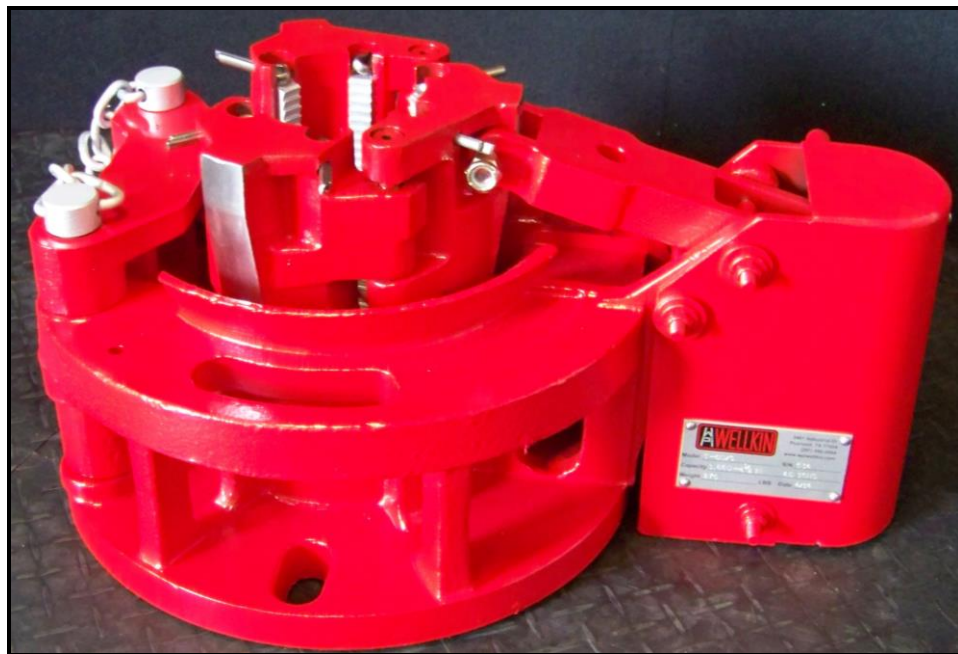




Model T-60 Tubing Spider  
Installation, Operation, Service and Parts Book Manual



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## **Terms and Conditions**

1. All WPI WELLKIN packing slips and invoices must show Buyer's purchase order number.
2. All shipments MUST contain packing slips.
3. **CONTRACT:** This order will become a binding contract upon receipt by WPI WELLKIN of Buyer's PO, receipt by Buyer of a written acknowledgement by WPI WELLKIN and receipt by WPI WELLKIN of a down payment in the amount specified in the contract.
4. This contract may be modified as mutually agreed by the Buyer and WPI WELLKIN.
5. **PAYMENT TERMS:** The payment terms are specified on the commercial offer from WPI WELLKIN. The Buyer agrees to the payment terms by acceptance of the bid.
6. **DELIVERY:** Time is of the essence. WPI WELLKIN will attempt to deliver the material early if possible. WPI WELLKIN will make best efforts to supply all material on a timely basis. If the delivery will run over the contract delivery date, WPI WELLKIN will notify the Buyer giving reason for delay. The current delivery estimate is specified on the commercial offer. The Buyer agrees to the delivery terms by acceptance of the bid.

When necessary, WPI WELLKIN will notify the Buyer in advance of completion of the order and Buyer will appoint an authorized representative or employee to inspect the material on a date and site as designated by WPI WELLKIN. Transportation, lodging and all other expenses portal to portal for Buyer representative or employee to witness and accept the material is the expense of the Buyer.

All costs associated with preparation, crating, insurance and ocean freight of the goods to the final destination to be at Buyer's expense.

7. **CANCELLATION:** This contract is considered to be special order and not subject to cancellation. Both parties hereto shall be given consideration in case of delays in delivery caused by fire, strike, riot, war, act of God, delay of carriers, governmental order or regulation, complete or partial shutdown of plant by reason of inability to obtain sufficient raw materials or power or any other similar or different contingency beyond the reasonable control of the respective parties.

8. **WARRANTIES AND REMEDIES:** WPI WELLKIN expressly warrants that all supplies, materials and parts covered by this contract will conform to the specifications in the contract as applicable and will meet or exceed industry standards for such equipment. WPI WELLKIN will supply Buyer with operations manuals and parts books for the material where applicable. Certificates of Compliance are available upon request.

