC-40-180</b>
028-0000-0	D70DC-2-81
098-2010-0	S84DC-40-148
098-2011-0	<b>S84DC-40-180</b>
098-2012-0	S84DC-40-148
098-2013-0	<b>S84DC-40-180</b>
098-3012-0	<b>S85DC-40-190</b>
098-3013-0	<b>S85DC-40A-220</b>
098-3014-0	<b>S85DC-40-235</b>
098-3015-0	<b>S85DC-40-250</b>
098-3016-0	<b>S85DC-40A-265</b>
098-3028-0	<b>S85DC-40-190</b>
098-3029-0	<b>S85DC-40A-220</b>
098-3030-0	<b>S85DC-40-235</b>
098-3031-0	<b>S85DC-40-250</b>
098-3032-0	<b>S85DC-40A-265</b>
099-3004-1	S95DC-40A-320 CM42
099-3005-1	S95DC-40A-300 CM42
099-3009-0	S95DC-40-250 CM42
099-3010-0	S95DC-40-190 CM42
099-3011-0	S95DC-40-235 CM42
099-3012-0	S95DC-40-265 CM42
099-3024-0	S95DC-40-190 CM42
099-3025-0	S95DC-40-235 CM42
099-3026-0	S95DC-40-250 CM42
099-3027-0	S95DC-40-265 CM42
099-3029-0	S95DC-40A-300 CM42
099-3030-0	S95DC-40A-320 CM42
DA348-8-5-DC-96.87	SD85CC-19-348
SA120-5-3-TB-53.75-14.37	S53MB-3-120
SA148-5-8-12-4-BC-54	S84DC-40-148
SA148-5-8-4-BC-54	S84DC-40-148
SA149-8-4-BC-54	S84DC-40-148
SA172-5-8-12-4-BC-60	<b>S84DC-40-180</b>
SA172-5-8-4-BC-60	<b>S84DC-40-180</b>
SA173-8-4-BC-60	<b>S84DC-40-180</b>
SA186-8-5-BC-54	<b>S85DC-40-190</b>
SA190-8-5-BC-54	<b>S85DC-40-190</b>
SA196-912-5-BC-58	S95DC-40-190 CM42
SA216-8-5-BC-60	<b>S85DC-40A-220</b>
SA220-8-5-BC-60	<b>S85DC-40A-220</b>
SA235-8-5-BC-65	<b>S85DC-40-235</b>
SA235-912-5-BC-66	S95DC-40-235 CM42
SA250-8-5-BC-68	<b>S85DC-40-250</b>
SA250-912-5-BC-69	S95DC-40-250 CM42
SA265-8-5-BC-71	<b>S85DC-40A-265</b>
SA265-912-5-BC-72	S95DC-40-265 CM42
SA300-9.12-5-BC-79	S95DC-40A-300 CM42
SA320-912-5-BC-83	S95DC-40A-320 CM42

### Iri International

732021	SD83LF-5-177
732022	SD93LF-1-177
937646	<b>SD83CB-16-117</b>
IJ141	D50AA-1-10
IJ152	D60AA-2-10

### J Craft

001679	<b>S63DC-44-123</b>
001682	<b>S63DC-44-111</b>
001683	<b>S73DC-41-129</b>

### J Craft

001684	<b>S74DC-40-156</b>
001685	<b>S85DC-40-190</b>

### Johnson

D3-38	S63DC-47-77 CM26
D3-42	S63DC-47-86 CM26
D3-48	<b>S63DC-47-107</b> CM26
D3-50	<b>S63DC-44-111</b> CM26
D3-52	<b>S63DC-47-120</b> CM26
D3-55	<b>S63DC-44-123</b> CM26
D3-60	<b>S63DC-47-140</b> CM26
D3-63	S63DC-47-150 CM26
E3-50	S73DC-40-110 CM23
E3-52	S73DC-40-110 CM23
E3-55	<b>S73DC-40-124</b> CM23
E3-60	<b>S73DC-40-140</b> CM23
E3-63	S73DC-40-150 CM23
E4-45	S74DC-40A-120 CM23
E4-48	<b>S74DC-40-135</b> CM23
F3-58	S84DC-40-140 CM66
F3-60	S83DC-40-139 CM66
F3-63	S83DC-51-150 CM66
F3-67	<b>S84DC-40-170</b> CM66
F3-69	S83DC-40-160 CM66
F4-51	S84DC-40-148 CM22
F4-53	S84DC-31-156 CM22
F4-55	<b>S84DC-40-161</b> CM22
F4-57	<b>S84DC-40-170</b> CM22
F4-60	<b>S84DC-40-180</b> CM22
F4-62	S84DC-40-188 CM22
F5-55	S85DC-40-197 CM1
F5-59	<b>S85DC-40A-220</b> CM1
G5-55	S95DC-40-190 CM22
G5-57	S95DC-40-190 CM22
G5-60	S95DC-40-220 CM22
G5-62	S95DC-40-220 CM22
G5-65	S95DC-40-235 CM22
G5-67	S95DC-40-250 CM22
G5-69	S95DC-40-250 CM22
G5-72	S95DC-40-265 CM22
G5-80	S95DC-40A-300 CM22
G5-85	S95DC-40A-320 CM22
FMD3-38	S63DC-47-77 CM26
FMD3-42	S63DC-47-86 CM26
FMD3-48	<b>S63DC-47-107</b> CM26
FMD3-50	<b>S63DC-44-111</b> CM26
FMD3-52	<b>S63DC-47-120</b> CM26
FMD3-55	<b>S63DC-44-123</b> CM26
FMD3-60	<b>S63DC-47-140</b> CM26
FMD3-63	S63DC-47-150 CM26
FME3-50	S73DC-40-110 CM23
FME3-52	S73DC-40-110 CM23
FME3-55	<b>S73DC-40-124</b> CM23
FME3-60	<b>S73DC-40-140</b> CM23
FME3-63	S73DC-40-150 CM23
FME4-45	S74DC-40A-120 CM23
FME4-48	<b>S74DC-40-135</b> CM23
FMF3-58	S84DC-40-140 CM66
FMF3-60	S83DC-40-139 CM66
FMF3-63	S83DC-51-150 CM66
FMF3-67	<b>S84DC-40-170</b> CM66
FMF3-69	S83DC-40-160 CM66
FMF4-51	S84DC-40-148 CM22
FMF4-53	S84DC-31-156 CM22
FMF4-55	<b>S84DC-40-161</b> CM22
FMF4-57	<b>S84DC-40-170</b> CM22
FMF4-60	<b>S84DC-40-180</b> CM22
FMF4-62	S84DC-40-188 CM22
FMF5-55	S85DC-40-197 CM1
FMF5-59	<b>S85DC-40A-220</b> CM1
FMG5-55	S95DC-40-190 CM22
FMG5-57	S95DC-40-190 CM22
FMG5-60	S95DC-40-220 CM22
FMG5-62	S95DC-40-220 CM22
FMG5-65	S95DC-40-235 CM22
FMG5-67	S95DC-40-250 CM22
FMG5-69	S95DC-40-250 CM22
FMG5-72	S95DC-40-265 CM22

### Johnson

FMG5-80	S95DC-40A-300 CM22
FMG5-85	S95DC-40A-320 CM22

### Kalyn / Siebert

2533038	S85DC-40-197
2533039	<b>S85DC-40A-220</b>
2533040	<b>S85DC-40-235</b>
2533047	S95DC-40-280
2533067	S85DC-40-285

### Kann Mfg

1400101	D30CD-10-28
1400102	B4775
1400103	B4773
1400104	SD52CC-27-72
1400105	SD62DB-3-84
1400106	C4774
1400117	B5370
1400118	D30LL-7-16
1400119	D35LL-8-16
1400121	B5609
1400128	B5642
1400135	B6148
1400136	B5773
1400147	SD52DB-CP547-84
1400148	SD52DB-CP557-70
1400150	B5983
3701054	B4775
3850017	D35DD-3-16
P4073-1	SD62DB-3-84
P4073-T	SD62DB-3-84
P4074-1	SD52CC-27-72
P4074-T	SD52CC-27-72

### Kayaba

110-40-535	D40CB-8-21
30155-01600	SD64CC-3-126
30155-01900	SD64CC-5-107

### Leach

15373	D40CD-11-15
16902	SD83CC-27-126
20278	SD75OO-1-100
32046	D60DC-10-30.50
37815	SD83CC-27-126
39726	SD86CC-1-171
41296	SD85CC-15-125
41297	SD84CC-11-104
41298	SD85CC-15-125
41354	D60CF-3-32.38
41357	D60CF-3-32.38
200868	SD75OO-2-113
200869	SD75OO-1-100
200870	SD64OO-1-87
201500	SD86OO-1-146
209785	SD63DC-71-81
209786	SD63DC-71-101
209787	SD64DC-3-145
210629	S35CL-2-32.69
210658	D45CL-16-32.50
210659	D55CC-8-37
210847	SD64DC-3-156
300679	D60DC-10-30.50
300900	D60DC-10-30.50
300990	D60DC-10-30.50
302385	D30DD-13-14.25
302514	D20LL-6-3.25
302525	SD63CC-23-167
302549	D30LD-6-28.62
303407	SD63CC-23-167
303904	D60DC-10-30.50
304000	SD63CC-23-167
304805	D60DC-11-30.50
305111	SD63CC-23-146
305112	D45CC-13-42
305127	D45CC-13-42
305240	D45CL-2-44.25
305241	D45CL-2-44.25

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## Quick Reference Guide

### Leach

305687	SD63CC-29-146
305688	SD63CC-39-167
305827	D60DC-10-30.50
305960	D20CL-2-12.75
306459	D45CL-2-42
306460	D30LD-5-28.62
306462	D25CC-12-100.50
306463	D45CC-13-42
306464	D45CC-13-42
306465	D45CL-2-44.25
306466	D20CL-2-12.75
306562	D60DC-10-30.50
306633	D45CC-13-42
306634	D45CC-13-44.25
306635	D45CL-2-42
306636	D45CL-2-44.25
306811	D25CC-12-87.50
307081	D60BC-2-30.31
307082	D60BC-2-27.81
307534	D35CD-9-26.75
400383	D60CF-3-32.38
400496	S21LL-2-1.5
400753	D40CL-2-39.38
401056	D40CL-2-39.38
401207	D40CD-11-15
402087	D60CF-2-57
402160	D40CL-2-39.38
402324	D40CL-2-39.38
404411	D50CB-9-32.50
405089	D40CL-2-39.38
405964	D40CD-11-15
406368	D60CF-3-32.38
406369	D40CL-2-39.38
406370	S21LL-2-1.5
406399	D40CL-2-39.38
406578	D50CB-9-32.50
406582	D60CF-2-57
406639	D40CL-2-39.38
407028	D40CL-3-23.50
601429	D40CL-2-39.38
602163	D30LD-6-28.62
605250	D40CD-11-15
700081	D60BC-3-30.31
701479	S35CL-2-32.69
704045	704045
2R1006A	D60DC-11-30.50
2R1008R	D60DC-10-30.50
PO1166	D60CF-3-32.38
PO265	D40CL-2-39.38

### Loadmaster

11071	SD64CC-3-126
14969	D40CB-8-21
17506	SD64CC-3-126
17678	SD64CC-3-126
17834	D55CB-7-40.50
20146	SD64CC-5-107
20148	SD64CC-3-147
22974	D55CB-7-40.50
22977	D40CB-8-21
150040-1	D40CB-8-21
150051-1	D40CB-8-21
150066	SD64CC-3-126
150072-1	SD64CC-3-126
150083-1	D40CB-8-21
150089-1	SD64CC-5-107
150123	D40CB-8-21
150586	SD64CC-3-126
750013	D40CB-8-21
750182	D55CB-7-40.50
EO 3760	SD64CC-5-107

### Lodal

9930216	SD84CC-21-135
9930230	SD74CC-12-135
9930251	<b>SD52CC-24-111</b>
9930254	SD42CC-19-111
9930258	SD95CC-3-160

### Lodal

9930260	SD84CC-21-135
9930272	SD42CC-19-111
9930303	SD42CC-19-111
9930341	SD53CC-36-155

### Lufkin Industries

13789850 (3789850) **S85DC-40A-265**

### Mabar

T63108	<b>S63DC-47-107</b>
T63120	<b>S63DC-47-120</b>
T63126	<b>S63DC-44-123</b>
T74135	<b>S74DC-40-135</b>
T74140	S74DC-40A-140
T74156	<b>S74DC-40-156</b>

### Mailhot

5000011	<b>S85DC-40-190</b>
5000012	<b>S85DC-40A-220</b>
5000026	<b>S85DC-40-250</b>
5000058	S95DC-40-250
5000060	S95DC-40-265
5000085	<b>S85DC-40-235</b>
5000134	S95DC-40-235
9000012	<b>S85DC-40-235</b>
9000015	<b>S85DC-40A-220</b>
9000016	S95DC-40-265
9000023	<b>S85DC-40-250</b>
9000025	<b>S85DC-40-190</b>
9000029	S95DC-40-250
9000030	S85DC-40-197
9000031	S84DC-40-188
9000034	<b>S74DC-40-135</b>
9000035	S73DC-40-110
9000036	<b>S63DC-44-123</b>
9000037	<b>S63DC-44-111</b>
9000038	<b>S64DC-9-156</b>
9000079	S95DC-40-235
C102-6-3	S63DC-47-104
C111-6-3	<b>S63DC-44-111</b>
C111-7-3	S73DC-40-110
C120-6-3	<b>S63DC-47-120</b>
C123-6-3	<b>S63DC-44-123</b>
C135-7-4	<b>S74DC-40-135</b>
C148-8.125-4	S84DC-40-148
C156-6-4	<b>S64DC-9-156</b>
C156-6-4A	<b>S64DC-9-156</b>
C156-6-4B	<b>S64DC-9-156</b>
C160-7-4	<b>S74DC-40-156</b>
C160-8.125-4	S84DC-31-156
C162-7-4	<b>S74DC-40-161</b>
C167-7-4	<b>S74DC-40-161</b>
C183-8.125-4	<b>S84DC-40-180</b>
C183-8-4	S84DC-40-188
C190-8.125-5	<b>S85DC-40-190</b>
C190-8-5	<b>S85DC-40-190</b>
C190-9.375-5	S95DC-40-190
C200-8-5	S85DC-40-197
C220-8.125-5	<b>S85DC-40A-220</b>
C220-8-5	<b>S85DC-40A-220</b>
C220-9.375-5	S95DC-40-220
C235-8.125-5	<b>S85DC-40-235</b>
C235-8-5	<b>S85DC-40-235</b>
C235-9.25-5	S95DC-40-235
C235-9.375-5	S95DC-40-235
C250-8.125-5	<b>S85DC-40-250</b>
C250-8-5	<b>S85DC-40-250</b>
C250-9.25-5	S95DC-40-250
C250-9.375-5	S95DC-40-250
C265-8.125-5	<b>S85DC-40A-265</b>
C265-9.25-5	S95DC-40-265
C265-9.375-5	S95DC-40-265
C280-8.125-5	S85DC-40-285
C280-9.375-5	S95DC-40-280
C300-9.375-5	S95DC-40A-300
PC0601113HG0037	<b>S63DC-44-111</b>
PC0601233HG0036	<b>S63DC-44-123</b>
PC0601564HG0038	<b>S64DC-9-156</b>

### Mailhot

PC0701113HG0035	S73DC-40-110
PC0701354HG0034	<b>S74DC-40-135</b>
PC0701624HG0033	<b>S74DC-40-161</b>
PC0701784HG0261	<b>S74DC-40-180</b>
PC0801834HG0031	S84DC-40-188
PC0801905HG0025	<b>S85DC-40-190</b>
PC0802005HG0030	S85DC-40-197
PC0802205HG0015	<b>S85DC-40A-220</b>
PC0802355HG0012	<b>S85DC-40-235</b>
PC0802505HG0023	<b>S85DC-40-250</b>
PC0802705HG0230	<b>S85DC-40A-265</b>
PC0922355HG0047	S95DC-40-235
PC0922505HG0029	S95DC-40-250
PC0922655HG0016	S95DC-40-265
PS0601113HG0045	<b>S63DC-44-111</b>
PS0601203HG0052	<b>S63DC-47-120</b>
PS0601564HG0041	<b>S64DC-9-156</b>
PS0601564HG0043	<b>S64DC-9-156</b>
PS0701354HG0012	<b>S74DC-40-135</b>
PS0701604HG0044	<b>S74DC-40-156</b>
PS0701674HG0081	<b>S74DC-40-161</b>
PS0811484HG0009	S84DC-40-148
PS0811604HG0010	S84DC-31-156
PS0811834HG0011	<b>S84DC-40-180</b>
PS0811905HG0001	<b>S85DC-40-190</b>
PS0812205HG0003	<b>S85DC-40A-220</b>
PS0812355HG0004	<b>S85DC-40-235</b>
PS0812655HG0006	<b>S85DC-40A-265</b>
PS0812805HG0007	S85DC-40-285
PS0912505HG0005	<b>S85DC-40-250</b>
PS0931905HG0020	S95DC-40-190
PS0932205HG0008	S95DC-40-220
PS0932355HG0022	S95DC-40-235
PS0932505HG0023	S95DC-40-250
PS0932655HG0024	S95DC-40-265
PS0932805HG0024	S95DC-40-280
PS0933005HG0026	S95DC-40A-300

### Mangino

62-94 ..... SD62CB-12-94

### Marathon

04-0127	D70DD-7-79
04-2001	SD63CB-11-118
04-2002	D70LN-3-80
04-2003	D70LN-2-90
92-3650	SD63DB-6-108

### Marion

3243C	S32DB-1-43 CM72
3250-C	S32DB-1-50 CM72
4243C	S42DB-5-43 CM72
4250C	<b>S42DB-5-51 CM72</b>
4250T	S42MB-6-50
4260T	M42MB-60
4375C	<b>S43DB-2-75 CM72</b>
5360C	S53DB-13-60
5374T	S53MB-5-74
5390C	<b>S53DB-13-90</b>
5390T	S53MB-5-90
A218630-119	S74DC-40A-120 CM26
A218630-135	<b>S74DC-40-135 CM26</b>

### Maxon

401216	S53DB-2-63
401222	D60DD-4-69

### Mcclain

1001140	D60DB-14-58
1001141	D60CC-26-78
1001143	D60DB-12-108
1001144	SD72DB-2-76
1001145	D70CC-7-78
1001146	D70DB-2-115
1001147	SD73DB-8-115
1001149	SD85CC-24-236
1001151	SD85MC-21-384
1001152	SD85CC-24-304

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Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.



## Quick Reference Guide

### Mcclain

1001154	SD96MC-8-384
1001155	SD96MC-5-456
1001156	SD96MC-8-480
1001160	<b>S85DC-40-250</b>
1001163	<b>S85DC-40-235</b>
1002190	D62LB-4-80
1002191	D72LB-8-80
1002432	SD73DB-8-160
HCL6X58	D60DB-14-58
HCL6X78	D60CC-26-78
HCL6X108	D60DB-12-108
HCL7X78	D70CC-7-78
HCL7X115	D70DB-2-115
HCL72X77	SD72DB-2-76
HCL73X115	SD73DB-8-115
HCL85X235	<b>S85DC-40-235</b>
HCL85X236	SD85CC-24-236
HCL85X250	<b>S85DC-40-250</b>
HCL85X384	SD85MC-21-384
HCL95X303	SD85CC-24-304
HCL96X384	SD96MC-8-384
HCL96X456	SD96MC-5-456
HCL96X480	SD96MC-5-480
MMH1501000	SD72DB-2-76
MMH1601000	D60CC-26-78

### Mcclain Ez Pack (Clean Earth)

20-35489	SD94CC-7-176
20-35883	D30DD-7-21.12
20-35908	D40DL-2-30.38
20-36393	D40DD-10-21.62
20-39032	SD94CC-7-176
20-41381	D40CB-7-42
20-42616	SD94CC-7-176
20-43726	D40DB-3-28.5
20-43727	D40DB-3-28.5
20-44095	D60DC-7-42.62
20-44125	D40LB-1-35.31
20-44969	D40DB-3-28.5
20-44973	D60DC-7-42.62
20-45169	D40LB-1-35.31
20-45450	D60DB-16-67.5
20-46008	D25DD-3-63
20-46012	D35LD-2-16.5
20-46076	D40DB-3-28.5
20-46077	D60DC-7-42.62
20-46119	D45CD-3-49.12
20-46139	D60DB-16-67.5
20-46141	D25DD-3-63
20-46142	D35LD-2-16.5
20-46151	D30DD-7-21.12
20-46152	D35DL-2-26.31
20-46153	D40DL-2-30.38
20-46155	D40DD-10-21.62
20-46159	D40CB-7-42
20-46163	D45CD-3-49.12
20-46171	D45CD-3-49.12
20-46249	D40LB-1-35.31
20-46332	D60DC-8-60
20-46372	D40DB-3-28.5
20-47048	D30LD-2-33.38
20-47088	D40CB-7-42
20-47090	D40LB-1-35.31
20-47091	D40DB-3-28.5
20-47092	D60DC-7-42.62
20-47491	D30DD-7-21.12
20-47492	D40DL-2-30.38
20-47868	D35LD-3-23.25
20-48279	D60DC-7-42.62
20-48280	D40DB-3-28.5
20-49348	D30DD-9-23
20-48496	SD94CC-7-176
20-48519	D55CC-3-49.13
20-48520	D30DD-4-89
20-48524	D40LD-2-16.5
20-48858	D35DB-2-14.25
20-49142	D60DB-16-67.5
20-49271	D35LD-2-16.5

### Mcclain Ez Pack (Clean Earth)

20-49272	D35LD-3-23.25
20-49273	D45CD-3-49.12
20-49276	D35LD-2-16.5
20-49277	D45CD-3-49.12
20-49278	D35LD-3-23.25
20-49480	D60DB-16-67.5
20-49774	D55CC-2-38.31
20-49775	D40CC-16-24.81
20-49897	D40DB-3-28.5
20-49898	D60DC-7-42.62
20-49952	D35LD-2-16.5
20-49999	D35LD-2-16.5
20-50000	D35LD-3-23.25
20-52344	D45CD-3-49.12
20-52345	D35LD-2-16.5
20-52346	D35LD-3-23.25
20-52347	D30LD-2-33.38
20-52348	D30DD-4-89
20-52349	D60DB-16-67.5
20-52355	D55CC-3-49.13
20-52356	D40LD-2-16.5
20-52357	D40DD-10-21.62
20-52362	D25DD-3-63
21-01365	SD62CC-23-70
21-01366	SD62CC-23-81
21-01367	SD62CC-23-92
21-01368	SD63CC-28-124
21-01369	SD74CC-13-162.88
21-01370	SD62CC-24-82.5
21-01371	SD62CC-24-96.5
21-01372	SD63CC-27-129
21-01374	SD74CC-15-167.50
21-01375	SD52CC-25-68.5
21-01376	SD52CC-25-82.5
21-01377	SD52CC-25-96.5
21-01378	SD53CC-30-129
21-01381	SD52CC-25-92.5
21-01382	SD53CC-30-117.25
21-01438	S63DC-54-79.31
21-01492	S53DC-18-64.75
21-01530	D60DC-7-42.62
21-01531	D40DB-3-28.5
21-01532	D40LB-1-35.31
21-01549	D30DL-1-18.5
21-01629	S31LC-1-28.56
21-01630	D30DD-7-21.12
21-01631	D40DL-2-30.38
21-01632	S31CC-24-23.56
21-01633	SD53CC-29-91.50
21-01634	D30DD-6-18
21-01635	D35DL-2-26.31
21-01644	S52DB-7-53.62
21-01646	S31LC-2-27.5
21-01647	D35CD-6-24.81
21-01648	D45CC-3-38.31
21-01765	SD63CC-27-129
21-01819	S53DB-9-82
21-01883	D40CC-16-24.81
21-01947	D30LC-2-31.5
21-01954	D55CC-2-38.31
21-01987	SD63CB-12-197
21-02112	S53DB-9-92
21-02113	S53DB-9-71
21-02220	D40DB-3-25.62
21-02610	D40DB-3-25.62
21-02804	D30DL-2-15.375
21-02830	D60DC-8-60
21-02832	D40CB-7-42
21-02833	D35DB-2-14.25
21-03153	D40LD-3-24.75
21-03228	D50CB-3-42
21-03390	D45LD-6-24
21-03471	D35DL-2-26.31
21-03472	D40DL-2-30.38
21-03854	SD52CB-6-132.75
21-03855	D35CD-7-51.31
21-03856	D30CD-7-24.75
21-03857	D25DD-4-24

### Mcclain Ez Pack (Clean Earth)

21-04533	D30DD-9-23
21-04536	SD63CB-12-132
21-04537	<b>SD63CB-12-167</b>
21-04538	SD63CB-12-197
21-04945	D30DD-9-23
21-05358	D45CD-2-49.12
21-06096	SD63CB-13-167
21-06097	SD63CB-13-197
21-06343	D45CD-2-51.31
21-07434	D30LD-4-24
21-07940	D60DB-16-67.5
21-09213	D40LD-4-21.75
21-09214	D45LD-5-21.75
21-09228	D40LD-5-24.75
21-09229	D45LD-6-24
21-10044	D40LD-6-24.75
21-10661	D50CB-6-40
21-11441	SD52CB-8-132.75
21-12474	D60DB-16-67.5
21-12851	D55CC-3-49.13
21-14634	D40CC-16-24.81
21-14635	D55CC-2-38.31
21-14636	D30LC-2-31.5
21-14637	SD62CC-24-82.5
21-14638	SD62CC-24-96.5
21-14639	SD63CC-27-129
21-14643	SD74CC-15-167.50
21-14653	D45CC-3-38.31
21-14654	SD52CC-25-68.5
21-14655	SD52CC-25-82.5
21-14656	SD52CC-25-96.5
21-14657	SD53CC-30-129
21-14658	D40DB-3-28.5
21-14659	D60DC-7-42.62
21-14660	D40LB-1-35.31
21-14661	D40DB-3-25.62
21-14662	SD74CC-13-162.88
21-14663	SD63CC-28-124
21-14664	SD62CC-23-92
21-14665	SD62CC-23-81
21-14666	SD62CC-23-70
21-14667	D60DC-8-60
21-14668	D30DL-2-15.375
21-14670	D30DD-7-21.12
21-14671	D40DL-2-30.38
21-14672	S31LC-1-28.56
21-14673	SD53CC-30-117.25
21-14675	D30DD-6-18
21-14676	D35DL-2-26.31
21-14677	S31CC-24-23.56
21-14678	SD53CC-29-91.50
21-14679	D40LD-6-24.75
21-15639	D55CC-3-49.13
21-15640	D45LD-6-24
21-15641	D45CD-2-49.12
21-15642	D40LD-5-24.75
21-15643	D35CD-7-51.31
21-15644	D30LD-2-33.38
21-15645	D45CD-2-51.31
21-15646	D30DD-4-89
21-15647	D30DD-9-23
21-15648	D50CB-3-42
21-15770	<b>SD63CB-12-167</b>
21-15771	SD63CB-13-167
21-15772	SD63CB-12-197
21-15773	SD63CB-12-132
21-15774	D45LD-5-21.75
21-15775	D40LD-4-21.75
21-15776	D25DD-4-24
21-15777	SD52CB-8-132.75
21-16048	SD52CB-6-132.75
70-1010	SD85CC-20-156
70-1032	SD62CC-20-82
70-1114	S63DC-54-79.31
70-1235	SD52CB-20-156
70-1251	SD85CC-19-378
70-1259	S53DC-16-80.75
70-1276	SD53CC-29-91.50

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## Quick Reference Guide

### Mcclain Ez Pack (Clean Earth)

70-1308	SD52CC-25-92.5
70-1309	SD53CC-30-117.25
70-1420	SD94CC-7-176
70-1422	SD74CC-13-162.88
70-1464	SD62CC-23-92
70-1465	SD63CC-28-124
70-1478	SD63CC-28-124
70-1487	S53DC-16-80.75
70-1488	SD63CC-28-124
70-1499	S53DB-9-82
70-1503	SD94CC-7-176
70-1504	SD53CC-29-91.50
70-1506	SD52CC-25-92.5
70-1507	SD62CC-23-92
70-1508	SD74CC-13-162.88
70-1510	SD85CC-19-378
70-1511	SD62CC-20-82
70-1546	SD74CC-13-162.88
70-1547	SD62CC-23-92
70-1548	SD63CC-28-124
70-1549	SD53CC-19-378
70-1566	SD52CC-25-92.5
70-1567	S31LC-1-28.56
70-1574	SD94CC-7-176
70-1575	SD94CC-7-176
70-1577	SD53CC-30-117.25
70-1579	SD62CC-23-70
70-1592	<b>SD63CB-12-167</b>
70-1595	S31LC-2-27.5
70-1598	SD52CC-25-96.5
70-1599	SD53CC-30-129
70-1600	SD52CC-25-82.5
70-1601	SD63CB-12-132
70-1602	SD52CC-25-92.5
70-1612	SD52CC-25-68.5
70-1616	SD63CC-28-124
70-1617	SD62CC-23-81
70-1618	SD62CC-23-92
70-1619	<b>SD63CB-12-167</b>
70-1621	SD52CC-25-92.5
70-1622	SD52CC-25-96.5
70-1626	SD53CC-30-117.25
70-1627	SD63CB-12-132
70-1631	SD74CC-13-162.88
70-1632	SD85CC-19-378
70-1639	SD53CC-30-129
70-1653	S53DC-16-80.75
70-1659	S63DC-54-79.31
70-1660	S63DC-61-92
70-1670	S53DC-18-64.75
70-1674	SD52CC-25-68.5
70-1681	SD62CC-24-82.5
70-1682	SD62CC-24-96.5
70-1683	SD63CC-27-129
70-1685	SD74CC-15-167.50
70-1687	SD62CC-24-82.5
70-1688	SD62CC-24-96.5
70-1689	SD63CC-27-129
70-1691	SD74CC-15-167.50
70-1704	S31LC-1-28.56
70-1705	SD53CC-30-129
70-1706	SD63CC-27-129
70-1720	SD52CC-25-82.5
70-1722	S53DB-9-92
70-1725	SD74CC-15-167.50
70-1726	SD62CC-24-96.5
70-1727	SD63CC-28-124
70-1730	<b>SD63CB-12-167</b>
70-1731	SD63CB-12-132
70-1732	S53DC-16-80.75
30-00147	S63DC-61-92
2563ADA	D25DD-3-63
3021CDA	D30DD-7-21.12
3021GDA	D30DD-7-21.12
3516BDA	D35LD-2-16.5
4021EDA	D40DD-10-21.62
4028BDA	D40DB-3-28.5
4028CDA	D40DB-3-28.5

### Mcclain Ez Pack (Clean Earth)

4028DA	D40DB-3-28.5
4030DA	D40DL-2-30.38
4030EDA	D40DL-2-30.38
4035CDA	D40LB-1-35.31
4035EDA	D40LB-1-35.31
4549DA	D45CD-3-49.12
5292DA	SD52CC-25-92.5
53117DA	SD53CC-30-117.25
5381B	S53DC-16-80.75
6042ADA	D60DC-7-42.62
6042DA	D60DC-7-42.62
6067DA	D60DB-16-67.5
6282DA	SD62CC-20-82
6292BDA	SD62CC-23-92
6292DA	SD62CC-22-92
63124BDA	SD63CC-28-124
63124DA	SD63CC-28-124
63124DDA	SD63CC-28-124
6380	S63DC-54-79.31
74162DA	SD74CC-13-162.88
85378DA	SD85CC-19-378
94176CDA	SD94CC-7-176
94176DA	SD94CC-7-176
94176HDA	SD94CC-7-176
104176ADA	SD94CC-7-176
C2523E	S31CC-24-23.56
C2524ADA	D25DD-4-24
C3015HDA	D30DL-2-15.375
C3018HDA	D30DD-6-18
C3021MDA	D30DD-7-21.12
C3023GDA	D30DD-9-23
C3031DDA	D30LC-2-31.5
C3033EDA	D30LD-2-33.38
C3089BDA	D30DD-4-89
C3128G	S31LC-1-28.56
C3128K	S31LC-1-28.56
C3526PDA	D35DL-2-26.31
C3551BDA	D35CD-7-51.31
C4022CDA	D40LD-4-21.75
C4025MDA	D40CC-16-24.81
C4025NDA	D40DB-3-25.62
C4025PDA	D40LD-6-24.75
C4025RDA	D40LD-5-24.75
C4028MDA	D40DB-3-28.5
C4030MDA	D40DL-2-30.38
C4035MDA	D40LB-1-35.31
C4522LOA	D45LD-5-21.75
C4525BDA	D45LD-6-24
C4538DDA	D45CC-3-38.31
C4549NDA	D45CD-2-49.12
C4551EDA	D45CD-2-51.31
C5042BDA	D50CB-3-42
C52133BDA	SD52CB-8-132.75
C52133CDA	SD52CB-6-132.75
C5269CDA	SD52CC-25-68.5
C5269EDA	SD52CC-25-68.5
C5283BDA	SD52CC-25-82.5
C5283EDA	SD52CC-25-82.5
C5292FDA	SD52CC-25-92.5
C5297CDA	SD52CC-25-96.5
C5297EDA	SD52CC-25-96.5
C53117EDA	SD53CC-30-117.25
C53117JDA	SD53CC-30-117.25
C53129CDA	SD53CC-30-129
C53129EDA	SD53CC-30-129
C5365K	S53DC-18-64.75
C5381K	S53DC-16-80.75
C5390A	S53DB-9-92
C5391EDA	SD53CC-29-91.50
C5538DDA	D55CC-2-38.31
C5549CDA	D55CC-3-49.13
C6042MDA	D60DC-7-42.62
C6060DDA	D60DC-8-60
C6270BDA	SD62CC-23-70
C6281BDA	SD62CC-23-81
C6282DA	SD62CC-20-82
C6283BDA	SD62CC-24-82.5
C6283DDA	SD62CC-24-82.5

### Mcclain Ez Pack (Clean Earth)

C6292BDA	SD62CC-23-92
C6292HDA	SD62CC-23-92
C6292KDA	SD62CC-23-92
C6297BDA	SD62CC-24-96.5
C6297CDA	SD62CC-24-96.5
C6297FDA	SD62CC-24-96.5
C63124HDA	SD63CC-28-124
C63124JDA	SD63CC-28-124
C63124MDA	SD63CC-28-124
C63129BDA	SD63CC-27-129
C63129CDA	SD63CC-27-129
C63129FDA	SD63CC-27-129
C63133ADA	SD63CB-12-132
C63133EDA	SD63CB-12-132
C63167BDA	<b>SD63CB-12-167</b>
C63167HDA	<b>SD63CB-12-167</b>
C63167JDA	SD63CB-13-167
C63198DDA	SD63CB-12-197
C6380R	S63DC-54-79.31
C6392J	S63DC-61-92
C74162DDA	SD74CC-13-162.88
C74162EDA	SD74CC-13-162.88
C74168BDA	SD74CC-15-167.50
C74168DDA	SD74CC-15-167.50
C74168FDA	SD74CC-15-167.50
C85378DDA	SD85CC-19-378
C104176CDA	SD94CC-7-176
D2563BDA	D25DD-3-63
D3021GDA	D30DD-7-21.12
D3021HDA	D30DD-7-21.12
D3023BDA	D30DD-9-23
D3033ADA	D30LD-2-33.38
D3089DA	D30DD-4-89
D3127A	S31LC-2-27.5
D3128D	S31LC-1-28.56
D3514CDA	D35DB-2-14.25
D3516CDA	D35LD-2-16.5
D3516GDA	D35LD-2-16.5
D3516JDA	D35LD-2-16.5
D3516KDA	D35LD-2-16.5
D3523BDA	D35LD-3-23.25
D3523DA	D35LD-3-23.25
D3526JDA	D35DL-2-26.31
D4016DA	D40LD-2-16.5
D4021EDA	D40DD-10-21.62
D4021JDA	D40DD-10-21.62
D4025ADA	D40CC-16-24.81
D4028DDA	D40DB-3-28.5
D4028EDA	D40DB-3-28.5
D4028FDA	D40DB-3-28.5
D4028GDA	D40DB-3-28.5
D4028KDA	D40DB-3-28.5
D4030EDA	D40DL-2-30.38
D4030FDA	D40DL-2-30.38
D4035HDA	D40LB-1-35.31
D4035JDA	D40LB-1-35.31
D4042BDA	D40CB-7-42
D4042CDA	D40CB-7-42
D4549ADA	D45CD-3-49.12
D4549BDA	D45CD-3-49.12
D4549DDA	D45CD-3-49.12
D4549EDA	D45CD-3-49.12
D5269BDA	SD52CC-25-68.5
D5283ADA	SD52CC-25-82.5
D5292CDA	SD52CC-25-92.5
D5292DDA	SD52CC-25-92.5
D5292EDA	SD52CC-25-92.5
D5297ADA	SD52CC-25-96.5
D53117DDA	SD53CC-30-117.25
D53129ADA	SD53CC-30-129
D53129BDA	SD53CC-30-129
D5381G	S53DC-16-80.75
D5382C	S53DB-9-82
D5391ADA	SD53CC-29-91.50
D5538ADA	D55CC-2-38.31
D5549DA	D55CC-3-49.13
D6042BDA	D60DC-7-42.62
D6042CDA	D60DC-7-42.62

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Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.



