

Vickers®
Cylinders



Series TZ Hydraulic Cylinders

Installation & Service Manual



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Introduction

Purpose of manual

This manual has been prepared to assist users of Vickers Series TZ cylinders for properly maintaining and repairing their units. In the sections that follow, instructions are given for proper installation, maintenance and overhaul.

General information

Model codes have many variations within a basic model series. They are covered by variables in the model code. Service inquiries should always include the complete model code number as stamped on the head or cap and three digit plant code.

How to order

Vickers has developed an easy system for ordering Series TZ Cylinders. This system has been developed to improve ease of ordering. The model code consists of sixteen alpha-numeric digits which fully describe the most common standard options offered.

To specify your Series TZ cylinder, review the Model Code section for a full description of each option available and corresponding code.

Custom cylinders

Although the model code has been arranged to cover the vast majority of available options, there will be occasions when an option which cannot be coded will be required. When such an option has been specified, enter an "X" for the appropriate item in the model code. For example, an application which requires a custom thread on the end of the piston rod, an "X" is inserted for item 7. The cylinder will include a unique five digit design number.

Replacement cylinders

Every custom cylinder is assigned a unique design number. This number is contained in the last five digits of the sixteen digit model code. Item 12 is always an alpha character. The "Stroke" and "Extra Rod Projection" positions (items 12 through 16) become the "Design Number" items for custom cylinders. When ordering a replacement part or cylinder, give the sixteen digit model code or the five digit design number to your local Vickers Representative.

Replacement parts

Each design number has a completed bill of materials on file in a quick retrieval computerized storage system. This gives the Field Sales Representatives rapid access in identifying and specifying genuine Vickers replacements parts.

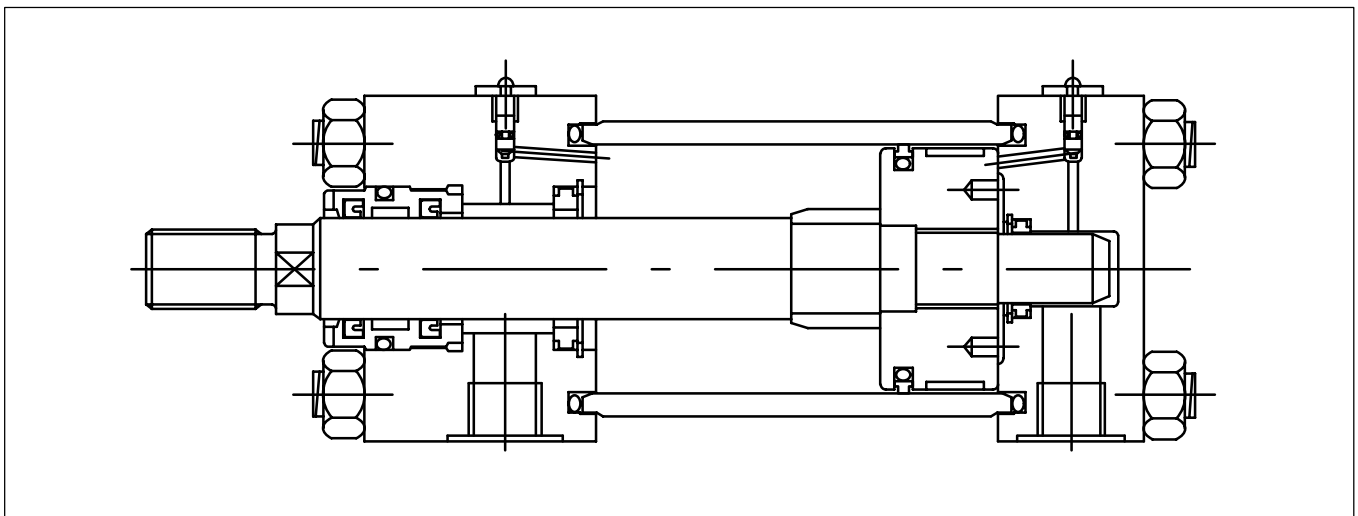


Figure 1. TZ Cylinder Section View

Cylinder Installation

All Vickers Series TZ cylinders are individually tested and inspected before shipment to assure freedom from defects. Plugs are inserted in the ports to protect threads and keep foreign matter from entering the cylinder prior to installation.

Mounting and alignment

Position the cylinder loosely in the mounting and check the alignment of the piston rod with the load connection at **both ends of the stroke**. If the cylinder is too large to move by hand, proceed with piping and installation and operate cylinder throughout the stroke prior to connection.

Trunnion and swivel mount bearings should fit closely for the entire length of the pin, and must be square with the load connection throughout the stroke.

Flush or foot mounted cylinders may be pinned or keyed to prevent shifting during high shock loads.

Always use the wrench flats when connecting piston rod to load to prevent damage to the sealing surface. Tighten piston rod against shoulder. If cylinder has been pressurized, relieve all pressure prior to turning the piston rod.

Piping connections

All piping connections should be deburred and the system thoroughly flushed to purge all contaminants prior to connecting cylinder ports. Care should be taken to prevent over tightening of the piping connections.

Cylinder operation

Cycle cylinder a few times with reduced load and pressure. Hydraulic cylinders may be erratic due to trapped air, but will normally purge themselves after several cycles. Some cylinders may be equipped with air bleed screws which can be slowly loosened with a male metric key wrench, then re-tightened after air is purged.

Cushioned cylinders are adjusted and tested prior to shipping, but usually require additional adjustment after connection to the work load. The cushion adjustment screw has a retainer plate to prevent inadvertent removal of the screw. A male metric hex wrench is required to adjust the cushion screw.

To increase effectiveness of the cushion, turn the adjustment screw clockwise. To provide less cushion, turn the screw counterclockwise. Most orifices are fully open with two full turns of the screw from the closed position.

The final position of the screw should be a balance between any shock or bounce at the start of the cushion and the final impact of the piston at the end of stroke.

Troubleshooting

Most problems in fluid power circuits result in a gradual or sudden loss of power in the work cylinders, which may cause them to stall or move slower than required. This chart assumes that all other components of the circuit such as the pump, relief valve, control valves,

hydraulic supply, etc. have been checked and the problem has been isolated to the cylinder.

Properly installed and maintained cylinders should function for millions of

cycles. Premature cylinder failures are usually caused by system or application problems that can be prevented. The purpose of this chart is to aid in identifying and correcting the most common causes of premature cylinder failure.

Check Cylinder for Evidence of:	Caused By:	Action Required:
Excessive wear on piston rod.	Side load due to misalignment between cylinder and load.	Check alignment of rod with load connection at all points in stroke.
	Pivot mount cylinder without proper stop tubing.	Follow Vickers cylinder catalog design recommendations.
Contamination in cylinder.	Exceptionally dirty environment.	Clean and flush the entire system, deburr connections.
	Worn rod wiper.	Shield piston rod area from direct contact with contaminant.
Impact damage or broken parts.	Lack of, or improperly adjusted cushions.	Reference adjustment instructions in this manual.
	Load and piston speed combination exceeds cylinder cushion capacity.	Consult your Vickers Sales Engineer.
	Lack of, or improperly adjusted speed controls.	Add or adjust flow controls to reduce piston speed.
	Excessive system pressure.	Reduce pressure to minimum required to move the load.
Permanent deformation or damaged static seals.	System pressure in excess of cylinder rating.	Follow Vickers cylinder catalog design recommendations.
	High pressure developed in cylinder cushion.	Consult your Vickers Sales Engineer.
	Cyl. externally loaded while control valve is closed.	Reduce load magnitude or resize cylinder.
Seal damage such as loss of elasticity, shape, etc.	Excessive temperature in environment or system.	Install replacement sealing system with proper rating.
	Incompatible hydraulic fluid.	Refer to Vickers cylinder catalog for compatible sealing system.
	Cylinder stored in horizontal position for extended period.	Replace seals, store vertically with rod up.

Table 1.

Service

The following instructions illustrate the complete rebuilding of your Vickers Series TZ hydraulic cylinder.

Refer to Figure 4 exploded view.



Before breaking a circuit connection, make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators, and block any load whose movement could generate pressure. Plug all removed units and cap all lines to prevent the entry of dirt into the system.