**MANUFACTURED ITEMS:** WPI WELLKIN manufactured items must be free of material and workmanship defects for a period of 6 months from the date of delivery. If any items fail because of a manufacturing defect within that period of time, then that item will be replaced by WPI WELLKIN. Expendable / wear items are not covered under warranty. Examples of such items include, but are not limited to, the following - dies, inserts, brake bands, rollers, gears, chains, filters, belts, flexible couplings, slip bodies, spider bowls.

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Replacement of parts will be accomplished at WPI WELLKIN's facility or at a designated service point. WPI WELLKIN's liability is limited to replacement of defective parts only and does not include the cost of labor, communications, transportation or handling connected to the replacement of these parts. WPI WELLKIN will in no event be liable for consequential damages or contingent liabilities arising out of the failure of any parts to operate properly. No expressed, implied or statutory guarantee other than herein set forth is made or authorized to be made by WPI WELLKIN.

**DISTRIBUTED ITEMS:** Items distributed by WPI WELLKIN are subject to the warranty provided by the Original Equipment Manufacturer (OEM). Upon request, WPI WELLKIN will furnish Buyer with a warranty statement from the OEM for the applicable material. The OEM warranty will start on the items' delivery date.

9. **COMMISSIONING:** On request, WPI WELLKIN can supply a representative for material commissioning. The Buyer is responsible for portal to portal transportation costs and the current WPI WELLKIN day rate.

10. **BUYER'S PROPERTY:** All equipment or material furnished by WPI WELLKIN shall be the property of the Buyer after the WPI WELLKIN invoice is paid in full.

11. **PATENTS:** WPI WELLKIN holds the Buyer harmless from all claims, for infringement or alleged infringement of any patents arising out of the sale or use of the goods furnished pursuant to this contract.

12. **INDEPENDENT CONTRACT:** In the event that any goods ordered hereunder require in connection with the installation thereof, the services of a contractor engaged by WPI WELLKIN or a supervisor, engineer, or other employee connected with or employed by WPI WELLKIN, and WPI WELLKIN agrees to furnish same, either with or without charge, such contractor, supervisor, engineer, or other employee in performing such services shall not be deemed to be the agent or employee of the Buyer.

13. **INSURANCE:** WPI WELLKIN agrees to carry General Operations and Liability Insurance and other coverage as required in accordance with applicable state and federal laws of the U.S.A.

14. **COMPLIANCE WITH LAWS:** WPI WELLKIN warrants that in its performance of this contract it will comply with all applicable Federal, State and Local laws, regulations, rulings and orders of the U.S.A.

15. **ASSIGNMENT:** This contract may not be assigned without the written consent of the Buyer and any attempted assignment thereof shall be void.

16. **PROPRIETARY INFORMATION:** All plans, drawings, specification and the subject matter contained therein and all other information given to WPI WELLKIN in connection with performance on this Purchase Order involve valuable property rights of the Buyer and shall be held confidential by WPI WELLKIN, shall remain the property of the Buyer and shall not be used by WPI WELLKIN for any purpose other than those for which they have been prepared or supplied. WPI WELLKIN agrees that, as far as possible, it will keep confidential the making of this order and the terms hereof. WPI WELLKIN agrees not to use for publicity purposes any information as to notice of receipt of order, photographs, drawings and/or materials in connection with performance of the Order without obtaining the prior written consent of the Buyer.

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## Spider Warnings

The tubing spider design integrates several safety features. However, the spider is only as safe as the operator using the unit. It is imperative that the operator and all other workers around the spider observe the warnings below. Failure to follow the instructions could result in **death, serious injury or equipment damage**.



- Observe, understand and follow all safety warnings.
- Never operate the spider above the rated design load.
- Use the correct size slip and insert. If the size does not match the tubing string, then the spider will not hold the tubing string.
- Do not operate without the gate closed and pinned.
- Keep all body parts and clothing away from moving machinery.
- Only trained personnel should operate, adjust or repair this equipment. Heat treated alloy steels are used in the construction of the spider. No weld repair on any components is allowed. Any attempts to repair these items by welding will void all warranties and liability.
- Turn off all power and disconnect the pneumatic connections from the equipment before performing any of the following. Also, relocate the spider to a work area to avoid dropping items down the well when disassembly will take place.
  - Performing repairs
  - Making adjustments
  - Lubricating the equipment
  - Changing slip inserts
- When the spider is used to hold the tubing string for extended periods of time, protect the pneumatic valve from accidental operation, which might release the tubing string.