## Quick Reference Guide

### Mcclain Ez Pack (Clean Earth)

D6042DDA	D60DC-7-42.62
D6042HDA	D60DC-7-42.62
D6060DA	D60DC-8-60
D6067ADA	D60DB-16-67.5
D6067BDA	D60DB-16-67.5
D6067EDA	D60DB-16-67.5
D6270DA	SD62CC-23-70
D6281DA	SD62CC-23-81
D6282FDA	SD62CC-20-82
D6283ADA	SD62CC-24-82.5
D6292CDA	SD62CC-23-92
D6292EDA	SD62CC-23-92
D6297ADA	SD62CC-24-96.5
D63124FDA	SD63CC-28-124
D63124HDA	SD63CC-28-124
D63129ADA	SD63CC-27-129
D63133DA	SD63CB-12-132
D63167DA	<b>SD63CB-12-167</b>
D6380L	S63DC-54-79.31
D74162ADA	SD74CC-13-162.88
D74162BDA	SD74CC-13-162.88
D74168ADA	SD74CC-15-167.50
D85378BDA	SD85CC-19-378
D85378CDA	SD85CC-19-378
D104176CDA	SD94CC-7-176
D104176DDA	SD94CC-7-176
H104176ADA	SD94CC-7-176
J3516HDA	D35LD-2-16.5
J4549FDA	D45CD-3-49.12
K2523D	S31CC-24-23.56
K2524DA	D25DD-4-24
K2563EDA	D25DD-3-63
K3015GDA	D30DL-2-15.375
K3018FDA	D30DL-1-18.5
K3018GDA	D30DD-6-18
K3021LDA	D30DD-7-21.12
K3023DDA	D30DD-9-23
K3023EDA	D30DD-9-23
K3025BDA	D30CD-7-24.75
K3025CDA	D30LD-4-24
K3031CDA	D30LC-2-31.5
K3033DDA	D30LD-2-33.38
K3089ADA	D30DD-4-89
K3127E	S31LC-2-27.5
K3128J	S31LC-1-28.56
K3514DDA	D35DB-2-14.25
K3516LDA	D35LD-2-16.5
K3523FDA	D35LD-3-23.25
K3525GDA	D35CD-6-24.81
K3526LDA	D35DL-2-26.31
K3526NDA	D35DL-2-26.31
K3549CDA	D35CD-7-51.31
K3551ADA	D35CD-7-51.31
K4016FDA	D40LD-2-16.5
K4021NDA	D40DD-10-21.62
K4022BDA	D40LD-4-21.75
K4025FDA	D40CC-16-24.81
K4025GDA	D40DB-3-25.62
K4025JDA	D40LD-3-24.75
K4025KDA	D40LD-5-24.75
K4025LDA	D40LD-6-24.75
K4028LDA	D40DB-3-28.5
K4030JDA	D40DL-2-30.38
K4030LDA	D40DL-2-30.38
K4035LDA	D40LB-1-35.31
K4042DDA	D40CB-7-42
K4522KDA	D45LD-5-21.75
K4525ADA	D45LD-6-24
K4525DA	D45LD-6-24
K4538FDA	D45CC-3-38.31
K4549LDA	D45CD-3-49.12
K4549MDA	D45CD-2-49.12
K4551CDA	D45CD-2-51.31
K5040ADA	D50CB-6-40
K5040BDA	D50CB-6-40
K5042ADA	D50CB-3-42
K52133ADA	SD52CB-8-132.75
K52133DA	SD52CB-6-132.75

### Mcclain Ez Pack (Clean Earth)

K5253A	S52DB-7-53.62
K5269DDA	SD52CC-25-68.5
K5283DDA	SD52CC-25-82.5
K5292GDA	SD52CC-25-92.5
K5297DDA	SD52CC-25-96.5
K53117HDA	SD53CC-30-117.25
K53129DDA	SD53CC-30-129
K5365B	S53DC-18-64.75
K5365CDA	S53DC-21-65
K5371J	S53DB-9-71
K5381N	S53DC-16-80.75
K5381XDA	S53DC-21-81
K5382V	S53DB-9-82
K5390B	S53DB-9-92
K5391CDA	SD53CC-29-91.50
K5538CDA	D55CC-2-38.31
K5549ADA	D55CC-3-49.13
K5549BDA	D55CC-3-49.13
K6042LDA	D60DC-7-42.62
K6060CDA	D60DC-8-60
K6067GDA	D60DB-16-67.5
K6067HDA	D60DB-16-67.5
K6067JDA	D60DB-16-67.5
K6270ADA	SD62CC-23-70
K6281ADA	SD62CC-23-81
K6283CDA	SD62CC-24-82.5
K6292JDA	SD62CC-23-92
K6297DDA	SD62CC-24-96.5
K63124LDA	SD63CC-28-124
K63129DDA	SD63CC-27-129
K63129EDA	SD63CC-27-129
K63133CDA	SD63CB-12-132
K63133DDA	SD63CB-12-132
K63167DDA	<b>SD63CB-12-167</b>
K63167FDA	<b>SD63CB-12-167</b>
K63167GDA	SD63CB-13-167
K63198ADA	SD63CB-12-197
K63198BDA	SD63CB-12-197
K63198CDA	SD63CB-13-197
K6380U	S63DC-54-79.31
K6392N	S63DC-61-92
K6499ADA	S64DC-11-99
K74162CDA	SD74CC-13-162.88
K74168EDA	SD74CC-15-167.50

### Mcneilus (Mtm)

0085219	B3394
0107559	C4219
0126158	S63DC-75-66
0126248	B6225
0126256	B6231
0189975	B6185
0189976	B6181
0601930	C4217
0604124	D4145
0604126	D4210
0604134	D4172
0604135	D4171
0604136	D4190
0604137	SD74DC-7-119
0604138	SD85DC-7-163
0604139	SD63DC-CP293-71
0604142	SD63DC-7-88
0604143	D4291
0604144	D4292
0604145	D4266
0604146	D4265
0604976	D4541
0605700	B5473
0605702	B5806
0605951	B6190
0605952	B6191
0606950	C3847
0606953	B5347
0606956	SD74DC-CP410-104
0606960	C3850
0606967	SD63DC-CP507-82
0606969	SD63DC-7-61

### Mcneilus (Mtm)

0614333	D35CC-16-26
0614371	B4388
0614374	D5820
0615860	C4539
0615862	S64DB-CP319-73
0617862	B4708
0619881	C5219
0619882	C5220
0619891	B5788
0633832	S75DB-CP394-86
0633849	B6310
0635876	B5489
0636002	S74DC-70-84
0637007	D30CD-11-21.25
0637008	D50DD-23-52.75
0637009	B6019
0637010	D25LL-8-38
0638264	B6387
0642850	B5427
0642852	S53DB-7-63
0651550	<b>D62LB-5-80</b>
0654696	B6071
0660009	B6347
0660776	SD53DD-CP592-170
0660777	B6178
0660778	B6151
0660781	B6347
0661950	SD63CC-41-164
0661951	SD63CC-41-181
0663500	B6314
0672135	B6311
0673089	SD63DC-CP625-76
0673894	SD63DC-CP604-97
1000066	C5219
1000067	C5220
1000068	D35CC-16-26
1000069	B5788
1000074	B3394
1000077	B4388
1000078	C4542
1000081	D4145
1000092	C4539
1000094	B5489
1000095	B5427
1000153	B6185
1000154	B6181
1000158	B6178
1000160	B6151
1000161	B6019
1000166	D50DD-23-52.75
1100028	B6347
1100031	B6231
1100038	D4210
1100045	B6310
1100104	B6314
1100105	D25LL-8-38
1100106	B6387
1100116	D5820
1100117	B5806
1101709	D60CC-33-65.75
1102355	B6497
1103780	B6546
1103899	B6487
1103900	B6488
1104922	D50DD-21-39.50
1105118	B6591
1106169	S35CC-4-37
1106845	D40LD-3-24.75
1106846	D45CD-3-49.12
1106958	C3847
1107471	<b>SD63CB-12-167</b>
1107976	B5873
1107995	B5799
1107996	B5654
1108087	SD63DB-6-108
1108088	D30CL-3-18.44
1108089	D45CC-14-41.50
1108091	B5162

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## Quick Reference Guide

### Mcneilus (Mtm)

1108092 ..... D55CC-6-63  
 1108093 ..... D40CD-13-37  
 1108097 ..... B5653  
 1108101 ..... C4438  
 1108102 ..... D50DC-3-45  
 1108103 ..... D30CL-2-25.25  
 1108104 ..... D55DB-2-63  
 1108107 ..... D45CC-15-41.50  
 1108108 ..... B5655  
 1108110 ..... B5653  
 1108220 ..... B6622  
 1108292 ..... D4266  
 1108392 ..... S53MC-38-166  
 1108626 ..... B6642  
 1108973 ..... D60BC-2-30.31  
 1109037 ..... SD53CC-38-182  
 1109039 ..... SD53CC-38-182  
 1109095 ..... B5866  
 1109096 ..... B5654  
 1109097 ..... B5655  
 1109279 ..... B5654  
 1109305 ..... SD63CC-39-167  
 1109306 ..... D35CD-7-51.31  
 1109307 ..... D30LD-4-24  
 1109314 ..... SD64DC-3-145  
 1109318 ..... SD63DC-71-101  
 1109612 ..... D40CL-2-39.38  
 1109698 ..... D30CA-2-3.62  
 1109699 ..... D60DB-7-72  
 1109700 ..... D70LN-2-80  
 1130000 ..... SD63CC-41-164  
 1130001 ..... SD63CC-41-181  
 1130015 ..... B5653  
 1130638 ..... D40CD-14-25  
 1130640 ..... D30CC-13-21.62  
 1130642 ..... B5873  
 1130728 ..... B5799  
 1130729 ..... B5653  
 1131210 ..... D40CD-8-22  
 1131389 ..... D40DB-3-28.5  
 1131393 ..... C3563  
 1131703 ..... B5654  
 1131704 ..... B5866  
 1131705 ..... B5873  
 1132628 ..... SD53CC-37-168  
 1132629 ..... D20DD-4-6.25  
 1132630 ..... D20DD-3-67  
 1132770 ..... B5866  
 1132771 ..... B5654  
 1132774 ..... B5799  
 1132775 ..... B5653  
 1136596 ..... S35CC-3-24.38  
 1136598 ..... D30CC-16-30.50  
 1136602 ..... C3603  
 1136603 ..... C3875  
 1136607 ..... SD53CC-38-151.5  
 1136608 ..... SD63DB-6-93  
 1136610 ..... SD63DB-7-132  
 1136612 ..... SD74DB-4-171  
 1136622 ..... SD63CC-28-124  
 1137329 ..... D55CC-7-24  
 1138456 ..... D45CD-2-51.31  
 1138697 ..... SD63CB-12-197  
 1139663 ..... D40LD-5-24.75  
 1139665 ..... D60DC-7-42.62  
 1140624 ..... SD63CC-41-164  
 1140625 ..... SD63CC-41-181  
 1141048 ..... B5654  
 1141057 ..... B5873  
 1144606 ..... SD63CC-11-96  
 1144707 ..... C5220  
 1145649 ..... B6622  
 1145650 ..... D20DD-3-67  
 1146255 ..... D60DB-16-67.5  
 1148322 ..... C3850  
 1149084 ..... D40DD-16-22.50  
 1149547 ..... D25LL-12-16  
 1149552 ..... D35CD-10-20

### Mcneilus (Mtm)

1149553 ..... D40DD-17-42  
 1149557 ..... D40DD-19-22.50  
 1149965 ..... D25LD-3-66  
 1149966 ..... D40CD-9-21.50  
 1149967 ..... D25LD-3-94  
 1150054 ..... SD86CC-2-177  
 1150058 ..... SD63CD-1-177  
 1150061 ..... S52DC-7-88  
 1151216 ..... D25LL-15-84  
 1151217 ..... D25LL-14-42  
 1151221 ..... D60DD-14-79  
 1151222 ..... D70DD-6-79  
 1151223 ..... H3121  
 200.107529 ..... C3686  
 200.107530 ..... C3241-4  
 200.107559 ..... C4219  
 200.126248 ..... B6225  
 200.126256 ..... B6231  
 200.126257 ..... B6236  
 200.150369 ..... B5134  
 200.15940 ..... D4048  
 200.16397 ..... D60CC-34-35  
 200.16418 ..... D60CC-29-35  
 200.189975 ..... B6185  
 200.189976 ..... B6181  
 200.189977 ..... B6297  
 200.85219 ..... B3394  
 9070.126158 ..... S63DC-75-66  
 9070.614333 ..... D35CC-16-26  
 9070.633849 ..... B6310  
 9070.638264 ..... B6387  
 9070.640899 ..... B4874  
 9070.644183 ..... D45DD-7-34.50  
 9070.644203 ..... B5899  
 9070.651550 ..... **D62LB-5-80**  
 9070.654695 ..... **D62LB-5-80**  
 9070.654696 ..... B6071  
 9070.654697 ..... **D72LB-9-80**  
 9070.654698 ..... B5043  
 9070.670032 ..... SD74DC-CP615-138  
 9070.670032 ..... SD74DC-CP615-138  
 9072.601028 ..... D4143  
 9072.601029 ..... D4143  
 9072.601048 ..... D3784  
 9072.601492 ..... D4106  
 9072.601930 ..... C4217  
 9072.601940 ..... C4040  
 9072.602556 ..... D4143  
 9072.604134 ..... D4172  
 9072.604137 ..... SD74DC-7-119  
 9072.604142 ..... SD63DC-7-88  
 9170.604123 ..... B4227  
 9170.604128 ..... S63DC-CP118-77  
 9170.605700 ..... B5473  
 9170.614371 ..... B6151  
 9170.615860 ..... C4539  
 9170.619880 ..... B4662  
 9170.619884 ..... C4542  
 9170.631567 ..... D35LD-4-20  
 9170.633832 ..... S75DB-CP394-86  
 9170.637007 ..... D30CD-11-21.25  
 9170.638476 ..... B6291  
 9170.642852 ..... S53DB-7-63  
 9170.660012 ..... B6152  
 9170.660776 ..... SD53DD-CP592-170  
 9170.660778 ..... B6151  
 9172.604147 ..... B4388  
 9180.651550 ..... **D62LB-5-80**  
 9270.604124 ..... D4145  
 9270.604126 ..... D4210  
 9270.604131 ..... SD63DC-7-80  
 9270.604132 ..... SD74DC-9-109  
 9270.604137 ..... SD74DC-7-119  
 9270.604138 ..... SD85DC-7-163  
 9270.604139 ..... SD63DC-CP293-71  
 9270.604142 ..... SD63DC-7-88  
 9270.606950 ..... C3847  
 9270.606956 ..... SD74DC-CP410-104

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9270.606967 ..... SD63DC-CP507-82  
 9270.606969 ..... SD63DC-7-61  
 9270.614374 ..... D5820  
 9270.615860 ..... C4539  
 9270.615861 ..... C4543  
 9270.615862 ..... S64DB-CP319-73  
 9270.632568 ..... B5056  
 9270.635876 ..... B5489  
 9270.636002 ..... S74DC-70-84  
 9270.642633 ..... B6349  
 9270.663500 ..... B6314  
 9270.673088 ..... SD52DC-CP627-55  
 9270.673089 ..... SD63DC-CP625-76  
 9270.673894 ..... SD63DC-CP604-97  
 9272.604120 ..... D4195  
 9272.604121 ..... D4131  
 9272.604123 ..... B4227  
 9272.604124 ..... D4145  
 9272.604125 ..... C4133  
 9272.604126 ..... D4210  
 9272.604127 ..... C5220  
 9272.604128 ..... S63DC-CP118-77  
 9272.604142 ..... SD63DC-7-88  
 9370.601930 ..... C4217  
 9370.601940 ..... C4040  
 9370.604124 ..... D4145  
 9370.604125 ..... C4133  
 9370.604127 ..... C5220  
 9370.604130 ..... C4217  
 9370.604136 ..... D4190  
 9370.605700 ..... B5473  
 9370.605701 ..... B5387  
 9370.605702 ..... B5806  
 9370.605909 ..... B6014  
 9370.606953 ..... B5347  
 9370.618926 ..... B5809  
 9370.618927 ..... B5810  
 9370.619881 ..... C5219  
 9370.619882 ..... C5220  
 9370.632570 ..... D20LL-4-17.50  
 9370.637009 ..... B6019  
 9370.637010 ..... D25LL-8-38  
 9370.640889 ..... C4500  
 9370.672005 ..... B6311  
 9370.672135 ..... B6311  
 9370.914365 ..... C5219  
 9430.615861 ..... C4543  
 9430.661950 ..... SD63CC-41-164  
 9430.661951 ..... SD63CC-41-181  
 9470.601028 ..... D4143  
 9470.601029 ..... D4143  
 9470.601048 ..... D3784  
 9470.602556 ..... D4143  
 9470.604048 ..... D3784  
 9470.604124 ..... D4145  
 9470.604134 ..... D4172  
 9470.604135 ..... D4171  
 9470.604143 ..... D4291  
 9470.604144 ..... D4292  
 9470.604145 ..... D4266  
 9470.604146 ..... D4265  
 9470.605951 ..... B6190  
 9470.605952 ..... B6191  
 9470.606690 ..... C3850  
 9470.606950 ..... C3847  
 9470.606953 ..... B5347  
 9470.606960 ..... C3850  
 9470.630861 ..... D4596  
 9470.637008 ..... D50DD-23-52.75  
 9470.640884 ..... C4621  
 9470.640886 ..... C4536  
 9570.604120 ..... D4195  
 9570.604121 ..... D4131  
 9570.614333 ..... D35CC-16-26  
 9570.614366 ..... D4496  
 9570.614380 ..... B5788  
 9570.617862 ..... B4708  
 9570.618928 ..... B5780

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## Quick Reference Guide

### Mcneilus (Mtm)

9570.618929	D45CC-7-46
9570.619836	D45CC-12-44
9570.619876	D30CD-9-20
9570.619891	B5788
9570.619980	B5864
9570.619985	D4522
9570.640887	C4484
9570.640896	C4619
9570.643701	B5495
9570.643704	B5072
9570.643705	D35DD-1-17.88
9570.643706	B5429
9570.643708	D30DD-12-9.12
9570.643710	B5899
9570.660009	B6347
9570.660777	B6178
9570.660781	B6347
9572.601691	B5806
9572.604129	D4106
9770.615862	S64DB-CP319-73
9770.640888	S53DB-7-63
9830.620243	SD63DC-71-81
9830.620509	D60BC-2-27.81
9830.620698	D60DC-11-30.50
9870.620505	D50CB-9-32.50
9870.620568	D60BC-2-30.31
9870.620569	C3810
9870.620645	D50CB-8-27
9870.620695	D60DC-10-30.50
9870.622401	C3872
9870.622402	C3878
9870.623499	D60CF-3-32.38
9870.623992	D60CF-2-57
9870.623999	D40CL-2-39.38
9872.622234	D40CD-9-24
9872.622235	D50CE-2-43.75
9872.622239	SD53CC-25-106
9872.622251	C3847
9872.623427	SD75OO-2-113
9872.623428	SD86OO-1-146
9872.623445	SD86CC-1-171
9872.623446	SD85CC-15-125
9872.623447	SD84CC-11-104
9872.623473	S21LL-2-1.5
9872.624071	D3812
9872.624073	SD74CC-11-131
9872.627004	D60DB-16-67.5
9880.623829	SD64CC-7-132
9970.601691	B5806
9970.604129	D4106
9970.604129A	B5473
9970.604975	C4750
9970.604976	D4541
9970.604129B	B5473

### Pak-Mor Mfg

080121	SD52DC-12-119
2000102	SD52DC-12-119
2001102	SD52DC-12-140
2001103	SD84MC-18-152
2001105	SD84MC-18-176
2001106	<b>SD85MC-15-220</b>
2001108	SD84MC-19-285
2001109	SD84MC-19-340
2001110	SD84MC-20-406
2001111	SD85MC-16-220
2001112	SD84MC-21-176
2001113	SD84MC-21-152
2001114	SD84MC-23-406
2001115	SD95MC-5-220
2001116	SD95MC-6-220
2001120	SD95MC-6-220
2001125	SD52DC-12-119
2001126	SD52DC-12-140
2001183	SD53CC-35-189
4148000	D60CB-5-26
4148022	D50DB-13-24
4148023	D50DL-2-42

### Pak-Mor Mfg

4148037	D60CL-2-40
4148044	D60CB-5-47
4149004	D50CD-3-43.12
4149065	D35LL-9-30
4149067	D35LL-9-38
4149071	D40CD-12-28
4149073	D30LL-7-26.50
4149075	D45DC-2-36
4149110	D35CL-2-12
4149111	D40CL-4-12
4149112	D25CL-2-12
4149131	D25LL-13-90

### Palmer Machine

8-4-148	S84DC-40-148
8-4-152 P	S84DC-40-148 CM20
8-4-156	S84DC-31-156
8-4-180	<b>S84DC-40-180</b>
8-4-188	<b>S84DC-40-180</b> CM20
8-5-172	S85DC-51-160 CM18
8-5-190 P	<b>S85DC-40-190</b>
8-5-220	<b>S85DC-40A-220</b>

### Peabody Galion (Godwin)

21-11903	S64DC-11-99
21-11904	S53DC-21-81
21-11905	S53DC-21-65
21-15649	S53DC-21-81
30-00197	SD53MC-4-81
30-00198	SD63MC-10-108
30-00199	S63MC-21-108
30-00200	SD63MC-10-128
30-00201	S63MC-21-128
30-00202	SD73MC-1-126
30-00203	S73MC-6-126
30-00204	SD73MC-1-142
30-00205	S73MC-6-142.12
30-00207	S74MC-8-167
30-00218	SD63DC-9-100.25
30-00239	SD63MC-10-153
30-00261	SD73DC-5-120
30-00591	SD73DC-5-138.75
31-00078	S73DC-59-125
31-00080	S63MC-21-80
31-00135	SD63DC-11-120
31-00144	SD63DC-12-100
31-00154	S63DC-69-125
31-00156	S53DC-60-71
31-00158	S73MC-7-126
31-00159	SD74DB-4-171
31-00214	S53MB-5-74
31-00215	S53MB-5-90
31-00216	S42MB-7-50
31-00217	S43MB-1-75
31-00363	S73MC-7-142.12
31-00392	SD73MC-2-126
31-00462	S73DC-59-142
70-1003	S42MB-6-50
70-1004	S53MB-5-74
70-1006	S43MB-1-75
70-1022	S63DC-60-92
70-1023	S84DC-40-188
70-1031	S53MB-5-90
70-1040	<b>S85DC-40A-220</b>
70-1041	S74DC-60-139.75
70-1049	<b>S85DC-40A-220</b>
70-1052	<b>S85DC-40A-220</b>
70-1061	S74DC-40A-120
CM38	
70-1112	S53DC-60-71
70-1113	S53DC-60-81
70-1115	S63DC-60-106
70-1116	S63DC-60-125
70-1117	S73DC-60-103
70-1118	S73DC-60-125
70-1119	S74DC-60-165.75
70-1121	S84DC-60-140
70-1122	S84DC-60-161

### Peabody Galion (Godwin)

70-1124	S85DC-40-197
70-1125	S95DC-40-190
70-1126	S95DC-40-220
70-1127	S95DC-40-250
70-1262	S53MB-5-90
70-1263	S53MB-5-74
70-1271	S73DC-60-142
70-1272	S63DC-60-92
70-1328	S63DC-60-79.12
70-1379	S53DC-60-71
70-1397	S43MB-1-75
70-1431	S53MB-5-90
70-1453	S84DC-60-161
70-1479	S43MB-1-75
70-1480	S53MB-5-74
70-1481	S53MB-5-90
70-1482	S53DC-60-81
70-1483	S63DC-60-92
70-1484	S63DC-60-106
70-1485	S63DC-60-125
70-1486	S73DC-60-125
70-1490	S63DC-60-79.12
70-1492	S73DC-60-103
70-1493	S73DC-60-142
70-1494	S74DC-60-165.75
70-1518	S42MB-6-50
70-1520	S53DC-60-108
70-1534	S73DC-60-125
70-1536	S84DC-60-140
70-1543	S84DC-60-161
70-1550	S53DC-60-108
70-1554	S73DC-60-142
70-1561	S63DC-60-92
70-1593	S73DC-60-142
70-1603	S63DC-60-106
70-1604	S63DC-60-125
70-1605	S73DC-60-103
70-1606	S73DC-60-125
70-1608	S74DC-60-165.75
70-1609	S84DC-60-140
70-1610	S84DC-60-161
70-1611	S73DC-60-125
70-1644	S74DC-60-139.75
70-1645	S73DC-60-125
70-1646	S73DC-60-103
70-1648	S63DC-60-125
70-1649	S63DC-60-92
70-1650	S63DC-60-106
70-1651	S74DC-60-165.75
70-1652	S84DC-60-161
70-1654	S53MB-5-90
70-1658	S63DC-60-79.12
70-1662	S53DC-60-71
70-1663	S84DC-60-140
70-1664	S53DB-9-71
70-1667	S53DB-9-71
70-1668	S53DB-9-82
70-1669	S73DC-60-142
70-1671	S53DC-60-81
70-1696	S42MB-6-50
70-1697	S43MB-1-75
70-1698	S53MB-5-74
70-1699	S53MB-5-90
70-1701	S53DC-60-108
70-1735	S53DC-60-81
70-1736	S63DC-60-79.12
70-1737	S63DC-60-106
70-1738	S63DC-60-125
70-1739	S63DC-60-92
70-1740	S73DC-60-103
70-1741	S73DC-60-125
70-1742	S73DC-60-142
70-1743	S74DC-60-165.75
70-1744	S74DC-60-139.75
70-1745	S84DC-60-140
70-1746	S84DC-60-161
4250-PG	S42MB-6-50
4374B	S43MB-1-75

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## Quick Reference Guide

### Peabody Galion (Godwin)

4374-G	S43MB-1-75
5371	S53DC-60-71
5371C	S53DC-60-71
5374A	S53MB-5-74
5374-G	S53MB-5-74
5381	S53DC-60-81
5389	S53MB-5-90
5389B	S53MB-5-90
5389E	S53MB-5-90
63108	S63DC-60-106
63128	S63DC-60-125
6380A	S63DC-60-79.12
6380G	S63DC-60-79.12
6392	S63DC-60-92
6392A	S63DC-60-92
73105	S73DC-60-103
73126-G	S73DC-60-125
73142A	S73DC-60-142
74120	S74DC-40A-120
CM38	
74140	S74DC-60-139.75
74167	S74DC-60-165.75
84140	S84DC-60-140
84164-G	S84DC-60-161
84188-G	S84DC-40-188
85204	S85DC-40-197
85220	<b>S85DC-40A-220</b>
95199	S95DC-40-190
95230	S95DC-40-220
95260	S95DC-40-250
C53108G	S53DC-60-108
C5371F	S53DC-60-71
C5371H	S53DB-9-71
C5381B	S53DC-16-80.75
C5381G	S53DC-16-80.75
C5381L	S53DC-60-81
C5381ZDA	S53DC-21-81
C5382D	S53DB-9-82
C5389J	S53MB-5-90
C63108M	S63DC-60-106
C63126M	S63DC-60-125
C6380P	S63DC-60-79.12
C6392H	S63DC-60-92
C73105G	S73DC-60-103
C73126D	S73DC-60-125
C73126J	S73DC-60-125
C73142D	S73DC-60-142
C73142F	S73DC-60-142
C74140G	S74DC-60-139.75
C74167F	S74DC-60-165.75
C84140H	S84DC-60-140
C84164F	S84DC-60-161
D4250B	S42MB-6-50
D4374D	S43MB-1-75
D53108	S53DC-60-108
D53108D	S53DC-60-108
D53108E	S53DC-60-108
D5371G	S53DB-9-71
D5374B	S53MB-5-74
D5381F	S53DC-60-81
D5389F	S53MB-5-90
D63108H	S63DC-60-106
D63108K	S63DC-60-106
D63128G	S63DC-60-125
D63128K	S63DC-60-125
D6380M	S63DC-60-79.12
D6392E	S63DC-60-92
D6392F	S63DC-60-92
D73105D	S73DC-60-103
D73105F	S73DC-60-103
D73126D	S73DC-60-125
D73126E	S73DC-60-125
D73126F	S73DC-60-125
D73126G	S73DC-60-125
D73142B	S73DC-60-142
D73142C	S73DC-60-142
D74167D	S74DC-60-165.75
D74167E	S74DC-60-165.75

### Peabody Galion (Godwin)

D84140F	S84DC-60-140
D84140G	S84DC-60-140
D84162	S84DC-60-161
D84164C	S84DC-60-161
D84164E	S84DC-60-161
FD73-142A	S73DC-60-142
K4250E	S42MB-6-50
K4250F	S42MB-7-50
K4374G	S43MB-1-75
K4374H	S43MB-1-75
K5371	S53DC-60-71
K5374D	S53MB-5-74
K5374E	S53MB-5-74
K5381P	S53DC-60-81
K5381TDA	SD53MC-4-81
K5389K	S53MB-5-90
K5389L	S53MB-5-90
K63108N	S63DC-60-106
K63108PDA	SD63MC-10-108
K63108R	S63MC-21-108
K63108SDA	SD63DC-9-100.25
K63108VDA	SD63DC-12-100
K63128R	S63DC-60-125
K63128TDA	SD63MC-10-128
K63128U	S63MC-21-128
K63128WDA	SD63DC-11-120
K63128X	S63DC-69-125
K63153DA	SD63MC-10-153
K6380T	S63DC-60-79.12
K6380W	S63MC-21-80
K6392K	S63DC-60-92
K73105J	S73DC-60-103
K73126M	S73DC-60-125
K73126PDA	SD73MC-1-126
K73126R	S73MC-6-126
K73126SDA	SD73DC-5-120
K73126T	S73DC-59-125
K73126U	S73MC-7-126
K73126VDA	SD73MC-2-126
K73142G	S73DC-60-142
K73142HDA	SD73MC-1-142
K73142J	S73MC-6-142.12
K73142K	S73MC-7-142.12
K73142L	S73DC-59-142
K73142NDA	SD73DC-5-138.75
K74140H	S74DC-60-139.75
K74167	SD74DB-4-171
K74167G	S74DC-60-165.75
K74167J	S74MC-8-167
K84140J	S84DC-60-140
K84164G	S84DC-60-161

### Perfection

375	M42DB-43-P
475	M52CB-43-P
5372V	<b>S53DC-14-72</b> CM69
5388V	<b>S53DC-14-84</b>
53105V	S53DC-11-104
53120V	S53DC-11-120
6388V	S63DC-47-86
63105V	<b>S63DC-47-107</b>
63120A	<b>S63DC-47-120</b>
63A132V	<b>S63DC-47-130</b>
73A132	<b>S73DC-41-129</b>
85A195V	<b>S85DC-40-190</b>
85A235V	<b>S85DC-40-235</b>
A154781	<b>S84DC-40-170</b>
A154875	<b>S84DC-40-170</b>
A154877	S84DC-40-140
A154879	S85DC-40-170
A1553380000	M42DB-43-P
A1553420000	M52CB-43-P
A22275	S53DC-11-120
A24176	M42DB-43-P
A24976	M52CB-43-P
A27123	<b>S63DC-47-107</b>
A27134	<b>S63DC-47-120</b>
A29651	S53DC-11-104

### Perfection

A29652	S53DC-11-120
A29732	<b>S53DC-14-84</b>
A29741	S63DC-47-86
A58627	S63DC-47-86
A59327	<b>S74DC-40-135</b>
A68577	<b>S53DC-14-72</b> CM69
A68827	<b>S84DC-40-170</b>
A68829	S85DC-40-170
A68832	S95DC-40-220
A68835	S95DC-40-250
A68841	S84DC-40-140
A68859	<b>S63DC-47-130</b>
A69064	<b>S73DC-40-120</b>
A69066	S74DC-40A-120
A69067	<b>S74DC-40-135</b>
A69069	S85DC-40-170
A69070	<b>S85DC-40-190</b>
A69071	<b>S85DC-40A-220</b>
A69072	<b>S85DC-40-235</b>
A69073	<b>S85DC-40-250</b>
A76479	<b>S73DC-41-129</b>
A80314	<b>S84DC-40-170</b>
A92097	S95DC-40-190
A94464	<b>S85DC-40-235</b>
A98278	<b>S84DC-40-170</b>
A99108	<b>S85DC-40-190</b>

### Pioneer Tarper

H7039	D20LL-7-24
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### Prince

AA266	D35BB-1-60
AA730	D50DB-8-66
AC695	S31CB-1-32
AC702	D50DB-2-54
AC703	D50DB-8-66
AE694	D35BB-1-80
AG485	D50DB-12-54
AH314	SD63CC-23-167
AK154	D50DB-12-54
AK186	D50DB-8-66
AK190	D50DB-5-54
AT315	D70LN-2-108
AW330	B1043
AW331	B2460
AW332	B2455
AW333	B2461
J1335	D60DB-7-72
J1408	D40BB-2-80
M387	D35BB-1-80
R656	D60LN-2-80
S1062	SD62CB-12-94
S373	SD62CB-12-114
S587	D70LN-2-75
S588	D70LN-2-80
S589	D70LN-2-90
S590	D70LN-2-108
W582	D50DB-2-54

### R/S Body (Godwin)

100586	S63DC-47-86 CM26
100602	S73DC-40-110 CM23
100610	<b>S73DC-40-124</b> CM23
100628	<b>S73DC-40-140</b> CM23
100630	S73DC-40-150 CM23
100651	S84DC-31-156 CM22
100655	S84DC-40-188 CM22
100659	S95DC-40A-300
CM22	
100661	<b>S84DC-40-180</b> CM22
100665	<b>S84DC-40-170</b> CM22
100859	<b>S63DC-47-107</b> CM26
101055	S95DC-40-250 CM22

### Rapid Rail

L10-00	B5799
L7-00	B5654
L8-00	B5653

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## Quick Reference Guide

### Rapid Rail

P2300 ..... B5789  
 P23-00 ..... B5873  
 T11-00 ..... B5866

### Rogers Mfg

00975 ..... **S64DB-6-135**  
 00980 ..... S42MB-5-60  
 01017 ..... SD53DC-5-84  
 01018 ..... S53DB-12-90  
 01038 ..... **S74DC-40-156**  
 01050 ..... S74DC-41-135

### Rudco

P28-022 ..... **D62LB-5-80**  
 P28-052 ..... **D72LB-9-80**

### Schwarze Industries

20931 ..... S42MB-6-50

### Shu-Pak Refuse

808788 ..... S63DC-42-82

### Skytop Brewster

082060-02-51 ..... **SD83CC-24-131**  
 082060-02-54 ..... SD83CC-24-132

### Smart Truck Systems

800043 ..... S53DB-14-78

### Somerset Welding

CY-2018 B60-18 ..... D84DB-7-25

### Stagg C+O Dempster

4CC80284 ..... D60DD-4-69

### Steco

68D1475 ..... SD86CC-2-177  
 90015-1 ..... **S85MC-48-265**

### Tesco Williamsen

327-01-100 ..... S42MB-3-90  
 327-01-103 ..... S53MB-3-120  
 327-01-104 ..... S63MB-9-120  
 327-01-106 ..... S63MB-8-140  
 327-01-107 ..... S74MB-3-154  
 327-01-108 ..... S74MB-3-172  
 327-01-127 ..... S74MB-5-167  
 4290VI ..... S42MB-3-90  
 53120VI ..... S53MB-3-120  
 63120VI ..... S63MB-9-120  
 63140VI ..... S63MB-8-140  
 74154VI ..... S74MB-3-154  
 74172VI ..... S74MB-3-172  
 WFMS-4290T ..... S42MB-3-90  
 WFMS-53120T ..... S53MB-3-120  
 WHP-53120VI ..... S53MB-3-120  
 WHP-63140VI ..... S63MB-8-140  
 WHP-74154VI ..... S74MB-3-154  
 WHP-74172VI ..... S74MB-3-172

### Texas Hydraulics

HS5027048SF ..... D50CB-8-27  
 HS6034040SH ..... C3810  
 SA4037056LA-03 ..... S35CC-4-37  
 TH6079064PA3 ..... D60DD-14-79  
 TH6079064PA-03 ..... D60DD-14-79  
 TH7079064PA-5 ..... D70DD-6-79

### Thiele

102-2-005-1 ..... S42CC-12-40  
 102-2-010-1 ..... S52CC-25-40

### Ti Brook

701700320 ..... S85DC-40-285

### Trailmobile

428-3-150 ..... **S85DC-40-190** CM53  
 428-3-151 ..... **S85DC-40A-220** CM65  
 428-3-156 ..... S95DC-40-235 CM42  
 428-3-157 ..... S95DC-40-250 CM42

### Truxmore

P1023 ..... SD84CC-20-144  
 P1027 ..... SD84CC-20-178

### Unit Rig

3001424 ..... SD73DB-6-115

### Universal Handling

D002-6410 ..... D4145  
 M609-4000 ..... SD73GF-2-156

### Vactor / Guzzler

1200334 ..... **S63DC-47-107**  
 1201313 ..... SD53MC-3-120  
 1201552 ..... SD63DB-14-120  
 1202100 ..... SD84MC-18-176  
 1202110 ..... SD84MC-21-176

### Wabash National

WC1392-2 ..... **S85DC-40-190**  
 WC1392-3 ..... S84DC-40-148

### Walinga

64-16622-6 ..... **S85DC-40A-220**

### Waltco

21147-5000 ..... D55CB-7-40.50  
 21162-5000 ..... D40CB-8-21  
 21198-5000 ..... D55CB-7-40.50  
 21203-5000 ..... D40CB-8-21  
 98036 ..... D30LD-6-28.62

### Ward

5044-165 ..... **S74DC-40-161**  
 5054-170 ..... S85DC-40-170  
 5054-190 ..... **S85DC-40-190**  
 5054-220 ..... **S85DC-40A-220**  
 5054-235 ..... **S85DC-40-235**

### Warren Inc

FHC-50166 ..... **S84DC-40-170**  
 FHC-50167 ..... **S85DC-40-190**  
 FHC-50168 ..... **S85DC-40A-220**  
 FHC-50169 ..... **S85DC-40A-220**  
 FHC-50171 ..... **S85DC-40-250**  
 FHC-50172 ..... **S85DC-40A-265**  
 FHC-50191 ..... **S84DC-40-180**

### Wittke Waste

010-9900 ..... D25LL-9-36  
 010-9901 ..... D25LL-14-42  
 010-9902 ..... D25LL-15-84  
 014-9900 ..... D35LD-5-19  
 016-9900 ..... B5548  
 018-9900 ..... D45LD-7-45.38  
 110121-2 ..... D25LL-9-36  
 AUHC-04 ..... D15DD-3-66  
 AUHC-07 ..... D20CC-6-4  
 AUHC-08 ..... D50CC-21-18.50  
 AUHC-09 ..... D30DC-2-17.38  
 FLHC-28C ..... D45LD-7-45.38  
 FLHC-33 ..... D25LL-15-71.50  
 FLHC-25 ..... D25LL-14-42  
 FLHC-26B ..... B5548  
 FLHC-26C ..... D45LD-7-45.38  
 FLHC-27 ..... D35LD-5-19  
 FLHC-27A ..... D35LD-5-19  
 FLHC-29 ..... D25LL-9-36  
 FLHC-34 ..... D25LL-15-84

Crossover and Application Data is for Reference Purpose Only. No Other Conditions are Expressed or Implied.