Required tools

- Spanner wrench
- Adjustable wrench
- Soft brass tool
- Thin tool
- Copper padded vice
- Rubber mallet
- Torque wrench

Replacing rod seals

1. Once the cylinder is removed from service, fully retract the piston rod and remove all port connections. Drain any hydraulic fluid by manually cycling the cylinder. Large cylinders can be carefully cycled with air pressure.
2. The Quick Change rod cartridge allows rod seal replacement without disturbing the tie rods. Remove any burrs from the wrench flat area of the piston rod. Place the cylinder in a vice, rod end up if possible. Remove the rod cartridge by rotating it counterclockwise with a spanner wrench or by removing the retainer screws on larger rod sizes. (If an appropriate spanner wrench is not available, service is best performed by disassembling the entire cylinder. The cartridge can then be removed by placing a bar such as a square shanked screw driver in the cartridge

slots, after removing the rod from the head.)

3. Remove the rod seal from the cartridge by carefully prying it out of the groove with a dull brass (or other soft material tool.)
4. Remove the elastomer wiper from the outer most groove by carefully prying it out of the groove with the dull brass tool.
5. The non-metallic wear band can be removed from the cartridge in a similar fashion.
6. Lightly lubricate the new rod seal, wear band and wiper. Install them in the cartridge as shown in Figure 2. Carefully lead the outside sealing edge into each groove. Be careful not to damage the seal or wiper.

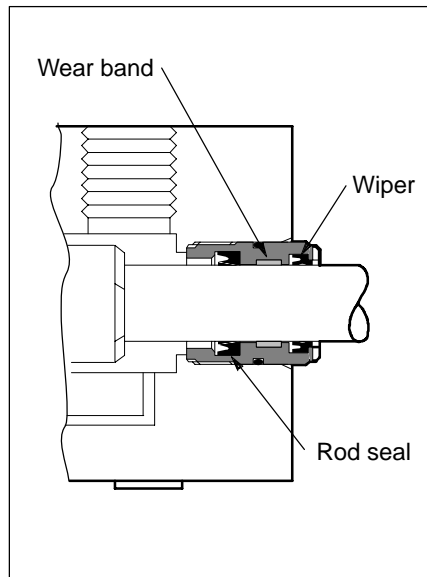


Figure 2.

7. Carefully replace the cartridge on the rod so that seal or wiper lips are not damaged when placing them over the piston rod. Threaded cartridges should be turned clockwise and tightened with a spanner wrench.
8. The bolt on cartridges on larger rods is retained by the retainer plate. Slide the retainer plate into position. Replace the retainer screws, and

tighten in a cross sequence pattern. Torque to the values shown in Table 2.

Bore (in.)	Rod (in.)	Torque	
		(ft. lb.)	(N.m)
5	3 & 3 1/2	34	45
6	3 & 3 1/2		
	4	52	70
7	3 & 3 1/2	34	45
	4 & 4 1/2	26	35
	5	52	70
8	3 1/2	34	45
	4 & 4 1/2	26	35
	5 & 5 1/2	52	70

Table 2.

Complete rebuild

1. Repeat steps 1, 2, 3, 4 and 5 in **Replacing rod seals** section.
2. Remove the tie rod nuts, loosening in a cross sequence pattern. Carefully remove the cap or head from the tie rods and inspect for damage or signs of contamination.
3. Remove the cylinder body from the head/cap. Slide the piston rod assembly out of the cylinder body. It is not normally necessary to remove the tie rods if threaded into a tapped head or cap for servicing, unless the tapped head or cap is mechanically damaged.
4. The piston does not have to be removed from the rod for normal piston seal replacement. The piston seal can be removed by inserting a thin tool under the seal and running it around the circumference of the piston. The elastomer energizer under the face seal should also be removed.
5. Remove the nonmetallic wear band which simply snaps into the groove on the piston's outer diameter.
6. If piston removal is required, clamp the piston rod securely in a copper padded vice to protect the rod finish.

- Heat the piston to Approximately 350° F with a torch or in an oven to break the anaerobic adhesive. Insert a spanner wrench in the drilled holes on the piston face and break the seal by rapping the wrench with a rubber mallet, rotating the piston in a counterclockwise direction.

On small cylinders, an alternate method not requiring a spanner wrench is to clamp the piston in a soft jawed vice and turn the rod, using an adjustable wrench on the rod flats.



CAUTION

THE PISTON IS HOT!

- Unscrew the piston and set it aside.
- Remove the cushion collar from the rod, if the cylinder is cushioned on the head end. Let the rod cool before re-assembly.
- Snugly secure the rod into the vice. Replace the cushion collar on the rod (if required). Thoroughly clean all metallic surfaces with a non-petroleum based cleaner and a wire brush, if necessary.
- Apply anaerobic adhesive near the rod shoulder (or collar) on the rod threads and on the piston I.D. threads.

NOTE

Be sure to follow the adhesive manufacturer's recommendations regarding surface preparation, priming requirements, proper adhesive for the thread size, and cure time prior to pressurization. Failure to do so could result in improper sealing and retention.

- Tighten the piston on the rod to the torque listed in Table 3, using the spanner wrench holes provided in the piston.
- Install new seals by placing one side in the piston groove and stretching the seal around the piston

circumference with the thin tool used in disassembly. The elastomer energizer should be installed in the bottom of the groove before installing the plastic face seal, as shown in Figure 3.

Rod Ø (in.)	Piston Torque	
	(ft. lb.)	(N.m)
5/8	30	40
1	40	54
1 3/8		
1 3/4	50	67
2	100	135
2 1/2	135	180
3 & 3 1/2	250	340
4 & 4 1/2	400	540
5 & 5 1/2	550	740

Table 3.

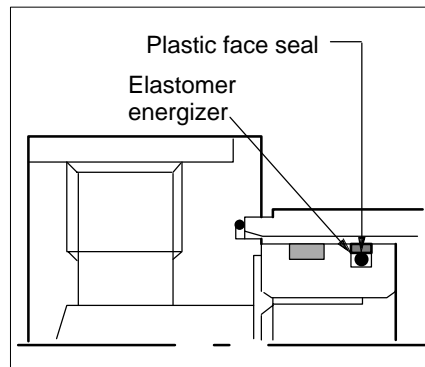


Figure 3.

- Cylinder body O-rings are easily removed using a thin blade tool. Care should be taken to avoid damaging the surface finish in the groove with the tool.
- Metallic cushion sleeves can be replaced by removing the snap ring sleeve retainers.

Note the sleeve orientation in the groove before removal. Some sleeves are not symmetrical and new sleeves must be installed in the groove in the same orientation.
- Shorter cylinders are more easily assembled in a vertical position.

Insert the body O-ring in the cap body groove and position the cylinder body on the cap.

- Snap the wear band on the piston into the wide groove. Lubricate the piston O.D. and seals. Carefully insert the piston rod assembly into the cylinder body. The body is designed to easily accept the piston with the sealing system in place.
- Install the body O-ring in the head body groove. When properly installed, the O-ring should remain in the head when inverted. Grease will hold the o-ring in place if required. Place the cylinder head with tie rods on the body.
- Repeat steps 6, 7 and 8 in "Replacing rod seals" section.
- Start the tie rod nuts until snug against the head or cap and lay the cylinder horizontally into a vice or clamped to a flat surface.
- Tighten the tie rod nuts gradually in a cross sequence pattern to equally distribute forces around the cylinder with a torque wrench. The required torque values are listed in Table 4. Check each nut a second time after reaching full torque

Rod Ø (in.)	Tie Rod Torque*	
	(ft. lb.)	(N.m)
1 1/2	14	19
2	33	45
2 1/2	50	68
3 1/4	105	140
4	150	205
5	340	460
6	570	770
7	840	1140
8	1120	1520

Table 4.

*Recommended torque values using MoS₂ lubricant with 0.12 coefficient of friction.