## Spider General Information

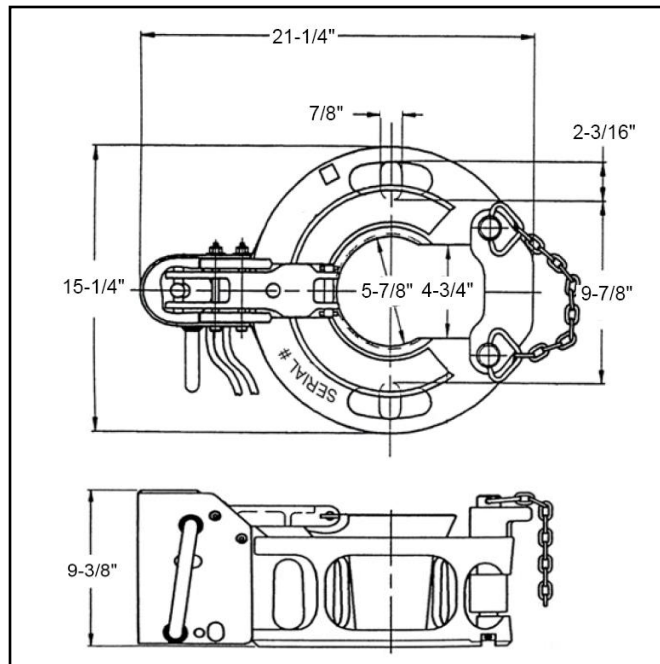
### Description

The purpose of a tubing spider is to hold the load of the tubing string as it is lowered or raised from the well. The spider is made up of 3 principal assemblies: the base, the slip and the actuator.

The base of the spider contains a machined taper that matches the slip bodies. It also has the mount for the linkage that operates the slip assembly. Installed on the slip body are the inserts. The size of insert and slip matches the tubing string. During operation, a control valve is used to actuate a pneumatic cylinder that opens or closes the slips.

### Specifications

Load rating	120000 lbs (54431 Kg)
Size range	1.050" to 4-1/2" (26.7 to 114.3 mm)
Material	Heat treated alloy steel
Pneumatic pressure requirements	40 to 80 PSI (2.8 to 5.5 bar)
Weight (with slips)	195 lbs (88.5 Kg)
Weight (without slips)	150 lbs (68.0 Kg)
Dimensions	
Bowl opening	5-7/8" (149.2 mm)
Gate opening	4-3/4" (120.7 mm)
Base diameter	15" (381 mm)
Height	9-3/8" (238.1 mm)
Base bolt slot	
Slot width	7/8" (22.2 mm)
Slot centers	10-3/4" to 13-3/8" (273.1 to 339.7 mm)



**Figure 1: Spider Dimensions**

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## **Installation**

Before any attempt is made to operate the tubing spider, the following section should be read, understood and then followed.

### **Control Valve**

The tubing spider control valve is connected to the spider by a set of hoses. Always place this valve in a location that is easily accessed by the rig crew operator.

### ***Hoses***

Verify that the cylinder hoses do not present a trip hazard or interfere with any moving machinery. When connecting and disconnecting the hoses, ensure that there is no pressure on the lines.

### ***Quick Disconnects***

The hoses are fitted with quick disconnects. Before a connection is made, inspect the end faces of the quick disconnect. If any foreign material is present, then carefully remove the debris with a lint free rag or towel.

## **Inspection**

Before moving the spider over the well, ensure the correct size slip assembly and inserts match the tube diameter.

After the lines are connected, cycle the cylinder and observe the linkage system to see if there are any functional problems. Disconnect the lines before moving the tubing spider.

## **Mount**

The spider must be secured over the wellhead. The slotted holes in the base could be used to bolt the spider to an adapter plate. There are also eyes on the spider where it can be chained down.

## **Operation**

Keep the insert teeth clean from buildup of mud, grease, sand or other debris.