Note: It is the Users Responsibility to Verify if the Replacement Cylinder is Interchangeable.

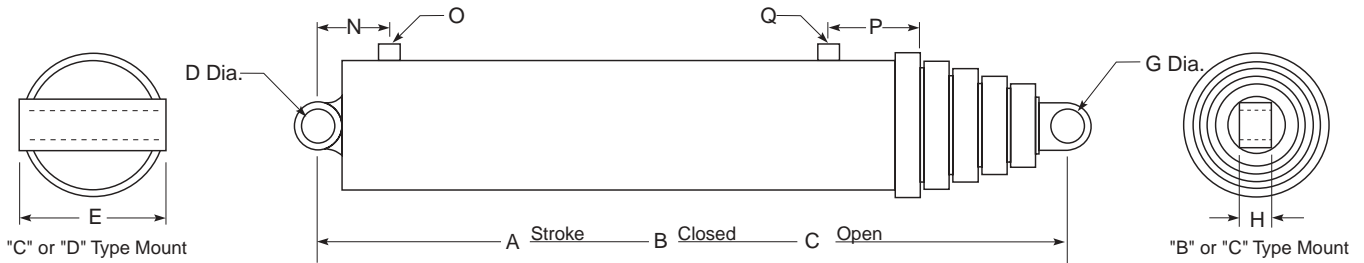
Note: In some applications, modifications may be required for proper cylinder installation.

Note: Bold / Highlighted Items are Standard Warehouse Cylinders.





## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts Design



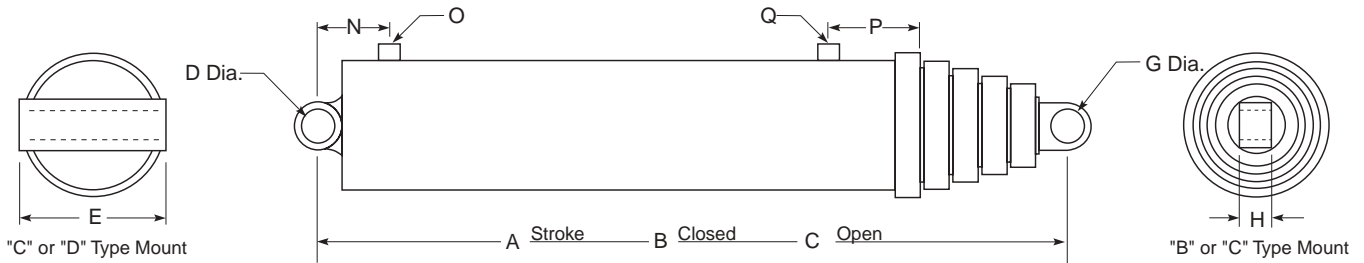
ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	G PIN	H WIDTH
S32DB-1-43	3780712001	3	2	42.62	29.69	72.31	2.00	4.00	1.25	1.69
S32DB-1-50	3780712002	3	2	50.00	33.38	83.38	2.00	4.00	1.25	1.69
S42CC-12-40	3771012035	4	2	40.00	32.44	72.44	1.50	2.00	1.50	2.00
S42DB-5-43	3781012004	4	2	43.62	30.19	73.81	2.00	5.00	1.50	2.62
<b>S42DB-5-51</b>	<b>3781012001</b>	<b>4</b>	<b>2</b>	<b>51.00</b>	<b>33.88</b>	<b>84.88</b>	<b>2.00</b>	<b>5.00</b>	<b>1.50</b>	<b>2.62</b>
<b>S43DB-2-75</b>	<b>3781013002</b>	<b>4</b>	<b>3</b>	<b>74.04</b>	<b>33.88</b>	<b>107.92</b>	<b>2.00</b>	<b>5.00</b>	<b>1.25</b>	<b>1.69</b>
S52CC-25-40	3771512043	5	2	40.00	32.44	72.44	1.50	2.00	1.50	2.00
S52DB-6-55	3771512051	5	2	55.00	38.00	93.00	3.50	6.00	1.50	3.62
S52DC-7-88	3771512060	5	2	87.88	58.37	146.25	3.50	6.25	1.50	1.50
S53DB-13-60	3781513005	5	3	60.00	30.00	90.00	2.00	6.00	1.50	2.63
S53DB-2-63	3771513013	5	3	63.00	34.12	97.12	3.63	6.25	1.50	2.69
S53DB-7-63	3771513048	5	3	63.00	34.12	97.12	3.63	6.25	1.50	2.69
S53DB-9-71	3771513108	5	3	71.13	39.38	110.50	2.00	6.25	1.38	2.63
<b>S53DC-14-72</b>	<b>3771513084</b>	<b>5</b>	<b>3</b>	<b>72.00</b>	<b>37.19</b>	<b>109.19</b>	<b>2.00</b>	<b>7.00</b>	<b>1.63</b>	<b>1.50</b>
S53DB-14-78	3771513137	5	3	78.00	38.00	116.00	3.50	6.50	1.50	2.69
S53DC-16-80.75	3771513094	5	3	80.75	40.25	121.00	4.50	8.00	1.63	2.00
S53DC-60-81	3771513095	5	3	81.13	39.00	120.13	2.00	7.00	1.63	2.00
S53DB-9-82	3771513099	5	3	82.75	39.38	122.13	2.00	6.25	1.38	2.63
<b>S53DC-14-84</b>	<b>3771513085</b>	<b>5</b>	<b>3</b>	<b>84.00</b>	<b>41.19</b>	<b>125.19</b>	<b>2.00</b>	<b>7.00</b>	<b>1.63</b>	<b>1.50</b>
S53DB-12-90	3781513001	5	3	90.00	39.75	129.75	2.00	6.00	1.62	2.63
<b>S53DB-13-90</b>	<b>3781513002</b>	<b>5</b>	<b>3</b>	<b>90.00</b>	<b>39.75</b>	<b>129.75</b>	<b>2.00</b>	<b>6.00</b>	<b>1.50</b>	<b>2.63</b>
S53DB-9-92	3771513107	5	3	92.12	42.50	134.62	2.00	6.25	1.38	2.63
S53DC-15-99	3771513091	5	3	99.00	46.50	145.50	2.00	7.75	1.75	1.50
S53DB-8-103	3771513073	5	3	103.38	46.56	149.94	1.75	8.00	1.50	2.69
S53DC-11-104	3771513105	5	3	104.00	47.69	151.69	2.00	7.00	1.75	2.00
S53DC-15-105	3771513090	5	3	105.00	48.50	153.50	2.00	7.75	1.75	1.50
S53DC-11-107	3771513069	5	3	107.56	48.38	155.94	2.00	7.00	1.75	2.00
S53DC-60-108	3771513156	5	3	107.75	48.25	156.00	2.00	7.00	1.63	2.00
S53DC-15-120	3771513089	5	3	120.00	52.50	172.50	2.00	7.75	1.75	1.50
S53DC-11-120	3771513101	5	3	120.13	53.06	173.19	2.00	7.00	1.75	2.00
S53DC-15-123	3771513088	5	3	123.00	54.50	177.50	2.00	7.75	1.75	1.50
S53DC-11-126	3771513070	5	3	126.63	54.56	181.19	2.00	7.00	1.75	2.00
S53DC-11-130	3771513103	5	3	129.88	56.31	186.19	2.00	7.00	1.75	2.00

Note; Bold / Highlighted Items are Standard Warehouse Items.

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Nominal Stage OD, refers to the Largest Moving Sleeve.

## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts



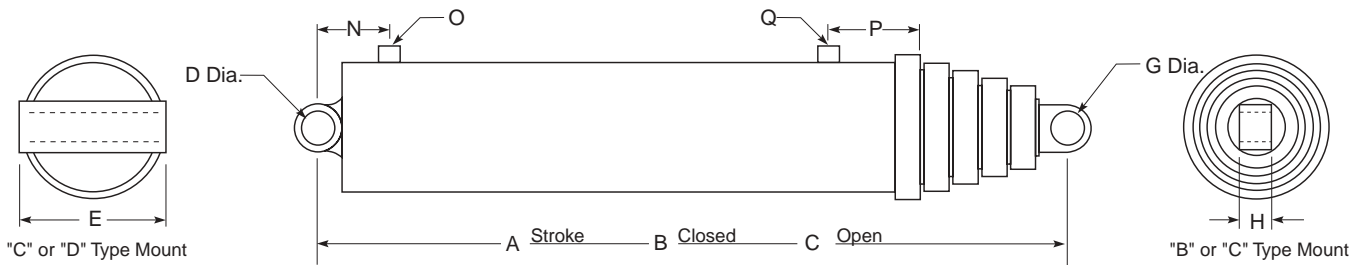
10 DIGIT NUMBER	N LOCATION	O SIZE	P LOCATION	Q SIZE	GALS TO FILL	GALS TO EXTEND	WEIGHT LBS	REBUILD KIT	REPACK KIT
3780712001			19.00"	1/2" NPT	0.7	0.8	45	3751804372	3751804372
3780712002			19.00"	1/2" NPT	0.8	1	50	3751804372	3751804372
3771012035	14.00"	1/2" NPT			1.1	1.5	85	3751804433	3751804227
3781012004			19.00"	1/2" NPT	1.2	1.6	70	3751805574	3751804227
<b>3781012001</b>			<b>19.00"</b>	<b>1/2" NPT</b>	<b>1.3</b>	<b>1.9</b>	<b>85</b>	<b>3751805574</b>	<b>3751804227</b>
<b>3781013002</b>			<b>19.00"</b>	<b>1/2" NPT</b>	<b>1.2</b>	<b>2.1</b>	<b>85</b>	<b>3751805575</b>	<b>3751804368</b>
3771512043	14.00"	1/2" NPT			1.8	2.5	110	3751804106	3911804231
3771512051	7.12"	3/4" NPT			2.16	3.41	135	3751804106	3911804231
3771512060	5.25"	#12 SAE			3.49	5.55	140	3751804106	3911804231
3781513005			19.00"	1/2" NPT	1.7	3	120	3751804017	3911804020
3771513013	4.75"	3/4" NPT			1.5	3.1	140	3751804017	3911804020
3771513048	4.75"	#12 SAE			1.5	3.1	140	3751804017	3911804020
3771513108	3.75"	#12 SAE			1.91	3.86	160	3751804017	3911804020
<b>3771513084</b>	<b>19.50"</b>	<b>3/4" NPT</b>			<b>1.8</b>	<b>3.5</b>	<b>155</b>	<b>3751804017</b>	<b>3911804020</b>
3771513137	6.75"	3/4" NPT			1.76	3.85	160	3751804017	3911804020
3771513094	24.38"	#12 SAE			1.86	4.03	160	3751804017	3911804020
3771513095	24.31"	#16 SAE			1.89	4.07	160	3751804017	3911804020
3771513099	3.75"	#12 SAE			1.91	4.14	160	3751804017	3911804020
<b>3771513085</b>	<b>19.50"</b>	<b>3/4" NPT</b>			<b>2</b>	<b>4.2</b>	<b>165</b>	<b>3751804017</b>	<b>3911804020</b>
3781513001			19.00"	3/4" NPT	2.2	4.5	160	3751804017	3911804020
<b>3781513002</b>			<b>19.00"</b>	<b>3/4" NPT</b>	<b>2.2</b>	<b>4.5</b>	<b>160</b>	<b>3751804017</b>	<b>3911804020</b>
3771513107	3.75"	#12 SAE			2.09	4.62	170	3751804017	3911804020
3771513091	24.81"	#16 90D SAE			2.3	5	175	3751804017	3911804020
3771513073			5.12"	3/4 90D NPT	2.3	5.1	182	3751804017	3911804020
3771513105			15.50"	1" NPT	2.4	5	190	3751804017	3911804020
3771513090	24.81"	#16 90D SAE			2.4	5.2	205	3751804017	3911804020
3771513069			9.9"	1" NPT	2.4	5.3	200	3751804017	3911804020
3771513156	20.25"	#16 SAE			2.19	5.43	200	3751804017	3911804020
3771513089	24.81"	#16 90D SAE			2.7	5.9	225	3751804017	3911804020
3771513101			15.50"	1" NPT	2.7	5.9	225	3751804017	3911804020
3771513088	24.81"	#16 90D SAE			2.8	6.1	230	3751804017	3911804020
3771513070			16.12"	1" NPT	2.8	6.2	230	3751804017	3911804020
3771513103			15.50"	1" NPT	2.9	6.4	230	3751804017	3911804020

Note; Bold / Highlighted Items are Standard Warehouse Items.

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Nominal Stage OD, refers to the Largest Moving Sleeve.

## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts



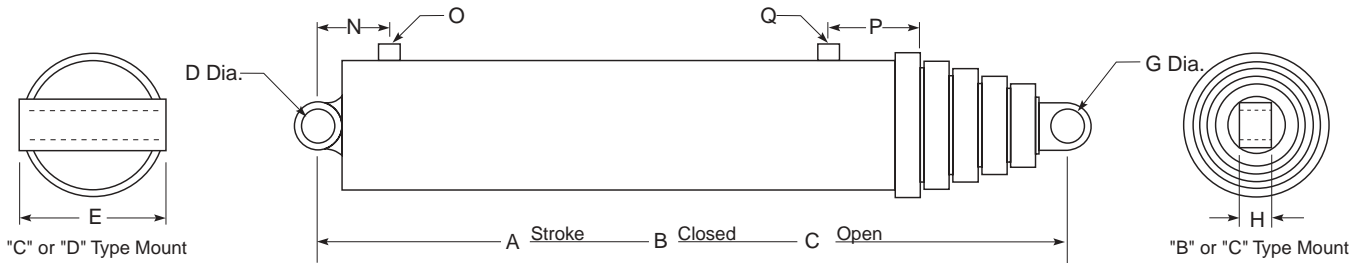
ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	G PIN	H WIDTH
S62CC-30-69	3771412059	6	2	69.00	49.25	118.25	1.50	1.50	1.50	1.50
S62DC-9-74	3771412068	6	2	74.00	49.25	123.25	2.00	7.00	2.00	2.00
S62DC-9-90	3771412072	6	2	90.00	59.00	149.00	2.00	7.00	2.00	2.00
S63DC-75-66	3771413243	6	3	66.00	36.00	102.00	3.62	7.25	2.00	2.00
S63DC-47-77	3771413179	6	3	77.00	39.00	116.00	2.00	7.00	2.00	2.00
S63DC-CP118-77	3799000118	6	3	77.00	39.00	116.00	2.00	7.00	2.00	2.00
S63DC-60-79.12	3771413153	6	3	79.13	39.31	118.44	2.00	7.00	1.63	2.00
S63DC-54-79.31	3771413158	6	3	79.38	40.13	119.50	4.50	8.00	1.63	2.00
<b>S63DC-47-82</b>	<b>3771413133</b>	<b>6</b>	<b>3</b>	<b>82.50</b>	<b>43.56</b>	<b>126.06</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
S63DC-66-82	3771413176	6	3	82.50	43.56	126.06	2.00	7.00	2.00	2.00
S63DC-42-82	3771413117	6	3	82.50	44.38	126.88	3.00	6.50	2.00	2.00
S63DC-47-86	3771413180	6	3	86.75	40.88	127.63	2.00	7.00	2.00	2.00
S63DC-61-92	3771413159	6	3	91.88	49.25	141.13	4.50	8.00	1.63	2.00
S63DC-47-92	3771413181	6	3	92.00	45.00	137.00	2.00	7.00	2.00	2.00
S63DC-60-92	3771413154	6	3	92.00	48.38	140.38	2.00	7.00	1.63	2.00
S63DC-47-104	3771413187	6	3	103.94	47.00	150.94	2.00	7.00	2.00	2.00
S63DC-60-106	3771413156	6	3	106.69	48.50	155.19	2.00	7.00	1.63	2.00
<b>S63DC-47-107</b>	<b>3771413185</b>	<b>6</b>	<b>3</b>	<b>107.56</b>	<b>48.38</b>	<b>155.94</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
<b>S63DC-44-111</b>	<b>3771413125</b>	<b>6</b>	<b>3</b>	<b>111.00</b>	<b>49.94</b>	<b>160.94</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
S63DC-66-111	3771413172	6	3	111.00	49.94	160.94	2.00	7.00	2.00	2.00
S63DC-45-120	3771413127	6	3	120.00	53.50	173.50	2.38	8.00	2.19	1.50
<b>S63DC-47-120</b>	<b>3771413183</b>	<b>6</b>	<b>3</b>	<b>120.06</b>	<b>52.62</b>	<b>172.68</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
<b>S63DC-44-123</b>	<b>3771413126</b>	<b>6</b>	<b>3</b>	<b>123.00</b>	<b>54.94</b>	<b>177.94</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
S63DC-60-125	3771413155	6	3	125.63	54.81	180.44	2.00	7.00	1.63	2.00
S63DC-69-125	3771413178	6	3	125.63	54.81	180.44	2.00	7.00	1.63	2.00
S63DC-45-126	3771413128	6	3	126.00	55.50	181.50	2.38	8.00	2.19	1.50
<b>S63DC-47-126</b>	<b>3771413186</b>	<b>6</b>	<b>3</b>	<b>126.62</b>	<b>54.56</b>	<b>181.18</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
S63DC-66-130	3771413223	6	3	130.00	56.00	186.00	2.00	7.00	2.00	2.00
<b>S63DC-47-130</b>	<b>3771413184</b>	<b>6</b>	<b>3</b>	<b>130.06</b>	<b>56.00</b>	<b>186.06</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
<b>S63DC-45-138</b>	<b>3771413129</b>	<b>6</b>	<b>3</b>	<b>138.00</b>	<b>59.50</b>	<b>197.50</b>	<b>2.38</b>	<b>8.00</b>	<b>2.19</b>	<b>1.50</b>
<b>S63DC-47-140</b>	<b>3771413149</b>	<b>6</b>	<b>3</b>	<b>140.25</b>	<b>59.81</b>	<b>200.06</b>	<b>2.00</b>	<b>7.00</b>	<b>2.00</b>	<b>2.00</b>
S63DC-47-150	3771413182	6	3	150.00	63.00	213.00	2.00	7.00	2.00	2.00
S63DC-45-150	3771413239	6	3	150.00	66.00	216.00	2.38	8.00	2.19	1.50
S63DC-45-162	3771413130	6	3	162.00	67.50	229.50	2.38	8.00	2.19	1.50

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Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

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## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts



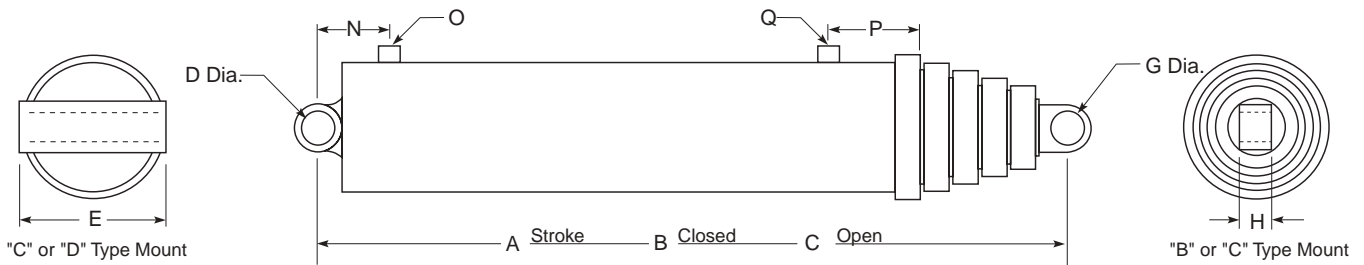
10 DIGIT NUMBER	N LOCATION	O SIZE	P LOCATION	Q SIZE	GALS TO FILL	GALS TO EXTEND	WEIGHT LBS	REBUILD KIT	REPACK KIT
3771412059	4.50"	1" NPT			4.3	6.5	220	3751804020	3751804026
3771412068	16.81"	1" NPT			4.38	6.96	235	3751804020	3751804026
3771412072	16.81"	1" NPT			5.34	8.62	240	3751804020	3751804026
3771413243	7.25"	#12 SAE			2.16	5.14	240	3751804018	3911804109
3771413179	20.81"	1" NPT			2.8	6.1	250	3751804018	3911804109
3799000118	6.31"	1" NPT			2.8	6.1	250	3751804018	3911804109
3771413153	25.06"	#16 SAE			2.85	6.18	250	3751804018	3911804109
3771413158	24.38"	#16 SAE			2.8	6.26	250	3751804018	3911804109
<b>3771413133</b>	<b>20.81"</b>	<b>1" NPT</b>			<b>3.2</b>	<b>6.4</b>	<b>250</b>	<b>3751804018</b>	<b>3911804109</b>
3771413176	20.81"	1" 90D NPT			3.2	6.4	250	3751804018	3911804109
3771413117	4.50"	1" NPT			3.23	7.57	250	3751804018	3911804109
3771413180	20.81"	1" NPT			3.1	6.9	250	3751804018	3911804109
3771413159	31.00"	#16 SAE			3.31	7.18	275	3751804018	3911804109
3771413181	20.81"	1" NPT			3.4	7.3	265	3751804018	3911804109
3771413154	29.50"	#16 SAE			3.65	7.18	275	3751804018	3911804109
3771413187	20.81"	1" NPT			3.6	8.1	270	3751804018	3911804109
3771413156	34.31"	#16 SAE			3.66	8.35	275	3751804018	3911804109
<b>3771413185</b>	<b>20.81"</b>	<b>1" NPT</b>			<b>3.7</b>	<b>8.4</b>	<b>270</b>	<b>3751804018</b>	<b>3911804109</b>
<b>3771413125</b>	<b>3.81"</b>	<b>1" NPT</b>	<b>24.00"</b>	<b>1" NPT</b>	<b>3.8</b>	<b>8.7</b>	<b>275</b>	<b>3751804018</b>	<b>3911804109</b>
3771413172	20.81"	1" 90D NPT			3.8	8.7	275	3751804018	3911804109
3771413127	24.91"	#16 90D SAE			4.1	9.4	275	3751804018	3911804109
<b>3771413183</b>	<b>20.81"</b>	<b>1" NPT</b>			<b>4.1</b>	<b>9.4</b>	<b>275</b>	<b>3751804018</b>	<b>3911804109</b>
<b>3771413126</b>	<b>3.81"</b>	<b>1" NPT</b>	<b>29.00"</b>	<b>1" NPT</b>	<b>4.2</b>	<b>9.6</b>	<b>275</b>	<b>3751804018</b>	<b>3911804109</b>
3771413155	35.56"	#16 SAE			4.2	9.85	275	3751804018	3911804109
3771413178	35.56"	#16 SAE			4.2	9.85	275	3751804018	3911804109
3771413128	24.91"	#16 90D SAE			4.3	9.9	275	3751804018	3911804109
<b>3771413186</b>	<b>20.81"</b>	<b>1" NPT</b>			<b>4.3</b>	<b>9.9</b>	<b>275</b>	<b>3751804018</b>	<b>3911804109</b>
3771413223	20.81"	1" 90D NPT			4.3	9.9	295	3751804018	3911804109
<b>3771413184</b>	<b>20.81"</b>	<b>1" NPT</b>			<b>4.3</b>	<b>9.9</b>	<b>295</b>	<b>3751804018</b>	<b>3911804109</b>
<b>3771413129</b>	<b>24.91"</b>	<b>#16 90D SAE</b>			<b>4.6</b>	<b>11.1</b>	<b>300</b>	<b>3751804018</b>	<b>3911804109</b>
<b>3771413149</b>	<b>20.81"</b>	<b>1" NPT</b>			<b>4.7</b>	<b>11.1</b>	<b>300</b>	<b>3751804018</b>	<b>3911804109</b>
3771413182	20.81"	1" NPT			5	11.9	310	3751804018	3911804109
3771413239	24.91"	#16 90D SAE			5.3	11.9	330	3751804018	3911804109
3771413130	24.91"	#16 90D SAE			5.3	11.9	330	3751804018	3911804109

Note; Bold / Highlighted Items are Standard Warehouse Items.

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Nominal Stage OD, refers to the Largest Moving Sleeve.

## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts



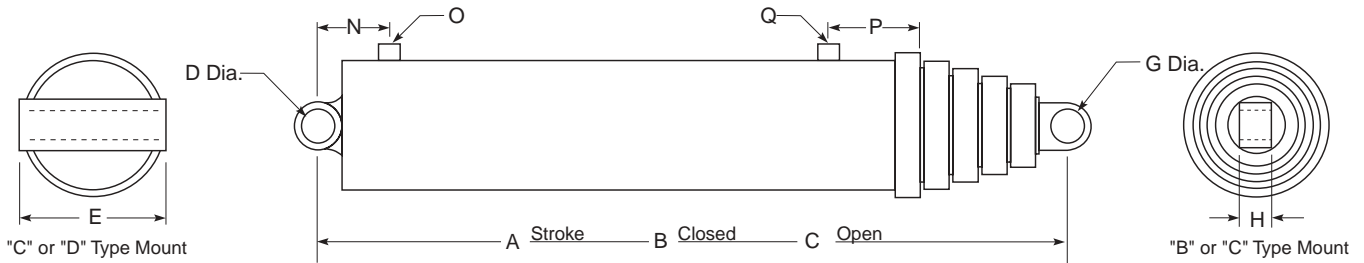
ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	G PIN	H WIDTH
S64DB-CP319-73	3799000319	6	4	73.00	32.56	105.56	3.50	7.25	1.50	2.69
<b>S64DB-6-135</b>	<b>3771414034</b>	<b>6</b>	<b>4</b>	<b>135.00</b>	<b>47.19</b>	<b>182.19</b>	<b>1.75</b>	<b>8.00</b>	<b>1.50</b>	<b>2.69</b>
<b>S64DB-6-156</b>	<b>3771414035</b>	<b>6</b>	<b>4</b>	<b>156.00</b>	<b>53.19</b>	<b>209.19</b>	<b>1.75</b>	<b>8.00</b>	<b>1.50</b>	<b>2.69</b>
<b>S64DC-9-156</b>	<b>3771414040</b>	<b>6</b>	<b>4</b>	<b>156.00</b>	<b>53.62</b>	<b>209.62</b>	<b>2.00</b>	<b>7.25</b>	<b>2.00</b>	<b>1.75</b>
S64DC-7-157	3771414036	6	4	157.00	58.56	215.56	1.50	7.00	1.50	2.00
S73DC-40-110	3772513068	7	3	110.63	50.06	160.69	2.00	8.25	2.00	2.00
<b>S73DC-40-120</b>	<b>3772513089</b>	<b>7</b>	<b>3</b>	<b>120.00</b>	<b>53.12</b>	<b>173.12</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
<b>S73DC-40-124</b>	<b>3772513069</b>	<b>7</b>	<b>3</b>	<b>124.88</b>	<b>54.81</b>	<b>179.69</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
S73DC-60-125	3772513086	7	3	125.25	55.38	180.63	2.00	7.00	1.63	2.00
S73DC-59-125	3772513096	7	3	125.25	55.38	180.63	2.00	7.00	1.63	2.00
<b>S73DC-41-129</b>	<b>3772513072</b>	<b>7</b>	<b>3</b>	<b>129.00</b>	<b>56.50</b>	<b>185.50</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
<b>S73DC-40-140</b>	<b>3772513070</b>	<b>7</b>	<b>3</b>	<b>140.44</b>	<b>60.00</b>	<b>200.44</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
S73DC-59-142	3772513117	7	3	142.12	61.00	203.12	2.00	7.00	1.63	2.00
S73DC-60-142	3772513087	7	3	142.13	61.00	203.13	2.00	7.00	1.63	2.00
S73DC-40-150	3772513083	7	3	150.00	63.50	213.50	2.00	8.25	2.00	2.00
S74DC-70-84	3772514113	7	4	84.00	36.00	120.00	3.62	8.25	2.00	2.00
S74DC-40A-120	3772514056	7	4	120.00	44.12	164.12	2.00	8.25	2.00	2.00
S74DC-41-135	3772514052	7	4	135.00	48.31	183.31	2.00	8.25	1.63	1.50
<b>S74DC-40-135</b>	<b>3772514047</b>	<b>7</b>	<b>4</b>	<b>135.00</b>	<b>48.44</b>	<b>183.44</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
S74DC-61-135	3772514070	7	4	135.00	48.44	183.44	2.00	8.25	2.00	2.00
S74DC-40A-140	3772514057	7	4	140.00	49.75	189.75	2.00	8.25	2.00	2.00
<b>S74DC-40-156</b>	<b>3772514050</b>	<b>7</b>	<b>4</b>	<b>156.00</b>	<b>53.75</b>	<b>209.75</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
<b>S74DC-40-161</b>	<b>3772514051</b>	<b>7</b>	<b>4</b>	<b>161.75</b>	<b>55.31</b>	<b>217.06</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
S74DC-60-165.75	3772514066	7	4	165.75	56.38	222.13	2.00	7.00	1.63	2.00
<b>S74DC-40-180</b>	<b>3772514063</b>	<b>7</b>	<b>4</b>	<b>180.00</b>	<b>61.12</b>	<b>241.12</b>	<b>2.00</b>	<b>8.25</b>	<b>2.00</b>	<b>2.00</b>
S75DB-CP394-86	3799000394	7	5	86.25	32.50	118.75	3.50	8.25	1.50	2.63
S83DC-26-134	3772913033	8	3	134.63	57.63	192.25	2.00	9.50	1.63	1.50
S83DC-40-139	3772913022	8	3	138.00	60.12	198.12	2.00	9.50	2.00	2.00
S83DC-51-150	3772913040	8	3	150.00	64.00	214.00	2.00	9.50	2.00	2.00
S83DC-40-160	3772913023	8	3	159.00	69.12	228.12	2.00	9.50	2.00	2.00

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Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Nominal Stage OD, refers to the Largest Moving Sleeve.

## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts



10 DIGIT NUMBER	N LOCATION	O SIZE	P LOCATION	Q SIZE	GALS TO FILL	GALS TO EXTEND	WEIGHT LBS	REBUILD KIT	REPACK KIT
3799000319	4.75"	#12 SAE			1.5	4.63	185	3751804021	3911804237
<b>3771414034</b>			<b>5.50"</b>	<b>2, 3/4" NPT</b>	<b>3.4</b>	<b>8.1</b>	<b>260</b>	<b>3751804021</b>	<b>3911804237</b>
<b>3771414035</b>			<b>5.50"</b>	<b>2, 3/4" NPT</b>	<b>3.5</b>	<b>10.1</b>	<b>293</b>	<b>3751804021</b>	<b>3911804237</b>
<b>3771414040</b>	<b>6.31"</b>	<b>1" NPT</b>			<b>3.5</b>	<b>10.1</b>	<b>285</b>	<b>3751804021</b>	<b>3911804237</b>
3771414036	4.31"	1" NPT			3.9	10.1	310	3751804021	3911804237
3772513068	7.06"	1" NPT	4.62"	1" NPT	5.3	12.6	335	3751804019	3751804002
<b>3772513089</b>	<b>7.06"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>5.7</b>	<b>13.7</b>	<b>370</b>	<b>3751804019</b>	<b>3751804002</b>
<b>3772513069</b>	<b>7.06"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>5.9</b>	<b>14.2</b>	<b>380</b>	<b>3751804019</b>	<b>3751804002</b>
3772513086	32.94"	#16 SAE			5.94	14.28	400	3751804019	3751804002
3772513096	32.94"	#16 SAE			5.94	14.28	400	3751804019	3751804002
<b>3772513072</b>	<b>8.56"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>6.1</b>	<b>14.7</b>	<b>400</b>	<b>3751804019</b>	<b>3751804002</b>
<b>3772513070</b>	<b>7.06"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>6.5</b>	<b>16.1</b>	<b>400</b>	<b>3751804019</b>	<b>3751804002</b>
3772513117	43.44"	#16 SAE			6.63	16.27	420	3751804019	3751804002
3772513087	43.44"	#16 SAE			6.63	16.27	420	3751804019	3751804002
3772513083	7.06"	1" NPT	4.62"	1" NPT	6.5	17.1	425	3751804019	3751804002
3772514113	7.25"	#12 SAE OR			2.6	8.1	300	3751804022	3751804003
3772514056	7.06"	1" NPT	4.62"	1" NPT	4.1	11.5	335	3751804022	3751804003
3772514052	18.31"	3/4" NPT			4.5	13.1	370	3751804022	3751804003
<b>3772514047</b>	<b>7.06"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>4.5</b>	<b>13.1</b>	<b>370</b>	<b>3751804022</b>	<b>3751804003</b>
3772514070			4.62"	1" 90D NPT	4.5	13.1	370	3751804022	3751804003
3772514057	7.06"	1" NPT	4.62"	1" NPT	4.6	13.5	380	3751804022	3751804003
<b>3772514050</b>	<b>7.06"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>5.1</b>	<b>15.1</b>	<b>390</b>	<b>3751804022</b>	<b>3751804003</b>
<b>3772514051</b>	<b>7.06"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>5.2</b>	<b>15.5</b>	<b>405</b>	<b>3751804022</b>	<b>3751804003</b>
3772514066	37.19"	#16 SAE			6.3	16.04	415	3751804022	3751804003
<b>3772514063</b>	<b>7.06"</b>	<b>1" NPT</b>	<b>4.62"</b>	<b>1" NPT</b>	<b>5.9</b>	<b>17.4</b>	<b>440</b>	<b>3751804022</b>	<b>3751804003</b>
3799000394	4.75"	#16 SAE			1.92	6.83	350	3751805472	3751804283
3772913033	5.62"	1" NPT			9	21	520	3751804118	3911804183
3772913022	6.50"	1" NPT	5.62"	1" NPT	9.1	21.9	530	3751804118	3911804183
3772913040	6.50"	1" NPT	17.25"	1" 90D NPT	9.8	23.9	590	3751804118	3911804183
3772913023	6.50"	1" NPT	5.62"	1" NPT	10.6	25.3	601	3751804118	3911804183

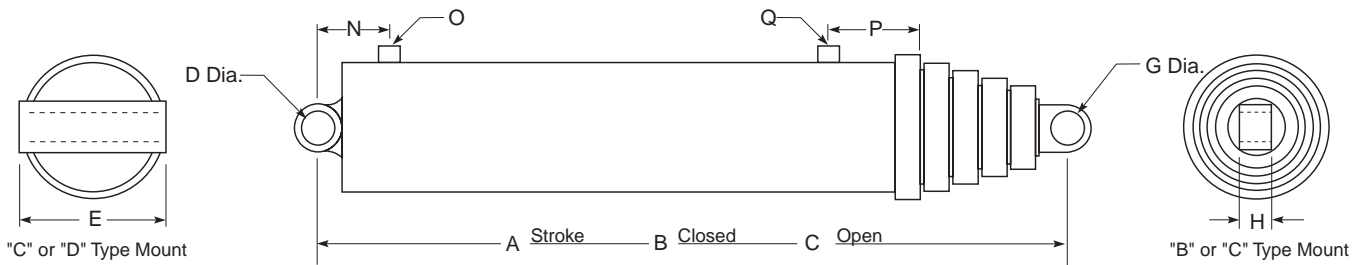
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## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts



ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	G PIN	H WIDTH
S84DC-40-140	3772914051	8	4	140.00	49.75	189.75	2.00	9.50	2.00	2.00
S84DC-40-148	3772914052	8	4	147.75	51.50	199.25	2.00	9.50	2.00	2.00
S84DC-31-156	3772914048	8	4	156.00	53.75	209.75	2.00	9.50	2.00	2.00
<b>S84DC-40-161</b>	<b>3772914014</b>	<b>8</b>	<b>4</b>	<b>160.00</b>	<b>55.75</b>	<b>215.75</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
S84DC-60-161	3772914055	8	4	161.75	55.75	217.50	2.00	7.00	1.63	2.00
<b>S84DC-40-170</b>	<b>3772914050</b>	<b>8</b>	<b>4</b>	<b>170.00</b>	<b>57.25</b>	<b>227.25</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
<b>S84DC-40-180</b>	<b>3772914053</b>	<b>8</b>	<b>4</b>	<b>180.00</b>	<b>59.75</b>	<b>239.75</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
S84DC-40-188	3772914057	8	4	188.00	61.75	249.75	2.00	9.50	2.00	2.00
S85DC-64-160	3779615022	8	5	160.00	48.00	208.00	2.00	9.50	2.00	2.00
S85DC-40-170	3772915077	8	5	170.00	49.88	219.88	2.00	9.50	2.00	2.00
S85DC-64-170	3779615014	8	5	170.00	49.88	219.88	2.00	9.50	2.00	2.00
<b>S85DC-40-190</b>	<b>3772915022</b>	<b>8</b>	<b>5</b>	<b>189.00</b>	<b>54.62</b>	<b>243.62</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
S85DC-64-190	3779615015	8	5	190.00	54.62	244.62	2.00	9.50	2.00	2.00
S85DC-40-197	3772915021	8	5	196.13	55.25	251.38	2.00	9.50	2.00	2.00
S85DC-64-197	3779615016	8	5	196.13	55.25	251.38	2.00	9.50	2.00	2.00
<b>S85DC-40A-220</b>	<b>3772915081</b>	<b>8</b>	<b>5</b>	<b>220.00</b>	<b>60.00</b>	<b>280.00</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
S85DC-64-220	3779615020	8	5	220.00	60.00	280.00	2.00	9.50	2.00	2.00
<b>S85DC-40-235</b>	<b>3772915019</b>	<b>8</b>	<b>5</b>	<b>234.00</b>	<b>64.62</b>	<b>298.62</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
S85DC-64-235	3779615017	8	5	235.00	64.62	299.62	2.00	9.50	2.00	2.00
<b>S85DC-40-250</b>	<b>3772915018</b>	<b>8</b>	<b>5</b>	<b>249.00</b>	<b>68.62</b>	<b>317.62</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
S85DC-64-250	3779615018	8	5	250.00	68.62	318.62	2.00	9.50	2.00	2.00
<b>S85DC-40A-265</b>	<b>3772915080</b>	<b>8</b>	<b>5</b>	<b>265.00</b>	<b>71.00</b>	<b>336.00</b>	<b>2.00</b>	<b>9.50</b>	<b>2.00</b>	<b>2.00</b>
S85DC-64-265	3779615021	8	5	265.00	71.00	336.00	2.00	9.50	2.00	2.00
S85DC-40-285	3772915078	8	5	285.00	78.50	363.50	2.00	9.50	2.00	2.00
S85DC-64-285	3779615019	8	5	285.00	78.50	363.50	2.00	9.50	2.00	2.00
S95DC-40-190	3773115015	9	5	190.00	56.00	246.00	2.00	10.88	2.00	2.00
S95DC-40-220	3773115011	9	5	218.00	62.44	280.44	2.00	10.88	2.00	2.00
S95DC-40-235	3773115010	9	5	233.00	65.44	298.44	2.00	10.88	2.00	2.00
S95DC-40-250	3773115009	9	5	248.00	68.44	316.44	2.00	10.88	2.00	2.00
S95DC-40-265	3773115013	9	5	265.00	72.62	337.62	2.00	10.88	2.00	2.00
S95DC-40-280	3773115016	9	5	280.00	78.62	358.62	2.00	10.88	2.00	2.00
S95DC-40A-300	3773115022	9	5	300.00	79.00	379.00	2.00	10.88	2.00	2.00
S95DC-40A-320	3773115023	9	5	320.00	83.00	403.00	2.00	10.88	2.00	2.00
S95DC-40A-340	3773115040	9	5	340.00	87.00	427.00	2.00	10.88	2.00	2.00
S96DC-1-285	3773116001	9	6	285.00	70.63	355.63	2.00	10.88	2.00	2.00

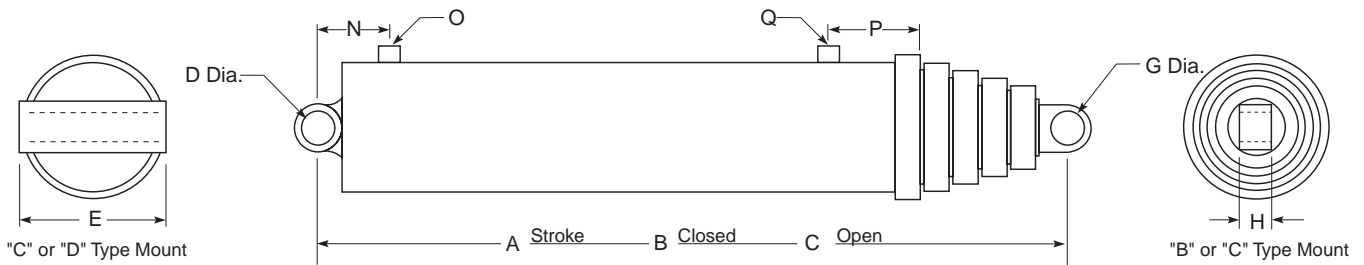
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## Single-Acting Telescopic Cylinders With CC, DB, and DC Mounts



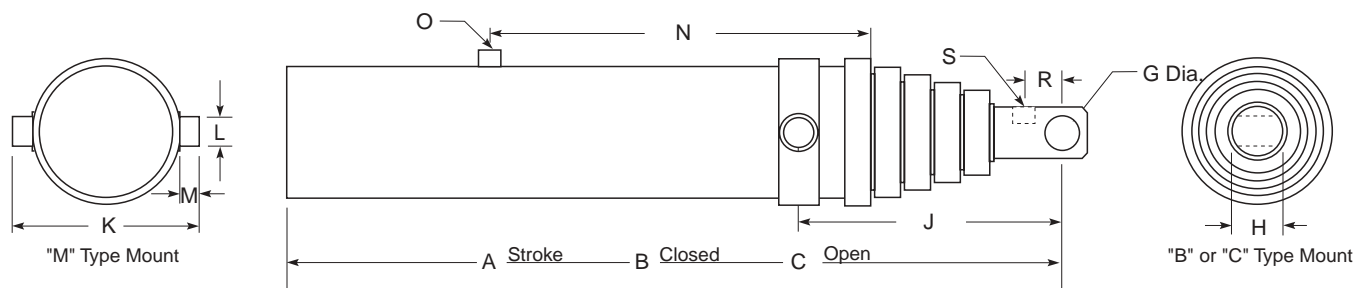
10 DIGIT NUMBER	N LOCATION	O SIZE	P LOCATION	Q SIZE	GALS TO FILL	GALS TO EXTEND	WEIGHT LBS	REBUILD KIT	REPACK KIT
3772914051	6.50"	1" NPT	5.62"	1" NPT	6.5	19.2	485	3751804023	3911804054
3772914052	6.50"	1" NPT	5.62"	1" NPT	6.7	20.3	530	3751804023	3911804054
3772914048	5.56"	1" NPT	5.62"	1" NPT	7.1	21.5	550	3751804023	3911804054
<b>3772914014</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>7.4</b>	<b>21.9</b>	<b>565</b>	<b>3751804023</b>	<b>3911804054</b>
3772914055	31.31"	#16 SAE			7.4	21.9	570	3751804023	3911804054
<b>3772914050</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>7.6</b>	<b>23.3</b>	<b>575</b>	<b>3751804023</b>	<b>3911804054</b>
<b>3772914053</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>8</b>	<b>24.7</b>	<b>580</b>	<b>3751804023</b>	<b>3911804054</b>
3772914057	6.50"	1" NPT	5.62"	1" NPT	8.3	25.8	580	3751804023	3911804054
3779615022	6.50"	1" NPT	12.00"	1" NPT	2.8	21.91	567	3751804591	
3772915077	6.50"	1" NPT	5.62"	1" NPT	5.8	20.1	570	3751804024	3911804060
3779615014	6.50"	1" NPT	12.00"	1" NPT	2.96	23.3	594	3751804591	
<b>3772915022</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>6.4</b>	<b>22.3</b>	<b>580</b>	<b>3751804024</b>	<b>3911804060</b>
3779615015	6.50"	1" NPT	12.00"	1" NPT	3.3	26.1	640	3751804591	
3772915021	6.50"	1" NPT	5.62"	1" NPT	6.5	22.8	590	3751804024	3911804060
3779615016	6.50"	1" NPT	12.00"	1" NPT	3.4	27.06	644	3751804591	
<b>3772915081</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>7.2</b>	<b>25.5</b>	<b>610</b>	<b>3751804024</b>	<b>3911804060</b>
3779615020	6.50"	1" NPT	12.00"	1" NPT	3.8	30.3	711	3751804591	
<b>3772915019</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>7.8</b>	<b>27.2</b>	<b>660</b>	<b>3751804024</b>	<b>3911804060</b>
3779615017	6.50"	1" NPT	12.00"	1" NPT	4.16	32.38	765	3751804591	
<b>3772915018</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>8.4</b>	<b>29.1</b>	<b>705</b>	<b>3751804024</b>	<b>3911804060</b>
3779615018	6.50"	1" NPT	12.00"	1" NPT	4.5	34.5	804	3751804591	
<b>3772915080</b>	<b>6.50"</b>	<b>1" NPT</b>	<b>5.62"</b>	<b>1" NPT</b>	<b>8.7</b>	<b>31.6</b>	<b>776</b>	<b>3751804024</b>	<b>3911804060</b>
3779615021	6.50"	1" NPT	12.00"	1" NPT	4.69	36.52	842	3751804591	
3772915078	6.50"	1" NPT	5.62"	1" NPT	9.8	34.1	800	3751804024	3911804060
3779615019	6.50"	1" NPT	12.00"	1" NPT	5.3	39.31	930	3751804591	
3773115015	6.50"	1" NPT	5.75"	1" NPT	6.4	22.4	835	3751804025	3751804004
3773115011	6.50"	1" NPT	5.75"	1" NPT	9.7	36.2	855	3751804025	3751804004
3773115010	6.50"	1" NPT	5.75"	1" NPT	10.2	38.7	880	3751804025	3751804004
3773115009	6.50"	1" NPT	5.75"	1" NPT	10.8	41.3	1100	3751804025	3751804004
3773115013	6.50"	1" NPT	5.75"	1" NPT	11.6	44.6	1200	3751804025	3751804004
3773115016	6.50"	1" NPT	5.75"	1" NPT	12.8	47.6	1215	3751804025	3751804004
3773115022	6.50"	1" NPT	5.75"	1" NPT	13.5	50.2	1230	3751804025	3751804004
3773115023	6.50"	1" NPT	5.75"	1" NPT	13.9	54.1	1245	3751804025	3751804004
3773115040	12.50"	1" NPT	5.75"	1" NPT	14.5	59.9	1245	3751804025	3751804004
3773116001	6.50"	1" NPT	5.75"	1" NPT 90D	10.3	41.8	1100	3751805576	3751804030

Note; Bold / Highlighted Items are Standard Warehouse Items.

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Note; Nominal Stage OD, refers to the Largest Moving Sleeve.

## Single-Acting Telescopic Cylinders With MB and MC Mounts



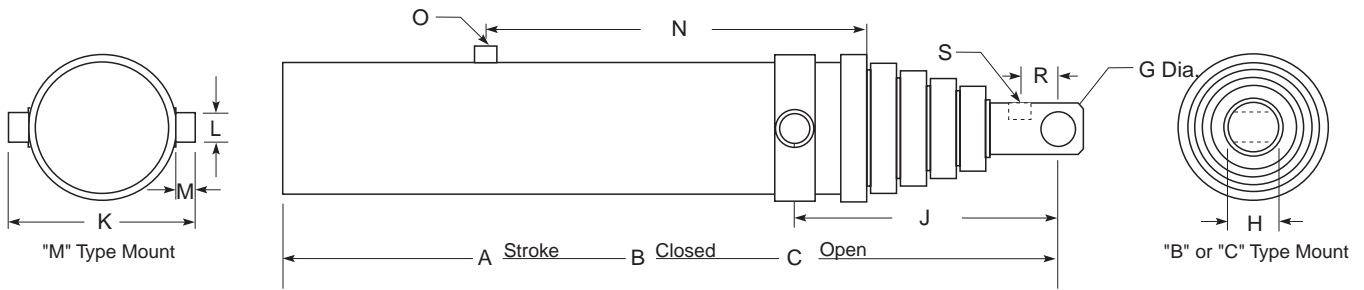
ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	G PIN	H WIDTH	J TR to PIN	K WIDTH	L DIA.	M LGTH
S42MB-6-50	3781012003	4	2	50.00	32.31	82.31	1.38	2.62	8.50	8.75	1.75	0.88
S42MB-7-50	3781012005	4	2	50.00	32.31	82.31	1.38	2.62	7.50	8.75	1.75	0.88
S42MB-5-60	3781012002	4	2	60.00	37.31	97.31	1.25	0.00	7.50	9.25	1.75	1.50
S42MB-3-90	3771012040	4	2	90.00	55.81	145.81	1.25	2.63	7.50	8.00	1.25	1.13
S43MB-1-75	3781013003	4	3	75.00	32.50	107.50	1.25	1.69	8.50	8.75	1.75	0.88
S43MB-2-75	3781013004	4	3	75.00	32.50	107.50	1.25	1.88	7.50	8.75	1.75	0.88
S53MB-5-74	3781513003	5	3	74.00		106.88	1.38	2.62	8.50	8.75	1.75	0.88
S53MB-5-90	3781513004	5	3	90.00	38.38	128.38	1.38	2.62	8.50	8.75	1.75	0.88
S53MB-3-120	3771513086	5	3	120.00	53.50	173.50	1.50	2.63	14.37	12.38	1.75	1.69
S53MC-38-166	3771513154	5	3	166.00	72.75	238.75	1.50	2.00	11.12	12.38	1.75	1.69
S63MC-21-80	3771413164	6	3	80.00	40.31	120.31	2.00	2.00	13.00	12.00	1.75	1.75
S63MB-11-108	3771413167	6	3	108.00	50.12	158.12	1.50	3.00	14.37	12.38	1.75	1.69
S63MB-9-120	3771413140	6	3	120.00	54.88	174.88	1.50	3.62	14.37	12.38	1.75	1.69
S63MC-21-128	3771413160	6	3	128.00	56.38	184.38	2.00	2.00	13.00	12.00	1.75	1.75
S63MB-8-140	3771413124	6	3	140.25	61.62	201.87	1.50	3.62	14.37	12.38	1.75	1.69
S63MB-8-150	3771413206	6	3	150.00	63.00	213.00	1.50	3.62	14.37	12.38	1.75	1.69
S63MB-8-160	3771413201	6	3	160.00	66.25	226.25	1.50	3.62	14.37	12.38	1.75	1.69
S64MB-4-140	3771414039	6	4	140.00	50.38	190.38	1.50	2.63	14.37	12.38	1.75	1.69
S64MB-5-156	3771414052	6	4	156.00	53.38	209.38	1.75	2.62	13.00	12.38	1.75	1.69
S73MC-7-126	3772513102	7	3	126.00	56.38	182.38	2.00	2.00	13.00	12.00	1.75	1.75
S73MC-6-126	3772513094	7	3	126.00	56.38	182.38	2.00	2.00	13.00	12.00	1.75	1.75
S73MC-6-142.12	3772513093	7	3	142.12	64.00	206.12	2.00	2.00	13.00	12.00	1.75	1.75
S73MC-7-142.12	3772513113	7	3	142.12	64.00	206.12	2.00	2.00	13.00	12.00	1.75	1.75
S74MB-3-154	3772514058	7	4	154.00	55.62	209.62	1.50	3.62	14.37	12.25	1.75	1.63
S74MB-5-167	3772514111	7	4	167.00	58.38	225.38	2.00	3.62	13.00	12.25	1.75	1.63
S74MC-8-167	3772514067	7	4	167.00	59.31	226.31	2.00	2.00	13.00	12.00	1.75	1.75
S74MB-3-172	3772514062	7	4	172.00	58.34	230.34	1.50	3.62	14.37	12.25	1.75	1.63
S85MC-48-160	3772915147	8	5	160.00	50.00	210.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-170	3772915117	8	5	170.00	50.00	220.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-190	3772915132	8	5	190.00	55.00	245.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-200	3772915121	8	5	199.00	55.00	254.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-220	3772915122	8	5	219.00	59.00	278.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-235	3772915123	8	5	234.00	65.00	299.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-250	3772915120	8	5	249.00	67.00	316.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-265	3772915119	8	5	265.00	71.00	336.00	2.00	3.00	15.50	14.00	2.25	1.25
S85MC-48-280	3772915118	8	5	280.00	78.87	358.87	2.00	3.00	15.50	14.00	2.25	1.25

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# Single-Acting Telescopic Cylinders With MB and MC Mounts

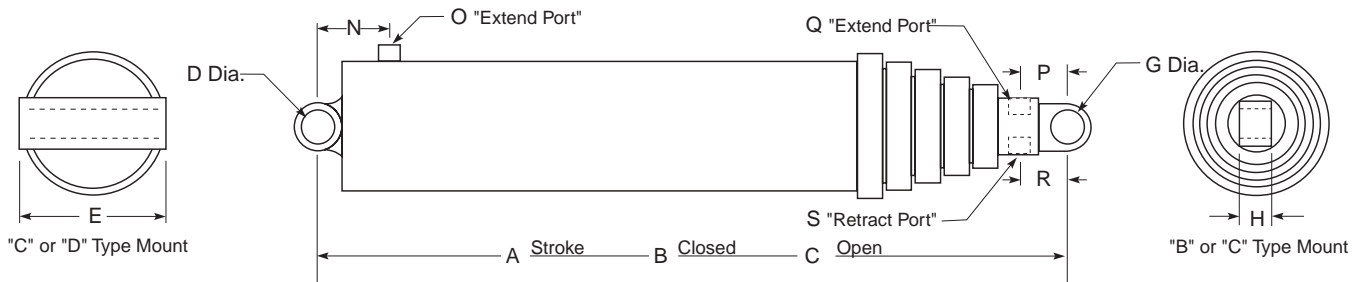


10 DIGIT NUMBER	N LOCATION	O SIZE	R LOCATION	S SIZE	GALS TO FILL	GALS TO EXTEND	WEIGHT LBS	REBUILD KIT	REPACK KIT
3781012003	19.00"	1/2" NPT			1.3	1.8	80	3751805574	3751804227
3781012005	19.00"	1/2" NPT			1.3	1.8	80	3751805574	3751804227
3781012002	19.00"	1/2" NPT			1.4	1.9	85	3751805574	3751804227
3771012040			1.25"	1/2" NPT	1.4	1.9	155	3751804433	3751804227
3781013003	19.00"	1/2" NPT			1.2	2.1	90	3751805575	3751804368
3781013004	19.00"	1/2" NPT			1.2	2.1	90	3751805575	3751804368
3781513003	19.00"	1/2" NPT			1.9	3.7	125	3751804017	3911804020
3781513004	19.00"	1/2" NPT			2.2	4.5	160	3751804017	3911804020
3771513086			2.00"	1" NPT	2.7	5.9	225	3751804017	3911804020
3771513154			2.75"	#12 SAE	3.35	8.26	395	3751805190	3911804020
3771413164			3.00"	#16 SAE	2.88	6.25	250	3751804018	3911804109
3771413167			2.00"	1" NPT	3.8	8.4	275	3751804018	3911804109
3771413140			2.00"	1" NPT	4.2	9.4	275	3751804018	3911804109
3771413160			3.00"	#16 SAE	4.28	10.04	300	3751804018	3911804109
3771413124			2.00"	1" NPT	4.8	11.2	300	3751804018	3911804109
3771413206			2.00"	1" NPT	5	11.8	325	3751804018	3911804109
3771413201			2.00"	1" NPT	5.2	15.56	330	3751804018	3911804109
3771414039			2.00"	1" NPT	3.3	9.1	290	3751804021	3911804237
3771414052			2.12"	1" NPT	3.15	10.09	250	3751804021	3911804237
3772513102			3.00"	#16 SAE	6.04	14.36	450	3751804019	3751804002
3772513094			3.00"	#16 SAE	6.04	14.36	450	3751804019	3751804002
3772513093			3.00"	#16 SAE	6.97	16.21	450	3751804019	3751804002
3772513113			3.00"	#16 SAE	6.97	16.21	450	3751804019	3751804002
3772514058			2.00"	1" NPT	5.2	15.1	412	3751804022	3751804003
3772514111			2.00"	#16 SAE	5.2	15.1	440	3751804022	3751804003
3772514067			3.00"	#16 SAE	5.2	15.1	440	3751804022	3751804003
3772514062			2.00"	1" NPT	5.6	16.6	436	3751804022	3751804003
3772915147			2.00"	1" NPT	4.88	19.6	400	3751804024	3911804060
3772915117			2.00"	1" NPT	5.75	20.08	600	3751804024	3911804060
3772915132			2.00"	1" NPT	6.46	23.06	620	3751804024	3911804060
3772915121			2.00"	1" NPT	6.4	23.5	620	3751804024	3911804060
3772915122			2.00"	1" NPT	7.1	26.1	640	3751804024	3911804060
3772915123			2.00"	1" NPT	7.8	27.2	670	3751804024	3911804060
3772915120			2.00"	1" NPT	8.4	29.1	720	3751804024	3911804060
3772915119			2.00"	1" NPT	8.7	31.6	780	3751804024	3911804060
3772915118			2.00"	1" NPT	9.8	34.1	870	3751804024	3911804060

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## Double-Acting Telescopic Cylinders Non-Trunnion Mount Design



ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	G PIN	H WIDTH
SD42CC-19-111	3771032025	4	2	111.75	75.50	187.25	2.00	2.00	1.50	2.00
SD52DC-CP627-55	3799000627	5	2	55.00	56.00	111.00	2.00	8.25	2.00	3.00
SD52DB-CP557-70	3799000557	5	2	70.00	60.00	130.00	2.00	4.00	2.50	3.69
SD52CC-27-72	3771532058	5	2	72.00	54.00	126.00	1.50	1.50	1.25	1.25
SD52DB-CP547-84	3799000547	5	2	84.00	60.00	144.00	2.00	4.00	2.50	3.69
SD52CC-25-96.5	3771532052	5	2	96.50	70.50	167.00	2.00	2.00	2.00	2.00
SD52CC-24-111	3771532049	5	2	111.75	75.50	187.25	2.00	2.00	2.00	2.00
SD52DC-12-119	3771532061	5	2	119.00	77.38	196.38	1.50	6.50	1.50	2.00
SD52CB-6-132.75	3771532057	5	2	132.75	85.25	218.00	2.00	2.00	2.00	2.00
SD52CB-8-132.75	3771532063	5	2	132.75	85.25	218.00	2.00	3.00	2.00	3.00
SD52DC-12-140	3771532062	5	2	140.00	94.62	234.62	1.50	6.50	1.50	2.00
SD53DC-5-84	3771533071	5	3	84.00	44.56	128.56	2.00	7.00	1.63	2.00
SD53CC-25-106	3771533051	5	3	106.00	50.00	156.00	1.50	2.00	1.50	2.25
SD53CC-16-111	3771533038	5	3	111.00	56.75	167.75	3.00	2.00	1.50	2.00
SD53CC-30-117.25	3771533057	5	3	117.25	70.88	188.13	2.00	2.00	2.00	2.00
SD53CC-30-129	3771533066	5	3	129.12	70.50	199.62	2.00	2.00	2.00	2.00
SD53CC-38-151.5	3771933011	5	3	151.50	81.25	232.75	2.00	3.00	2.00	3.00
SD53CC-36-155	3771533084	5	3	155.75	75.50	231.25	2.00	2.00	1.50	2.00
SD53CC-37-168	3771433914	5	3	168.00	80.31	248.31	2.00	2.25	2.00	2.25
SD53DD-CP592-170	3799000592	5	3	170.00	78.88	248.88	2.00	6.75	2.00	6.75
SD53CC-38-170.12	3771933010	5	3	170.12	78.88	249.00	2.00	3.00	2.00	3.00
SD53CD-2-182	3771533067	5	3	182.00	81.00	263.00	2.00	3.88	2.00	6.50
SD53CC-38-182	3771933005	5	3	182.00	81.25	263.25	2.00	3.00	2.00	3.00
SD53CC-35-189	3771933004	5	3	189.40	82.85	272.25	3.56	2.25	3.56	2.25
SD62DB-2-78	3771432059	6	2	78.00	56.62	134.62	2.50	7.50	2.50	4.63
SD62CB-12-79	3771432077	6	2	79.00	58.50	137.50	2.50	3.00	2.50	4.69
SD62CC-20-82	3771432054	6	2	82.00	56.50	138.50	3.00	2.25	3.00	2.25
SD62DB-3-84	3771432066	6	2	84.00	60.00	144.00	2.00	4.00	2.50	4.69
SD62CC-22-92	3771432058	6	2	92.50	70.50	163.00	2.00	2.00	2.00	2.00
SD62CB-12-94	3771432078	6	2	94.00	66.00	160.00	2.50	3.00	2.50	4.69
SD62CC-24-96.5	3771432063	6	2	96.50	70.50	167.00	2.00	2.00	2.00	2.00
SD62CB-12-114	3771432079	6	2	114.00	76.00	190.00	2.50	3.00	2.50	4.69
SD63DC-7-61	3799000441	6	3	59.38	50.63	110.00	2.00	8.25	2.00	3.00
SD63DC-CP293-71	3799000293	6	3	71.75	56.00	127.75	2.00	8.25	2.00	3.00
SD63CC-11-73	3771433025	6	3	73.00	48.00	121.00	1.25	1.50	1.25	1.50
SD63DC-CP625-76	3799000625	6	3	76.00	56.00	132.00	2.00	8.25	2.00	3.00
SD63DC-7-80	3771433070	6	3	78.38	50.63	129.00	2.00	8.25	2.00	3.00
SD63DC-CP507-82	3799000507	6	3	82.00	50.62	132.62	2.00	8.25	2.00	3.00
SD63DC-71-81	3771413226	6	3	82.84	62.50	145.34	2.00	7.25	2.00	2.48
SD63DC-7-88	3771433071	6	3	88.75	56.00	144.75	2.00	8.25	2.00	3.00
SD63CC-16-92	3771433063	6	3	92.00	48.75	140.75	2.25	2.00	1.50	2.38
SD63DB-6-93	3771433073	6	3	93.00	50.75	143.75	1.75	7.12	1.75	3.69
SD63CC-11-96	3771433044	6	3	96.00	52.44	148.44	1.25	1.50	1.25	1.50
SD63DC-CP604-97	3799000604	6	3	97.25	56.00	153.25	2.00	8.25	2.00	3.00
SD63DC-12-100	3771433097	6	3	100.00	49.50	149.50	2.00	7.00	1.62	2.00
SD63DC-9-100.25	3771433082	6	3	100.25	49.50	149.75	2.00	7.00	1.63	2.00
SD63DC-71-101	3771413225	6	3	101.75	62.50	164.25	2.00	7.25	2.00	2.48
SD63DB-6-108	3771433045	6	3	108.00	50.75	158.75	1.75	7.12	1.75	3.69

Note; Bold / Highlighted Items are Standard Warehouse Items.

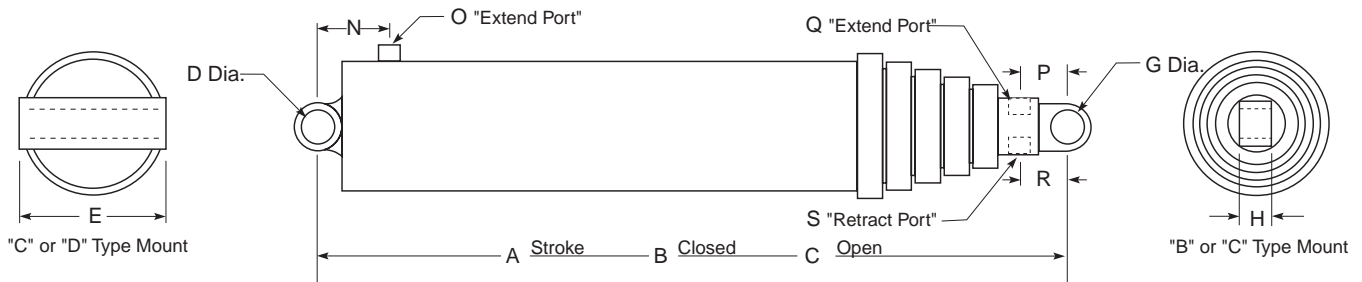
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Note; Nominal Stage OD, refers to the Largest Moving Sleeve.