Exploded view

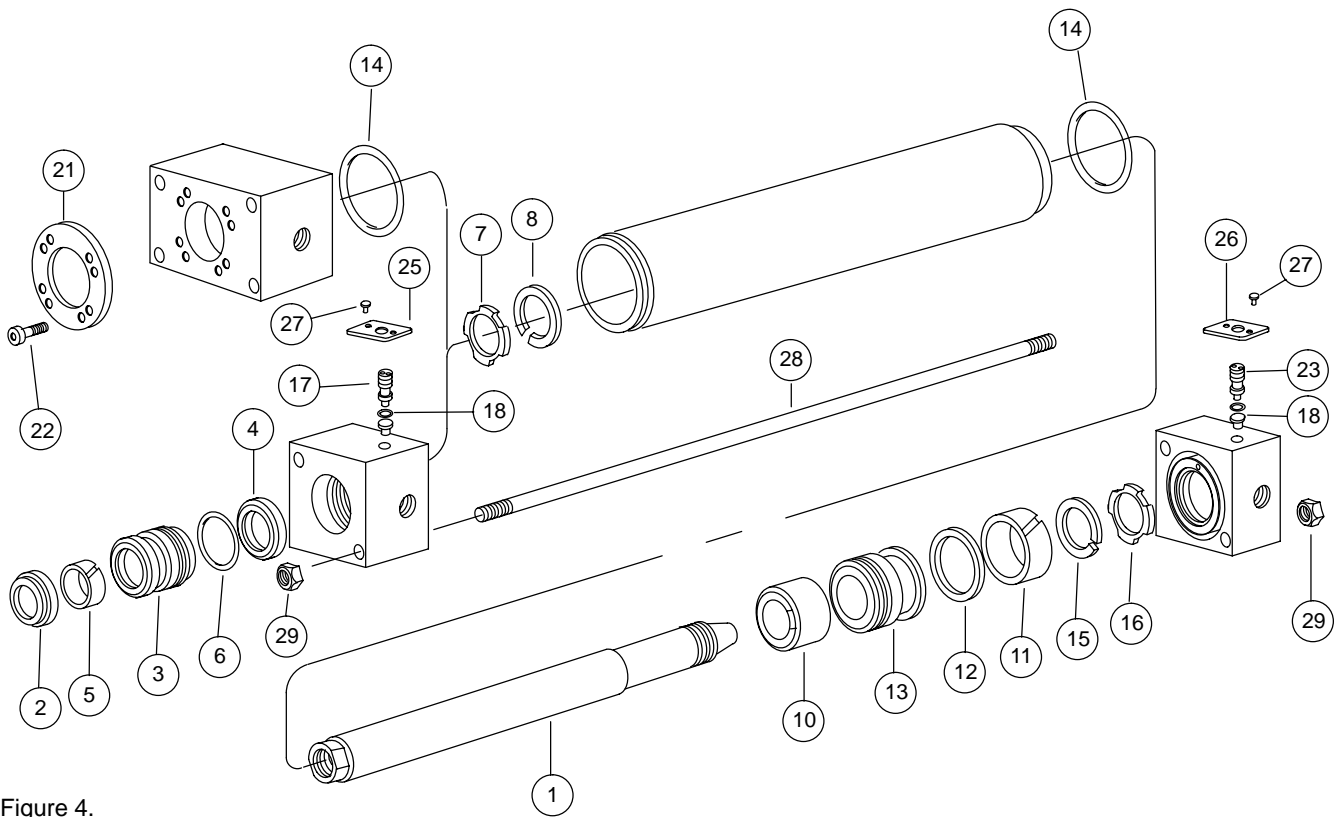


Figure 4.

Maintenance

Inspection

All parts in the unit must be kept clean during the overhaul. Handle each part with care and always work in a clean area.

Periodic inspection of the fluid condition and tube or piping connections can save time consuming breakdowns and unnecessary parts replacement. The following should be checked regularly:

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to the pump can result. In suction or return lines, loose connections permit air to be drawn into the system resulting in noisy and/or erratic operation.
2. Clean fluid is the best insurance for long service life. Therefore, the reservoir should be checked periodically for dirt or other contaminants. If the fluid becomes contaminated, the system should be drained and the reservoir cleaned before new fluid is added.
3. Filter elements also should be checked and replaced periodically. A clogged filter element results in a higher pressure drop. This can force particles through the filter which would ordinarily be trapped, or can cause the by-pass to open, resulting in a partial or complete loss of filtration.
4. Air bubbles in the reservoir can ruin the pump and other components. If bubbles are seen, locate the source of the air and seal the leak.

Cleanliness

Thorough precautions should always be observed to insure the hydraulic system is clean:

1. Clean (flush) entire new system to remove paint, metal chips, welding shot, etc.
2. Filter each change of oil to prevent introduction of contaminants into the system.
3. Provide continuous oil filtration to remove sludge and products of wear and corrosion generated during the life of the system.
4. Provide continuous protection of system from entry of airborne contamination by sealing the system and/or by proper filtration of the air.
5. During usage, proper oil filling and servicing of filter, breathers, reservoirs, etc., cannot be over emphasized.
6. Thorough precautions should be taken by proper system and reservoir design, to insure that aeration of the oil will be kept to a minimum.

Vickers supports and recommends the hydraulic Systems Standards for Stationary Industrial Machinery advanced by the American National Standards Institute; ANSI/(NFPA/JIC) T2.24.1-1991. Key elements of this Standard as well as other vital information on the correct methods for treating hydraulic fluid are included in Vickers publication #561; "Vickers Guide to Systemic Contamination Control," available from your local Vickers distributor or by contacting Vickers. Recommendations on filtration and the selection of products to control fluid condition are included in this publication.

Sound Level

Noise is only indirectly affected by the fluid selection, but the condition of the fluid is of paramount importance in obtaining optimum reduction of system sound levels.

Some of the major factors affecting the fluid conditions that cause the loudest noises in a hydraulic system are:

1. Very high viscosities at start-up temperature can cause pump noises due to cavitation.
2. Running with a moderately high viscosity fluid will slow the release of air captured in the fluid. The fluid will not be completely purged of such air in the time it remains in the reservoir before recycling through the system.
3. Aerated fluid can be caused by ingestion of air through the pipe joints of inlet lines, high velocity discharge lines, cylinder rod packings or by fluid discharging above the fluid level in the reservoir. Air in the fluid causes a noise similar to cavitation.

Hydraulic Fluid Recommendations

Oil in a hydraulic system performs the dual function of lubrication and transmission of power. It constitutes a vital factor in a hydraulic system, and careful selection of it should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of system components with particular emphasis on hydraulic pumps. Any oil selected for use with pumps is acceptable for use with valves, cylinders or motors.

Order literature #694 for oil selection recommendations.

Adding Fluid to the System

When hydraulic fluid is added to the system, it should be pumped through a 10 micron absolute filter. The use of a Vickers Clean Cart portable filtering transfer unit to filter clean fluid into the system is recommended. For further information on the Clean Cart transfer unit, obtain service drawing #601.

It is important that the fluid be kept clean and free from any substance that may cause improper operation or wear to the cylinder, pump and other hydraulic units. Therefore, the use of cloth to strain the fluid should be avoided to prevent lint from entering the system.

Replacement Parts

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and materials are used in the manufacture of our parts. Substitutes may result in early failure.

Product Life

The service life of these products is dependent on environment, duty cycle, operating parameters and system cleanliness. Since these parameters vary from application to application, the ultimate user must determine and establish the periodic maintenance required to maximize life and detect potential component problems.

Fluids

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials and additives for protection against wear of components, elevated viscosity and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561; "Vickers Guide to Systemic Contamination Control," available from your local Vickers distributor or by contacting Vickers, Incorporated.

Recommendation of filtration and the selection of products to control fluid condition are included in #561.

Recommended cleanliness levels using petroleum oil under common conditions is based on the highest fluid pressure levels in the system.

Fluids other than petroleum, severe service cycles or temperature extremes are cause for adjustment of these cleanliness codes. See Vickers Publication 561 for exact details.

