



Superior Energizer





Superior Energizer

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OVERVIEW

The Logan Superior Energizer is essentially a fluid spring that stores energy when a strain is pulled on the fishing string. Its function is to increase the impact energy delivered to the stuck fish by the Logan Superior Hydraulic Fishing Jar and the collars used to supply the impact energy.

When the strain is removed by the free stroke of the fishing jar, the stored energy is released, accelerating the collars upward until a blow of high impact is struck. The hydraulic fluid contained in the tool cushions much of the jarring shock from the rebounding string after each stroke to protect tools and string from damage.

Variable load is controlled by applying a lighter or heavier pull on the working string. A light pull will create light impact and a heavy impact will create hard impact at the strike point.

The Logan Superior Energizer is run in conjunction with a Logan Superior Hydraulic Fishing Jar of the same size. Each size of Logan Superior Energizer is designed to match a corresponding size of Logan Superior Hydraulic Fishing Jar.

OPERATION

The Logan Superior Energizer is installed in the string when maximum jarring impact and impulse are needed, particularly in shallow, deviated, or directional holes. Running strings lack stretch at shallow depths. Acceleration and effectiveness of the jarring assembly are diminished due to the small amount of available stretch. In deviated or directional holes, friction between the running string and the wall of the hole will often diminish accelerated movement. In these cases, much of the energy will be lost. The Logan Superior Energizer provides a means to store the required energy immediately above the drill collars and fishing jar to

offset the loss of stretch or drag on the running string. In conventional jarring operations, using either hydraulic or mechanical jars, the intensity of a blow is a function of, and is proportional to the accelerated movement of the entire running string above the fishing jar.

Avoid running the tools at a highly deviated point or in the curve of a directional hole. Isolate the Logan Superior Hydraulic Fishing Jar and Logan Superior Energizer from stiffer sections of the string with flexible joints.

The Logan Superior Energizer is simple to use and requires only a straight pull at a speed determined by the job. It is completely safe to assemble since no high-pressure pre-loading is required.

All internal and external threaded connections are tightened to the recommended torque at the Logan manufacturing facilities prior to shipment. Check all external connections after use to ensure proper torque is maintained.

CAUTION: Tong the Superior Energizer approximately four inches from the threads. Do not tong the threads. Doing so will damage the tool.

USE WITH THE LOGAN SUPERIOR HYDRAULIC FISHING JAR

The Logan Superior Energizer is always used with a Logan Superior Hydraulic Fishing Jar. Use of the Logan Superior Energizer allows the use of fewer drill collars than would otherwise be possible. This is especially true when operating in shallow depths where sometimes too many drill collars are used to replace available stretch in the string with mass. Using drill collars to achieve mass should be avoided as this practice often damages tools and the running string.

It is recommended that no less than two joints of drill collars or no less than four joints of heavyweight drill pipe be installed between the Logan Superior Hydraulic Fishing Jar and the Logan Superior Energizer.

RIG UP

Fill the Logan Superior Energizer with the correct Logan Energizer Fluid (see page 13) and test the tool in a Logan Jar Tester (see page 7) or equivalent test fixture to verify performance.

Before using, carefully examine the Logan Superior Energizer to be sure the tool has been properly assembled and filled, and that there is no leakage.

To achieve maximum effect from jarring action, the Logan Superior Energizer should be installed in the string immediately above the drill collars, heavyweight drill pipe, and other concentrated mass located between the Logan Superior Hydraulic Fishing Jar and Energizer. Except when flexibility is required for bending, there should be no change in weight per foot in the first 1,000 feet in the working string directly above the Logan Superior Energizer.

NOTE: The Logan Superior Energizer is shipped from the factory in the closed position. The Superior Energizer is installed between the running string (tubing or drill pipe) and the jarring mass (i.e. drill collars) that are located directly above the Logan Superior Hydraulic Fishing Jar. When the tool is elevated, the mandrel will stroke open two to three inches before elevating the attached fishing assembly. This is part of the temperature compensating design feature that makes the Logan Superior Energizer unique.

Once the tool is lowered into the well, downhole temperature will expand the energizer fluid and close this gap, increasing the working stroke of the tool. When the fishing



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string is pulled from the well, the Logan Superior Energizer will once again stroke open two to three inches.