## Double-Acting Telescopic Cylinders Non-Trunnion Mount Designs



10 DIGIT NUMBER	N LOC.	O SIZE	P LOC.	Q SIZE	R LOC.	S SIZE	GALS TO FILL	GALS TO EXT.	WT. LBS	REBUILD KIT	REPACK KIT
3771032025			3.43"	#16 SAE	3.43"	#8 SAE	2.9	5.4	220	3751804006	3751804227
3799000627			3.50"	#12 SAE	3.50"	#12 SAE	2.4	4.3	180	3751804062	
3799000557			2.50"	#16 SAE	2.50"	#12 SAE	3.5	6.1	180	3751805220	3911804231
3771532058			3.12"	#16 SAE	3.12"	#12 SAE	3.1	4.5	165	3751804350	3751804349
3799000547			2.50"	#16 SAE	2.50"	#12 SAE	3.5	5.3	300	3751805005	3911804231
3771532052			5.88"	#12 SAE	5.88"	#8 SAE	3.9	6.0	310	3751804005	3911804231
3771532049			3.12"	#20 SAE	3.12"	#12 SAE	4.5	7.0	330	3751804005	3911804231
3771532061			3.50"	1" NPT	3.50"	3/4" NPT	4.7	7.4	335	3751804005	3911804231
3771532057			3.38"	#20 SAE	3.38"	#16 SAE	4.6	8.3	355	3751804350	3751804349
3771532063			3.38"	#20 SAE	3.38"	#16 SAE	4.6	8.3	355	3751804350	3751804349
3771532062			3.50"	1" NPT	3.50"	3/4" NPT	5.9	8.8	380	3751804005	3911804231
3771533071			2.00"	3/4" NPT	2.00"	1/2" NPT	2.2	4.2	220	3751804201	3911804020
3771533051			2.38"	#12 SAE	2.38"	#10 SAE	2.7	5.3	225	3751804201	3911804020
3771533038	2.88"	3/4" NPT			2.62"	3/4" NPT	2.7	5.5	235	3751804201	3911804020
3771533057			5.88"	#12 SAE	5.88"	#8 SAE	3.1	5.9	225	3751804201	3911804020
3771533066			5.88"	#12 SAE	5.88"	#8 SAE	3.2	6.5	235	3751804201	3911804020
3771933011			3.56"	#16 SAE	3.56"	#12 SAE	3.9	8.5	400	3751805158	3751805155
3771533084			3.18"	#16 SAE	3.18"	#8 SAE	3.9	8.5	325	3751805548	3911804020
3771433914			3.38"	#20 SAE	3.38"	#16 SAE	3.9	8.5	438	3796800692	
3799000592			2.88"	#16 SAE	2.88"	#12 SAE	3.9	8.5	325	3751805125	
3771933010			3.56"	#16 SAE	3.56"	#12 SAE	3.9	8.8	400	3751805158	3751805155
3771533067			3.06"	#16 SAE	3.06"	#8 SAE	3.9	9.4	345	3751804201	3911804020
3771933005			3.56"	#16 SAE	3.56"	#12 SAE	3.9	9.4	400	3751805158	3751805155
3771933004			4.06"	#16 SAE	4.06"	#12 SAE	4.4	10.7	345	3751804590	3751804589
3771432059	3.31"	1" NPT	2.75"	1" NPT	2.75"	1" NPT	4.9	8.9	300	3751804435	3751804026
3771432055			End Of Rod	3/4" NPT	End Of Rod	#12 SAE	5.0	7.5	350	3751804435	3751804310
3771432054	4.13"	3/4" NPT			3.00"	3/4" NPT	5.1	9.2	300	3751804435	3751804026
3771432066			2.12"	#16 SAE	2.12"	#12 SAE	5.2	9.1	260	3751804435	3751804026
3771432058			6.00"	1" NPT	6.00"	1/2" NPT	5.6	8.8	330	3751804435	3751804026
3771432056			End Of Rod	3/4" NPT	End Of Rod	#12 SAE	5.7	8.9	330	3751804435	3751804310
3771432063			5.95"	#16 SAE	5.95"	#12 SAE	5.9	9.2	350	3751804435	3751804026
3771432057			End Of Rod	3/4" NPT	End Of Rod	#12 SAE	6.7	10.8	375	3751804435	3751804310
3799000441			3.50"	#12 SAE	3.50"	#10 SAE	3.0	5.9	375	3751804018	3911804109
3799000293			3.50"	#12 SAE	3.50"	#12 SAE	3.9	6.1	255	3751804406	3911804109
3771433025			3.62"	1" NPT	3.62"	3/4" NPT	3.4	7.1	260	3751804406	3911804109
3799000625			3.50"	#12 SAE	3.50"	#12 SAE	3.9	6.0	320	3751804406	3911804109
3771433070			5.50"	#12 SAE	5.50"	#12 SAE	3.5	6.3	375	3751804018	3911804109
3799000507			3.50"	#12 SAE	3.50"	#12 SAE	3.5	6.5	250	3751804406	3911804109
3771413226	OUT BASE	BLEEDER	3.92"	#16 SAE	3.92"	#16 SAE	3.9	7.0	305	3751804406	3911804109
3771433071			3.50"	#12 SAE	3.50"	#12 SAE	3.9	6.9	386	3751804018	3911804109
3771433063			3.19"	1" NPT	1.62"	3/4" NPT	3.5	7.2	300	3751804406	3911804109
3771433073			2.25"	3/4" NPT	2.25"	3/4" NPT	3.9	7.9	268	3751804437	3911804109
3771433044			3.62"	1" NPT	3.62"	3/4" NPT	3.7	7.7	275	3751804406	3911804109
3799000604			3.50"	#12 SAE	3.50"	#12 SAE	3.9	7.7	280	3751804018	3911804109
3771433097	2.81"	#16 SAE	2.94"	#12 SAE	2.94"	#12 SAE	3.6	7.8	290	3751804437	3911804109
3771433082	2.81"	#16 SAE	2.94"	#12 SAE	2.94"	#12 SAE	3.6	7.8	290	3751804437	3911804109
3771413225	OUT BASE	BLEEDER	3.92"	#16 SAE	3.92"	#16 SAE	3.9	7.9	290	3751804406	3911804109
3771433045			2.25"	3/4" NPT	2.25"	3/4" NPT	3.9	8.6	290	3751804437	3911804109

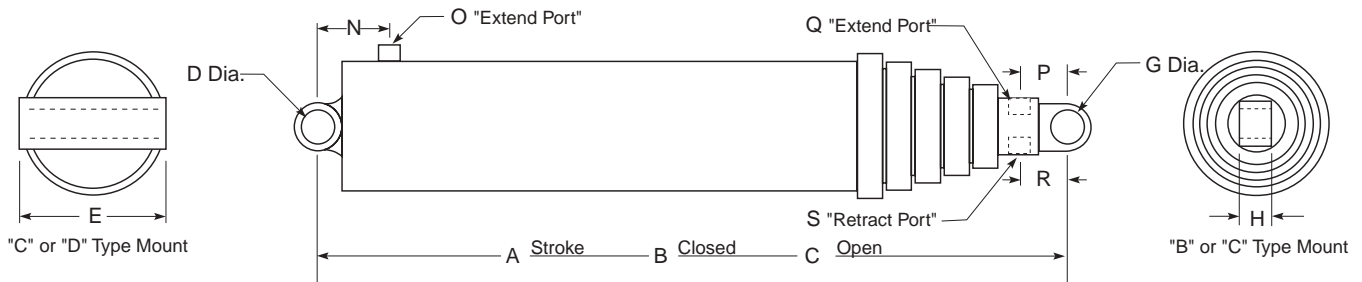
Note; Bold / Highlighted Items are Standard Warehouse Items.

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Nominal Stage OD, refers to the Largest Moving Sleeve.



## Double-Acting Telescopic Cylinders Non-Trunnion Mount Designs



ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	G PIN	H WIDTH
SD63CC-16-110	3771433038	6	3	110.00	54.75	164.75	2.25	2.00	1.50	2.38
SD63CB-11-118	3771433091	6	3	118.00	58.50	176.50	2.50	3.00	2.50	3.69
SD63DC-11-120	3771433095	6	3	120.00	55.00	175.00	2.00	7.00	1.62	2.00
SD63DB-10-120	3771433067	6	3	120.00	58.50	178.50	3.00	7.25	2.50	3.69
SD63DB-14-120	3771433104	6	3	120.00	60.00	180.00	2.00	8.25	2.00	3.69
SD63CC-28-124	3771433072	6	3	124.50	76.88	201.38	2.00	2.00	2.00	2.00
SD63CC-27-129	3771433074	6	3	129.00	70.50	199.50	2.00	2.00	2.00	2.00
SD63DB-7-132	3771433046	6	3	132.00	62.38	194.38	1.75	7.12	1.75	3.69
SD63CB-12-132	3771433902	6	3	132.75	85.25	218.00	2.00	4.00	2.00	3.69
SD63DB-11-152	3771433068	6	3	152.25	69.00	221.25	2.50	7.50	2.50	3.69
D4145	3790004145	6	3	164.00	81.62	245.62	2.00	6.75	2.00	3.00
SD63CC-41-164	3771833006	6	3	164.00	82.12	246.12	2.00	2.25	2.00	2.25
SD63CC-39-167	3771433906	6	3	167.00	78.50	245.50	2.00	2.00	2.00	2.00
SD63CB-13-167	3771433096	6	3	167.00	85.25	252.25	2.00	3.00	2.00	3.00
SD63CB-12-167	3771433901	6	3	167.00	85.25	252.25	2.00	4.00	2.00	3.69
D5820	3790005820	6	3	170.00	81.62	251.62	2.00	6.75	2.00	3.00
SD63CB-14-173	3771433107	6	3	173.50	77.00	250.50	2.50	3.00	2.50	3.69
SD63CC-41-181	3771833007	6	3	181.00	85.44	266.44	2.00	2.25	2.00	2.25
SD63CB-13-197	3771433103	6	3	197.00	85.25	282.25	2.00	3.00	2.00	3.00
SD63CB-12-197	3771433903	6	3	197.44	85.25	282.69	2.00	4.00	2.00	3.69
SD64DC-4-110.34	3771434046	6	4	110.34	43.50	153.84	2.00	7.25	1.50	2.25
SD64CC-7-118	3771434037	6	4	118.00	50.00	168.00	1.50	2.00	1.50	2.25
SD64CC-7-132	3771434035	6	4	132.19	50.00	182.19	1.50	2.00	1.50	2.25
SD64DC-3-145	3771434048	6	4	145.00	62.50	207.50	2.00	7.25	2.00	2.48
SD64CC-7-152	3771434036	6	4	152.00	55.00	207.00	1.50	2.00	1.50	2.25
SD64DC-3-156	3771434044	6	4	156.64	62.50	219.14	2.00	7.25	2.00	2.48
SD72AC-1-156	3772532018	7	2	156.00	96.00	252.00	N/A	N/A	2.00	2.00
SD73DB-8-115	3772533069	7	3	115.00	60.00	175.00	3.00	8.25	3.00	4.69
SD73DB-6-115	3772533050	7	3	115.75	56.38	172.13	3.00	8.25	3.00	4.69
SD73CC-25-120	3772533045	7	3	120.00	64.75	184.75	2.00	2.00	2.00	2.00
SD73DC-5-120	3772533056	7	3	120.75	55.00	175.75	2.00	7.00	1.63	2.00
SD73DC-5-138.75	3772533073	7	3	138.75	61.00	199.75	2.00	7.00	1.63	2.00
SD73GF-2-156	3772533024	7	3	156.00	73.62	229.62	FLANGE	MOUNT	TAPPED	0.75-10
SD73DB-8-160	3772533068	7	3	160.00	80.00	240.00	3.00	8.25	3.00	4.69
SD74DC-CP410-104	3799000410	7	4	104.38	50.63	155.00	2.00	8.25	2.00	3.00
SD74DC-9-109	3772534055	7	4	109.38	50.63	160.00	2.00	8.25	2.00	3.00
SD74DC-7-119	3772534040	7	4	119.50	56.00	175.50	2.00	8.25	2.00	3.00
SD74CC-11-131	3772534032	7	4	131.50	53.38	184.88	1.25	1.50	1.25	1.50
SD74CC-12-135	3772534033	7	4	135.25	61.00	196.25	2.00	2.00	2.00	2.00
SD74DC-CP615-138	3799000615	7	4	138.00	56.00	194.00	2.00	8.25	2.00	3.00
SD74DB-6-144	3772534037	7	4	144.00	56.50	200.50	3.00	8.25	2.00	3.62
SD74CC-13-162.88	3772534042	7	4	163.00	77.00	240.00	2.00	2.00	2.00	2.00
SD74DB-4-171	3772534031	7	4	171.00	62.38	233.38	1.75	7.00	1.75	3.62
SD74DB-7-197	3772534038	7	4	197.00	69.00	266.00	2.50	8.50	2.50	3.69
SD75OO-1-100	3772535004	7	5	100.00	39.50	139.50	BALL	3.00 DIA	BALL	3.00 DIA
SD75OO-2-113	3772535005	7	5	113.50	39.50	153.00	BALL	3.00 DIA	BALL	3.00 DIA

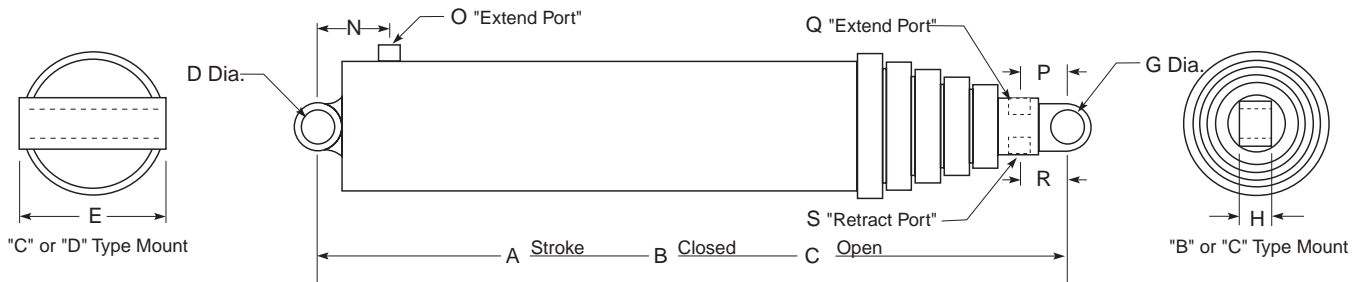
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## Double-Acting Telescopic Cylinders Non-Trunnion Mount Designs



10 DIGIT NUMBER	N LOC.	O SIZE	P LOC.	Q SIZE	R LOC.	S SIZE	GALS TO FILL	GALS TO EXT.	WT. LBS	REBUILD KIT	REPACK KIT
3771433038			3.19"	1" NPT	1.62"	3/4" NPT	4.0	8.6	300	3751804406	3911804109
3771433091			2.00"	#16 SAE	2.00"	#12 SAE	4.3	9.3	310	3751804406	3911804109
3771433095	3.06"	#16 SAE	2.94"	#12 SAE	2.94"	#12 SAE	4.1	9.4	310	3751804437	3911804109
3771433067	3.56"	1" NPT	2.50"	1" NPT	2.50"	1" NPT	4.3	9.4	315	3751804406	3911804109
3771433104	3.12"	1" NPT	2.25"	1" NPT	2.25"	1" NPT	4.5	9.4	315	3751804406	3911804109
3771433072			5.94"	#16 SAE	5.94"	#12 SAE	4.7	9.8	340	3751804406	3911804109
3771433074			4.88"	#12 SAE	4.88"	#8 SAE	4.7	10.2	335	3751804406	3911804109
3771433046			2.25"	3/4" NPT	2.25"	3/4" NPT	4.7	12.7	330	3751804406	3911804109
3771433902			4.62"	#16 SAE	3.25"	#12 SAE	6.2	12.3	614	3751804417	3751804170
3771433068	3.31"	1" NPT	2.50"	1" NPT	2.50"	1" NPT	5.3	14.6	450	3751804406	3911804109
3790004145	SPECIAL	SPECIAL					6.6	8.6	495	3751804922	
3771833006			3.50"	#20 SAE	3.88"	#16 SAE	6.6	8.6	495	3796800060	
3771433906			5.31"	#20 SAE	5.31"	#12 SAE	5.7	13.1	433	3751804417	3751804170
3771433096			3.88"	#20 SAE	3.88"	#16 SAE	6.2	13.9	618	3751804449	3751804278
3771433901			4.62"	#16 SAE	3.25"	#12 SAE	6.6	13.9	618	3751804417	3751804170
3790005820	SPECIAL	SPECIAL					6.6	9.1	550	3751804922	
3771433107			2.25"	#16 SAE	2.25"	#12 SAE	5.9	13.7	400	3751804406	3911804109
3771833007			3.50"	#20 SAE	3.88"	#16 SAE	6.9	9.5	490	3796800060	
3771433103			3.88"	#20 SAE	3.88"	#16 SAE	6.2	15.6	635	3751804449	3751804278
3771433903			4.62"	#16 SAE	3.25"	#12 SAE	6.2	15.6	635	3751804417	3751804170
3771434046			2.38"	#12 SAE	2.38"	#10 SAE	2.5	10.1	300	3751805090	3911804237
3771434037			2.38"	#12 SAE	2.38"	#10 SAE	2.5	10.1	265	3751804320	3911804237
3771434035			2.38"	#12 SAE	2.38"	#10 SAE	3.5	10.7	265	3751804320	3911804237
3771434048	OUT BASE	BLEEDER	2.00"	#16 SAE	2.00"	#16 SAE	7.2	12.6	340	3751804320	3911804237
3771434036			2.38"	#12 SAE	2.38"	#10 SAE	3.9	12.5	310	3751804320	3911804237
3771434044	OUT BASE	BLEEDER	2.00"	#16 SAE	2.00"	#16 SAE	7.2	12.6	340	3751804320	3911804237
3772532018			3.00"	1 1/4" NPT	3.00"	1" NPT	10.5	24.4	650	3751804213	3911804135
3772533069	OUT BASE	BLEEDER	2.50"	#16 SAE	2.50"	#16 SAE	6.3	13.2	465	3751805258	3751804002
3772533050			2.00"	1" NPT	2.00"	3/4" NPT	6.0	13.2	395	3751805258	3751804002
3772533045			3.62"	3/4" NPT	3.62"	1/2" NPT	6.6	14.1	430	3751805258	3751804002
3772533056	3.56"	#16 SAE			2.94"	#12 SAE	5.7	13.8	450	3751805258	3751804002
3772533073	3.56"	#16 SAE			2.94"	#12 SAE	6.4	15.9	485	3751805258	3751804002
3772533024			1.25"	1" NPT	1.25"	3/4" NPT	8.4	18.3	520	3751805258	3751804002
3772533068	OUT BASE	BLEEDER	2.50"	#20 SAE	2.50"	#16 SAE	8.7	18.3	590	3751805258	3751804002
3799000410			3.50"	#12 SAE	3.50"	#12 SAE	4.2	11.3	300	3751804008	3771804003
3772534055			3.50"	#12 SAE	3.50"	#12 SAE	4.2	10.7	525	3751804008	3751804003
3772534040			3.50"	#12 SAE	3.50"	#12 SAE	4.9	11.7	550	3751804008	3751804003
3772534032			3.88"	3/4" NPT	3.88"	3/4" NPT	4.7	12.8	375	3751804008	3751804003
3772534033			6.62"	#20 SAE	6.62"	#16 SAE	5.1	13.1	425	3751804008	3751804003
3799000615			3.50"	#12 SAE	3.50"	#12 SAE	4.9	13.4	440	3751804008	3751804003
3772534037	4.12"	1" NPT	2.25"	1" NPT	2.25"	3/4" NPT	5.2	16.8	445	3751804008	3751804003
3772534042			5.94"	#16 SAE	5.94"	#12 SAE	6.1	15.8	525	3751804008	3751804003
3772534031			2.25"	3/4" NPT	2.25"	3/4" NPT	5.6	16.5	485	3751804008	3751804003
3772534038	3.88"	1" NPT	3.25"	1" NPT	3.25"	1" NPT	6.5	19.3	500	3751804008	3751804003
3772535004	4.38"	#12 SAE			2.12"	#8 SAE	2.8	8.7	285	3751805262	3911804219
3772535005	4.38"	#12 SAE			2.12"	#8 SAE	2.8	9.1	280	3751805262	3911804219

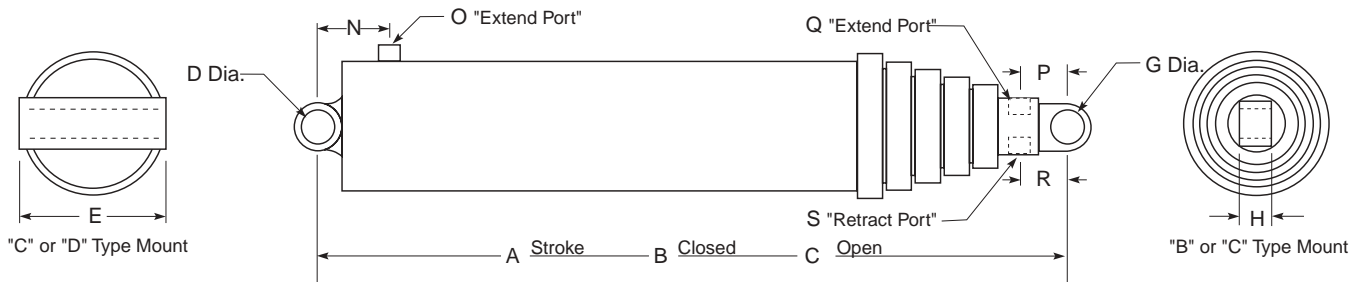
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Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Nominal Stage OD, refers to the Largest Moving Sleeve.



## Double-Acting Telescopic Cylinders Non-Trunnion Mount Designs



ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	G PIN	H WIDTH
SD83CB-16-117	3772933016	8	3	117.00	59.75	176.75	3.19	1.50	1.50	3.62
SD83CC-27-126	3772933013	8	3	126.63	72.13	198.75	2.50	3.00	2.50	3.00
SD83CC-24-131	3773033043	8	3	131.50	60.00	191.50	1.75	2.00	1.75	2.00
SD83CC-24-132	3773033042	8	3	132.00	63.00	195.00	1.75	2.00	1.75	2.00
SD83CB-11-147	3773033030	8	3	147.00	69.00	216.00	2.00	2.00	2.00	3.62
SD83CC-24-156	3772933015	8	3	156.00	73.00	229.00	1.75	2.00	1.75	2.00
SD83GF-2-156	3772933018	8	3	156.00	73.62	229.62	FLANGE	MOUNT	TAPPED	5.63
SD83CB-12-176	3773033033	8	3	176.81	82.00	258.81	1.75	2.00	1.75	2.50
SD83CC-22-176	3773033038	8	3	176.81	82.00	258.81	1.75	2.50	1.75	2.00
SD83GF-2-177	3772933017	8	3	177.00	85.00	262.00	FLANGE	MOUNT	TAPPED	5.63
SD83LF-5-177	3773033027	8	3	177.13	77.50	254.63	2.00	4.00	PLATE	7.00
Note: SD83CB-11- and SD83CB-16 are Skip-A-Sleeve Designs with Plunger and all Sleeves Double Acting										
Note: SD83CB-12-, SD83CB-22-, SD83CC-24 and SD83LF-5 are Skip-A-Sleeve Designs, only Plunger is Double Acting and all Sleeves Single Acting										
SD84CC-21-135	3772934037	8	4	135.25	61.00	196.25	2.00	2.00	2.00	2.00
SD84CC-20-144	3772934036	8	4	144.75	65.00	209.75	1.75	2.00	1.75	2.00
SD84CC-20-178	3772934035	8	4	178.38	69.25	247.63	1.75	2.00	1.75	2.00
SD85CC-15-125	3772935003	8	5	125.00	49.75	174.75	2.00	2.50	2.00	2.50
SD85DC-7-163	3772935036	8	5	163.00	56.00	219.00	2.00	9.25	2.00	3.00
SD85DB-5-220	3773035034	8	5	220.00	65.25	285.25	3.00	9.50	2.50	3.69
SD85CC-19-348	3772935026	8	5	348.00	99.88	447.88	2.00	2.00	2.00	2.00
SD85CC-19-378	3772935027	8	5	378.00	104.75	482.75	2.00	2.00	2.00	2.00
SD85DC-2-380	3772935014	8	5	380.00	101.19	481.19	2.00	9.50	2.00	2.00
SD85DC-2-440	3772935021	8	5	440.00	113.25	553.25	2.00	9.50	2.00	2.00
SD86OO-1-146	3772936002	8	6	146.50	43.31	189.81	BALL	3.00 DIA	BALL	3.00 DIA
SD86CC-1-171	3772936001	8	6	171.00	49.75	220.75	2.00	2.50	2.00	2.50
SD93CC-13-132	3773133011	9	3	132.00	63.00	195.00	1.75	2.00	1.75	2.00
SD93CC-1-147	3777533002	9	3	147.00	69.50	216.50	2.00	2.00	2.00	2.00
SD93LF-1-177	3773133005	9	3	177.00	77.50	254.50	2.00	4.00	SPECIAL	MOUNT
SD93DC-1-177	3773133001	9	3	177.13	82.56	259.69	2.00	11.25	2.50	2.50
Note: SD93CC-1- is a Skip-A-Sleeve Design with Plunger and all Sleeves Double Acting										
Note: SD93CC-13-, SD93LF-1- and SD93DC-1 are Skip-A-Sleeve Designs, only Plunger is Double Acting and all Sleeves Single Acting										
SD94CC-7-176	3778634004	9	4	176.13	69.13	245.25	2.50	3.00	2.50	3.00
SD94CC-8-190	3773134005	9	4	190.00	71.00	261.00	2.25	2.25	2.00	2.00
SD94CC-9-190	3773134006	9	4	190.00	74.00	264.00	2.25	2.25	2.00	2.00
SD95CC-3-160	3773135018	9	5	160.00	61.00	221.00	2.00	2.00	2.00	2.00
SD95DD-1-220	3773135019	9	5	220.00	68.50	288.50	3.00	23.50	3.00	12.00
SD96CC-3-199	3773136009	9	6	199.69	57.56	257.25	2.00	2.00	2.00	2.00

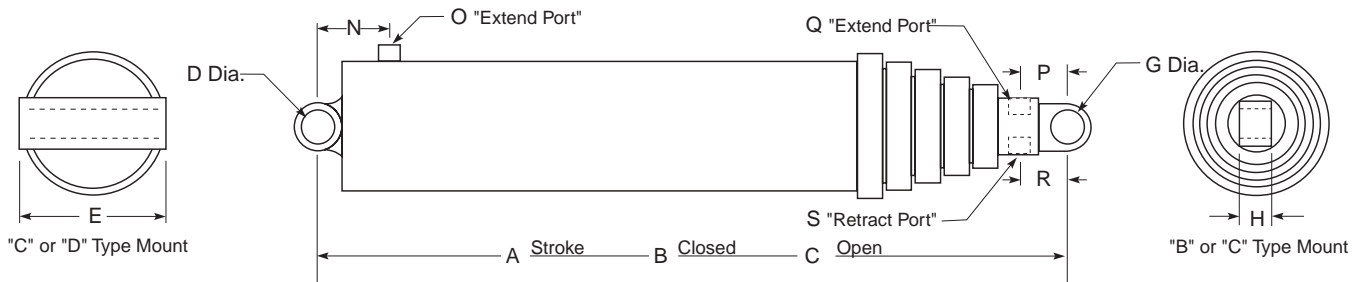
Note; Bold / Highlighted Items are Standard Warehouse Items.

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Nominal Stage OD, refers to the Largest Moving Sleeve.



## Double-Acting Telescopic Cylinders Non-Trunnion Mount Designs



10 DIGIT NUMBER	N LOC.	O SIZE	P LOC.	Q SIZE	R LOC.	S SIZE	GALS TO FILL	GALS TO EXT.	WT. LBS	REBUILD KIT	REPACK KIT
3772933016			3.38"	1/2" NPT	1.62"	1/2" NPT	9.0	21.6	520	3751804611	3751804610
3772933013			5.38"	1 1/4" NPT	5.38"	3/4" NPT	9.4	24.2	633	3751805542	3751804302
3773033043	4.50"	1/2" NPT			2.00"	1/2" NPT	9.4	24.2	575	3751804409	3911804118
3773033042	4.50"	1/2" NPT			2.00"	1/2" NPT	9.8	24.4	575	3751804409	3911804118
3773033030			3.12"	1/2" NPT	1.38"	1/2" NPT	10.9	27.2	650	3751804611	3751804610
3772933015	4.50"	1/2" NPT			2.00"	1/2" NPT	11.4	28.8	645	3751804409	3911804118
3772933018			1.75"	1 1/4" NPT	1.75"	1" NPT	11.5	28.8	650	3751804577	3751804467
3773033033			3.75"	1/2" NPT	2.00"	3/8" NPT	12.6	32.5	815	3751804545	3751804544
3773033038	DUT BAS	3/8" NPT	3.75"	1/2" NPT	2.00"	3/8" NPT	12.6	32.5	815	3751804409	3751804057
3772933017			1.75"	1 1/4" NPT	1.75"	1" NPT	13.3	32.7	680	3751804577	3751804467
3773033027	4.00"	1/2" NPT			SPECIAL	3/8" NPT	12.3	32.7	765	3751804410	3751804057
Note: SD83CB-11- and SD83CB-16 are Skip-A-Sleeve Designs with Plunger and all Sleeves Double Acting											
Note: SD83CB-12-, SD83CB-22-, SD83CC-24 and SD83LF-5 are Skip-A-Sleeve Designs, only Plunger is Double Acting and all Sleeves Single Acting											
3772934037			6.62"	#20 SAE	6.62"	#16 SAE	7.1	21.9	560	3751804007	3911804054
3772934036			3.43"	#24 SAE	3.43"	#12 SAE	8.3	23.4	625	3751804007	3911804054
3772934035			3.43"	#24 SAE	3.43"	#12 SAE	8.8	28.9	665	3751804007	3911804054
3772935003	6.75"	#12 SAE	2.25"	#12 SAE	2.50"	2, #8 SAE	5.4	17.8	505	3751804167	3911804060
3772935036			3.50"	#12 SAE	3.50"	#12 SAE	5.2	22.8	588	3751804167	3911804060
3773035034	4.12"	1" NPT			2.25"	1" NPT	9.9	31.2	609	3751804167	3911804060
3772935026			4.25"	1 1/4" NPT	4.00"	1" NPT	10.6	40.9	885	3751804167	3911804060
3772935027			4.25"	1 1/4" NPT	4.00"	1" NPT	11.3	44.3	1015	3751804167	3911804060
3772935014			4.12"	1 1/4" NPT	4.12"	1" NPT	12.6	44.7	1100	3751804167	3911804060
3772935021			4.12"	1 1/4" NPT	4.12"	1" NPT	14.3	51.8	1175	3751804167	3911804060
3772936002	4.38"	#12 SAE			2.12"	#8 SAE	3.9	18.2	400	3751805177	3911804238
3772936001	6.75"	#12 SAE	2.25"	#12 SAE	2.50"	2, #8 SAE	5.1	21.3	513	3751805177	3911804238
3773133011	4.50"	1/2" NPT			2.00"	1/2" NPT	12.5	25.9	460	3751804465	3751804422
3777533002			3.50"	1/2" NPT	3.50"	1/2" NPT	12.3	28.8	825	3751805244	3751804422
3773133005	4.00"	3/4" NPT			SPECIAL	3/4" NPT	15.4	32.9	1060	3751804562	3751804422
3773133001	3.06"	3/4" NPT			3.75"	3/8" NPT	14.0	34.6	1100	3911804163	3751804422
Note: SD93CC-1- is a Skip-A-Sleeve Design with Plunger and all Sleeves Double Acting											
Note: SD93CC-13-, SD93LF-1- and SD93DC-1 are Skip-A-Sleeve Designs, only Plunger is Double Acting and all Sleeves Single Acting											
3778634004			4.25"	#20 SAE	4.25"	#12 SAE	11.3	39.0	930	3751804027	3751804029
3773134005			4.38"	#20 SAE	4.38"	#16 SAE	11.7	42.1	930	3751804027	3751804029
3773134006			4.38"	#20 SAE	4.38"	#16 SAE	12.3	42.1	950	3751804027	3751804029
3773135018			6.62"	#20 SAE	6.62"	#16 SAE	8.5	31.5	810	3751804055	3751804004
3773135019	4.12"	1" NPT			3.50"	1" NPT	10.1	36.8	857	3751804055	3751804004
3773136009			4.12"	1 1/4" NPT	4.12"	1" NPT	7.3	34.6	795	3751804028	3751804030

Note; Bold / Highlighted Items are Standard Warehouse Items.

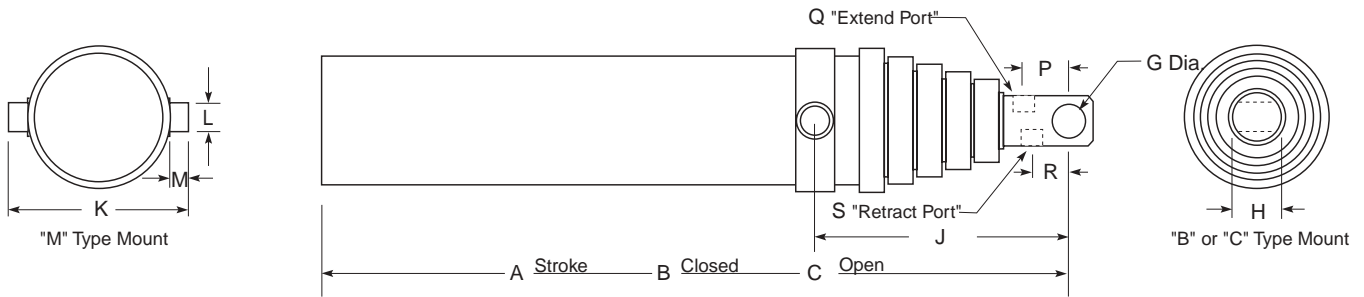
Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

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## Double-Acting Telescopic Cylinders Trunnion Mount Designs

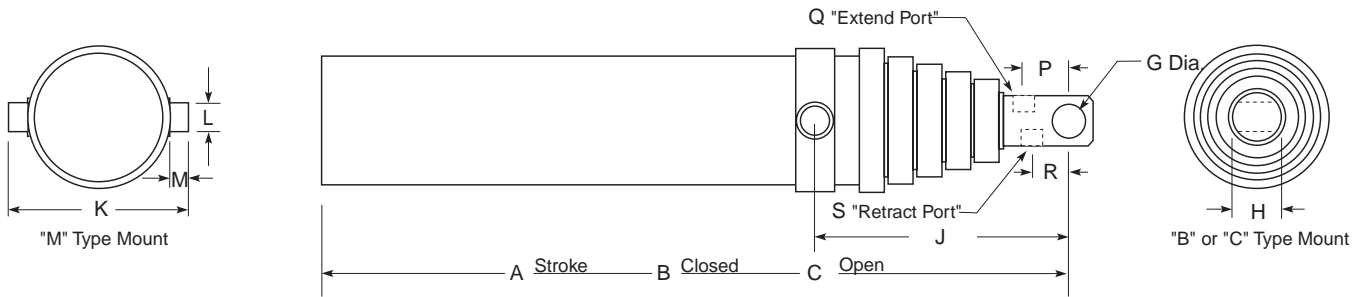


ENGINEERING NUMBER	10 DIGIT NUMBER	NOMINAL STAGE OD	NUMBER STAGES	A STROKE	B CLOSED	C OPEN	G PIN	H WIDTH	J TR to PIN	K WIDTH	L DIA.	M LGTH
SD53MC-4-81	3771533059	5	3	81.00	43.50	124.50	1.75	2.00	13.00	12.00	1.75	1.75
SD53MC-3-120	3771533037	5	3	120.00	56.00	176.00	1.50	2.00	23.25	12.38	1.75	1.69
SD53MC-5-120	3771533070	5	3	120.00	56.06	176.06	1.50	2.00	17.44	12.38	1.75	1.69
SD62MC-10-46	3771432039	6	2	46.00	40.75	86.75	1.75	1.50	33.00	10.12	2.00	1.25
SD63MC-10-108	3771433079	6	3	108.00	52.63	160.63	2.00	2.00	13.00	12.00	1.75	1.75
SD63MC-10-128	3771433081	6	3	128.00	59.44	187.44	2.00	2.00	13.00	12.00	1.75	1.75
SD63MB-12-140	3771433120	6	3	140.00	61.88	201.88	1.75	3.00	14.38	12.38	1.75	1.69
SD63MC-10-153	3771433114	6	3	153.00	67.75	220.75	2.00	2.00	13.00	12.00	1.75	1.75
SD73MC-1-126	3772533055	7	3	126.00	58.63	184.63	2.00	2.00	13.00	12.00	1.75	1.75
SD73MC-2-126	3772533070	7	3	126.00	58.63	184.63	2.00	2.00	13.00	12.00	1.75	1.75
SD73MC-1-142	3772533057	7	3	142.12	64.00	206.12	2.00	2.00	13.00	12.00	1.75	1.75
SD84MC-18-152	3772934021	8	4	152.00	69.00	221.00	1.75	2.00	10.50	14.75	3.00	2.13
SD84MC-21-152	3772934027	8	4	152.00	69.00	221.00	1.75	2.00	10.50	14.75	3.00	2.13
SD84MC-18-176	3772934020	8	4	176.25	69.00	245.25	1.75	2.00	10.50	14.75	3.00	2.13
SD84MC-21-176	3772934026	8	4	176.25	69.00	245.25	1.75	2.00	10.50	14.75	3.00	2.13
SD85MC-15-220	3772935023	8	5	220.25	69.25	289.50	1.75	2.00	10.75	14.75	3.00	2.13
SD85MC-16-220	3772935024	8	5	220.25	69.25	289.50	1.75	2.00	10.75	14.75	3.00	2.13
SD85MC-18-241	3772935028	8	5	241.75	75.50	317.25	3.00	2.63	56.00	15.50	3.00	2.00
SD85MC-20-384	3772935032	8	5	384.00	106.00	490.00	2.00	2.00	46.25	16.00	2.00	2.00
SD85MC-21-384	3772935038	8	5	384.00	106.00	490.00	2.00	2.00	46.25	16.00	3.00	2.00
SD95MC-5-220	3773135012	9	5	220.25	69.75	290.00	3.00	2.50	11.37	17.50	3.00	2.50
SD95MC-6-220	3773135013	9	5	220.25	69.75	290.00	3.00	2.50	11.37	17.50	3.00	2.50
SD95MC-7-239	3773135017	9	5	239.25	75.00	314.25	3.00	2.63	56.00	17.25	3.00	2.00
SD96MC-8-384	3773136017	9	6	384.00	95.00	479.00	2.00	2.00	46.25	16.00	3.00	2.00
SD96MC-5-412	3773136006	9	6	412.00	99.62	511.62	2.00	2.00	46.25	16.00	3.00	2.00
SD96MC-5-456	3773136007	9	6	456.00	107.00	563.00	2.00	2.00	46.25	16.00	3.00	2.00
SD96MC-5-480	3773136008	9	6	480.00	110.88	590.88	2.00	2.00	46.25	16.00	3.00	2.00
SD96MC-8-480	3773136025	9	6	480.00	110.88	590.88	2.00	2.00	46.25	16.00	3.00	2.00

Note: SD84MC-18-, SD85MC-15- and SD95MC-6- are 3 Port Quick Sweep Design.