System Pressure Level

Product	1000 psi	2000 psi	3000+ psi
Cylinders	20/18/15	20/18/15	20/18/15

Seal Kits

Bore Size	Rod Diameter	Rod Cartridge Seals Kits (1)			Piston Seal Kits (2)		
		"N" Normal	"L" Low Friction	"T" High Temperature	"N" Normal	"L" Low Friction	"T" High Temperature
		Seal Kit No.	Seal Kit No.	Seal Kit No.	Seal Kit No.	Seal Kit No.	Seal Kit No.
1 1/2	5/8" 1"	6533N-TZCC 6533N-TZDE	6533L-TZCC 6533L-TZDE	6543T-TZCC 6543T-TZDE	6633N-TVCE 6633N-TVCE	6633L-TVCE 6633L-TVCE	6643T-TVCE 6643T-TVCE
2	1" 1 3/8"	6533N-TZDE 6533N-TZGH	6533L-TZDE 6533L-TZGH	6543T-TZDE 6543T-TZGH	6633N-TVDG 6633N-TVDG	6633L-TVDG 6633L-TVDG	6643T-TVDG 6643T-TVDG
2 1/2	1" 1 3/8" 1 3/4"	6533N-TZDE 6533N-TZGH 6533N-TZHL	6533L-TZDE 6533L-TZGH 6533L-TZHL	6543T-TZDE 6543T-TZGH 6543T-TZHL	6633N-TVEJ	6633L-TVEJ	6643T-TVEJ
3 1/4	1 3/8" 1 3/4" 2"	6533N-TZGH 6533N-TZHL 6533N-TZKM	6533L-TZGH 6533L-TZHL 6533L-TZKM	6543T-TZGH 6543T-TZHL 6543T-TZKM	6633N-TVGL	6633L-TVGL	6643T-TVGL
4	1 3/4" 2" 2 1/2"	6533N-TZHL 6533N-TZKM 6533N-TZLP	6533L-TZHL 6533L-TZKM 6533L-TZLP	6543T-TZHL 6543T-TZKM 6543T-TZLP	6633N-TVHN	6633L-TVHN	6643T-TVHN
5	2" 2 1/2" 3" 3 1/2"	6533N-TZKM 6533N-TZLP 6533N-TZMU 6533N-TZNV	6533L-TZKM 6533L-TZLP 6533L-TZMU 6533L-TZNV	6543T-TZKM 6543T-TZLP 6543T-TZMU 6543T-TZNV	6633N-TVKQ	6633L-TVKQ	6643T-TVKQ
6	2 1/2" 3" 3 1/2" 4"	6533N-TZLP 6533N-TZMU 6533N-TZNV 6533N-TZNW	6533L-TZLP 6533L-TZMU 6533L-TZNV 6533L-TZNW	6543T-TZLP 6543T-TZMU 6543T-TZNV 6543T-TZNW	6633N-TZLP	6633L-TZLP	6643T-TZLP
7	3" 3 1/2" 4" 4 1/2" 5"	6533N-TZMU 6533N-TZNV 6533N-TZNW 6533N-TZNY 6533N-TZNZ	6533L-TZMU 6533L-TZNV 6533L-TZMW 6533L-TZNY 6533L-TZNZ	6543T-TZMU 6543T-TZNV 6543T-TZMW 6543T-TZNY 6543T-TZNZ	6633N-TZMU	6633L-TZMU	6643T-TZMU
8	3 1/2" 4" 4 1/2" 5" 5 1/2"	6533N-TZNV 6533N-TZNW 6533N-TZNY 6533N-TZNZ 6533N-TZN1	6533L-TZNV 6533L-TZNW 6533L-TZNY 6533L-TZNZ 6533L-TZN1	6543T-TZNV 6543T-TZNW 6543T-TZNY 6543T-TZNZ 6543T-TZN1	6633N-TVNU	6633L-TVNU	6643T-TVNU

(1) Rod Cartridge Seal Kits Include:

- 1 Rod wiper
- 1 Rod seal
- 1 Rod Wear band
- 2 O.D. Bearing seal

(2) Piston Seal Kits Include:

- 2 Body O-rings
- 1 Piston wear band
- 1 Piston seal

Exploded view

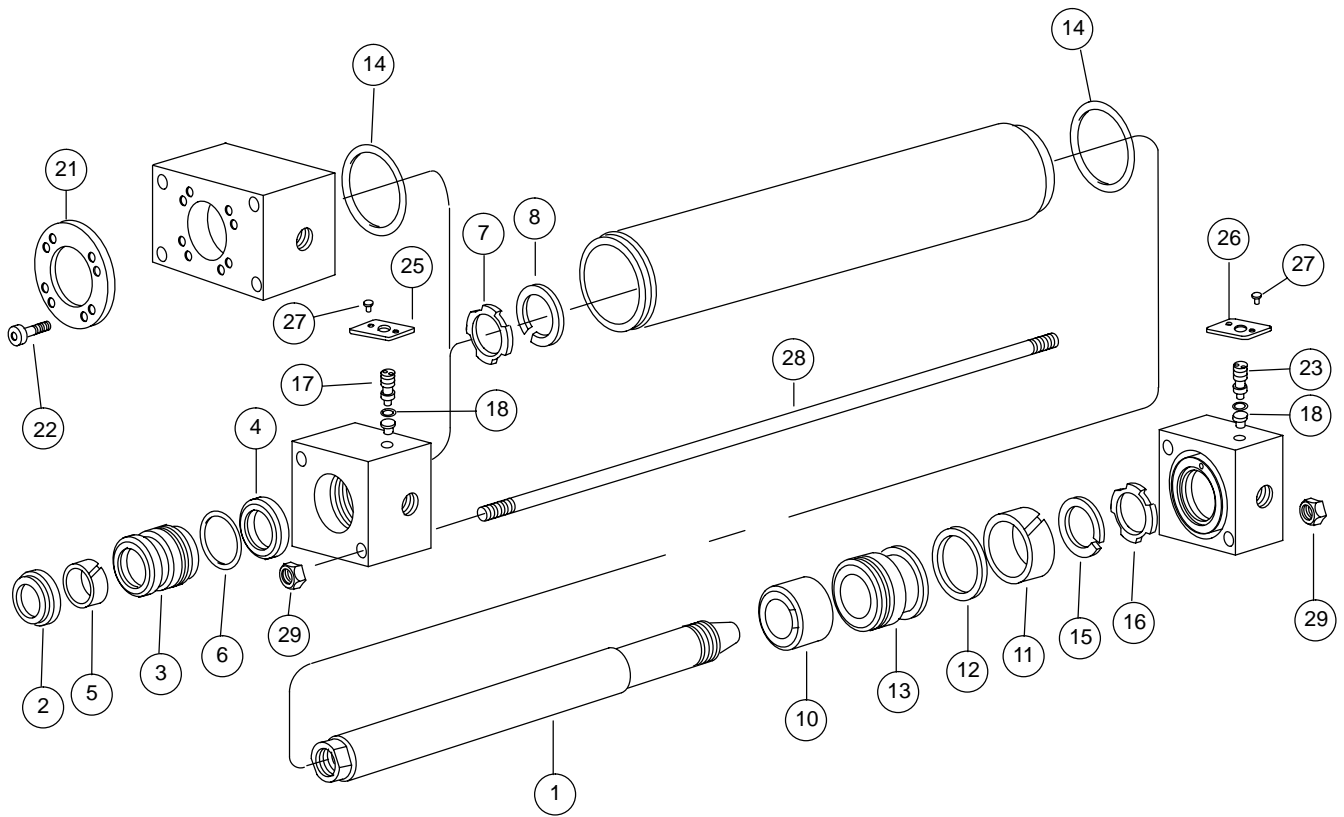


Figure 5.

Replacement Parts - Single Rod Cylinders

Refer to Figure 5.