This gap may be somewhat greater if a heavy length of fish is being recovered.

WARNING: The Logan Superior Fishing Jar is shipped from the factory in the closed (cocked) position. The closed Superior Fishing Jar should not be left suspended in the elevator, especially with any significant amount of weight suspended below it, as the tool may open and drop the length of its stroke, causing damage or injury.

JARRING

Velocity and relative impact load of a blow is controlled by the amount of stretch in the running string (pull load) and weight of the drill collars installed above the Logan Superior Hydraulic Fishing Jar. It is necessary to install similar weight above the Logan Superior Energizer for a minimum of 1,000 feet to lessen the reverse inertia on the fishing jar. Apply the minimum pull load above the weight of the drill collars and string to obtain an effective blow.

CAUTION: Maximum pull load on the fishing jar should not be exceeded at any time during the pull cycle.

1. To strike the initial blow, set the string down to ensure the fishing jar is closed. Raise the string by applying the desired pull load on the fishing jar.
2. Set the brake and wait for the jar to strike. Depending on depth of operation, amount of stretch on the string (pull load), downhole temperature, hole condition, and other variables, the initial blow may take from a few seconds to several minutes.

3. Close the jar and repeat. It is only necessary to close the jar before stretching the string to strike the next blow. Any desired pull load, up to the maximum pull load for the jar, may be struck on subsequent blows.

The Logan Superior Energizer can transmit full torque in either direction at all times while maintaining full circulation throughout the tool.

RIG MAINTENANCE

No specific action is required for rig down. In most cases, after moderate use on a short job, minor maintenance may be performed on the rig floor. After inspecting the rig floor for oil leaks, lay the Logan superior Energizer on the derrick floor.

It is recommended that the Logan Superior Energizer should not remain suspended in the elevator for extended periods.

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Once the tool is lowered into the well, downhole temperature will expand the energizer fluid and close this gap, increasing the working stroke of the tool. When the fishing string is pulled from the well, the Logan Superior Energizer will once again stroke open two to three inches.

This gap may be somewhat greater if a heavy length of fish is being recovered.

WARNING: The Logan Superior Fishing Jar is shipped from the factory in the closed (cocked) position. The closed Superior Fishing Jar should not be left suspended in the elevator, especially with any significant amount of weight suspended below it, as the tool may open and drop the length of its stroke, causing damage or injury.

Immediately remove the Logan Superior Energizer from the fishing string and flush all mud from the bore, especially from inside the washpipe.

DRESSING AREA MAINTENANCE

After prolonged field service the Logan Superior Energizer should be disassembled, cleaned, inspected, and redressed.

EQUIPMENT REQUIRED

The following is a list of equipment that will be required to dress the Logan Superior Energizer.

1. A suitable vise and tong or equivalent device of suitable size.
2. Overhead crane with 1,000 lb. minimum capacity.
3. Pipe wrenches of suitable sizes for outside diameters of body parts and for all internal parts.
4. Chain wrenches of suitable sizes for all threaded parts.
5. A suitable belt pulley assembly that can be suspended from a hoist for rotating threaded parts during make up or break out.
6. Suitable nylon lift straps for lifting heavy parts during disassembly or assembly.



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7. A suitable jar tester for tool diameter and length.
8. Logan Superior Energizer Service Kit. (see pages 14 – 15)
9. The required packing assembly sleeves for the size tool being dressed.
10. Required spare parts, packing sets, and o-rings for the size of tool being dressed.

CAUTION: The Logan Superior Energizer could contain residual well pressure. Care should be taken when draining silicone oil from the tool so bodily injury does not occur.

NOTE: The Logan Superior Energizer should always be in the CLOSED position prior to disassembly.