Depending on the operation of the control valve, pressure applied to the cylinder will either cause it to extend or retract. This cylinder moves the slip assembly via a lift arm.

### **Opening the Slips**

Retracting the cylinder prevents the insert teeth from engaging and supporting the tubing string by moving the slip up and out of the way.

### **Closing the Slips**

To engage the insert teeth on the tubing string, the cylinder is extended. Then, the load of the tubing string can be held if it is lowered slightly thereby transferring the load from the hook to the spider.

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## **Objects Larger than Spider Bore**

When an object is coming in or out of the well that has a diameter larger than the bore of the spider, then the tubing spider has to be removed. Ensure the weight of the tubing string is not being held by the spider. Remove the gate so the spider can be removed from the string. Pass the object, and reinstall the tubing spider over the well. Install the gate back onto the spider and pin it in place.

## **Slip Assembly**

The slip assembly must correlate with the size of tubing being held. The following instructions are for the replacement of the slip assembly or inserts. Refer to the warning section of the manual before working on the spider.

### ***Slip Replacement***

Follow the steps below. Refer to the parts drawing in this manual for a visual aid.

1. Use the pneumatic system to hold the slip body in the raised position.
2. Loosen and remove the nut from the bolt that secures the slip to the lift arm. Lift the slip assembly out of the spider. Retain the two washers for the new nut and bolt.
3. Replace with the new slip assembly with inserts already installed. Align the slip hole with the hole in the lift arm and secure using a new bolt and nut. Tighten the nut until the end of the bolt is flush with the end of the nut.
4. Function test the slip to verify correct operation before usage.

### ***Insert Replacement***

Use the following steps as a guide. Refer to the parts drawing in this manual for a visual aid.

1. Use the pneumatic system to hold the slip body in the raised position.
2. Remove the three cotter pins.
3. Slide or drive the slip inserts out of the slip body groove.
4. Clean the built up debris out of the slip body. Apply a new coating of grease to the slip body.
5. Install the new slip inserts by aligning the vertical groove in the insert with the slip body. *Notes: 1) Orient insert so teeth will grab tubing. 2) Always replace inserts in a full set.*
6. Reinstall the cotter pins or replace with new ones. Spread the legs of the pins to keep them from falling out.
7. Function test the slip to verify correct operation before usage.

## **Troubleshooting**

The following table addresses possible solutions to problems that may occur during operation.

**Table 1: Troubleshooting the Spider**

Problem	Solution
Slip insert teeth are not gripping tubing	1) Clean the teeth. Verify they are clean from built up debris such as dirt, mud, grease, sand, etc. 2) Inspect the teeth for damage. Replace inserts if any of the teeth are worn, broken or chipped.



	<p>3) Verify the insert is not too loose in the slip body. If the insert can move vertically 1/10" or more, then it is too loose. Replace the slip body assembly.</p> <p>4) Verify the correct size slip assembly and inserts are being used for the diameter of the tubing string.</p>
Slip assembly torsion spring is broke or has a permanent set	1) Replace the spring with a new one.
Slip assembly shoulder bolt is worn	1) Replace the shoulder bolt with a new one.
Slip assembly, when landed, is below the bottom of the bowl	1) Replace the slip assembly. If the new slip extends below the bowl, then the spider bowl needs to be replaced.
Actuating cylinder does not function properly	<p>1) Verify the pressure to the cylinder meets system requirements.</p> <p>2) The seals could be worn inside the cylinder. Replace with new seals or replace the entire cylinder.</p>
Lift arm pivot points are worn	<p>1) Replace lift arm with new one if the holes in the lift arm are worn.</p> <p>2) Inspect the bolts in the link arm assembly. Replace if there is any wear present.</p>

## **Service**

It is important to maintain the spider in a condition that will provide continued safe operation. The following sections highlight items that need to be addressed over the life of the unit. Record the maintenance activities on a log or report that is kept on file and can be traced back to the serial number of the spider.

### **Daily**

1. Grease all pivot points on the tubing spider.
2. Inspect inserts for debris or wear.
3. Verify linkage operates properly.

### **As Required Maintenance**

1. Replace slip inserts.
2. Replace slip assembly.
3. Replace bowl bushings.

### **Semi-annual Maintenance**

4. Perform all activities listed in the daily section.
5. Replace the shoulder bolts and torsion springs in the slip body assembly.
6. Rebuild the cylinder with new seals.
7. Function test the spider to verify proper operation.