Key No.	Part Name	No Req'd	BORE SIZE 1 1/2"		BORE SIZE 2"	
			5/8" ROD	1" ROD	1" ROD	1 3/8" ROD
1	Piston rod Non-cushioned (# = rod end type) Cushioned head end Cushioned cap end Specify stroke Cushioned both ends	1 1 1 1	TZ82C#CA10B___ TZ82C#CF10B___ TZ82C#CC10B___ TZ82C#CL10B___	TZ82E#CA10B___ TZ82E#CF10B___ TZ82E#CC10B___ TZ82E#CL10B___	TZ82E#DA10B___ TZ82E#DF10B___ TZ82E#DC10B___ TZ82E#DL10B___	TZ82H#DA10B___ TZ82H#DF10B___ TZ82H#DC10B___ TZ82H#DL10B___
*2	Rod wiper (Normal sealing system option)	1	7947-0062	7947-0100	7947-0100	7947-0138
3	Rod bearing cartridge with gland drain (Normal sealing system option)	1	TZ81CA010	TZ81EA010	TZ81EA010	TZ81HA010
*4	Rod seal (Normal sealing system option)	1	7943-0062	7943-0100	7943-0100	7943-0138
*5	Rod wear band	1	7945-0062	7945-0100	7945-0100	7945-0138
*6	Seal O.D. bearing	2	200093	592753	592753	200120
7	Cushion sleeve (Head end) (Rod end cushion cylinders only)	1	SH-92-R-15	N/A	N/A	N/A
8	Retainer ring (Head end) (Rod end cushion cylinders only)	1	5194-118-HD	N/A	N/A	N/A
9	Body (Consult factory if intermediate trunnion mount) Specify stroke	1	TZ57CA _____	TZ57CA _____	TZ57DA _____	TZ57DA _____
10	Cushion collar	1	TV93EC1C	TV93JC1C	TV93JD1C	TV93LD1C
*11	Piston wear band	1	7949-040	7949-040	7949-050	7949-050
*12	Piston seal (Normal sealing system option)	1	7948-040	7948-040	7948-050	7948-050
13	Piston	1	TV53CF0E7	TV53CF0J7	TV53DF0J7	TV53DF0L7
*14	Body O-ring	2	353270	353270	353208	353208
15	Retainer ring (Cap end) (Cap cushioned cylinders only)	1	5194-75-DG	5194-75-DG	5194-100-DG-R	5194-100-DG-R
16	Cushion sleeve (Cap end) (Cap cushioned cylinders only)	1	SH-92-B-15	SH-92-B-15	SH-92-B-20	SH-92-B-20
17	Cushion adjusting screw (2 req'd if cushioned both ends)	1 or 2	TV95-040	TV95-040	TV95-040	TV95-040
18	Cushion adjusting O-ring (2 req'd if cushioned both ends)	1 or 2	02-152528	02-152528	02-152528	02-152528
19	Steel ball (1 req'd if cushioned head end)	1	N/A	02-157952	02-157952	02-157952
20 **	Ball retainer (1 req'd if cushioned head end)	1	N/A	TV98-040	TV98-040	TV98-040
21	Rod bearing retainer (>2 1/2" rod)	1	N/A	N/A	N/A	N/A
22	Retainer screw (Soc. head cap screw) (Qty. req'd noted with part No.)	As noted	N/A	N/A	N/A	N/A
23 **	Air bleeder screw	A/R	TV94-040	TV94-040	TV94-040	TV94-040
24	Retaining plate – Ball check adj. screw	1 per screw	7971-040	7971-040	7971-040	7971-040
25	Retaining plate – Cushion adj. screw	1 per screw	7972-040	7972-040	7972-040	7972-040
26	Retaining plate – Air bleed adj. screw	1 per screw	7973-040	7973-040	7973-040	7973-040
27	Retaining plate drive screws (Included with retaining plate)	A/R				
28	Tie rods (Specify mtg. style/bore & stroke)	4	TZ56 _ C _____	TZ56 _ C _____	TZ56 _ E _____	TZ56 _ E _____
29	Tie rod nuts (Specify mtg. style/bore & stroke)	A/R	5305-006	5305-006	5305-010	5305-010

Notes:

* Sold in seal kit only

** Order item #18 for O-rings req'd

Replacement Parts

Refer to Figure 5.

Key No.	No Req'd	BORE SIZE 2 1/2"			BORE SIZE 3 1/4"		
		1" ROD	1 3/8" ROD	1 3/4" ROD	1 3/8" ROD	1 3/4" ROD	2" ROD
1	1	TZ82E#EA10B ___	TZ82H#EA10B ___	TZ82L#EA10B ___	TZ82H#GA10B ___	TZ82L#GA10B ___	TZ82M#GA10B ___
	1	TZ82E#EF10B ___	TZ82H#EF10B ___	TZ82L#EF10B ___	TZ82H#GF10B ___	TZ82L#GF10B ___	TZ82M#GF10B ___
	1	TZ82E#EC10B ___	TZ82H#EC10B ___	TZ82L#EC10B ___	TZ82H#GC10B ___	TZ82L#GC10B ___	TZ82M#GC10B ___
	1	TZ82E#EL10B ___	TZ82H#EL10B ___	TZ82L#EL10B ___	TZ82H#GL10B ___	TZ82L#GL10B ___	TZ82M#GL10B ___
*2	1	7947-0100	7947-0138	7947-0175	7947-0138	7947-0175	7947-0200
3	1	TZ81EA010	TZ81HA010	TZ81LA010	TZ81HA010	TZ81LA010	TZ81MA010
*4	1	7943-0100	7943-0138	7943-0175	7943-0138	7943-0175	7943-0200
*5	1	7945-0100	7945-0138	7945-0175	7945-0138	7945-0175	7945-0200
*6	2	592753	200120	200127	200120	200127	294585
7	1	SH-92-R-25	N/A	N/A	SH-92-R-32	SH-92-R-32	N/A
8	1	5194-200-HD-R	N/A	N/A	5194-250-DG-R	5194-250-DG-R	N/A
9	1	TZ57EA _____	TZ57EA _____	TZ57EA _____	TZ57GA _____	TZ57GA _____	TZ57GA _____
10	1	TV93JE1C	TV93LE1C	TV93NE1C	TV93LG1C	TV93NG1C	TV93QG1C
*11	1	7949-063	7949-063	7949-063	7949-080	7949-080	7949-080
*12	1	7948-063	7948-063	7948-063	7948-080	7948-080	7948-080
13	1	TV53EF0J7	TV53EF0L7	TV53EF0N7	TV53GF0L7	TV53GF0N7	TV53GF0Q7
*14	2	200131	200131	200131	380648	380648	380648
15	1	5194-100-DG-R	5194-100-DG-R	5194-100-DG-R	5194-125-DG	5194-125-DG	5194-125-DG
16	1	SH-92-B-25	SH-92-B-25	SH-92-B-25	SH-92-B-32	SH-92-B-32	SH-92-B-32
17	1 or 2	TV95-040	TV95-040	TV95-040	TV95-080	TV95-080	TV95-080
18	1 or 2	02-152528	02-152528	02-152528	02-147746	02-147746	02-147746
19	1	N/A	02-157952	02-157952	N/A	N/A	02-157950
20 **	1	N/A	TV98-040	TV98-040	N/A	N/A	TV98-080
21	1	N/A	N/A	N/A	N/A	N/A	N/A
22	As noted	N/A	N/A	N/A	N/A	N/A	N/A
23 **	A/R	TV94-040	TV94-040	TV94-040	TV94-080	TV94-080	TV94-080
24	1 per screw	7971-040	7971-040	7971-040	7971-080	7971-080	7971-080
25	1 per screw	7972-040	7972-040	7972-040	7972-080	7972-080	7972-080
26	1 per screw	7973-040	7973-040	7973-040	7973-080	7973-080	7973-080
27	A/R						
28	4	TZ56 _ E _____	TZ56 _ E _____	TZ56 _ E _____	TZ56 _ F _____	TZ56 _ F _____	TZ56 _ F _____
29	A/R	5305-010	5305-010	5305-010	5305-014	5305-014	5305-014

Notes:

* Sold in seal kit only

** Order item #18 for O-rings req'd

Refer to Figure 5.