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 Note; Diameters G are for nominal pin size, for actual hole size refer to print.  
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## Double-Acting Telescopic Cylinders Trunnion Mount Designs

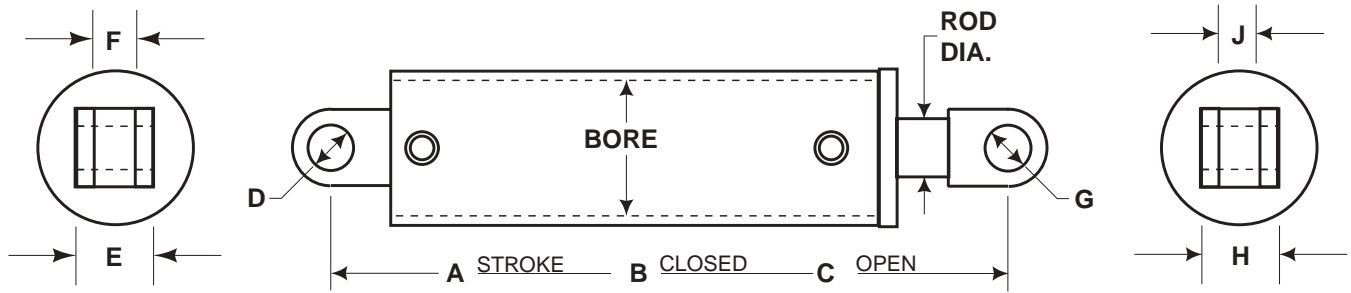


10 DIGIT NUMBER	P LOCATION	Q SIZE	R LOCATION	S SIZE	GALS TO FILL	GALS TO EXTEND	WT LBS	REBUILD KIT	REPACK KIT
3771533059	3.00"	#12 SAE	3.00"	#8 SAE	1.7	5.1	200	3751804201	3911804020
3771533037	2.50"	3/4" NPT	2.50"	1/2" NPT	3.1	6.2	280	3751804201	3911804020
3771533070	2.50"	3/4" NPT	2.50"	1/2" NPT	3.1	6.2	280	3751804201	3911804020
3771432039	3.06"	1 1/4" NPT	3.06"	3/4" NPT	2.1	4.6	225	3751804435	3751804026
3771433079	3.00"	#16 SAE	3.00"	#16 SAE	3.9	8.6	295	3751804406	3911804109
3771433081	3.00"	#16 SAE	3.00"	#16 SAE	4.7	10.0	320	3751804406	3911804109
3771433120	1.75"	1" NPT	1.75"	3/4" NPT	5.9	13.1	425	3751804406	3911804109
3771433114	3.00"	#16 SAE	3.00"	#16 SAE	6.1	14.8	440	3751804406	3911804109
3772533055	3.00"	#16 SAE	3.00"	#16 SAE	6.2	14.6	450	3751805258	3751804002
3772533070	3.00"	#16 SAE	3.00"	#16 SAE	6.2	14.6	450	3751805258	3751804002
3772533057	3.00"	#16 SAE	3.00"	#16 SAE	7.6	16.9	490	3751805258	3751804002
3772934021	3.12"	1, 3/4" NPT	3.12"	3/4" NPT	9.5	24.6	770	3751804007	3911804054
3772934027	3.12"	1 1/4" NPT	3.12"	3/4" NPT	9.5	24.6	759	3751804007	3911804054
3772934020	3.12"	1, 3/4" NPT	3.12"	3/4" NPT	9.5	28.5	770	3751804007	3911804054
3772934026	3.12"	1 1/4" NPT	3.12"	3/4" NPT	9.5	28.5	765	3751804007	3911804054
3772935023	3.12"	1, 3/4" NPT	3.12"	3/4" NPT	7.1	31.2	830	3751804167	3911804060
3772935024	3.12"	1 1/4" NPT	3.12"	3/4" NPT	7.1	31.2	830	3751804167	3911804060
3772935028	4.62"	#20 SAE	4.62"	#12 SAE	10.4	48.1	850	3751804167	3911804060
3772935032	4.12"	1 1/4" NPT	4.12"	1" NPT	13.1	54.5	1127	3751804167	3911804060
3772935038	3.50"	1 1/4" NPT	3.25"	1" NPT	13.1	54.5	1130	3751804167	3911804060
3773135012	3.88"	1 1/2" NPT	3.88"	1" NPT	11.5	43.1	1065	3751804055	3751804004
3773135013	3.88"	1, 1 1/2" NPT	3.88"	1" NPT	11.5	43.1	1065	3751804055	3751804004
3773135017	4.62"	#20 SAE	4.62"	#12 SAE	13.9	46.9	1160	3751804055	3751804004
3773136017	3.50"	#20 SAE	3.50"	#16 SAE	13.6	69.4	1545	3751804050	3751804030
3773136006	4.12"	1 1/4" NPT	4.12"	1" NPT	14.8	71.5	1545	3751804050	3751804030
3773136007	4.12"	1 1/4" NPT	4.12"	1" NPT	16.1	79.2	1645	3751804050	3751804030
3773136008	4.12"	1 1/4" NPT	4.12"	1" NPT	16.7	83.3	1710	3751804050	3751804030
3773136025	3.50"	#20 SAE	3.50"	#16 SAE	16.7	83.3	1750	3751804050	3751804030

Note: SD84MC-18-, SD85MC-15- and SD95MC-6- are 3 Port Quick Sweep Design.

Note; Bold / Highlighted Items are Standard Warehouse Items.  
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# Piston Rod Cylinders, Double Acting



ENGINEERING NUMBER	10 DIGIT NUMBER	BORE I.D.	ROD O.D.	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	F GAP	G PIN	H WIDTH	J GAP
D15DD-3-66	3776921019	1.50	1.00	66.00	87.00	153.00	1.25	5.62		1.25	4.75	
B5799	3790005799	1.75	1.12	71.88	85.12	157.00	SPL	MNT		THD	0.75-16	
D20DD-4-6.25	3770121125	2.00	1.00	6.25	14.50	20.75	1.00	2.50		1.00	2.50	
B5429	3790005429	2.00	1.00	6.25	14.50	20.75	1.00	2.50		1.00	2.50	
B6225	3790006225	2.00	1.25	3.94	14.12	18.06	N/A	2.50		N/A	1.25	
D20CC-6-4	3770121131	2.00	1.25	4.00	14.00	18.00	1.00	1.00		1.00	0.75	
B6546	3790006546	2.00	1.25	8.12	22.38	30.50	1.00	3.00		1.00	2.00	
B6387	3790006387	2.00	1.25	9.12	22.38	31.50	1.00	3.00		1.00	2.00	
D20CL-2-12.75	3770121132	2.00	1.25	12.75	23.65	36.40	1.00	1.00		1.00	2.25	1.25
D20LL-4-17.50	3790004957	2.00	1.25	17.50	28.50	46.00	1.00	2.25	1.25	1.00	2.25	1.25
B4708	3790004708	2.00	1.25	20.00	30.75	50.75	1.00	2.25	1.25	1.00	2.25	1.25
D20LL-7-24	3770121134	2.00	1.25	24.00	38.75	62.75	1.00	2.28	1.28	1.00	2.28	1.28
D20DD-3-67	3770121123	2.00	1.25	67.00	79.50	146.50	1.00	1.25		1.00	4.62	
B4388	3790004388	2.00	1.50	95.00	105.00	200.00	1.25	3.00		1.25	2.00	
B4662	3790004662	2.00	1.50	107.00	117.00	224.00	1.25	3.00		1.25	2.00	
B5387	3790005387	2.50	1.50	12.00	22.25	34.25	1.00	2.50	1.50	1.00	1.81	1.06
D25CC-10-14.12	3772621119	2.50	1.50	14.12	25.00	39.12	1.50	2.00		1.50	2.00	
D25LL-12-16	3772621129	2.50	1.50	16.00	26.25	42.25	1.00	2.63	1.13	1.00	2.63	1.13
D25LL-8-38	3772621116	2.50	1.50	38.00	49.00	87.00	1.12	2.25	1.25	1.13	2.25	1.25
D25LD-3-66	3772621122	2.50	1.50	66.00	76.00	142.00	1.25	1.88	1.13	1.25	2.50	
D25LL-15-71.50	3772621134	2.50	1.50	71.50	88.25	159.75	1.00	2.13	1.13	1.00	2.13	1.13
D25LL-15-84	3772621133	2.50	1.50	84.00	100.75	184.75	1.00	2.13	1.13	1.00	2.13	1.13
D25CC-12-87.50	3772621126	2.50	1.50	87.50	116.00	203.50	1.00	0.50		1.00	0.50	
D25LD-2-90	3772621121	2.50	1.50	90.00	100.00	190.00	1.25	2.13	1.13	1.25	2.50	
D25LL-13-90	3772621130	2.50	1.50	90.00	105.38	195.38	1.00	2.13	1.13	1.00	2.13	1.13
D25LD-3-94	3772621123	2.50	1.50	94.00	104.00	198.00	1.25	1.88	1.13	1.25	2.50	
D25CC-12-100.50	3772621127	2.50	1.50	100.50	116.00	216.50	1.00	0.50		1.00	0.50	
D25DD-4-24	3772621097	2.50	1.75	24.00	33.50	57.50	1.00	3.25		1.00	3.25	
D25LL-9-36	3772621124	2.50	1.75	36.00	48.00	84.00	1.25	2.13	1.13	1.25	2.13	1.13
D25LL-14-42	3772621131	2.50	1.75	42.00	56.00	98.00	1.25	2.13	1.13	1.25	2.13	1.13
D25DD-3-63	3772621095	2.50	1.75	63.00	74.25	137.25	1.00	4.25		1.00	4.25	
B5654	3790005654	3.00	1.12	8.00	16.38	24.38	1.00	1.00		DRILLED	TPD	
B5743	3790005743	3.00	1.12	8.00	16.38	24.38	1.00	1.00		DRILLED	TPD	
B5866	3790005866	3.00	1.12	18.50	26.63	45.13	0.75	1.00		THD	1.00-14	
D30DL-2-15.375	3770521054	3.00	1.25	15.38	24.25	39.63	1.00	4.00		1.00	2.13	1.13
D30CA-2-3.62	3770521101	3.00	1.50	3.63	15.00	18.63	1.00	1.00		N/A	1.50	
D30DD-12-9.12	3790005740	3.00	1.50	9.12	22.38	31.50	2.00	4.00		2.00	2.00	
D30DC-2-17.38	3770521097	3.00	1.50	17.37	26.62	43.99	1.25	3.25		1.50	1.69	
D30CL-3-18.44	3770521099	3.00	1.50	18.44	27.50	45.94	1.13	1.00		1.13	2.00	1.09
D30CC-13-21.62	3770521098	3.00	1.50	21.62	35.00	56.62	1.50	1.50		1.50	2.00	
D30DD-9-23	3770521067	3.00	1.50	23.00	33.75	56.75	1.25	3.50		1.25	2.50	
C4438	3790004438	3.00	1.50	25.25	34.25	59.50	1.00	1.00		1.13	2.00	1.13
D30CL-2-25.25	3770521093	3.00	1.50	25.25	34.25	59.50	1.00	0.75		1.13	2.00	1.13
D30LL-7-26.50	3770521094	3.00	1.50	26.50	38.41	64.91	1.25	5.88		1.00	2.13	
D30CC-16-30.50	3770521106	3.00	1.50	30.50	43.88	74.38	1.25	1.88		1.25	1.88	
B6347	3790006347	3.00	1.75	20.00	37.50	57.50	1.50	1.50		1.50	2.50	

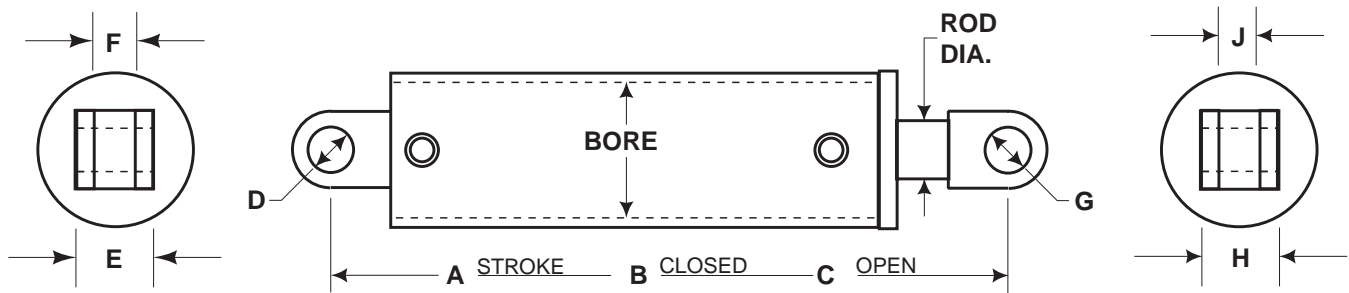
Note; The drawing above is for General Reference Only, Listed Cylinders may have Pin Eye Bushings, Bearings, Ports Flow Tubes or Other Options

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Bold / Highlighted Items are Standard Warehouse Items.



## Piston Rod Cylinders, Double Acting



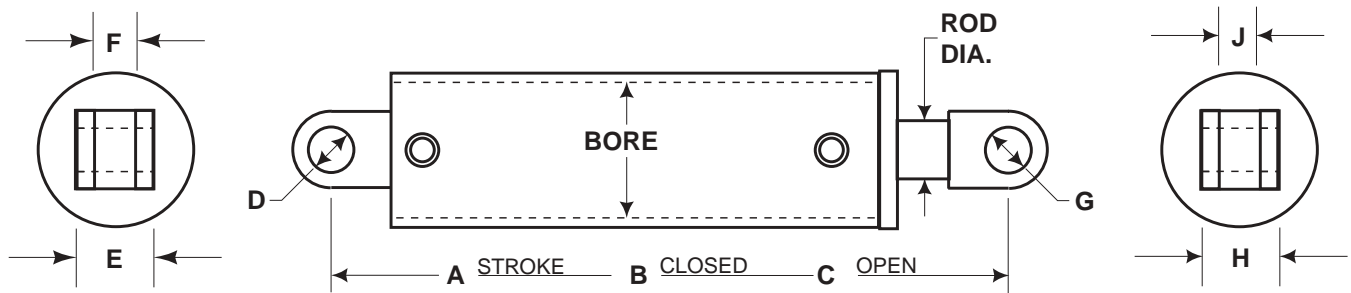
10 DIGIT NUMBER	EXTEND PORT	RETRACT PORT	GALS TO RET.	GALS TO EXT.	WT. LBS	REBUILD KIT
3776921019	#10 SAE O-RING	#10 SAE O-RING	0.30	0.50	60	3751805502
3790005799	#8 SAE O-RING	#8 SAE O-RING	0.44	0.75	70	3796805799
3770121125	#4 SAE O-RING	#4 SAE O-RING	0.06	0.09	40	3796805429
3790005429	#4 SAE O-RING	#4 SAE O-RING	0.06	0.09	40	3796805429
3790006225	#6 OR OUT BASE	#6 SAE O-RING	0.04	0.04	40	3751805569
3770121131	#8 SAE O-RING	#8 SAE O-RING	0.03	0.05	40	3751805285
3790006546	#6 SAE O-RING	#6 SAE O-RING	0.07	0.11	40	3796806387
3790006387	#6 SAE O-RING	#6 SAE O-RING	0.08	0.13	40	3796806387
3770121132	#6 SAE O-RING	#8 SAE O-RING	0.11	0.17	40	3751805509
3790004957	#6 SAE O-RING	#6 SAE O-RING	0.15	0.25	42	3751805102
3790004708	#6 SAE O-RING	#6 SAE O-RING	0.17	0.28	44	3796804708
3770121134	3/8" NPT	3/8" NPT	0.20	0.32	50	3751805285
3770121123	#6 SAE O-RING	#6 SAE O-RING	0.56	0.91	120	3751805245
3790004388	#6 SAE O-RING	#6 SAE O-RING	0.56	1.30	140	3796804388
3790004662	#6 SAE O-RING	#6 SAE O-RING	0.64	1.46	155	3796804388
3790005387	#6 SAE O-RING	#6 SAE O-RING	0.17	0.26	35	3796805387
3772621119	#6 SAE O-RING	#6 SAE O-RING	0.19	0.30	35	3751805446
3772621129	1/4" NPT	1/4" NPT	0.25	0.34	40	3751805446
3772621116	#6 SAE O-RING	#6 SAE O-RING	0.52	0.82	59	3796806390
3772621122	1/2" NPT	1/2" NPT	0.90	1.40	95	3751805360
3772621134	#8 SAE O-RING	#8 SAE O-RING	0.98	1.52	105	3751805446
3772621133	#8 SAE O-RING	#8 SAE O-RING	1.14	1.78	120	3751805446
3772621126	#8 SAE O-RING	#8 SAE O-RING	1.19	1.86	136	3751805360
3772621121	1/2" NPT	1/2" NPT	1.22	1.91	150	3751805446
3772621130	1/2" NPT	1/2" NPT	1.25	1.91	123	3751805446
3772621123	1/2" NPT	1/2" NPT	1.28	2.00	150	3751805360
3772621127	#8 SAE O-RING	#8 SAE O-RING	1.37	2.13	132	3751805360
3772621097	#8 SAE O-RING	#8 SAE O-RING	0.26	0.51	60	3751804177
3772621124	#6 SAE O-RING	#6 SAE O-RING	0.40	0.76	65	3751805482
3772621131	#6 SAE O-RING	#6 SAE O-RING	0.47	0.90	75	3751805482
3772621095	#8 SAE O-RING	#8 SAE O-RING	0.69	1.34	90	3751804177
3790005654	#8 SAE O-RING	#8 SAE O-RING	0.21	0.25	25	3796805654
3790005743	#8 SAE O-RING	#8 SAE O-RING	0.21	0.25	25	3796805743
3790005866	#8 SAE O-RING	#8 SAE O-RING	0.49	0.57	36	3796805866
3770521054	#8 SAE O-RING	#8 SAE O-RING	0.39	0.48	40	3751804194
3770521101	#8 SAE O-RING	#8 SAE O-RING	0.08	0.11	40	3751805463
3790005740	#6 SAE O-RING	#6 SAE O-RING	0.21	0.28	55	3796805740
3770521097	#8 SAE O-RING	#8 SAE O-RING	0.42	0.53	55	3751805463
3770521099	3/8" NPT	3/8" NPT	0.42	0.56	55	3751805463
3770521098	#8 SAE O-RING	#8 SAE O-RING	0.50	0.67	60	3771805516
3770521067	#8 SAE O-RING	#8 SAE O-RING	0.53	0.71	60	3751804285
3790004438	#8 SAE O-RING	#8 SAE O-RING	0.58	0.78	60	3751805192
3770521093	#6 SAE O-RING	#6 SAE O-RING	0.58	0.78	60	3751805463
3770521094	3/8" NPT	3/8" NPT	0.61	0.81	64	3751805463
3770521106	#12 SAE O-RING	#12 SAE O-RING	0.70	0.93	70	3751805545
3790006347	#8 SAE O-RING	#8 SAE O-RING	0.41	0.62	63	3796806347

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## Piston Rod Cylinders, Double Acting



ENGINEERING NUMBER	10 DIGIT NUMBER	BORE I.D.	ROD O.D.	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	F GAP	G PIN	H WIDTH	J GAP
B6310	3790006310	3.00	1.75	20.75	33.00	53.75	1.50	1.50		1.50	3.00	
D30DD-7-21.12	3770521057	3.00	1.75	21.13	30.38	51.50	1.25	3.75		1.25	3.00	
D30CD-11-21.25	3770521104	3.00	1.75	21.25	33.00	54.25	1.50	1.50		1.50	3.00	
B5806	3790005806	3.00	1.75	24.00	33.25	57.25	1.00	1.00		1.00	2.38	1.13
D30LD-4-24	3770521071	3.00	1.75	24.75	35.62	60.37	2.00	2.63	1.38	2.00	3.50	
D30CD-7-24.75	3770521058	3.00	1.75	24.75	35.62	60.37	2.00	2.00		2.00	3.50	
D30CD-10-28	3770521102	3.00	1.75	28.00	40.75	68.75	1.50	1.50		1.50	3.50	
B5162	3790005162	3.00	1.75	28.19	38.00	66.19	1.00	1.00		1.00	1.50	
D30LD-2-33.38	3770521048	3.00	1.75	33.38	46.12	79.50	1.00	2.50	1.25	1.00	2.00	
B4775	3790004775	3.00	1.75	36.00	48.00	84.00	1.50	2.75	1.50	1.50	2.75	1.50
B5642	3790005642	3.00	1.75	36.00	48.00	84.00	1.50	2.75	1.50	1.50	2.25	
C4539	3790004539	3.00	2.00	14.00	25.00	39.00	1.50	4.00		1.50	3.00	
B5653	3790005653	3.00	2.00	16.06	25.31	41.37	1.00	1.00		DRILLED	TPD	
D30LD-5-28.62	3770521095	3.00	2.00	28.63	70.62	99.25	1.50	3.38	2.38	1.50	2.00	
D30LD-6-28.62	3770521103	3.00	2.00	28.63	70.62	99.25	1.50	3.94	2.94	1.50	2.00	
C4133	3790004133	3.00	2.00	31.00	41.25	72.25	1.12	2.50	1.50	1.13	2.50	1.50
D30LC-2-31.5	3770521105	3.00	2.00	31.50	44.00	75.50	1.25	2.75	1.75	3.00	2.00	
D30DD-4-89	3770521049	3.00	2.00	89.00	100.25	189.25	1.00	4.25		1.00	4.25	
C5219	3790005219	3.25	2.00	31.00	41.25	72.25	1.13	2.50	1.50	1.13	2.50	1.50
C5220	3790005220	3.25	2.00	38.00	49.00	87.00	1.13	2.50	1.50	1.13	2.50	1.50
D35CD-10-20	3773821065	3.50	1.50	20.00	31.44	51.44	1.25	1.50		1.25	2.00	
D35LD-2-16.5	3774021003	3.50	1.75	16.50	27.50	44.00	1.50	2.38	1.13	1.50	2.50	
D35LD-5-19	3773821057	3.50	1.75	19.00	30.75	49.75	1.00	2.38	1.13	1.25	4.13	
D35LD-3-23.25	3774021004	3.50	1.75	23.25	34.25	57.50	1.50	2.38	1.13	1.50	2.50	
D35DL-2-26.31	3774021006	3.50	1.75	26.31	38.69	65.00	1.25	4.25		1.25	2.75	1.75
C4621	3790004621	3.50	2.00	13.00	29.00	42.00	2.00	4.50		2.00	1.75	
B5495	3790005495	3.50	2.00	14.75	29.25	44.00	2.00	4.50		2.00	4.50	
B5899	3790005899	3.50	2.00	14.75	29.25	44.00	2.00	4.50		2.00	4.50	
D35DD-3-16	3790005389	3.50	2.00	16.00	24.00	40.00	1.50	4.00		1.50	4.00	
B5072	3790005072	3.50	2.00	17.88	38.75	56.63	2.00	4.50		2.00	5.50	
D35DD-1-17.88	3790005501	3.50	2.00	17.88	42.75	60.63	2.00	4.50		2.00	5.50	
D35CC-16-26	3790004398	3.50	2.00	26.00	47.50	73.50	1.50	1.50		1.50	2.50	
D35CD-9-26.75	3773821061	3.50	2.00	26.75	37.50	64.25	1.25	1.50		1.25	2.50	
B4773	3790004773	3.50	2.00	38.00	51.00	89.00	1.50	1.50		1.50	2.00	
B5773	3790005773	3.50	2.00	38.00	57.00	95.00	1.50	1.50		1.50	2.00	
B6148	3790006148	3.50	2.00	38.00	57.00	95.00	1.50	1.50		1.50	2.50	
B6311	3790006311	3.50	2.00	42.00	54.75	96.75	1.75	1.50		1.75	1.50	
D35CD-7-51.31	3774021009	3.50	2.00	51.31	67.69	119.00	2.00	2.00		2.00	2.00	
D35CC-17-21.62	3773821056	3.50	2.25	21.63	32.63	54.25	1.50	2.00		1.50	2.00	
D35DB-2-14.25	3774021007	3.50	2.50	14.25	27.00	41.25	1.25	4.25		1.25	2.50	
D35LL-9-30	3773821058	3.50	2.50	29.81	39.34	69.15	1.25	2.13	1.13	1.25	2.13	1.13
D35LL-9-38	3773821059	3.50	2.50	37.81	47.34	85.15	1.25	2.13	1.13	1.25	2.13	1.13
B6071	3790006071	3.50	2.50	80.00	95.00	175.00	4.25	1.25		2.50	1.25	

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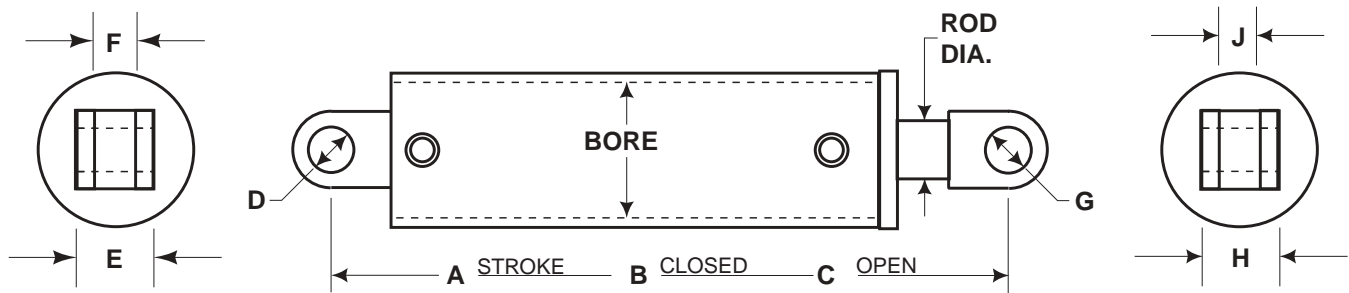
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## Piston Rod Cylinders, Double Acting



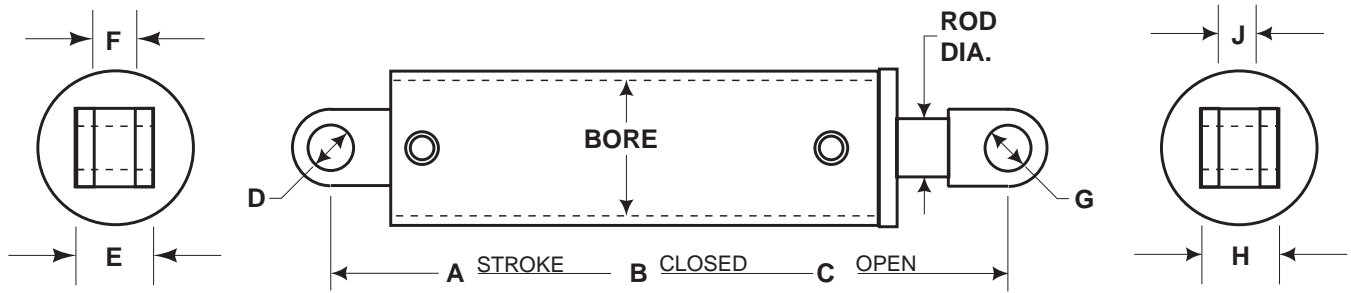
10 DIGIT NUMBER	EXTEND PORT	RETRACT PORT	GALS TO RET.	GALS TO EXT.	WT. LBS	REBUILD KIT
3790006310	#8 SAE O-RING	#8 SAE O-RING	0.42	0.64	65	3796806310
3770521057	#8 SAE O-RING	#8 SAE O-RING	0.43	0.65	68	3751804178
3770521104	#8 SAE O-RING	#8 SAE O-RING	0.43	0.65	68	3751805506
3790005806	#8 SAE O-RING	#8 SAE O-RING	0.49	0.74	70	3751805567
3770521071	#16 SAE O-RING	#16 SAE O-RING	0.50	0.76	72	3751804248
3770521058	#16 SAE O-RING	#16 SAE O-RING	0.50	0.76	72	3751804248
3770521102	#8 SAE O-RING	#8 SAE O-RING	0.57	0.86	72	3751805500
3790005162	#8 SAE O-RING	#8 SAE O-RING	0.57	0.87	75	3796805162
3770521048	#6 SAE O-RING	#6 SAE O-RING	0.70	1.10	75	3751804178
3790004775	#8 SAE O-RING	#8 SAE O-RING	0.73	1.11	83	3796804775
3790005642	#8 SAE O-RING	#8 SAE O-RING	0.73	1.11	83	3796805642
3790004539	#8 SAE O-RING	#8 SAE O-RING	0.24	0.43	60	3796804539
3790005653	#8 SAE O-RING	#8 SAE O-RING	0.28	0.50	65	3796805653
3770521095	#8 SAE O-RING	#8 SAE O-RING	0.50	0.88	100	3751805369
3770521103	#8 SAE O-RING	#8 SAE O-RING	0.50	0.88	110	3751805369
3790004133	#6 SAE O-RING	#6 SAE O-RING	0.53	0.95	85	3796804133
3770521105	#6 SAE O-RING	#6 SAE O-RING	0.54	0.97	80	3751805369
3770521049	#8 SAE O-RING	#8 SAE O-RING	1.52	2.73	170	3751804179
3790005219	#6 SAE O-RING	#6 SAE O-RING	0.70	1.12	85	3796805219
3790005220	#6 SAE O-RING	#6 SAE O-RING	0.85	1.38	85	3796805220
3773821065	#12 SAE O-RING	#12 SAE O-RING	0.68	0.83	55	3751805377
3774021003	#8 SAE O-RING	#6 SAE O-RING	0.52	0.69	85	3751804173
3773821057	#8 SAE O-RING	#8 SAE O-RING	0.60	0.80	95	3751805480
3774021004	#8 SAE O-RING	#8 SAE O-RING	0.73	0.97	105	3751804173
3774021006	#12 SAE O-RING	#8 SAE O-RING	0.83	1.10	110	3751804246
3790004621	#6 SAE O-RING	#6 SAE O-RING	0.37	0.55	80	3796804621
3790005495	#6 SAE O-RING	#6 SAE O-RING	0.42	0.62	85	3796805495
3790005899	#6 SAE O-RING	#6 SAE O-RING	0.42	0.62	85	3796805899
3790005389	#8 SAE O-RING	#8 SAE O-RING	0.45	0.67	85	3796805389
3790005072	#6 SAE O-RING	#6 SAE O-RING	0.51	0.75	85	3796805072
3790005501	#6 SAE O-RING	#6 SAE O-RING	0.51	0.75	90	3796805501
3790004398	#8 SAE O-RING	#8 SAE O-RING	0.73	1.08	100	3796804398
3773821061	#8 SAE O-RING	#8 SAE O-RING	0.75	1.11	80	3751805450
3790004773	#8 SAE O-RING	#8 SAE O-RING	1.07	1.58	119	3796804773
3790005773	#12 SAE O-RING	#12 SAE O-RING	1.07	1.58	120	3796805773
3790006148	#12 SAE O-RING	#12 SAE O-RING	1.07	1.58	120	3796806148
3790006311	#6 SAE O-RING	#6 SAE O-RING	1.18	1.75	100	3796806311
3774021009	#16 SAE O-RING	#16 SAE O-RING	1.45	2.14	130	3751804247
3773821056	#12 SAE O-RING	#12 SAE O-RING	0.53	0.90	70	3751805444
3774021007	#8 SAE O-RING	#8 SAE O-RING	0.30	0.60	80	3751804281
3773821058	3/8" NPT	3/8" NPT	0.61	1.25	90	3751805461
3773821059	3/8" NPT	3/8" NPT	0.78	1.58	106	3751805461
3790006071	#8 SAE O-RING	#8 SAE O-RING	1.64	3.34	223	3796806071

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# Piston Rod Cylinders, Double Acting



ENGINEERING NUMBER	10 DIGIT NUMBER	BORE I.D.	ROD O.D.	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	F GAP	G PIN	H WIDTH	J GAP
D40CB-8-21	3776821085	4.00	1.50	21.00	32.50	53.50	1.00	1.50		0.75	1.50	
D40DL-2-30.38	3776821029	4.00	1.75	30.38	43.75	74.13	1.25	4.75		1.25	2.75	1.75
D40CD-11-15	3776821074	4.00	2.00	15.00	29.13	44.13	1.75	1.50		1.75	2.25	
D40LD-2-16.5	3776821020	4.00	2.00	16.50	27.50	44.00	2.00	2.63	1.38	2.00	4.00	
D40CD-9-21.50	3776821077	4.00	2.00	21.50	45.94	67.44	1.50	1.50		1.50	3.00	
D40LD-4-21.75	3776821041	4.00	2.00	21.75	38.62	60.37	2.00	2.63	1.38	2.00	3.50	
D40CD-8-22	3776821067	4.00	2.00	22.00	36.00	58.00	1.50	2.88		1.50	2.50	
D40DD-16-22.50	3776821069	4.00	2.00	22.50	33.12	55.62	1.50	4.50		1.50	2.25	
D40DD-19-22.50	3776821080	4.00	2.00	22.50	33.12	55.62	1.50	4.50		1.50	2.25	
D40CL-3-23.50	3776821076	4.00	2.00	23.38	34.50	57.88	1.75	1.50		1.25	2.50	1.25
D40CE-3-24	3776821073	4.00	2.00	24.00	41.00	65.00	1.50	1.50		THD	2.00-8	
D40CD-10-24	3776821072	4.00	2.00	24.00	43.50	67.50	1.50	1.50		1.50	3.00	
D40CD-9-24	3776821071	4.00	2.00	24.00	43.50	67.50	1.50	1.50		1.50	3.00	
D40LD-5-24.75	3776821042	4.00	2.00	24.75	35.62	60.37	2.00	2.63	1.38	2.00	3.50	
D40LD-3-24.75	3776821027	4.00	2.00	24.75	35.62	60.37	2.00	2.63	1.38	2.00	3.50	
D40LD-6-24.75	3776821044	4.00	2.00	24.75	38.62	63.37	2.00	2.63	1.38	2.00	3.50	
D40CD-14-25	3776821084	4.00	2.00	25.00	36.00	61.00	1.50	2.88		1.50	2.50	
D4131	3790004131	4.00	2.00	26.00	47.50	73.50	1.50	1.50		1.50	1.50	
D40CD-12-28	3776821075	4.00	2.00	28.00	40.38	68.38	1.25	1.50		1.25	2.50	
B5548	3790005548	4.00	2.00	45.38	57.37	102.75	1.50	2.88	1.62	1.50	3.38	
B6178	3790006178	4.00	2.00	46.00	63.12	109.12	2.00	2.00		2.00	2.00	
C3847	3790003847	4.00	2.50	21.63	32.63	54.25	1.50	2.00		1.50	2.00	
D40DD-10-21.62	3776821019	4.00	2.50	21.63	33.31	54.94	2.00	5.13		2.00	3.62	
D40CC-16-24.81	3776821024	4.00	2.50	24.81	34.31	59.13	1.50	3.00		1.50	3.00	
D40LB-1-35.31	3776821021	4.00	2.50	35.31	51.44	86.75	1.25	2.75	1.75	1.25	2.50	
D40CD-13-37	3776821078	4.00	2.50	37.00	48.00	85.00	1.50	2.00		1.50	3.00	
D40DD-17-42	3776821070	4.00	2.50	42.00	52.50	94.50	1.50	4.50		1.50	2.25	
D40CB-7-42	3776821030	4.00	2.50	42.00	53.06	95.06	1.50	2.50		1.50	2.50	
B5609	3790005609	4.00	2.50	72.00	86.50	158.50	TR	TR		1.50	3.00	
D40DB-3-25.62	3776821025	4.00	2.75	25.62	37.62	63.24	1.50	4.63		1.50	2.63	
D40DB-3-28.5	3776821022	4.00	2.75	28.50	37.62	66.12	1.50	4.63		1.50	2.63	
D4291	3790004291	4.00	3.00	23.00	36.06	59.06	2.00	5.75		2.00	3.50	
D4143	3790004143	4.00	3.00	23.50	34.00	57.50	1.75	5.00		1.75	2.00	
B6622	3790006622	4.00	3.00	39.50	54.38	93.88	2.00	6.12		2.00	5.62	
B6643	3790006643	4.00	3.00	52.75	68.00	120.75	2.00	6.12		2.00	5.00	
D45LD-5-21.75	3774121016	4.50	2.00	21.75	38.62	60.37	2.00	2.63	1.38	2.00	3.50	
D45LD-6-24	3774121017	4.50	2.00	24.75	35.62	60.37	2.00	2.63	1.38	2.00	3.50	
C3850	3790003850	4.50	2.00	26.50	40.62	67.12	1.50	2.00		1.50	2.50	
D45CC-11-26.94	3774121027	4.50	2.00	26.94	40.63	67.57	1.50	2.00		1.50	2.00	
D45CC-3-38.31	3775221022	4.50	2.00	38.31	53.31	91.62	1.50	2.75		3.00	2.75	
D45LD-7-45.38	3774121032	4.50	2.00	45.38	57.37	102.75	1.50	2.88	1.62	1.50	3.38	
D45CD-3-49.12	3774121013	4.50	2.00	49.13	67.69	116.81	1.50	2.00		1.50	2.25	
D45CD-2-49.12	3774121012	4.50	2.00	49.13	67.69	116.82	2.00	2.00		2.00	2.25	
D45CD-2-51.31	3774121014	4.50	2.00	51.31	67.69	119.00	2.00	2.00		2.00	2.25	
D45DD-8-16.75	3774121038	4.50	2.50	16.75	27.00	43.75	1.50	5.75		1.50	3.00	
D45CC-16-32.50	3774121037	4.50	2.50	32.50	44.12	76.62	2.00	2.75		2.00	2.75	
D45CC-14-41.50	3774121035	4.50	2.50	41.50	59.25	100.75	2.00	2.00		2.00	2.88	
D45CC-15-41.50	3774121036	4.50	2.50	41.50	59.25	100.75	2.00	2.00		2.00	3.00	