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## **Annual Maintenance**

1. Perform all activities listed in the daily section.
2. Completely disassemble the spider.
3. Replace the shoulder bolts and torsion springs in the slip body assembly.
4. Replace the cylinder.
5. Replace the lift arm and bolts in the lift arm assembly.
6. Function test the spider to verify proper operation.

Instructions for replacing the crank shafts and bushings can be found in the following text.

## **Bowl Bushing Replacement**

Use the following steps as a guide. Refer to the parts drawing in this manual for a visual aid.

1. Use the pneumatic system to hold the slip bodies in the raised position.
2. Remove the slip assemblies per the instructions found in the operation section.
3. Release the pressure on the cylinder allowing it to extend. Bleed any remaining pressure out of the cylinder.
4. Loosen and remove the nuts on the bolts that mount the cylinder housing to the spider base. Keep the bolts, washers and nuts together and set aside.
5. Remove the cylinder mount housing with the pneumatic cylinder and lift arm attached.
6. There are four bushings in the bowl. Using a press or bushing puller, remove these bushings discard. Install four new bushings into the bowl.
7. Reassemble the tubing spider.
  - a. Install the cylinder mount housing. Tighten all nuts.
  - b. Connect air to the cylinder. Retract the cylinder to raise the lift arm.
  - c. Install the slip assembly to the lift arm.
  - d. Function test the spider to verify proper operation.

## **Lift Arm and Cylinder Replacement**

Use the following steps as a guide. Refer to the parts drawing in this manual for a visual aid.

1. Use the pneumatic system to hold the slip bodies in the raised position.
2. Remove the slip assemblies per the instructions found in the operation section.
3. Release the pressure on the cylinder allowing it to extend. Bleed any remaining pressure out of the cylinder.
4. Loosen and remove the nuts on the bolts that mount the cylinder housing to the spider base. Keep the bolts, washers and nuts together and set aside.
5. Remove the cylinder mount housing with the pneumatic cylinder and lift arm attached.
6. Disconnect the cylinder hoses. Remove the elbows and pipe nipples from both ports of the cylinder.
7. Remove the bolt that pins the bottom of the cylinder. Lift the cylinder out of the housing. Set the bolt, nut and washers aside.
8. Remove a cotter pin from the pivot pin that connects the cylinder rod to the lift arm.
9. Install the pivot pin into a new lift arm and cylinder. Insert a cotter pin through the exposed hole of the pivot pin. Spread the pin legs to keep it from backing out.
10. Reassemble the tubing spider.

- a. Place the cylinder back in its housing. Orient the cylinder ports so they align with the holes in the housing.
- b. Pin the bottom of the cylinder using the bolt, nut and washers removed earlier.
- c. Install the pipe fittings into the cylinder ports.
- d. Attach the cylinder housing back to the spider bowl.
- e. Install the slip body onto the lift arm.
- f. Connect the cylinder hoses.
- g. Function test the spider to verify proper operation.

## **One Year Spares**

Below is a list of recommended spares for one year of operation.

**Table 2: Pneumatic Tubing Spider One Year Spares**

Part Number	Qty.	Parts Description
46024	1	Lift Arm
54569	1	Pneumatic Cylinder
54816	2	Pneumatic Cylinder Repair Kit
1045-2	2	Bolt Kit, Cylinder Mounting and Lift Arm
56812	2	Bolt and Spring Kit for Slip Body
28445	2	Roll Pin for Pivot Pin
992550-01-01	4	Steel Tension Bushing