Key No.	No Req'd	BORE SIZE 4"			BORE SIZE 5"		
		1 3/4" ROD	2" ROD	2 1/2" ROD	2" ROD	2 1/2" ROD	3" ROD
1	1	TZ82L#HA10B ___	TZ82M#HA10B ___	TZ82P#HA10B ___	TZ82M#KA10B ___	TZ82P#KA10B ___	TZ82U#KA10B ___
	1	TZ82L#HF10B ___	TZ82M#HF10B ___	TZ82P#HF10B ___	TZ82M#KF10B ___	TZ82P#KF10B ___	TZ82U#KF10B ___
	1	TZ82L#HC10B ___	TZ82M#HC10B ___	TZ82P#HC10B ___	TZ82M#KC10B ___	TZ82P#KC10B ___	TZ82U#KC10B ___
	1	TZ82L#HL10B ___	TZ82M#HL10B ___	TZ82P#HL10B ___	TZ82M#KL10B ___	TZ82P#KL10B ___	TZ82U#KL10B ___
*2	1	7947-0175	7947-0200	7947-0250	7947-0200	7947-0250	7947-0300
3	1	TZ81LA010	TZ81MA010	TZ81PA010	TZ81MA010	TZ81PA010	TZ81UA010
*4	1	7943-0175	7943-0200	7943-0250	7943-0200	7943-0250	7943-0300
*5	1	7945-0175	7945-0200	7945-0250	7945-0200	7945-0250	7945-0300
*6	2	200127	294585	260279	294585	260279	353789
7	1	SH-92-R-40	SH-94-R-40	N/A	SH-92-R-50	SH-92-R-50	N/A
8	1	5194-275-HD	5194-275	N/A	5194-337	5194-337	N/A
9	1	TZ57HA _____	TZ57HA _____	TZ57HA _____	TZ57KA _____	TZ57KA _____	TZ57KA _____
10	1	TV93NH1C	TV93QH1C	TV93SH1C	TV93QK1C	TV93SK1C	TV93UK1C
*11	1	7949-100	7949-100	7949-100	7949-125	7949-125	7949-125
*12	1	7948-100	7948-100	7948-100	7948-125	7948-125	7948-125
13	1	TV53HF0N7	TV53HF0Q7	TV53HF0S7	TV53KF0Q7	TV53KF0S7	TV53KF0U7
*14	2	353789	353789	353789	200171	200171	200171
15	1	5194-131-HD	5194-131-HD	5194-131-HD	5194-131-HD	5194-131-HD	5194-131-HD
16	1	SH-92-B-40	SH-92-B-40	SH-92-B-40	SH-92-B-40	SH-92-B-40	SH-92-B-40
17	1 or 2	TV95-080	TV95-080	TV95-080	TV95-080	TV95-080	TV95-080
18	1 or 2	02-147746	02-147746	02-147746	02-147746	02-147746	02-147746
19	1	N/A	N/A	02-157950	N/A	N/A	02-157950
20 **	1	N/A	N/A	TV98-080	N/A	N/A	TV98-080
21	1	N/A	N/A	N/A	N/A	N/A	TV80U0
22	As noted	N/A	N/A	N/A	N/A	N/A	(8) 473763
23 **	A/R	TV94-080	TV94-080	TV94-080	TV94-080	TV94-080	TV94-080
24	1 per screw	7971-080	7971-080	7971-080	7971-080	7971-080	7971-080
25	1 per screw	7972-080	7972-080	7972-080	7972-080	7972-080	7972-080
26	1 per screw	7973-080	7973-080	7973-080	7973-080	7973-080	7973-080
27	A/R						
28	4	TZ56 _ F _____	TZ56 _ F _____	TZ56 _ F _____	TZ56 _ H _____	TZ56 _ H _____	TZ56 _ H _____
29	A/R	5305-014	5305-014	5305-014	5305-016	5305-016	5305-016

Notes:

* Sold in seal kit only

** Order item #18 for O-rings req'd

Replacement Parts

Refer to Figure 5.

Key No.	No Req'd	BORE SIZE 5"		BORE SIZE 6"			BORE SIZE 7"
		3 1/2" ROD	2 1/2" ROD	3" ROD	3 1/2" ROD	4" ROD	3" ROD
1	1	TZ82V#KA10B	TZ82P#LA10B	TZ82U#LA10B	TZ82V#LA10B	TZ82W#LA10B	TZ82U#MA10B
	1	TZ82V#KF10B	TZ82P#LF10B	TZ82U#LF10B	TZ82V#LF10B	TZ82W#LF10B	TZ82U#MF10B
	1	TZ82V#KC10B	TZ82P#LC10B	TZ82U#LC10B	TZ82V#LC10B	TZ82W#LC10B	TZ82U#MC10B
	1	TZ82V#KL10B	TZ82P#LL10B	TZ82U#LL10B	TZ82V#LL10B	TZ82W#LL10B	TZ82U#ML10B
*2	1	7947-0350	7947-0250	7947-0300	7947-0350	7947-0400	7947-0300
3	1	TZ81VA010	TZ81PA010	TZ81UA010	TZ81VA010	TZ81WA010	TZ81UA010
*4	1	7943-0350	7943-0250	7943-0300	7943-0350	7943-0400	7943-0300
*5	1	7945-0350	7945-0250	7945-0300	7945-0350	7945-0400	7945-0300
*6	2	353789	260279	353789	353789	593059	353789
7	1	N/A	SH-92-R-60	SH-92-R-70	SH-92-R-80	N/A	SH-92-R-70
8	1	N/A	5194-412	5194-450	5194-475	N/A	5194-450
9	1	TZ57KA	TZ57LA	TZ57LA	TZ57LA	TZ57LA	TZ57MA
10	1	TV93UK1C	TZ93SL1C	TZ93UL1C	TZ93UL1C	TZ93WL1C	TZ93UM1C
*11	1	7949-125	7967-0600	7967-0600	7967-0600	7967-0600	7967-0700
*12	1	7948-125	7963-0600	7963-0600	7963-0600	7963-0600	7963-0700
13	1	TV53KF0U7	TZ53LF0S7	TZ53LF0U7	TZ53LF0U7	TZ53LF0W7	TZ53MF0U7
*14	2	200171	924862	924862	924862	924862	924864
15	1	5194-131-HD	5194-150-DG	5194-150-DG	5194-150-DG	5194-150-DG	5194-187-HD
16	1	SH-92-B-40	SH-92-B-60	SH-92-B-60	SH-92-B-60	SH-92-B-60	SH-92-B-70
17	1 or 2	TV95-080	TV95-160	TV95-160	TV95-160	TV95-160	TV95-160
18	1 or 2	02-147746	02-147747	02-147747	02-147747	02-147747	02-147747
19	1	02-157953	N/A	N/A	N/A	02-157953	N/A
20 **	1	TV98-080	N/A	N/A	N/A	TV98-160	N/A
21	1	TV80U0	N/A	TV80U0	TV80U0	TV80W0	TV80U0
22	As noted	(8) 473763	N/A	(8) 473763	(8) 473763	(12) 02-152530	(8) 473763
23 **	A/R	TV94-080	TV94-160	TV94-160	TV94-160	TV94-160	TV94-160
24	1 per screw	7971-080	7971-160	7971-160	7971-160	7971-160	7971-160
25	1 per screw	7972-080	7972-160	7972-160	7972-160	7972-160	7972-160
26	1 per screw	7973-080	7973-160	7973-160	7973-160	7973-160	7973-160
27	A/R						
28	4	TZ56 _ H	TZ56 _ J	TZ56 _ J	TZ56 _ J	TZ56 _ J	TZ56 _ K
29	A/R	5305-016	5305-017	5305-017	5305-017	5305-017	5305-018

Notes:

* Sold in seal kit only

** Order item #18 for O-rings req'd

Refer to Figure 5.