DISASSEMBLY

1. Position the Logan Superior Energizer in a floor vise with the connector body centered in the vise. Support the mandrel end of the Logan Superior Energizer with a support stand.
2. Loosen the pressure body and back off the connection, place an oil catch bucket below the connection, to catch the oil in the pressure chamber. Exercise care at this point of disassembly since residual well pressure could be trapped inside. Allow the silicone oil to drain from the pressure body.
3. Remove the pressure body and washpipe body as an assembly and lay aside for later disassembly. Remember to use the pulley belt assembly to support the parts as they are being removed. **Not supporting the parts properly can cause thread galling or other damages.**

4. Unscrew and remove the washpipe and lay it on a pallet.
5. Remove the piston assembly and lay it on the workbench.
6. Reposition the Superior Energizer in the vise and clamp it in the vise on the spline body. Support the Superior Energizer at the balance body with a support stand.
7. Remove the connector body and place it on a pallet.
8. Remove the mandrel extension and lay it on a pallet.
9. Remove the impact sleeve, if so equipped, and lay it on a pallet.
10. Remove the mandrel from the spline body and lay it on a pallet.
11. Remove the spline body from the vise.
12. Now position the pressure body, and washpipe body in the vise, clamping on the washpipe body.
13. Remove the pressure body, taking care to catch any oil that might have migrated into the washpipe body when the assembly was removed, and lay it on a pallet.

INSPECTION OF PARTS

NOTE: All parts should be cleaned prior to inspection. If steam cleaning or high-pressure washing is available, this is the best type of cleaning to be applied to the parts.

NOTE: Inspect all seals as they are removed for unusual wear patterns. Noting seal wear can help identify other areas of wear that could cause premature seal failure.

CAUTION: Magnetic particle inspection of all parts is strongly recommended for locating fatigue cracks that could lead to catastrophic failure downhole. Inspect all parts for signs of wear on seal surfaces, splines, bores, bearing faces at each connection, 15° shoulders at each connection, and impact surfaces. Inspect all outside body parts for rotational wear, especially if the tools have been used for heavy milling jobs.

Pressure Body

Examine the pull bore of the pressure body for galling or pitting. If severe damage is noted, the parts will have to be replaced or reworked. This procedure cannot be done in the oil field facility. Return the part to the manufacturing facility for repair.

Impact Surfaces

The impact loads are taken on the male end of the spline body and the Impact sleeve large O.D. end face, if equipped. These areas should be inspected for upsets due to high impact loads. Any upsets can be removed with a file or hand held die grinder and the proper cutting bit. Also inspect for visual signs of cracking or damage.

CAUTION: Care should be taken when using power tools. Always wear protective eyewear and gloves to prevent metal particles from getting in your eyes and hands.

Splines

Inspect the splines in the spline body and the splines on the mandrel for any type of unusual damage such as heavy spline wear on the sides of the splines from heavy milling jobs. Look for burrs on the edges of the splines from normal use. Remove burrs with a file or hand held grinder.



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ASSEMBLY

Preparation

Make sure all parts have been cleaned and inspected. Prior to assembly, install all seals in their proper location by observing their location and direction. Some seals have special non-extrusion devices and care should be taken to assure their proper assembly. All seals should be lubricated with silicone oil prior to assembly.

1. Place the spline body in the vise and clamp it down. Apply a good anti-galling grease to the inside of the splines and inside the top end of the spline body past the mandrel seals.
2. Install the mandrel through the spline body. Take care to insure the splines on the mandrel are lined up with the splines in the spline body. Grease the splines on the mandrel before assembly.
3. Install the mandrel extension onto the end of the mandrel and torque it to the specified torque found in the strength data chart. Some Logan Superior Energizers require an impact sleeve. If the Logan Superior Energizer you are working on requires the sleeve, install it before the mandrel extension is screwed onto the mandrel. When installing the impact sleeve, install it with the larger O.D. end going on first. Make sure the threads are coated with Kopr-Kote® or equivalent thread compound. Keep the thread compound confined between the o-ring seal on the connection to avoid contamination of the silicone oil.

4. Install the balance body onto the spline body with balance holes pointed away from spline body. Coat the threads with thread compound.
5. Install seal installation rings on the mandrel extension shoulder.
6. Install the connector body onto the mandrel extension with the I.D. wiper end pointed toward balance body. Make sure the entire length of the mandrel extension is lubricated with silicone oil to ease assembly. Screw threaded end into the balance body and tighten.
7. Remove the assembly sleeve from the mandrel extension.
8. Install the packing assembly on the mandrel extension.
9. Install the washpipe. Make sure to apply thread compound to the threads of the mandrel extension.
10. Install the pressure body.
NOTE: The pressure body is stenciled with "Connector Body End" and "Washpipe Body End" Please make note and assemble in the proper direction. Make sure the threads on the connector body are coated with thread compound.
11. Install the washpipe body. Make sure the threads are coated with thread compound.
12. Tighten all outside body joints to the recommended tightening torque specified in the torque data chart below.