## **Parts Book**

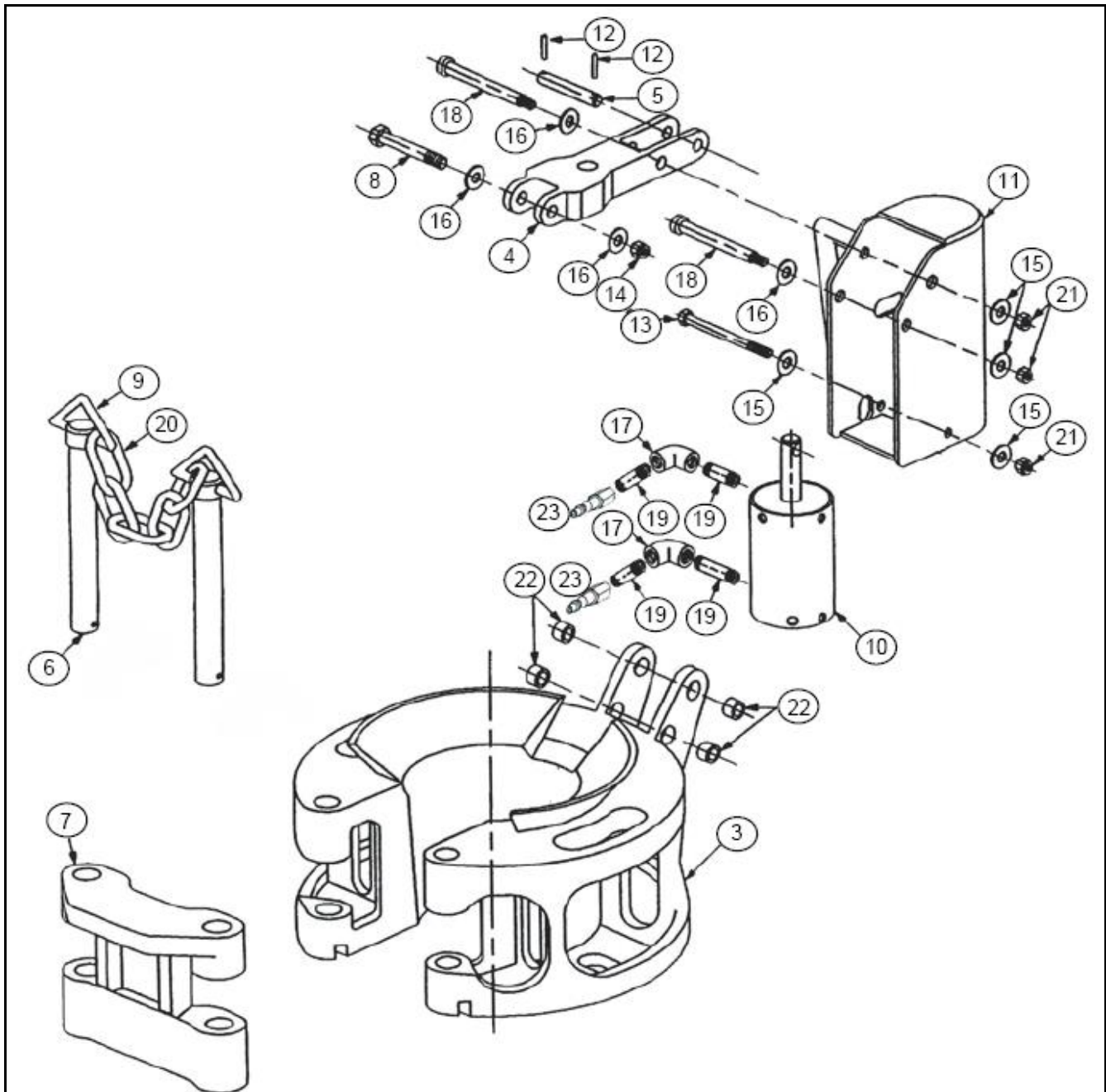
Below are parts lists for the tubing spider and following are drawings with corresponding item numbers.