Key No.	Part Name	No Req'd	BORE SIZE 7"				
			3 1/2" ROD	4" ROD	4 1/2" ROD	5" ROD	
1	Piston rod (# = rod end type)	Non-cushioned	1	TZ82V#MA10B__	TZ82W#MA10B__	TZ82Y#MA10B__	TZ82Z#MA10B__
		Cushioned head end	1	TZ82V#MF10B__	TZ82W#MF10B__	TZ82Y#MF10B__	TZ82Z#MF10B__
		Cushioned cap end	1	TZ82V#MC10B__	TZ82W#MC10B__	TZ82Y#MC10B__	TZ82Z#MC10B__
		Cushioned both ends	1	TZ82V#ML10B__	TZ82W#ML10B__	TZ82Y#ML10B__	TZ82Z#ML10B__
*2	Rod wiper (Normal sealing system option)	1	7947-0350	7947-0400	7947-0450	7947-0500	
3	Rod bearing cartridge with gland drain (Normal sealing system option)	1	TZ81VA010	TZ81WA010	TZ81YA010	TZ81ZA010	
*4	Rod seal (Normal sealing system option)	1	7943-0350	7943-0400	7943-0450	7943-0500	
*5	Rod wear band	1	7945-0350	7945-0400	7945-0450	7945-0500	
*6	Seal O.D. bearing	2	353789	593059	593059	260282	
7	Cushion sleeve (Head end) (Rod end cushion cylinders only)	1	SH-92-R-80	N/A	N/A	N/A	
8	Retainer ring (Head end) (Rod end cushion cylinders only)	1	5194-475	N/A	N/A	N/A	
9	Body (Consult factory if intermediate trunnion mount) Specify stroke	1	TZ57MA _____	TZ57MA _____	TZ57MA _____	TZ57MA _____	
10	Cushion collar	1	TZ93UM1C	TZ93WM1C	TZ93WM1C	TZ93ZM1C	
*11	Piston wear band	1	7967-0700	7967-0700	7967-0700	7967-0700	
*12	Piston seal (Normal sealing system option)	1	7963-0700	7963-0700	7963-0700	7963-0700	
13	Piston	1	TZ53MF0U7	TZ53MF0W7	TZ53MF0W7	TZ53MF0Z7	
*14	Body O-ring	2	924864	924864	924864	924864	
15	Retainer ring (Cap end) (Cap cushioned cylinders only)	1	5194-187-HD	5194-187-HD	5194-187-HD	5194-187-HD	
16	Cushion sleeve (Cap end) (Cap cushioned cylinders only)	1	SH-92-B-70	SH-92-B-70	SH-92-B-70	SH-92-B-70	
17	Cushion adjusting screw (2 req'd if cushioned both ends)	1 or 2	TV95-160	TV95-160	TV95-160	TV95-160	
18	Cushion adjusting O-ring (2 req'd if cushioned both ends)	1 or 2	02-147747	02-147747	02-147747	02-147747	
19	Steel ball (1 req'd if cushioned head end)	1	N/A	02-157953	02-157953	02-157953	
20 **	Ball retainer (1 req'd if cushioned head end)	1	N/A	TV98-160	TV98-160	TV98-160	
21	Rod bearing retainer (>2 1/2" rod)	1	TV80U0	TV80W0	TV80W0	TV80Z0	
22	Retainer screw (Soc. head cap screw) (Qty. req'd noted with part No.)	As noted	(8) 473763	(12) 02-152530	(12) 02-152530	(12) 02-152531	
23 **	Air bleeder screw	A/R	TV94-160	TV94-160	TV94-160	TV94-160	
24	Retaining plate - Ball check adj. screw	1 per screw	7971-160	7971-160	7971-160	7971-160	
25	Retaining plate - Cushion adj. screw	1 per screw	7972-160	7972-160	7972-160	7972-160	
26	Retaining plate - Air bleed adj. screw	1 per screw	7973-160	7973-160	7973-160	7973-160	
27	Retaining plate drive screws (Included with retaining plate)	A/R					
28	Tie rods (Specify mtg. style/bore & stroke)	4	TZ56 _ K _____	TZ56 _ K _____	TZ56 _ K _____	TZ56 _ K _____	
29	Tie rod nuts (Specify mtg. style/bore & stroke)	A/R	5305-018	5305-018	5305-018	5305-018	

Notes:

* Sold in seal kit only

** Order item #18 for O-rings req'd

Replacement Parts

Refer to Figure 5.

Key No.	No Req'd	BORE SIZE				
		3 1/2" ROD	4" ROD	4 1/2" ROD	5" ROD	5 1/2" ROD
1	1	TZ82V#NA10B _____	TZ82W#NA10B _____	TZ82Y#NA10B _____	TZ82Z#NA10B _____	TZ821#NA10B _____
	1	TZ82V#NF10B _____	TZ82W#NF10B _____	TZ82Y#NF10B _____	TZ82Z#NF10B _____	TZ821#NF10B _____
	1	TZ82V#NC10B _____	TZ82W#NC10B _____	TZ82Y#NC10B _____	TZ82Z#NC10B _____	TZ821#NC10B _____
	1	TZ82V#NL10B _____	TZ82W#NL10B _____	TZ82Y#NL10B _____	TZ82Z#NL10B _____	TZ821#NL10B _____
*2	1	7947-0350	7947-0400	7947-0450	7947-0500	7947-0550
3	1	TZ81VA010	TZ81WA010	TZ81YA010	TZ81ZA010	TZ811A010
*4	1	7943-0350	7943-0400	7943-0450	7943-0500	7943-0550
*5	1	7945-0350	7945-0400	7945-0450	7945-0500	7945-0550
*6	2	353789	593059	593059	260282	260282
7	1	SH-92-R-80	N/A	N/A	N/A	N/A
8	1	5194-475	N/A	N/A	N/A	N/A
9	1	TZ57NA _____	TZ57NA _____	TZ57NA _____	TZ57NA _____	TZ57NA _____
10	1	TV93UN1C	TV93WN1C	TV93WN1C	TV93ZN1C	TV93ZN1C
*11	1	7949-200	7949-200	7949-200	7949-200	7949-200
*12	1	7948-200	7948-200	7948-200	7948-200	7948-200
13	1	TV53NF0U7	TV53NF0W7	TV53NF0W7	TV53NF0Z7	TV53NF0Z7
*14	2	924865	924865	924865	924865	924865
15	1	5194-206-HD	5194-206-HD	5194-206-HD	5194-206-HD	5194-206-HD
16	1	SH-92-B-70	SH-92-B-70	SH-92-B-70	SH-92-B-70	SH-92-B-70
17	1 or 2	TV95-160	TV95-160	TV95-160	TV95-160	TV95-160
18	1 or 2	02-147747	02-147747	02-147747	02-147747	02-147747
19	1 or 2	N/A	02-157953	02-157953	02-157953	02-157953
20 **	1 or 2	N/A	TV98-160	TV98-160	TV98-160	TV98-160
21	1	TV80U0	TV80W0	TV80W0	TV80Z0	TV80Z0
22	As noted	(8) 473763	(12) 02-152530	(12) 02-152530	(12) 02-152531	(12) 02-152531
23 **	A/R	TV94-160	TV94-160	TV94-160	TV94-160	TV94-160
24	1 per screw	7971-160	7971-160	7971-160	7971-160	7971-160
25	1 per screw	7972-160	7972-160	7972-160	7972-160	7972-160
26	1 per screw	7973-160	7973-160	7973-160	7973-160	7973-160
27	A/R					
28	4	TZ56 _ L _____	TZ56 _ L _____	TZ56 _ L _____	TZ56 _ L _____	TZ56 _ L _____
29	A/R	5305-019	5305-019	5305-019	5305-019	5305-019

Notes:

* Sold in seal kit only

** Order item #18 for O-rings req'd

How to Order

Standard Cylinders

Vickers has created an easy system for ordering Series TZ Cylinders. This system has been developed to improve our service to you. The model code consists of sixteen alpha-numeric digits which fully describe the most common standard options offered on Series TZ cylinders.

To specify your Series TZ cylinder, review the following pages for a full description of each option available and select the desired code.

This model code system will:

- † **Simplify the re-order process.**
Each Vickers Series TZ cylinder is assigned a sixteen digit model code. That code is unique to a particular cylinder description. That way, when you re-order your Series TZ cylinder, you're assured of exactly the same top quality cylinder design.
- † **Improve identification.**
Every Series TZ cylinder has its sixteen digit model code clearly marked on the product, impression stamped in the metal head or cap. Each sixteen digit code completely describes a specific cylinder. This allows seals and replacement components to be easily identified in the field.
- † **Facilitate communications.**
This fully descriptive model code system allows you to work directly with your local Vickers sales engineer to identify and service your Vickers cylinder.