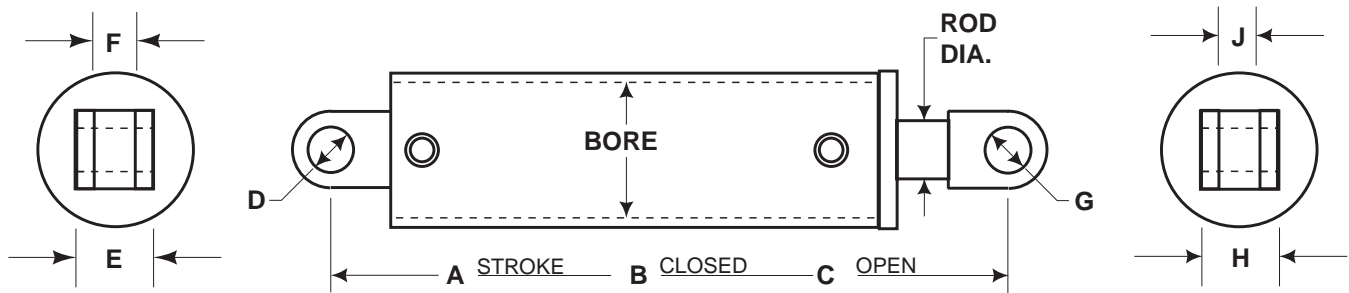
Note; The drawing above is for General Reference Only, Listed Cylinders may have Pin Eye Bushings, Bearings, Ports Flow Tubes or Other Options

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

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## Piston Rod Cylinders, Double Acting



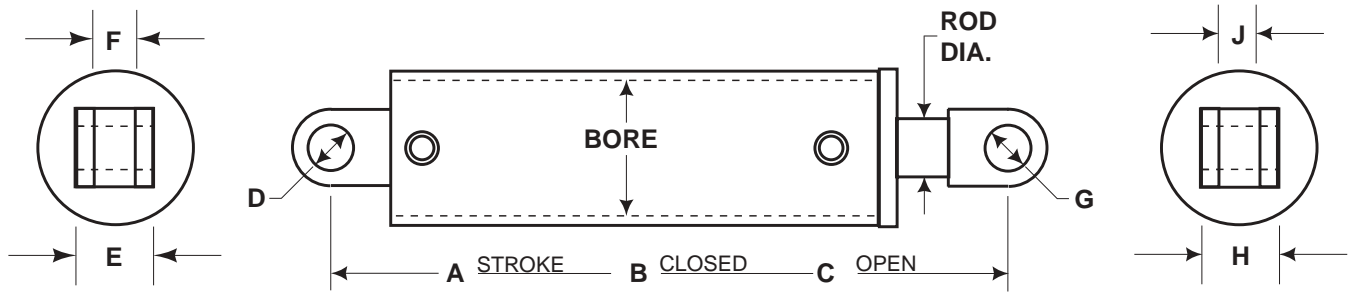
10 DIGIT NUMBER	EXTEND PORT	RETRACT PORT	GALS TO RET.	GALS TO EXT.	WT. LBS	REBUILD KIT
3776821085	3/4" NPT	3/4" NPT	0.98	1.14	70	3751805538
3776821029	#12 SAE O-RING	#12 SAE O-RING	1.34	1.66	75	3751804245
3776821074	3/4" NPT	3/4" NPT	0.66	0.82	75	3776821074
3776821020	#8 SAE O-RING	#8 SAE O-RING	0.68	0.90	75	3751804171
3776821077	1/2" NPT	1/2" NPT	1.00	1.17	100	3751805460
3776821041	#8 SAE O-RING	#8 SAE O-RING	0.86	1.15	100	3751804239
3776821067	#10 SAE O-RING	#10 SAE O-RING	0.90	1.20	110	3751805387
3776821069	#8 SAE O-RING	#8 SAE O-RING	0.92	1.22	110	3751805447
3776821080	#8 SAE O-RING	#8 SAE O-RING	0.92	1.22	90	3751805447
3776821076	#10 SAE O-RING	#10 SAE O-RING	0.96	1.28	85	3751805460
3776821073	#12 SAE O-RING	#12 SAE O-RING	0.98	1.30	105	3751805447
3776821072	1/2" NPT	1/2" NPT	0.98	1.30	110	3751805460
3776821071	1/2" NPT	1/2" NPT	0.98	1.30	110	3751805460
3776821042	#16 SAE O-RING	#16 SAE O-RING	1.01	1.35	140	3751804239
3776821027	#8 SAE O-RING	#8 SAE O-RING	1.01	1.35	140	3751804239
3776821044	#16 SAE O-RING	#16 SAE O-RING	1.01	1.35	210	3751804454
3776821084	#10 O-RING	#10 O-RING	1.02	1.36	110	3751805460
3790004131	#8 SAE O-RING	#8 SAE O-RING	1.07	1.42	122	3796804131
3776821075	1/2" NPT	1/2" NPT	1.14	1.52	95	3751805460
3790005548	#12 SAE O-RING	#12 SAE O-RING	1.86	2.47	125	3796805548
3790006178	#16 SAE O-RING	#12 SAE O-RING	1.88	2.51	166	3796806178
3790003847	#12 SAE O-RING	#12 SAE O-RING	0.72	1.18	90	3796803847
3776821019	#12 SAE O-RING	#8 SAE O-RING	0.72	1.18	95	3751804176
3776821024	#8 SAE O-RING	#8 SAE O-RING	0.83	1.36	95	3751804197
3776821021	#8 SAE O-RING	#8 SAE O-RING	1.18	1.96	95	3751804203
3776821078	#12 SAE O-RING	#12 SAE O-RING	1.23	2.01	140	3751805459
3776821070	#8 SAE O-RING	#8 SAE O-RING	1.39	2.28	145	3751805459
3776821030	#16 SAE O-RING	#12 SAE O-RING	1.39	2.28	150	3751804203
3790005609	#16 SAE O-RING	#16 SAE O-RING	2.39	3.92	245	3796805609
3776821025	#8 SAE O-RING	#8 SAE O-RING	0.74	1.40	95	3751804202
3776821022	#8 SAE O-RING	#8 SAE O-RING	0.82	1.55	95	3751804202
3790004291	#16 SAE O-RING	#12 SAE O-RING	0.55	1.26	125	3796804291
3790004143	#16 SAE O-RING	#12 SAE O-RING	0.56	1.28	120	3796804143
3790006622	#20 SAE O-RING	#16 SAE O-RING	0.94	2.15	190	3796806622
3790006643	#16 SAE O-RING	#16 SAE O-RING	1.26	2.87	234	3796806643
3774121016	#8 SAE O-RING	#8 SAE O-RING	1.21	1.50	150	3751804238
3774121017	#16 SAE O-RING	#16 SAE O-RING	1.37	1.71	160	3751804238
3790003850	#12 SAE O-RING	#12 SAE O-RING	1.47	1.83	105	3796803850
3774121027	#12 SAE O-RING	#12 SAE O-RING	1.56	1.85	105	3751805448
3775221022	#16 SAE O-RING	#16 SAE O-RING	2.12	2.64	130	3751804230
3774121032	#12 SAE O-RING	#12 SAE O-RING	2.60	3.10	150	3751805448
3774121013	#12 SAE O-RING	#12 SAE O-RING	2.72	3.39	195	3751804172
3774121012	#16 SAE O-RING	#16 SAE O-RING	2.72	3.39	210	3751804172
3774121014	#16 SAE O-RING	#16 SAE O-RING	2.84	3.54	210	3751804172
3774121038	#8 SAE O-RING	#8 SAE O-RING	0.80	1.15	90	3751805541
3774121037	#20 SAE O-RING	#16 SAE O-RING	1.55	2.23	140	3751805541
3774121035	#12 SAE O-RING	#12 SAE O-RING	1.98	2.86	200	3751805486
3774121036	#12 SAE O-RING	#12 SAE O-RING	1.98	2.86	200	3751805392

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# Piston Rod Cylinders, Double Acting



ENGINEERING NUMBER	10 DIGIT NUMBER	BORE I.D.	ROD O.D.	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	F GAP	G PIN	H WIDTH	J GAP
D45CC-13-42	3774121030	4.50	2.50	42.00	69.00	111.00	1.75	2.00		1.75	1.75	
D45CL-2-42	3774121028	4.50	2.50	42.00	69.00	111.00	1.75	3.56	1.81	1.75	1.75	
D45CC-13-44.25	3774121031	4.50	2.50	44.25	69.00	113.25	1.75	2.00		1.75	1.75	
D45CL-2-44.25	3774121029	4.50	2.50	44.25	69.00	113.25	1.75	3.56	1.81	1.75	1.75	
D4496	3790004496	4.50	2.50	46.00	63.12	109.12	2.00	2.00		2.00	2.00	
B5788	3790005788	4.50	2.50	46.00	63.12	109.12	2.00	2.00		2.00	2.00	
D45CC-7-46	3790005782	4.50	2.50	46.00	63.12	109.12	2.00	2.00		2.00	2.00	
D45CC-5-34.50	3774121023	4.50	3.00	34.50	53.62	88.12	2.00	2.25		2.00	2.25	
D45DD-7-34.50	379006002	4.50	3.00	34.50	54.00	88.50	2.00	6.12		2.00	5.00	
B6291	3790006291	4.50	3.00	34.50	56.00	90.50	2.50	3.64		2.50	3.64	
D45CC-6-34.50	3774121024	4.50	3.00	34.50	56.00	90.50	1.38	4.21		1.38	4.21	
D4048	3790004048	4.50	3.00	35.00	56.00	91.00	2.25	1.75		2.25	1.75	
B6231	3790006231	4.50	3.00	52.75	68.00	120.75	2.00	6.12		2.00	5.00	
D4266	3790004266	4.50	3.50	23.00	36.06	59.06	2.00	5.75		2.00	3.50	
B6487	3790006487	4.50	3.50	25.62	40.50	66.12	2.00	6.12		2.00	4.00	
D3784	3790003784	4.50	3.50	31.00	41.00	72.00	2.00	5.75		2.00	3.00	
D4292	3790004292	4.50	3.50	32.50	47.38	79.88	2.00	6.12		2.00	5.25	
B5873	3790005873	5.00	1.50	43.00	60.00	103.00	2.00	1.75		1.50	1.25	
D50CD-4-30	3777921071	5.00	2.00	30.00	54.00	84.00	1.50	2.44		1.50	2.44	
D50CD-3-43.12	3777921062	5.00	2.00	43.13	58.87	102.00	1.50	2.00		1.75	2.00	
D3812	3790003812	5.00	2.00	46.88	66.63	113.50	1.75	1.50		1.75	3.25	
D50DB-13-24	3777921059	5.00	2.50	24.00	33.31	57.31	1.25	5.88		1.25	2.50	
D50CC-23-36	3777921065	5.00	2.50	36.00	49.00	85.00	2.00	2.00		2.63	2.00	
C3872	3790003872	5.00	2.50	36.00	49.25	85.25	2.00	1.88		2.63	1.88	
D50DL-2-42	3777921060	5.00	2.50	42.00	52.31	94.31	1.25	5.88		1.25	2.13	1.13
D50CB-3-42	3777921005	5.00	2.50	42.00	53.06	95.06	1.50	2.00		1.50	2.50	
D50CE-2-43.75	3777921057	5.00	2.50	43.75	57.62	101.37	2.00	2.00		THD	2.25-12	
D4195	3790004195	5.00	2.50	44.25	65.12	109.37	1.75	3.62	2.12	2.00	1.50	
B6497	3790006497	5.00	2.50	46.00	63.12	109.12	2.00	2.00		2.00	2.00	
D50CC-22-20	3777921064	5.00	3.00	20.00	33.00	53.00	2.00	2.00		2.00	2.00	
D50CB-8-27	3777921058	5.00	3.00	27.00	39.00	66.00	1.75	3.00		1.75	3.00	
B5427	3790005427	5.00	3.00	34.50	56.00	90.50	1.75	6.12		1.75	5.00	
B6236	3790006236	5.00	3.00	34.50	56.00	90.50	2.00	6.12		2.00	4.50	
B6349	3790006349	5.00	3.00	34.50	56.62	91.12	2.00	2.25		2.00	2.25	
D50DD-23-52.75	3777921066	5.00	3.00	52.75	68.00	120.75	2.00	6.12		2.00	5.00	
D50CC-21-18.50	3777921063	5.00	3.50	18.50	34.50	53.00	2.50	2.50		2.50	2.50	
B5056	3790005056	5.00	3.50	28.00	66.50	94.50	2.00	6.12		2.00	4.00	
D50CB-9-32.50	3777921067	5.00	3.50	32.50	44.38	76.88	2.00	2.75		2.00	2.75	
C4543	3790004543	5.00	3.50	34.00	46.50	80.50	2.00	6.00		2.00	4.00	
D50CC-24-34.19	3777921069	5.00	3.50	34.19	52.50	86.69	2.25	2.25		2.25	2.25	
D50DC-3-45	3777921070	5.00	3.50	45.00	60.00	105.00	3.50	6.50		2.00	3.00	
B5473	3790005473	5.00	3.50	50.00	66.50	116.50	1.75	3.00		1.75	4.50	
D50AA-1-10	3776321013	5.00	3.75	10.00	21.69	31.69	SPL	MNT		SPL	MNT	
D50AA-3-16	3776321058	5.00	3.75	16.00	28.03	44.03	SPL	MNT		SPL	MNT	
D50AB-4-10	3776321011	5.00	3.88	10.00	32.00	42.00	SPL	MNT		SPL	MNT	
D4172	3790004172	5.00	4.00	25.62	40.50	66.12	2.00	6.12		2.00	4.00	
B6191	3790006191	5.00	4.00	25.62	40.50	66.12	2.00	6.12		2.00	4.00	
D4265	3790004265	5.00	4.00	32.50	47.38	79.88	2.00	6.12		2.00	5.25	

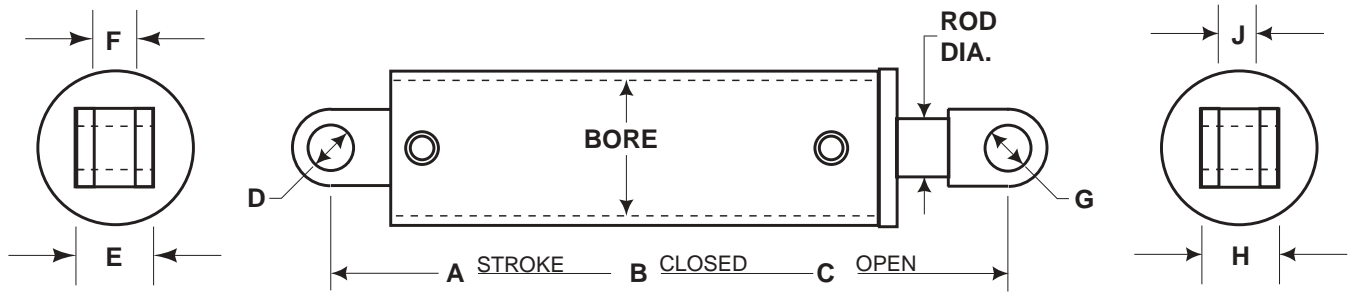
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## Piston Rod Cylinders, Double Acting



10 DIGIT NUMBER	EXTEND PORT	RETRACT PORT	GALS TO RET.	GALS TO EXT.	WT. LBS	REBUILD KIT
3774121030	#12 SAE O-RING	#12 SAE O-RING	2.08	2.90	213	3751805489
3774121028	#12 SAE O-RING	#12 SAE O-RING	2.08	2.90	218	3751805489
3774121031	#12 SAE O-RING	#12 SAE O-RING	2.18	3.05	211	3751805489
3774121029	#12 SAE O-RING	#12 SAE O-RING	2.18	3.05	210	3751805489
3790004496	#16 SAE O-RING	#12 SAE O-RING	2.19	3.17	225	3796804496
3790005788	#16 SAE O-RING	#12 SAE O-RING	2.19	3.17	225	3796804496
3790005782	#12 SAE O-RING	#12 SAE O-RING	2.19	3.17	230	3796805782
3774121023	#16 SAE O-RING	#16 SAE O-RING	1.32	2.38	230	3751805194
3790006002	#12 SAE O-RING	#12 SAE O-RING	1.32	2.38	205	3796806002
3790006291	#16 SAE O-RING	#16 SAE O-RING	1.32	2.38	230	3796806291
3774121024	#16 SAE O-RING	#16 SAE O-RING	1.32	2.38	230	3751805194
3790004048	3/4# NPT	3/4" NPT	1.34	2.41	230	3796804048
3790006231	#16 SAE O-RING	#16 SAE O-RING	2.02	3.64	287	3796806231
3790004266	#16 SAE O-RING	#12 SAE O-RING	0.63	1.59	155	3796804266
3790006487	#16 SAE O-RING	#12 SAE O-RING	0.70	1.77	173	3796806487
3790003784	#16 SAE O-RING	#12 SAE O-RING	0.84	2.13	180	3796803784
3790004292	#16 SAE O-RING	#12 SAE O-RING	0.89	2.24	140	3796804292
3790005873	#8 SAE O-RING	#16 SAE O-RING	3.33	3.66	150	3796805873
3777921071	#8 SAE O-RING	#8 SAE O-RING	2.15	2.55	130	3751805395
3777921062	3/4" NPT	3/4" NPT	3.19	3.66	200	3751805484
3790003812	1/2" NPT	1/2" NPT	3.35	3.99	205	3796803812
3777921059	1/2" NPT	1/2" NPT	1.53	2.04	120	3751805443
3777921065	#16 SAE O-RING	#16 SAE O-RING	2.31	3.06	137	3751805495
3790003872	#16 SAE O-RING	#16 SAE O-RING	2.31	3.06	185	3796803872
3777921060	1/2" NPT	1/2" NPT	2.68	3.57	175	3751805443
3777921005	#12 SAE O-RING	#12 SAE O-RING	2.68	3.57	200	3751804233
3777921057	3/4" NPT	3/4" NPT	2.79	3.72	190	3751805443
3790004195	#12 SAE O-RING	#12 SAE O-RING	2.83	3.77	242	3796804195
3790006497	#12 SAE O-RING	#12 SAE O-RING	2.94	3.91	250	3796806497
3777921064	#12 SAE O-RING	#12 SAE O-RING	1.10	1.70	130	3751805494
3777921058	3/4" NPT	3/4" NPT	1.47	2.30	150	3751805445
3790005427	#16 SAE O-RING	#16 SAE O-RING	1.88	2.93	250	3796805427
3790006236	#16 SAE O-RING	#16 SAE O-RING	1.88	2.93	210	3796806236
3790006349	#16 SAE O-RING	#16 SAE O-RING	1.88	2.93	215	3796806349
3777921066	#16 SAE O-RING	#16 SAE O-RING	2.90	4.48	270	3751805505
3777921063	#16 SAE O-RING	#16 SAE O-RING	0.91	1.57	180	3751805451
3790005056	#20 SAE O-RING	#16 SAE O-RING	1.22	2.38	170	3796805056
3777921067	#16 SAE O-RING	#12 SAE O-RING	1.50	2.80	160	3751805451
3790004543	#16 SAE O-RING	#16 SAE O-RING	1.48	2.90	170	3796805489
3777921069	#12 SAE O-RING	#12 SAE O-RING	1.48	2.91	180	3751805451
3777921070	#12 SAE O-RING	#12 SAE O-RING	2.00	3.82	165	3751805451
3790005473	#8 SAE O-RING	#8 SAE O-RING	2.17	4.25	210	3796805473
3776321013	3/8" NPT	1/8" NPT IN ROD	0.25	1.00	123	3911804199
3776321058	3/8" NPT	1/8" NPT IN ROD	1.02	1.36	150	3911804199
3776321011	1/4" NPT	1/4" NPT	0.34	0.85	150	3751805570
3790004172	#16 SAE O-RING	#12 SAE O-RING	0.79	2.18	214	3796804172
3790006191	#16 SAE O-RING	#12 SAE O-RING	0.79	2.18	215	3796806191
3790004265	#16 SAE O-RING	#12 SAE O-RING	1.00	2.77	185	3796804265

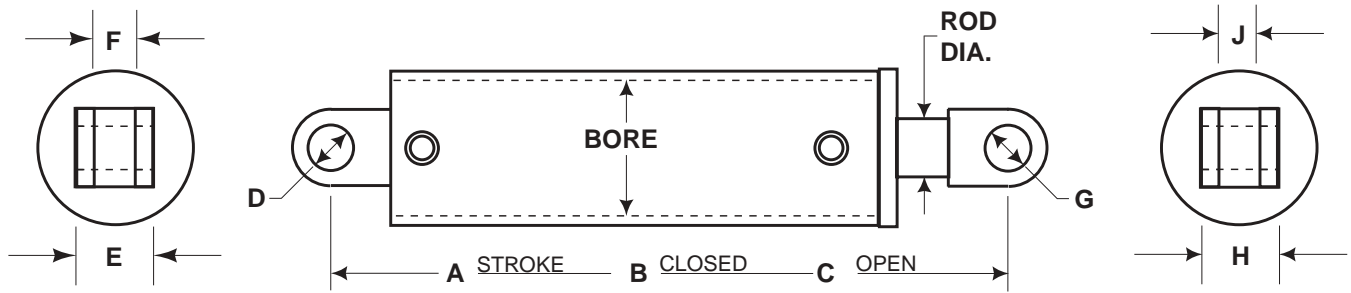
Note; The drawing above is for General Reference Only, Listed Cylinders may have Pin Eye Bushings, Bearings, Ports Flow Tubes or Other Options

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## Piston Rod Cylinders, Double Acting



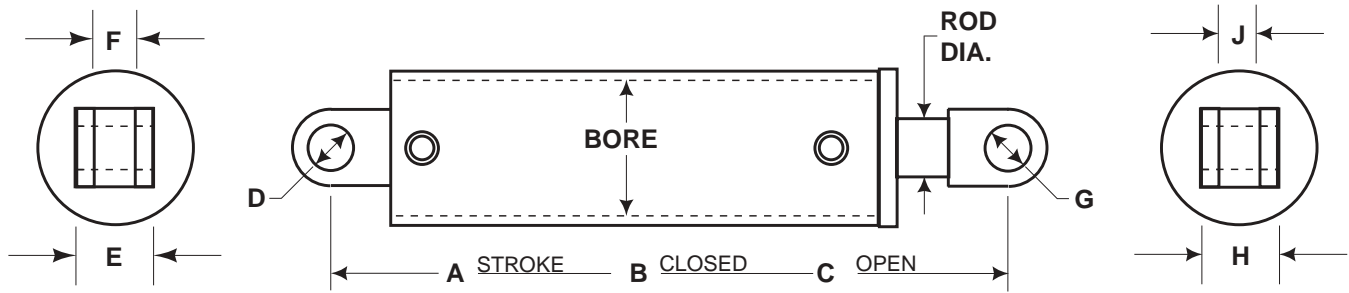
ENGINEERING NUMBER	10 DIGIT NUMBER	BORE I.D.	ROD O.D.	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	F GAP	G PIN	H WIDTH	J GAP
D4541	3790004541	5.00	4.00	37.25	54.62	91.87	2.00	6.12		2.00	5.25	
B6488	3790006488	5.00	4.00	38.62	54.62	93.24	2.00	6.12		2.50	5.00	
B5489	3790005489	5.00	4.00	39.50	54.38	93.88	2.00	6.12		2.00	6.12	
D4596	3790004596	5.00	4.00	39.50	54.38	93.88	2.00	6.12		2.00	4.00	
B6314	3790006314	5.00	4.00	39.50	54.38	93.88	1.38	6.31		1.38	5.81	
D50DD-21-39.50	3777921061	5.00	4.00	39.50	54.38	93.88	2.00	6.12		2.00	5.62	
D50CB-6-40	3777921038	5.00	4.00	40.00	52.50	92.50	2.00	3.00		2.00	3.00	
D55CC-8-37	3771921040	5.50	2.50	37.00	49.38	86.38	2.00	2.75		2.00	2.75	
D55CC-2-38.31	3771921030	5.50	2.50	38.31	53.31	91.62	1.50	2.75		3.00	2.75	
D55CB-7-40.50	3771921042	5.50	2.50	40.50	53.50	94.00	1.50	2.50		1.50	2.50	
D55CC-3-49.13	3771921032	5.50	3.00	49.13	67.69	116.81	2.00	2.00		2.00	2.75	
D55CC-7-24	3771921039	5.50	3.50	24.00	36.60	60.60	2.00	2.00		2.00	2.00	
C3878	3790003878	5.50	3.50	24.25	36.25	60.50	2.00	1.75		2.00	2.00	
D55CC-9-35.88	3771921041	5.50	4.00	35.88	49.38	85.26	2.00	2.00		2.00	2.00	
D55CB-5-49.88	3771921034	5.50	4.00	49.88	66.00	115.88	1.75	3.00		2.00	3.88	
D55CB-6-52.88	3771921038	5.50	4.00	52.88	72.00	124.88	1.75	3.00		2.00	3.88	
C3563	3790003563	5.50	4.00	54.13	75.00	129.13	1.25	1.25		1.25	2.00	
D55CC-6-63	3771921033	5.50	4.00	63.00	81.00	144.00	2.00	3.00		2.00	3.00	
D55DB-2-63	3771921035	5.50	4.00	63.00	81.12	144.12	2.00	6.50		2.00	3.88	
B6190	3790006190	5.50	4.50	38.62	54.62	93.24	2.50	6.75		2.50	5.00	
D4171	3790004171	5.50	4.50	38.62	54.63	93.25	2.50	6.75		2.50	5.00	
D60AA-2-10	3770921075	6.00	SPL	10.00	21.69	31.69	SPL	MNT		SPL	MNT	
C4536	3790004536	6.00	2.25	15.75	30.00	45.75	2.50	2.50		2.50	2.50	
C3810	3790003810	6.00	2.50	34.00	51.00	85.00	1.75	3.00		1.75	3.00	
D60DC-7-42.62	3771421134	6.00	2.75	42.63	59.25	101.88	2.00	7.00		3.00	2.75	
D60DC-8-60	3771421161	6.00	2.75	60.00	76.62	136.62	2.00	7.00		3.00	2.75	
D60CB-5-26	3771421220	6.00	3.00	26.00	40.50	66.50	1.50	2.50		1.50	3.00	
D60CL-2-40	3771421221	6.00	3.00	40.00	54.47	94.47	1.50	2.50		1.50	3.00	1.56
D60CB-5-47	3771421217	6.00	3.00	47.00	61.50	108.50	1.50	2.50		1.50	3.00	
D60CB-6-56.50	3771421236	6.00	3.00	56.50	71.25	127.75	1.50	2.00		1.25	3.00	
D3838	3790003838	6.00	3.00	76.00	89.62	165.62	3.50	7.25		3.50	3.50	
B5983	3790005983	6.00	3.50	78.00	99.62	177.62	2.00	2.00		2.00	3.50	
D60DD-4-69	3771421090	6.00	3.75	69.00	84.31	153.31	3.50	7.00		2.75	5.00	
D60DB-20-63	3771421215	6.00	4.00	63.00	75.00	138.00	2.00	7.00		2.00	3.88	
D4210	3790004210	6.00	4.00	65.75	81.62	147.37	2.00	6.75		2.00	3.00	
D60CC-33-65.75	3790006419	6.00	4.00	65.75	82.12	147.87	2.00	2.25		2.00	2.25	
D60DD-14-79	3771421222	6.00	4.00	79.00	96.00	175.00	3.00	6.63		3.00	4.50	
D60BC-2-27.81	3771421229	6.00	4.50	27.81	45.50	73.31	1.75	6.50		3.38	2.50	
D60BC-2-30.31	3771421218	6.00	4.50	30.31	43.00	73.31	1.75	6.50		3.38	2.50	
D60BC-3-30.31	3771421224	6.00	4.50	30.31	43.00	73.31	1.75	6.50		3.38	2.50	
D60DC-10-30.50	3771421216	6.00	4.50	30.50	43.25	73.75	1.75	6.50		3.38	2.50	
D60DC-11-30.50	3771421219	6.00	4.50	30.50	43.25	73.75	1.50	6.50		3.38	2.50	
B6297	3790006297	6.00	4.50	31.88	52.38	84.26	4.25	4.25		4.25	4.25	
C4219	3790004219	6.00	4.50	31.88	56.00	87.88	2.25	1.97		2.25	1.97	
B6181	3790006181	6.00	4.50	32.00	52.50	84.50	2.25	3.64		2.25	3.64	
C3241-4	3771421196	6.00	4.50	32.00	56.00	88.00	2.00	1.62		2.00	1.62	
D60CF-3-32.38	3771421225	6.00	4.50	33.88	43.12	77.00	SPL	MNT		SPL	4.50	

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## Piston Rod Cylinders, Double Acting



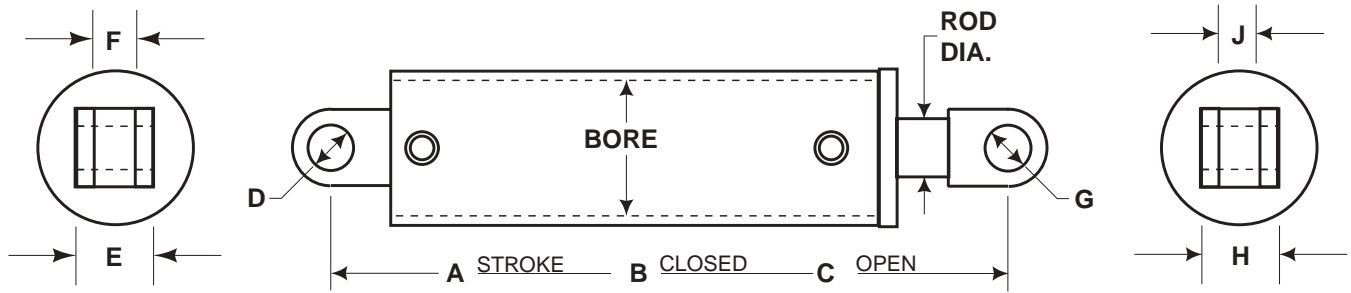
10 DIGIT NUMBER	EXTEND PORT	RETRACT PORT	GALS TO RET.	GALS TO EXT.	WT. LBS	REBUILD KIT
3790004541	#16 SAE O-RING	#12 SAE O-RING	1.14	3.17	196	3796804541
3790006488	#16 SAE O-RING	#12 SAE O-RING	1.19	3.29	177	3796806488
3790005489	#20 SAE O-RING	#16 SAE O-RING	1.21	3.36	312	3796805489
3790004596	#20 SAE O-RING	#16 SAE O-RING	1.21	3.36	312	3796804596
3790006314	#20 SAE O-RING	#16 SAE O-RING	1.21	3.36	312	3751805065
3777921061	#20 SAE O-RING	#16 SAE O-RING	1.21	3.36	300	3751805492
3777921038	#16 SAE O-RING	#16 SAE O-RING	1.23	3.40	210	3751804530
3771921040	#20 SAE O-RING	#16 SAE O-RING	3.02	3.81	180	3751805517
3771921030	#16 SAE O-RING	#16 SAE O-RING	3.13	3.94	190	3751804241
3771921042	#16 SAE O-RING	#12 SAE O-RING	3.30	4.17	205	1751805517
3771921032	#12 SAE O-RING	#12 SAE O-RING	3.55	5.05	400	3751804175
3771921039	#12 SAE O-RING	#12 SAE O-RING	1.47	2.47	142	3751805524
3790003878	#12 SAE O-RING	#12 SAE O-RING	1.47	2.47	145	3796803878
3771921041	#12 SAE O-RING	#12 SAE O-RING	1.84	3.70	185	3751805521
3771921034	1/2" NPT	1/2" NPT	2.43	5.13	250	3771805404
3771921038	#12 SAE O-RING	#12 SAE O-RING	2.56	5.44	250	3751805404
3790003563	#16 SAE O-RING	#16 SAE O-RING	2.63	5.57	305	3796803563
3771921033	#16 SAE O-RING	#16 SAE O-RING	3.05	6.48	320	3751805404
3771921035	#16 SAE O-RING	#16 SAE O-RING	3.05	6.48	335	3771805404
3790006190	#16 SAE O-RING	#12 SAE O-RING	1.32	3.98	212	3796806190
3790004171	#16 SAE O-RING	#12 SAE O-RING	1.32	3.98	240	3796804171
3770921075	3/8" NPT	3/8" NPT IN ROD	0.25	1.00	180	3751804440
3790004536	#12 SAE O-RING	#12 SAE O-RING	1.66	1.96	160	3796804536
3790003810	1" NPT	1" NPT	3.44	4.17	205	3796803810
3771421134	#16 SAE O-RING	#16 SAE O-RING	4.13	5.22	250	3751804204
3771421161	#16 SAE O-RING	#16 SAE O-RING	5.81	7.34	270	3751804204
3771421220	3/4" NPT	3/4" NPT	4.31	5.75	190	3751805449
3771421221	3/4" NPT	3/4" NPT	4.31	5.75	245	3751805449
3771421217	3/4" NPT	3/4" NPT	4.31	5.75	276	3751805449
3771421236	3/4" NPT	3/4" NPT	5.19	6.92	300	3751805407
3790003838	#16 SAE O-RING	#16 SAE O-RING	6.98	9.31	356	3796803838
3790005983		Ported in Rod	6.30	9.55	420	3796805983
3771421090	1" NPT	1" NPT	5.15	8.45	390	3751805571
3771421215	1" NPT	1" NPT	4.28	7.71	320	3751805409
3790004210	#16 SAE O-RING	#16 SAE O-RING	4.47	8.05	350	3796804210
3790006419	#16 SAE O-RING	#16 SAE O-RING	4.47	8.05	450	3796806419
3771421222	3/4" NPT	3/4" NPT	5.48	9.67	380	3751805409
3771421229	#20 SAE O-RING	#16 SAE O-RING	3.42	3.40	215	3771421229
3771421218	#20 SAE O-RING	#16 SAE O-RING	1.72	3.71	200	3751805410
3771421224	#20 SAE O-RING	#16 SAE O-RING	1.72	3.71	200	3751805410
3771421216	1.25" NPT	1" NPT	1.63	3.73	190	3751805410
3771421219	1.25" NPT	1" NPT	1.63	3.73	190	3751805410
3790006297	#12 SAE O-RING	#12 SAE O-RING	1.71	3.91	250	3796832414
3790004219	#12 SAE O-RING	#12 SAE O-RING	1.71	3.91	260	3796832414
3790006181	#12 SAE O-RING	#12 SAE O-RING	1.72	3.92	221	3796832414
3771421196	#12 SAE O-RING	#12 SAE O-RING	1.72	3.92	260	3796832414
3771421225	#16 SAE O-RING	#16 SAE O-RING	1.82	3.96	173	3751805410