**Table 3: Spider Parts List**

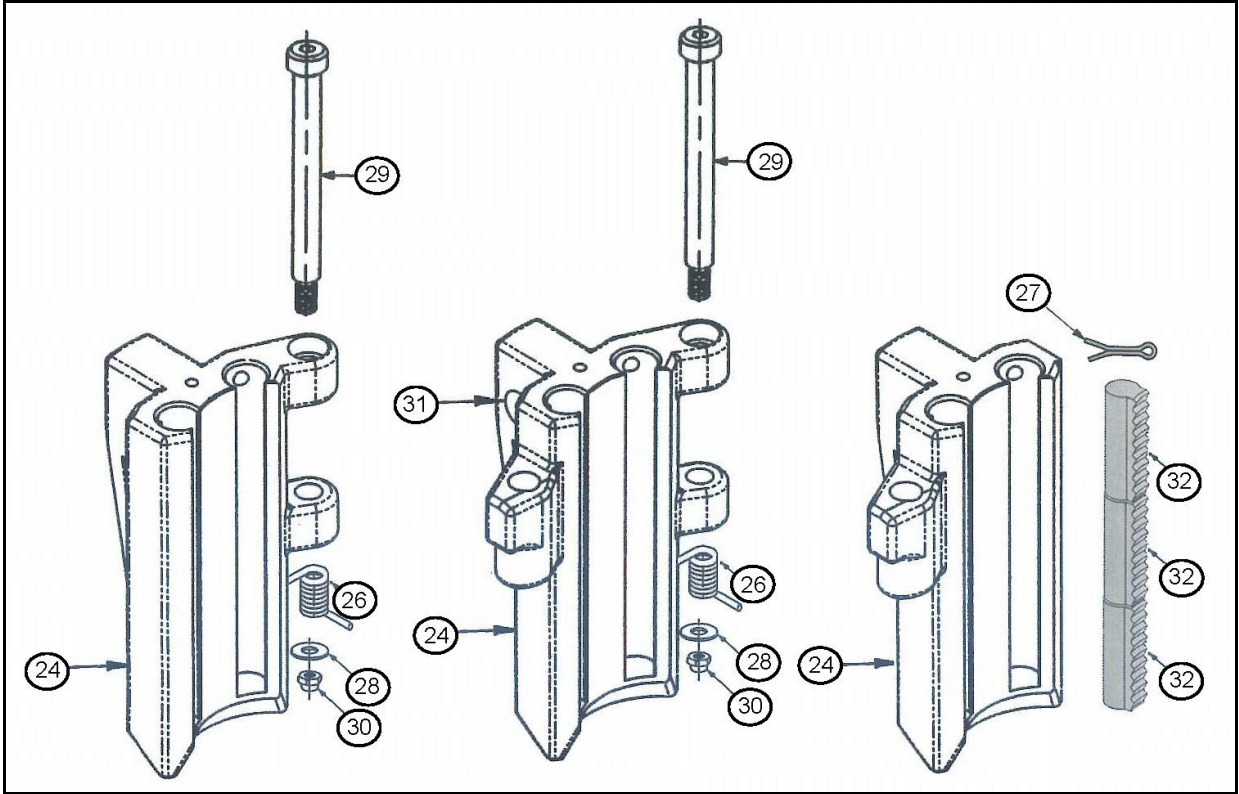
Item	Part Number	Qty.	Parts Description
1	61000-100	1	Model T-60 Spider Assembly, complete, less Slip Body and Inserts
2	67580	1	Model T-60 Spider Assembly, complete with 2-7/8" Slip Body (Less Inserts)
	62458	1	Model T-60 Spider Assembly, complete with 3-1/2" Slip Body (Less Inserts)
3	61005-100	1	Model T-60 Spider Bowl Assembly (less Cylinder and Guard)
4	46024	1	Lift Arm
5	21784	1	Pivot Pin
6	28250	2	Gate Pin
	1030-4	2	Gate Pin Cotter Pin
7	42440	1	Plain Gate
8	24212	1	Lift Arm Bolt
9	28251	2	Bendable Chain Loop
10	54569	1	Air Cylinder Assembly
11	43733	1	Cylinder Housing
12	28445	2	Roll Pin for Pivot Pin
13	992033-18	1	Hex Head Bolt
14	992089-09	1	Self Locking Hex Nut
15	24223	4	Flat Washer
16	24235	4	SAE Flat Washer
17	27864	2	90° Pipe Elbow