TESTING

NOTE: Prior to testing the Logan Superior Energizer make sure you have all the necessary technical data. Test loads required to make a pull.

1. Install the proper test subs onto the Superior Energizer and lift it into the jar tester using an appropriate hoist.
2. Set the jar tester at the proper loads for the tool being tested.

FILLING AND TESTING

The Logan Superior Energizer is to be filled only with Energizer Fluid (silicone fluid). (*Logan Part No. 50529; see page 13*).

1. Stroke the mandrel so the measured gap is in the fill position. (*See figure and chart on page 6*).
2. With the tool horizontal, rotate the tool so the fill plug holes in the connector body (two holes at 180°) are pointing straight up and down (perpendicular to the floor).
3. Tilt the tool 15 to 20° from horizontal with the mandrel end higher.
4. Fill the fluid chamber with Energizer Fluid (silicone fluid) using the fill plug holes in the connector body until all the air is removed. Pump the fluid in the fill plug hole on the under side of the tool. Let the air and oil escape from the fill plug hole on the topside of the tool and return to the fill pump reservoir. When air is removed, install both fill plugs.



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5. Set the jar tester to the Test Pull Load per chart on page 6. Place the Logan Superior Energizer in the jar tester and pull to the Test Pull Load.

NOTE: If the pull load needs adjusting, make the adjustment and then relax the pull load and re-pull the tools to insure accurate Pull Load/Tester pressure reading and stroke length.

6. With Test Pull Load applied, measure the Pull Stroke Length. (Refer to figure and chart below.)

7. If the Pull Stroke Length is not correct, the pull load should be applied, held for a short period of time, and then relaxed. Repeat several times to properly set the packing before adjusting the fluid volume.

8. If the Pull Stroke Length is short, the tool has too much fluid and some will need to be removed.

WARNING: Exercise caution when removing the fill plug. The fluid in the tool may still be pressurized. Before removing the fill plug, use the jar tester to push the tool closed all the way.

Only the top fill plug needs to be removed to drain some fluid. It is recommended that only a very small amount be removed and the tool retested. Repeat this process as required to get proper Test Pull Load and Stroke.

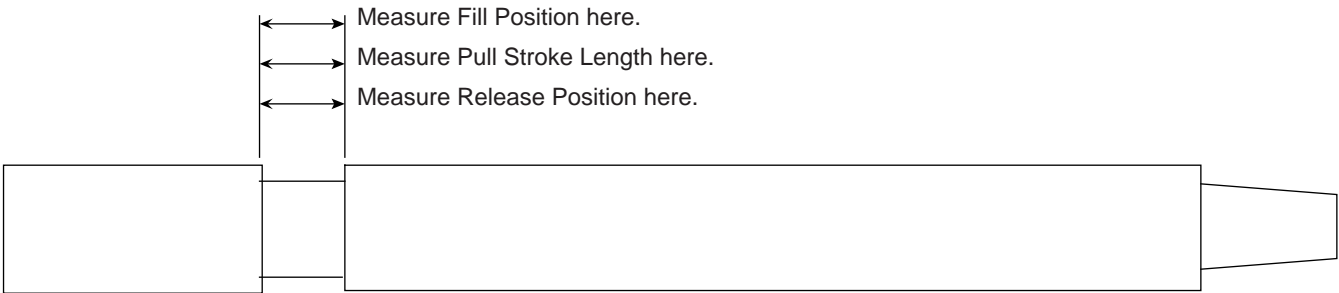
9. If the Pull Stroke Length is long, the tool has too little fluid and some will need to be added.

Only the top fill plug needs to be removed to add fluid. Add a small amount of fluid and retest the tool.

WARNING: Exercise caution when removing the fill plug. The fluid in the tool may still be pressurized. Before removing the fill plug, use the jar tester to push the tool closed all the way.