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## Piston Rod Cylinders, Double Acting



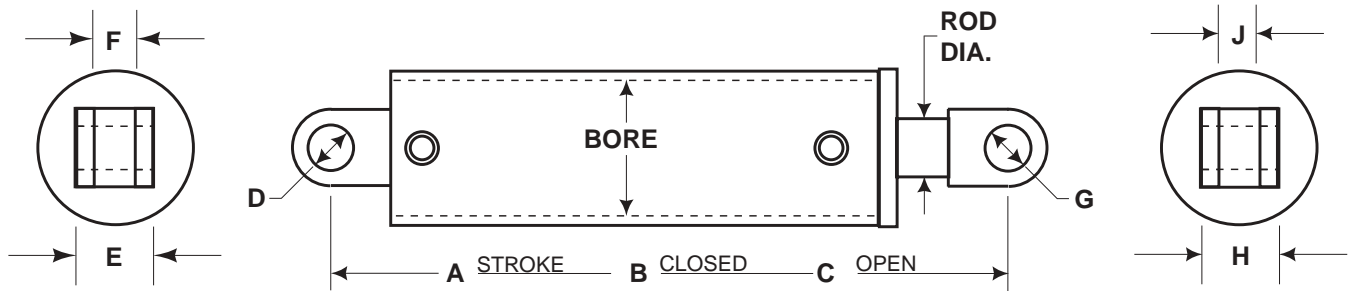
ENGINEERING NUMBER	10 DIGIT NUMBER	BORE I.D.	ROD O.D.	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	F GAP	G PIN	H WIDTH	J GAP
D60CC-34-35	3790003666	6.00	4.50	35.00	55.38	90.38	2.25	1.75		2.25	1.75	
D60CF-2-57	3771421223	6.00	4.50	57.00	71.00	128.00	SPL	MNT		SPL	MNT	
D60DB-14-58	3771421165	6.00	4.50	58.00	72.25	130.25	1.50	7.12		1.50	4.00	
D60DB-7-72	3771421147	6.00	4.50	72.00	90.00	162.00	2.50	7.00		2.50	4.38	
D60CC-26-78	3771421146	6.00	4.50	78.00	100.00	178.00	3.00	3.94		3.00	1.75	
D60DB-12-108	3771421160	6.00	4.50	108.00	126.00	234.00	1.50	7.12		1.50	4.00	
D60DB-16-67.5	3771421181	6.00	5.00	67.50	84.25	151.75	3.50	7.00		2.75	4.94	
D62DB-9-15	3771421118	6.25	2.00	15.00	26.69	41.69	2.00	7.00		0.75	2.00	
D62CC-36-68	3770921069	6.25	3.00	68.50	88.35	156.85	3.00	2.00		3.00	2.00	
D62DB-8-79	3771421105	6.25	4.75	79.25	96.25	175.50	3.00	6.56		3.00	4.50	
D62LB-4-80	3771421178	6.25	4.75	80.00	98.75	178.75	2.50	6.55	3.50	2.50	4.69	
D62LB-5-80	3771421180	6.25	4.75	80.00	98.75	178.75	2.50	6.53	3.50	2.50	4.69	
D62CB-20-80.88	3771421226	6.25	4.75	80.88	95.50	176.38	1.75	2.25		1.75	4.00	
D62CC-58-80.88	3771421227	6.25	4.75	80.88	96.50	177.38	2.50	2.00		2.50	2.00	
D62LB-5-90	3771421186	6.25	4.75	90.00	108.75	198.75	2.50	6.53	3.50	2.50	4.69	
C4774	3790004774	6.50	4.00	66.00	86.88	152.88	2.00	3.00		2.00	3.50	
D70LN-2-80	3773721025	7.00	3.00	80.00	92.50	172.50	SPL	MNT		0.75	3.00	
D70LN-3-80	3773721111	7.00	3.00	80.00	92.72	172.72	SPL	MNT		0.75	3.00	
D70LN-2-90	3773721023	7.00	3.00	90.00	102.50	192.50	SPL	MNT		0.75	3.00	
D70DD-6-79	3773721109	7.00	4.00	79.00	96.00	175.00	3.00	7.62		3.00	4.50	
D70CC-7-78	3773721011	7.00	4.50	78.00	100.00	178.00	3.00	3.94		3.00	1.75	
D70DD-7-79	3773721110	7.00	4.50	79.00	96.50	175.50	3.00	7.50		3.00	4.50	
D70DB-2-115	3773721013	7.00	4.50	115.00	145.00	260.00	2.00	7.75		2.00	4.44	
C3686	3790003686	7.00	5.25	32.00	56.00	88.00	2.25	1.97		2.25	1.97	
D70CC-8-108	3773721018	7.00	5.50	108.00	136.12	244.12	2.00	2.00		2.00	2.00	
D70CC-8-131	3773721012	7.00	5.50	131.00	159.12	290.12	2.00	2.00		2.00	2.00	
D72DB-7-15	3772521071	7.25	2.75	15.00	26.69	41.69	2.00	8.25		0.75	2.75	
D72DB-7-25	3772521073	7.25	2.75	25.00	36.69	61.69	2.00	8.25		0.75	2.75	
D72DB-7-25-1	3772521074	7.25	2.75	25.00	47.69	72.69	2.00	8.25		0.75	2.75	
D72CC-48-85	3772521066	7.25	3.00	85.00	102.50	187.50	1.50	2.00		3.00	2.00	
D72CB-11-60	3772521065	7.25	4.75	60.00	75.00	135.00	1.75	2.25		1.75	4.00	
D72LB-8-80	3772521120	7.25	4.75	80.00	98.75	178.75	2.50	6.53	3.53	2.50	4.69	
D72LB-9-80	3772521122	7.25	4.75	80.00	98.75	178.75	2.50	6.53	3.53	2.50	4.69	
D72CC-53-80.88	3772521134	7.25	4.75	80.88	96.50	177.38	2.50	2.00		2.50	2.00	
D72CB-14-83.62	3772521135	7.25	4.75	83.63	98.63	182.25	1.75	2.25		1.75	4.00	
D72LB-8-92	3772521118	7.25	4.75	92.00	110.75	202.75	2.50	6.53	3.53	2.50	4.69	
D84DB-7-25	3772921006	8.44	2.75	25.00	36.69	61.69	2.00	9.50		0.75	2.75	
D84DB-7-25-1	3772921007	8.44	2.75	25.00	47.69	72.69	2.00	9.50		0.75	2.75	
D84GA-2-16	3773021049	8.44	7.90	16.50	27.25	43.75	FLG	12.00		TPD	7.90	

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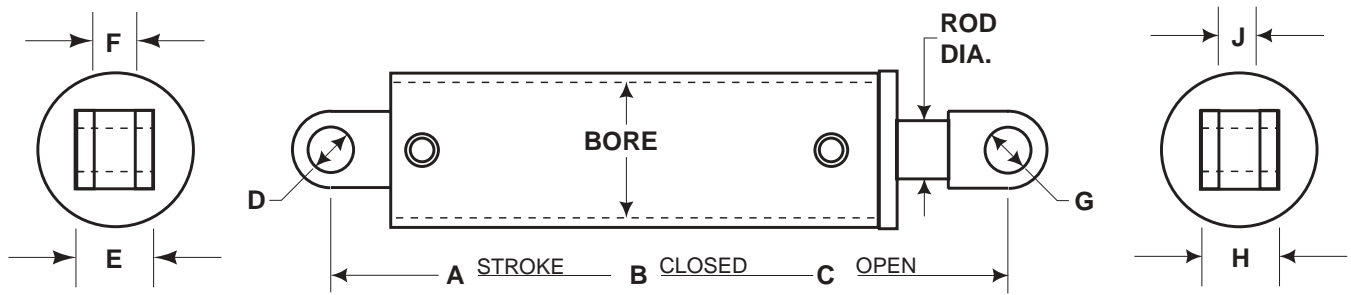
10 DIGIT NUMBER	EXTEND PORT	RETRACT PORT	GALS TO RET.	GALS TO EXT.	WT. LBS	REBUILD KIT
3790003666	2" SAE 4 BOLT	3/4" NPT	1.88	4.29	225	3796803666
3771421223	#16 SAE O-RING	#16 SAE O-RING	3.05	6.98	190	3771421223
3771421165	3/4" NPT	3/4" NPT	3.11	7.10	200	3751804243
3771421147	#12 SAE O-RING	#12 SAE O-RING	3.86	8.82	400	3751804338
3771421146	#12 SAE O-RING	#12 SAE O-RING	8.29	9.55	410	3751804276
3771421160	#16 SAE O-RING	#16 SAE O-RING	5.79	13.22	450	3751804243
3771421181	#16 SAE O-RING	#16 SAE O-RING	2.53	8.27	375	3751804580
3771421118	3/4" NPT IN BASE	3/4" NPT	2.00	1.80	130	3751804431
3770921069	3/4" NPT	3/4" NPT	7.01	9.10	330	3751804015
3771421105	3/4" NPT	3/4" NPT	4.45	10.53	330	3751804047
3771421178	1" NPT	1" NPT	4.49	10.63	350	3751804047
3771421180	3/4" NPT	3/4" NPT	4.49	10.63	350	3751804047
3771421226	3/4" NPT	3/4" NPT	4.54	10.75	350	3751804047
3771421227	3/4" NPT	3/4" NPT	4.54	10.75	350	3751804047
3771421186	3/4" NPT	3/4" NPT	5.05	11.96	375	3751804047
3790004774		Ported in Rod	5.89	9.46	375	3796804774
3773721025	#12 SAE O-RING	#12 SAE O-RING	10.90	13.40	500	3751804337
3773721111	3/4" NPT	3/4" NPT	10.90	13.40	510	3751805412
3773721023	#12 SAE O-RING	#12 SAE O-RING	12.24	15.00	540	3751804337
3773721109	3/4" NPT	3/4" NPT	9.06	13.16	510	3751805414
3773721011	#16 SAE O-RING	#16 SAE O-RING	7.63	13.00	560	3751804291
3773721110	3/4" NPT	3/4" NPT	7.73	13.17	520	3751805415
3773721013	#16 SAE O-RING	#16 SAE O-RING	11.25	19.16	675	3751804297
3790003686	#12 SAE O-RING	#12 SAE O-RING	2.34	5.34	350	3796803686
3773721018	1" NPT	1" NPT	6.89	18.00	455	3751804284
3773721012	1" NPT	1" NPT	8.36	21.83	690	3751804284
3772521071	3/4" NPT IN BASE	3/4" NPT	2.30	2.69	176	3751804148
3772521073	3/4" NPT IN BASE	3/4" NPT	3.83	4.47	228	3751804148
3772521074	3/4" NPT IN BASE	3/4" NPT	3.83	4.47	230	3751804148
3772521066	3/4" NPT	3/4" NPT	12.59	15.20	520	3751804016
3772521065	3/4" NPT	3/4" NPT	6.12	10.73	385	3911804216
3772521120	1" NPT	1" NPT	13.54	14.30	470	3911804216
3772521122	3/4" NPT	3/4" NPT	13.54	14.30	450	3911804216
3772521134	3/4" NPT	3/4" NPT	8.25	14.46	420	3911804216
3772521135	3/4" NPT	3/4" NPT	8.53	14.95	420	3911804216
3772521118	1" NPT	1" NPT	15.50	16.44	520	3911804216
3772921006	3/4" NPT IN BASE	3/4" NPT	5.42	6.10	260	3751804149
3772921007	3/4" NPT IN BASE	3/4" NPT	5.42	6.10	280	3751804149
3773021049	3/4" NPT	3/4" NPT	0.50	4.00	300	3751804335

Note; The drawing above is for General Reference Only, Listed Cylinders may have Pin Eye Bushings, Bearings, Ports Flow Tubes or Other Options

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Bold / Highlighted Items are Standard Warehouse Items.

## Piston Rod Cylinders, Single Acting



ENGINEERING NUMBER	10 DIGIT NUMBER	BORE I.D.	ROD O.D.	A STROKE	B CLOSED	C OPEN	D PIN	E WIDTH	F GAP	G PIN	H WIDTH	J GAP
D20LL-6-3.25	3770121130	2.00	1.12	3.25	14.38	17.63	1.00	1.88	1.13	1.00	1.88	1.13
B6185	3790006185	2.00	1.25	2.00	6.00	8.00	FLANGE	MOUNT		N/A	1.25	
B3394	3790003394	2.00	1.25	2.50	8.38	10.88	FLANGE	MOUNT		N/A	1.25	
C4542	3790004542	2.88	2.50	16.00	29.00	45.00	1.25	1.25		1.50	1.50	
C4217	3790004217	2.88	2.50	38.00	48.00	86.00	1.25	1.25		1.50	1.50	
D30DD-13-14.25	3770521096	3.00	1.50	14.25	21.50	35.75	1.50	2.00		1.50	3.50	
B5347	3790005347	3.00	2.50	31.25	38.75	70.00	1.00	1.50		1.00	0.88	
S31LC-1-28.56	3770711027	3.25	2.75	28.56	39.31	67.87	1.63	3.13	2.13	1.63	2.00	
D30LL-7-16	3790005423	3.50	2.00	16.00	26.00	42.00	1.00	2.25	1.25	1.00	2.25	1.25
D35LL-8-16	3790005424	3.50	2.00	16.00	26.00	42.00	1.00	2.25	1.25	1.00	2.25	1.25
D35CC-18-36.88	3773821055	3.50	2.50	37.00	50.50	87.50	1.75	1.50		1.75	1.00	
S35CC-4-37	3776815004	3.50	2.50	37.00	50.50	87.50	1.75	1.50		1.75	1.00	
D4190	3790004190	3.50	3.00	42.00	52.00	94.00	1.75	1.50		1.75	1.50	
D40CL-2-39.38	3790003884	4.00	2.25	39.38	49.25	88.63	1.75	1.25		1.25	2.31	1.31
S35CC-3-24.38	3776815002	4.00	3.50	24.38	34.25	58.63	1.25	1.00		1.25	1.00	
S35CC-2-24.75	3776815001	4.00	3.50	24.75	36.00	60.75	1.25	1.00		1.25	1.25	
S35CL-2-32.69	3776815003	4.00	3.50	32.69	43.75	76.44	1.75	1.25		1.25	2.50	1.25
D50LC-2-24.50	3777921068	5.00	3.50	24.50	34.25	58.75	1.26	2.75	0.75	1.25	1.25	
S21LL-2-1.5	3771411106	6.00	1.75	1.50	23.09	24.59	1.50	6.00	4.00	1.50	4.03	2.03

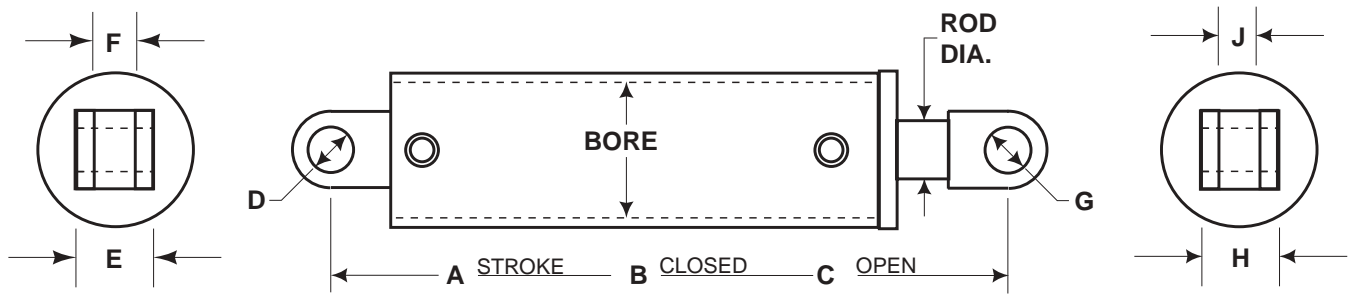
Note; The drawing above is for General Reference Only, Listed Cylinders may have Pin Eye Bushings, Bearings, Ports Flow Tubes or Other Options

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

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## Piston Rod Cylinders, Single Acting



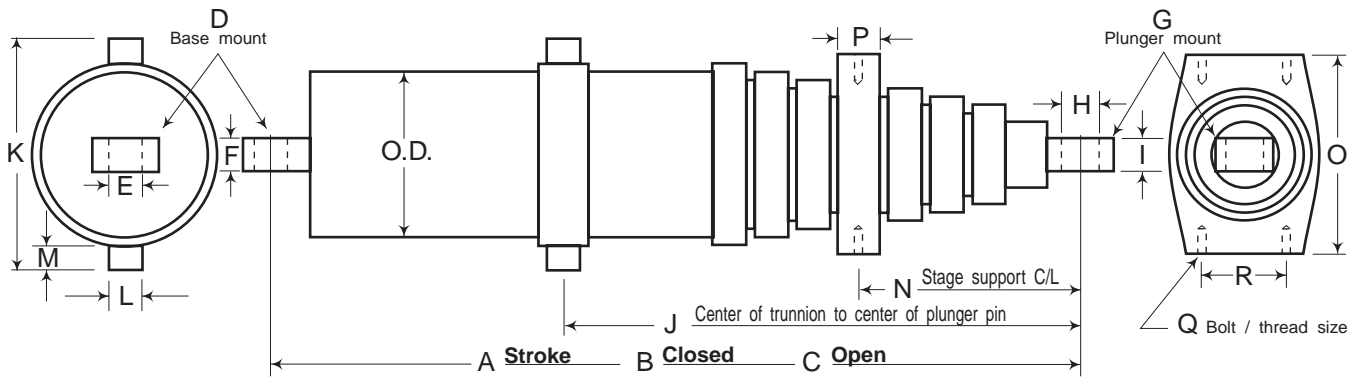
10 DIGIT NUMBER	BODY OR BOTTOM PORT	TOP OR ROD PORT	GALS TO EXT.	WT. LBS	REBUILD KIT
3770121130	#8 SAE O-RING	1/8" FILTER VENT	0.04	25	3751805483
3790006185	3/8" NPT		0.03	25	3751805568
3790003394	3/8" NPT		0.04	35	3796803394
3790004542		#6 SAE IN ROD	0.46	50	3796804542
3790004217		#6 SAE IN ROD	1.08	56	3796804217
3770521096	#8 SAE O-RING	1/8" FILTER VENT	0.44	33	3751805496
3790005347		1/2" NPT	0.96	90	3796805347
3770711027	#4 SAE O-RING		0.73	59	3751804199
3790005423	#6 SAE O-RING	#6 SAE O-RING	0.67	50	3751805471
3790005424	#6 SAE O-RING	#6 SAE O-RING	0.67	50	3751805471
3773821055	3.75" 1/4" NPT W 9/64" ORIFICE		1.54	135	3751805461
3776815004		#4 SAE IN ROD	1.54	100	3751805454
3790004190		#6 SAE IN ROD	1.75	118	3796804190
3790003884	#8 SAE O-RING	#8 SAE IN ROD	2.14	90	3796803884
3776815002		#8 SAE IN ROD	1.02	75	3751805454
3776815001		1/2" NPT IN ROD	1.35	115	3751805454
3776815003	#10 SAE O-RING		1.36	80	3751805454
3777921068	#8 SAE O-RING	#8 SAE IN ROD	2.08	95	3751805527
3771411106	#12 SAE O-RING	1/8" FILTER VENT	0.18	100	3751805518

Note; The drawing above is for General Reference Only, Listed Cylinders may have Pin Eye Bushings, Bearings, Ports Flow Tubes or Other Options

Note; Diameters D and G are for nominal pin size, for actual hole size refer to print.

Note; Bold / Highlighted Items are Standard Warehouse Items.

# Telescopic Cylinder Application Data Form



Cylinder application \_\_\_\_\_

Single- or Double-acting \_\_\_\_\_ System operating pressure Normal \_\_\_\_ Max. \_\_\_\_

O.D. of body \_\_\_\_\_ Is there a relief valve in system \_\_\_\_ Setting \_\_\_\_

O.D. largest moving stage \_\_\_\_\_ System flow in G.P.M. Min. \_\_\_\_ Max. \_\_\_\_

Number of moving stages \_\_\_\_\_ System operating temp. Normal \_\_\_\_ Max. \_\_\_\_

Chrome or non-chrome stages \_\_\_\_\_ Fluid type \_\_\_\_\_

Mounting conditions \_\_\_\_Vert. \_\_\_\_Horz. \_\_\_\_Incline angle Load holding requirements \_\_\_\_\_

Any side or eccentric loading possible \_\_\_\_\_ Environmental condition \_\_\_\_\_

A : Total stroke \_\_\_\_\_ J : Plunger pin to trunnion C/L (if applicable) \_\_\_\_\_

B : Closed length \_\_\_\_\_ K : Trunnion overall width \_\_\_\_\_

C : Open length \_\_\_\_\_ L : Trunnion lug diameters \_\_\_\_\_

D : Base mount type or code \_\_\_\_\_ M : Trunnion lug lengths \_\_\_\_\_

E : Base pin diameter \_\_\_\_\_ N : Plunger pin to stage support (if applicable) \_\_\_\_\_

F : Base mount width \_\_\_\_\_ O : Stage support width \_\_\_\_\_

G : Plunger mount type or code \_\_\_\_\_ P : Stage support thickness \_\_\_\_\_

H : Plunger pin diameter \_\_\_\_\_ Q : Stage support bolt & thread size \_\_\_\_\_

I : Plunger mount width \_\_\_\_\_ R : Stage support bolt locations & C/L's \_\_\_\_\_

Special mounting (if applicable) \_\_\_\_\_

Extend port size and type \_\_\_\_\_ Extend port location \_\_\_\_\_

Retract port size and type \_\_\_\_\_ Retract port location \_\_\_\_\_

Special features or comments \_\_\_\_\_

Requested by: Firm \_\_\_\_\_ Current Quan. \_\_\_\_\_

Address \_\_\_\_\_ Future Quan. \_\_\_\_\_

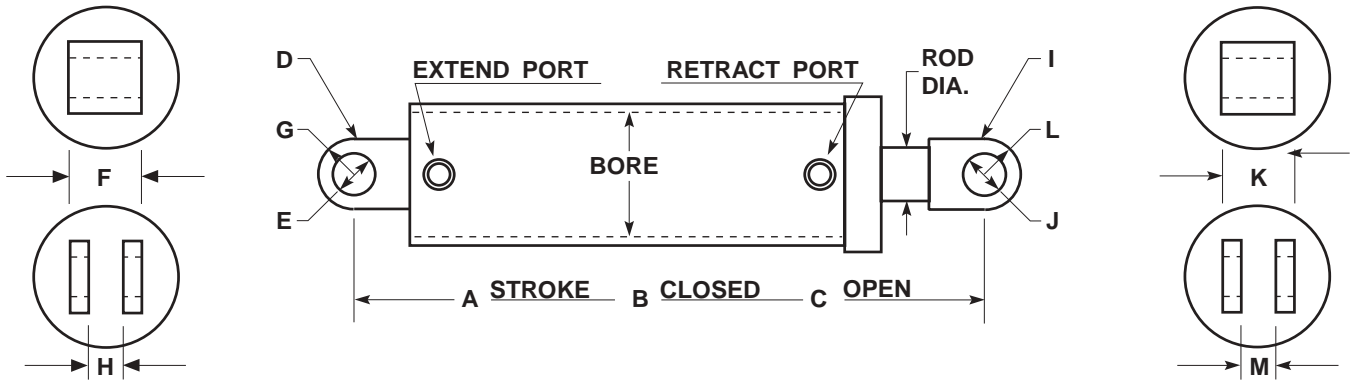
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Contact \_\_\_\_\_

Phone: (800) 848-5575 \* 330-480-8431 \* Fax (800) 694-3392 \* 330-480-8432

**Piston Rod Cylinder Application Data Form**



Cylinder application \_\_\_\_\_

Single- or Double-acting \_\_\_\_\_ System operating pressure Normal \_\_\_\_ Max. \_\_\_\_

Bore \_\_\_\_\_ Is there a relief valve in system \_\_\_\_ Setting \_\_\_\_

Rod diameter \_\_\_\_\_ System flow in G.P.M Min. \_\_\_\_ Max. \_\_\_\_

Head & gland design \_\_\_\_\_ System operating temp. Normal \_\_\_\_ Max. \_\_\_\_

Piston design \_\_\_\_\_ Fluid type \_\_\_\_\_

Mounting conditions \_\_\_\_Vert. \_\_\_\_Horz. \_\_\_\_Incline angle Load holding requirements \_\_\_\_\_

Any side or eccentric loading possible \_\_\_\_\_ Environmental condition \_\_\_\_\_

A : Total stroke \_\_\_\_\_

B : Closed length \_\_\_\_\_

C : Open length \_\_\_\_\_

D : Base mount type or code \_\_\_\_\_

I : Plunger mount type or code \_\_\_\_\_

E : Base pin diameter \_\_\_\_\_

J : Plunger pin diameter \_\_\_\_\_

F : Base mount width \_\_\_\_\_

K : Plunger mount width \_\_\_\_\_

G : Base mount radius \_\_\_\_\_

L : Plunger mount radius \_\_\_\_\_

H Base Clevis Gap (if applicable) \_\_\_\_\_

M : Plunger clevis gap (if applicable) \_\_\_\_\_

Special mounting (if applicable) \_\_\_\_\_

Extend port size and type \_\_\_\_\_ Extend port location \_\_\_\_\_

Retract port size and type \_\_\_\_\_ Retract port location \_\_\_\_\_

Special features or comments \_\_\_\_\_

Requested by: Firm \_\_\_\_\_ Current Quan. \_\_\_\_\_

Address \_\_\_\_\_ Future Quan. \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Contact \_\_\_\_\_

Phone: (800) 848-5575 \* 330-480-8431 \* Fax (800) 694-3392 \* 330-480-8432



## Storage and Installation

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### STORAGE

It pays to keep spare hydraulic cylinders on hand for use when you need them. But, you must know and follow these recommended storage practices or the cylinders can be ruined. Hydraulic cylinders, though often large and unwieldy, are precision machines with finely finished parts and close tolerances. And they're expensive. So handle them with care.

For optimum storage life, hydraulic cylinders should be kept in an environment that is protected from excessive moisture and temperature extremes. A hot, dry desert climate with cold nights, for example, must be accommodated when choosing the storage area. Daytime heat quickly bakes oil out of sealing materials, which causes leaks and rapid wear when the cylinder is placed in service. Cooling at night causes water condensation and corrosion damage to wear surfaces. Storage areas that allow exposure to rain, snow and extreme cold must like wise be avoided.

It's best to store cylinders indoors if possible. But indoors or out, be sure that plugs or closures are properly installed in all ports to keep out moisture and dirt. However, overtightening of port plugs should be avoided. Widely varying temperatures and tightly closed ports may cause pressure inside the cylinder to build up to the point where the piston moves far enough to expose the rod to corrosion or contamination. Try to choose a storage location where the cylinders are protected from physical damage. Even a little ding from a falling bar or forklift tine can cause trouble later.

Cylinders, Particularly large ones, should be stored closed in a vertical position with the rod end down. Be sure they're blocked securely to keep them from toppling. Storing with the rod ends down keeps oil on the seals, which protects them from drying out. This is more critical with fabric and butyl seals than with urethane sealing materials. Storing single-acting cylinders with the rod end up can cause port closures to pop open and leak, exposing the sleeves to corrosion damage and contamination. Storing with the rod end down also discourages the temptation to lift a cylinder by the rod eye – a dangerous practice. If horizontal storage cannot be avoided, the rod or cylinder should be rolled into a new position every two months or so to prevent drying, distortion and deterioration of the seals. Don't forget that a cylinder can be a major source of contamination. A small scratch or nick on the sleeve will quickly shred packing and contaminate the system. Store cylinders carefully and keep them clean.

The following procedures should be followed in order to prevent oxidation and maintain the surfaces of a mounted hydraulic cylinder during idle periods. These idle periods may include; inventory units, demo units, out of service units, etc.

- All machined surfaces left expose should be coated with a light film of grease, if not oxidation will occur.
- If oxidation is present, apply a light coat of oil to the surfaces.
- Buff surfaces with 320 or 400 grit sandpaper. Do not buff surfaces up and down the length, buff only around the circumference.
- If after buffing, the surfaces show evidence of oxidation damage i.e., pitting, the cylinder should be inspected by an authorized service center for evaluation.
- Operation of a hydraulic cylinder with surface damage will shorten the longevity and preclude any warranty express or implied.

### INSTALLATION

- Cleanliness is an important consideration, and Parker cylinders are shipped with the ports plugged to protect them from contaminants entering the ports. These plugs should not be removed until the piping is to be installed. Before making the connection to the cylinder ports, the piping should be thoroughly cleaned to remove all chips or burrs which might have resulted from threading or flaring operations. One small foreign particle can cause premature failure of the cylinder or other hydraulic system components. If oxidation is present, apply a light coat of oil to the surfaces.
- Proper alignment of the cylinder piston rod and its mating component on the machine should be checked in both the extended and retracted positions. Improper alignment will result in excessive rod gland and/or cylinder bore wear.
- Cylinders operating in an environment where air drying material are present such as fast- drying chemicals, paint, or welding splatter, or other hazardous conditions such as excessive heat, should have shields installed to prevent damage to the piston rod and piston rod seals.

## Parker Safety Guide for Selecting and Using Hydraulic Cylinders and Their Accessories

**WARNING:  FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF CYLINDERS AND THEIR RELATED ACCESSORIES CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.**

Before selecting or using Parker cylinders or related accessories, it is important that you read, understand and follow the following safety information.

### User Responsibility

Due to very wide variety of cylinder applications and cylinder operating conditions, Parker does not warrant that any particular cylinder is suitable for any specific application. This safety guide does not analyze all technical parameters that must be considered in selecting a product. The hydraulic and pneumatic cylinders outlined in this catalog are designed to Parker's design guide lines and do not necessarily meet the design guide lines of other agencies such as American Bureau of Shipping, ASME Pressure Vessel Code etc. The user, through its own analysis and testing, is solely responsible for:

- Making the final selection of the cylinders and related accessories.
- Determining if the cylinders are required to meet specific design requirements as required by the Agency(s) or industry standards covering the design of the user's equipment.
- Assuring that the user's requirements are met, OSHA requirements are met, and safety guidelines from the applicable agencies such as but not limited to ANSI are followed and that the use presents no health or safety hazards.
- Providing all appropriate health and safety warnings on the equipment on which the cylinders are used.

### Seals

The seals for the product lines shown in this catalogue are intended for mineral base hydraulic fluids and for the operating temperatures ranges as indicated. The operation of these products with other fluids or at other operating temperatures must be brought to the attention of our engineering department so that proper seals for intended operation may be selected.

The application of cylinders may allow fluids such as cutting fluids, wash down fluids etc. to come in contact with the external area of the cylinder. These fluids may attack the piston rod wiper and/or the primary seal and must be taken into account when selecting and specifying seal compounds.

Dynamic seals will wear. The rate of wear will depend on many operating factors. Wear can be rapid if a cylinder is mis-aligned or if the cylinder has been improperly serviced. The user must take seal wear into consideration in the application of cylinders.

### Piston Rods

Possible consequences of piston rod failure or separation of the piston rod from the piston include, but are not limited to are:

- Piston rod and/or attached load thrown off at high speed.
- High velocity fluid discharge.
- Piston rod extending when pressure is applied in the piston retract mode.

Piston rods or machine members attached to the piston rod may move suddenly and without warning as a consequence of other conditions occurring to the machine such as, but not limited to:

- Unexpected detachment of the machine member from the piston rod.
- Failure of the pressurized fluid delivery system (hoses, fittings, valves, pumps, compressors) which maintain cylinder position.
- Catastrophic cylinder seal failure leading to sudden loss of pressurized fluid.
- Failure of the machine control system.

Part of selecting cylinders for a specific operation involves the proper selection of the piston rod diameter. This catalogue contains information in the selection of piston rod diameter, which must be followed in order to avoid possible buckling.

Piston rods are not normally designed to absorb bending moments or loads which are perpendicular to the axis of piston rod motion. These additional loads can cause the piston rod to fail. If these types of additional loads are expected to be imposed on the piston rod, their magnitude should be made known to our engineering department.

The cylinder user should always make sure that the piston rod is securely attached to the machine member.

### Cushions

Cushions are devices internal to the cylinder to slow the piston and rod assembly down at the end of the stroke. It is suggested they be used to reduce piston impact at the end of the cylinder stroke when the cylinder is expected to move at relatively high velocity.

Cylinder cushions are normally designed to absorb the energy of a linear applied load. A rotating mass has considerably more energy than the same mass moving in a linear mode. Cushioning for a rotating mass application should be reviewed by our engineering department.

### Cylinder Mountings

Some cylinder mounting configurations may have certain limitations such as but not limited to minimum stroke for side or foot mounting cylinders or pressure de-ratings for certain flange mounts. Carefully review the catalog for these types of restrictions.

Always mount cylinders using the largest possible high tensile alloy steel socket head cap screws that can fit in the cylinder mounting holes and torque them to the manufacturer's recommendations for their size.

### Port Fittings

Hydraulic cylinders applied with meter out or deceleration circuits are subject to intensified pressure at piston rod end.

The rod end pressure is approximately equal to:

$$\frac{\text{operating pressure} \times \text{effective cap end area}}{\text{effective rod end piston area}}$$

Contact your connector supplier for the pressure rating of individual connectors.

### Cylinder Modifications or Repairs

Cylinders as shipped from the factory are not to be disassembled and/or modified. If cylinders require modifications, these modifications must be done at Parker locations or by Parker certified facilities. It is allowed to disassemble cylinders for the purpose of replacing seals or seal assemblies.



## Offer of Sale

The items described in this document are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries 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 Parker Hannifin Corporation, its subsidiary 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. 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 the date of shipment from Parker Hannifin Corporation. 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 WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. **Limitation Of Remedy:** SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

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 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. 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 noninfringing, 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 a 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, acts 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 Ohio. 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 action accrues.

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**Parker Hannifin Corporation**  
6035 Parkland Blvd.  
Cleveland, Ohio 44124-4141  
Telephone: (216) 896-3000  
Fax: (216) 896-4000  
www.parker.com

## Parker Hannifin Corporation

### About Parker Hannifin Corporation

Parker Hannifin is a leading global motion-control company dedicated to delivering premier customer service. A Fortune 500 corporation listed on the New York Stock Exchange (PH), our components and systems comprise over 1,400 product lines that control motion in some 1,000 industrial and aerospace markets. Parker is the only manufacturer to offer its customers a choice of hydraulic, pneumatic, and electromechanical motion-control solutions. Our Company has the largest distribution network in its field, with over 7,500 distributors serving nearly 400,000 customers worldwide.

### Parker's Charter

To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

### Product Information

North American customers seeking product information, the location of a nearby distributor, or repair services will receive prompt attention by calling the Parker Product Information Center at our toll-free number: 1-800-C-PARKER (1-800-272-7537). In Europe, call 00800-C-PARKER-H (00800-2727-5374).

#### The Aerospace Group

is a leader in the development, design, manufacture and servicing of control systems and components for aerospace and related high-technology markets, while achieving growth through premier customer service.



#### The Climate & Industrial Controls Group

designs, manufactures and markets system-control and fluid-handling components and systems to refrigeration, air-conditioning and industrial customers worldwide.



#### The Fluid Connectors Group

designs, manufactures and markets rigid and flexible connectors, and associated products used in pneumatic and fluid systems.



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designs, produces and markets a full spectrum of hydraulic components and systems to builders and users of industrial and mobile machinery and equipment.



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designs, manufactures and markets quality filtration and clarification products, providing customers with the best value, quality, technical support, and global availability.



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**Mobile Cylinder Div.**  
P.O. Box 239  
Youngstown, OH 44501-0239  
Tel: (330) 740-8670  
Fax: (330) 480-8432  
[www.parker.com](http://www.parker.com)

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