Custom Cylinders

New Cylinders

Although the model code has been arranged to cover the vast majority of available options, there will be occasions when you require an option which cannot be coded. When specifying such an option, enter an "X" for the appropriate item in the sixteen digit model code, then describe your requirements. For example, if you have an application which requires a custom thread on the end of the piston rod, enter an "X" for item 7. Then add a full description at the end of the model code, such as "With 3.25 inch total rod projection and M22 x 1,5 thread 1.375 inches long." The cylinder will then be given a unique five digit design number on receipt of order (as explained below).

Replacement Cylinders

Every Vickers custom cylinder is assigned a unique design number. This number is contained in the last five digits of the sixteen digit model code, and item 12 is always a alpha character (see page 19). In other words, the "Stroke" and "Extra Rod Projection" locations (items 12 through 16) become the "Design Number" items for custom cylinders. When ordering a replacement cylinder, simply give the sixteen digit model code or the five digit design number to your local Vickers Sales Representative.

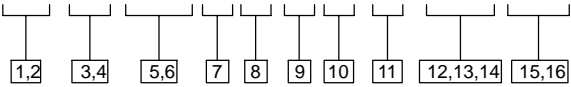
Replacement Parts

Each design number is stored in a quick retrieval computerized storage system. This gives our field sales representatives rapid access to assist you in identifying and specifying genuine Vickers replacement parts.

Model Code

(All dimensions are in inches)

TZ 17 KM 5 N 5 K W 108 PC



1,2 Series

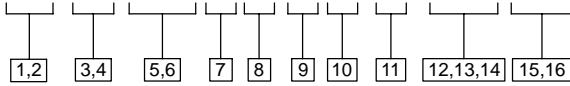
TZ – ANSI B93.15/NFPA
Interchangeable hydraulic cylinder

3,4 Mounting style

Code	Mounting style	Code	Mounting style	Code	Mounting style
		09 (ME5)	Head Rectangular 	17 (MT1)	Head Trunnion
01 (MS2)	Side Lug 	10 (MP1)	Cap Clevis 	21 (MX2)	Cap Extended Tie Rod
02 (MS4)	Tapped 	12 (MF2)	Cap Rectangular Flange 	22 (MX3)	Head Extended Tie Rod
04	Keyed Side Lug 	13 (MF6)	Cap Square Flange 	23 (MX1)	Both Ends Extended Tie Rod
05	Keyed Tapped 	14 (ME6)	Cap Rectangular 	25	Double Rod, Side Lug
07 (MF1)	Head Rectangular Flange 	15 (MT4)	Intermediate Trunnion 	Code Other mounting styles	
08 (MF5)	Head Square Flange 	16 (MT2)	Cap Trunnion 	24	No Mount
				26	Double Rod Tapped
				28	Double Rod Keyed Side Lug
				29	Double Rod Keyed Tapped
				31	Double Rod Rectangular Flange
				32	Double Rod Square Flange
				33	Double Rod Rectangular
				34	Double Rod Intermediate Trunnion
				35	Double Rod Head Trunnion
				39	Double Rod Extended Tie Rod
				40	Double Rod Both Ends Extended Tie Rod
				41	Double Rod No Mount

(All dimensions are in inches)

TZ 17 KM 5 N 5 K W 108 PC



5,6 Bore and rod diameters		
Code	Bore	Rod
CC –	1 1/2	5/8
CE –	1 1/2	1
DE –	2	1
DH –	2	1 3/8
EE –	2 1/2	1
EH –	2 1/2	1 3/8
EL –	2 1/2	1 3/4
GH –	3 1/4	1 3/8
GL –	3 1/4	1 3/4
GM –	3 1/4	2
HL –	4	1 3/4
HM –	4	2
HP –	4	2 1/2
KM –	5	2
KP –	5	2 1/2
KU –	5	3
KV –	5	3 1/2
LP –	6	2 1/2
LU –	6	3
LV –	6	3 1/2
LW –	6	4
MU –	7	3
MV –	7	3 1/2
MW –	7	4
MY –	7	4 1/2
MZ –	7	5
NV –	8	3 1/2
NW –	8	4
NY –	8	4 1/2
NZ –	8	5
N1 –	8	5 1/2

7 Rod end type - inch		
Code	Rod End Style	
2 Short female UN thread		
5 Small male UN thread		
6 Plain no attachment		
9 Intermediate male UN thread		
G Grooved end		
K Extended small male UN thread		
M Extended intermediate male UN thread		

Rod end type - metric		
Code	Rod End Style	
0 Intermediate male metric thd.		
1 Short female metric thread		
L Extended small male metric thread		
N Extended intermediate male metric thread		

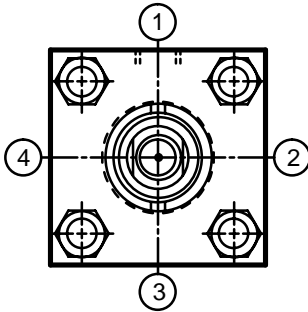
8 Sealing system	
Code	Fluid Type
N –	Normal
L –	Low friction and water glycol
T –	High temperature

9 Ports		
For maximum reliability, SAE ports are recommended.		
Code	Port Style	
1 NPTF		
2 Oversize NPTF		When boss is required
3 SAE/UN O-ring		Straight thread O-ring seal port
4 Oversize SAE/UN O-ring		When boss is required
5 NFPA standard SAE/UN O-ring		Straight thread O-ring seal port
6 SAE 4-bolt manifold		
7 BSPP		
8 Oversize BSPP		When boss is required
9 Metric		
0 Oversize metric		When boss is required
A ISO 6149-1 O-ring		Straight thread O-ring seal port
B Oversize ISO 6149-1 O-ring		When boss is required

10 Port location

Ports are located as shown below when viewing cylinder from head end (mounting end of double rod cylinder).

With some mounting styles, certain port locations cannot be selected due to interference with the mounting.



Code	Head	Cap
K-	1	1
L-	1	2
M-	1	3
N-	1	4
P-	2	1
R-	2	2
S-	2	3
T-	2	4
U-	3	1
V-	3	2
W-	3	3
Y-	3	4
1-	4	1
2-	4	2
3-	4	3
4-	4	4

11 Cushion location

Cushions are located as shown in item 10 when viewing cylinder from head end (mounting end of double rod cylinders). “-” in table indicates no cushion.

Code	Head	Cap
A-	-	-
B-	-	1
C-	-	2
D-	-	3
E-	-	4
F-	1	-
G-	2	-
H-	3	-
J-	4	-
K-	1	1
L-	1	2
M-	1	3
N-	1	4
P-	2	1
R-	2	2
S-	2	3
T-	2	4
U-	3	1
V-	3	2
W-	3	3
Y-	3	4
1-	4	1
2-	4	2
3-	4	3
4-	4	4

12,13,14 Stroke length

The first two digits indicate stroke length from 00 inches through 99 inches.

The third indicates fractions of an inch per the following codes:

Code	Fraction	Code	Fraction
0-	0	8-	1/2
1-	1/16	9-	9/16
2-	1/8	A-	5/8
3-	3/16	B-	11/16
4-	1/4	C-	3/4
5-	5/16	D-	13/16
6-	3/8	E-	7/8
7-	7/16	F-	15/16

15,16 Enter applicable code for either:

Extra rod projection (“C” dimension)

Item 15 indicates inches from 0 through 9.

Item 16 indicates fractions of an inch per codes shown for item 14.

- or -

Air bleed or proximity switch location

Item 15 indicates air bleeds (H)^D gland drains (G), or proximity switches (P).

Item 16 indicates location of air bleeds, gland drain*, or proximity switches as shown in item 10 when viewing cylinder from head end (mounting end of double rod cylinders). “-” in table indicates no air bleed or proximity switch.

Code	Head	Cap
B-	-	1
C-	-	2
D-	-	3
E-	-	4
F*-	1	-
G*-	2	-
H*-	3	-
J*-	4	-
K-	1	1
L-	1	2
M-	1	3
N-	1	4
P-	2	1
R-	2	2
S-	2	3
T-	2	4
U-	3	1
V-	3	2
W-	3	3
Y-	3	4
1-	4	1
2-	4	2
3-	4	3
4-	4	4

* Gland drain optional on head only.

Information contained in this catalog is accurate as of the publication date and is subject to change without notice. Performance values are typical values. Customers are responsible for selecting products for their applications using normal engineering methods.

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