Item	Part Number	Qty.	Parts Description
18	26359	2	Shoulder Bolt
19	27863	4	Pipe Nipple
20	24225	1	Double Loop Coil Chain, #2 Zinc Plated
21	24647	3	Flex Lock Hex Nut
22	992550-01-01	4	Steel Tension Bushing
23	PI-04-04-N-F	2	Quick Disconnect (QD), Male, 1/4"
	992285-MH-6-6	2	or Quick Disconnect (QD), Male (with pipe adapter) 3/8"
<b>2-7/8" Slip Body and Inserts</b>			
24	62461	1	Slip Body for 2-7/8" (Less Inserts)
25	56812	1	Bolt and Spring Kit
26	54219	2	Slip Body Spring
27	90-1010	6	Cotter Pin for Inserts
28	61-1200	2	Flat Washer
29	12-1040-21	2	Shoulder Bolt
30	41-1200-21	2	Flex Lock Hex Nut
31	9400	1	Mounting Bolt Bushing
32	62474	1	1" Insert Set (18 Each)
	62475	1	1-1/4" Insert Set (18 Each)
	62476	1	1-1/2" Insert Set (18 Each)
	62478	1	2-1/16" Insert Set (18 Each)
	42586	1	2-3/8" Insert Set (18 Each)
	42587	1	2-7/8" Insert Set (18 Each)
<b>3-1/2" Slip Body and Inserts</b>			
24	62462	1	Slip Body for 3-1/2" (Less Inserts)
25	56812	1	Bolt and Spring Kit
26	54219	2	Slip Body Spring
27	90-1010	6	Cotter Pin for Inserts
28	61-1200	2	Flat Washer
29	12-1640-21	2	Shoulder Bolt
30	41-1200-21	2	Flex Lock Hex Nut
31	9400	1	Mounting Bolt Bushing
32	42588	1	3-1/2" Insert Set (18 Each)
<b>Integral Slip Body</b>			
24	49933	1	4" Slip Body (Integral Inserts)
24	34989	1	4-1/2" Slip Body (Integral Inserts)
<b>Pneumatic Cylinder Repair</b>			
33	50644	1	Brass Cylinder Barrel
34	50646	1	Cylinder End
35	50648	1	Cylinder Cap
36	26894	1	Cylinder Stem
	54816	1	Pneumatic Cylinder Repair Kit including the following:
37	27859	1	Cotter Pin
38	19337	1	O-ring
39	27861	1	O-ring
40	18496	2	O-ring
41	24223	1	Flat Washer
42	27858	1	Finished Slotted Hex Nut
43	18415	6	Button Head Cap Screw

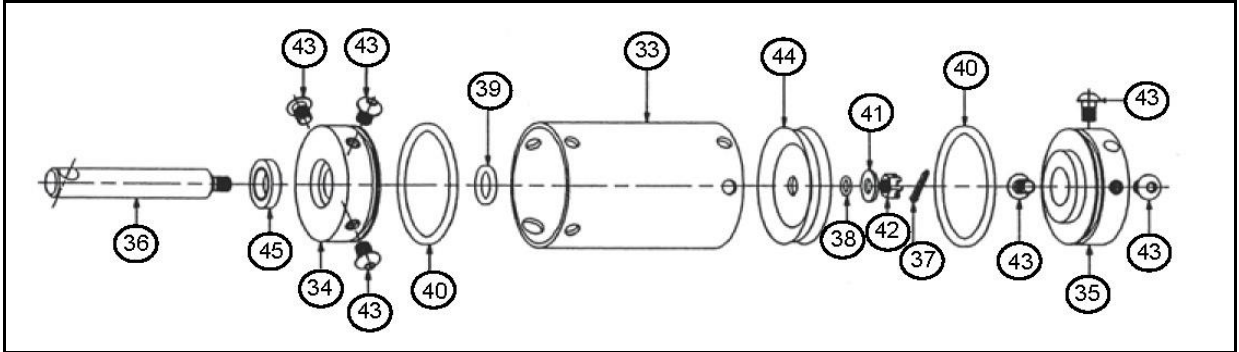
Item	Part Number	Qty.	Parts Description
44	27860	1	Piston and Seal Assembly
45	992549-01	1	Wiper Seal
<b>Optional Parts</b>			
	56812	1	Bolt and Spring Kit for 2-7/8" or 3-1/2" Slip Body
	65200-100	1	Pneumatic Foot Control Valve Assembly with Cover
	65220-200	1	Pneumatic Hand Control Valve Assembly
	992311	1	Filter/Regulator/Lubricator Assembly with Gauge
	65300-G	1	Set of Pneumatic Hoses (Three 180" with 1/4" QDs)
	65300	1	Set of Pneumatic Hoses (Three 180" with 3/8" QDs)



**Figure 2: Tubing Spider Parts**



**Figure 3: 2-7/8" and 3-1/2" Slip Body Parts**



**Figure 4: Pneumatic Cylinder Parts**