10. The Logan Superior Energizer is properly filled when the Test Pull Load is attained just as the tool reaches the Test Pull Stroke plus or minus 1/8 inch.

11. Relax the jar tester allowing the tool to retract as far as it will without pushing it with the jar tester. Measure the Release Position and compare to data in chart. It should be within about 1/4 inch.

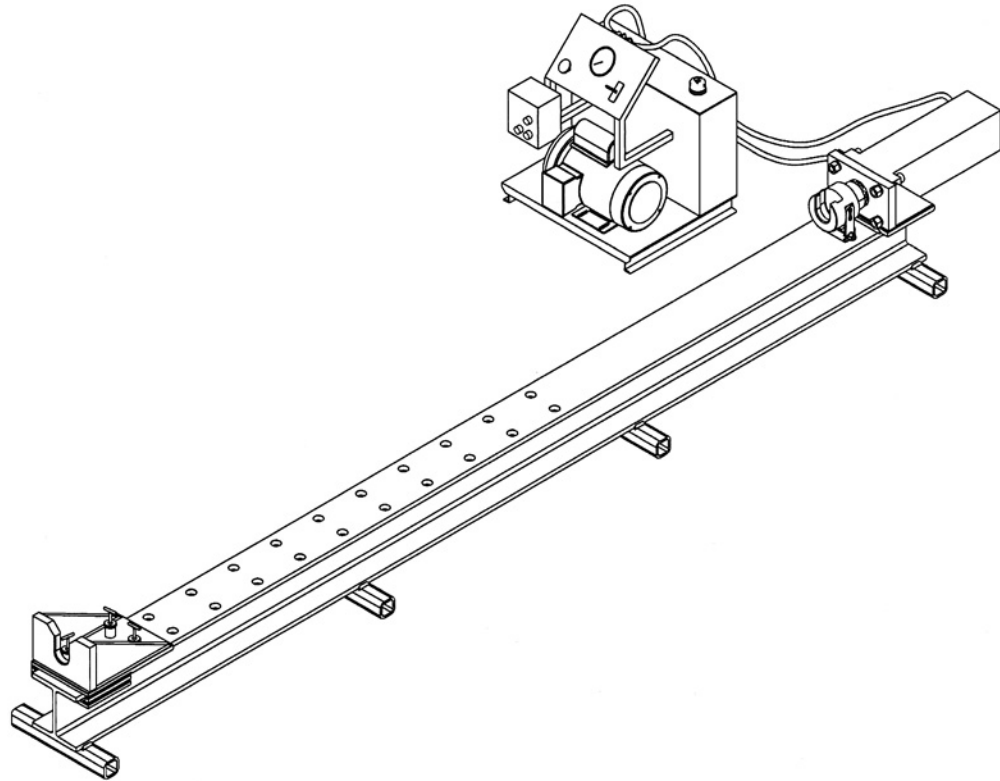


| Tool Size (OD x ID) | Connection | Fill Position | Test Pull Load | Test Pull Stroke | Release Position | Total Stroke | Torque (ft-lbs) |
|---------------------|------------|---------------|----------------|------------------|------------------|--------------|-----------------|
| 3-1/6" x 1-1/2" | 2-3/8 EUE | 2-1/2" | 30,500 | 5-7/8" | 3-11/16" | 6" | 2,400 |
| 3-1/8" x 1" | 2-3/8 REG | 2" | 43,692 | 5-7/8" | 4" | 6" | 2,700 |
| 3-1/8" x 1-1/2" | 2-7/8 PAC | 2-1/2" | 28,450 | 5-3/4" | 3-1/2" | 6" | 2,600 |
| 3-3/4" x 1-1/4" | 2-7/8 REG | 2-1/2" | 56,900 | 6-3/8" | 3-7/8" | 6-5/8" | 3,500 |
| 3-3/4" x 1-1/2" | 2-3/8 IF | 2-1/2" | 56,900 | 6-3/8" | 3-3/8" | 6-5/8" | 3,500 |
| 4-1/4" x 2" | 2-7/8 IF | 2-1/4" | 40,600 | 5-11/16" | 4" | 6-3/16" | 5,000 |
| 4-3/4" x 2-1/4" | 3-1/2 IF | 3-1/4" | 81,300 | 6-5/8" | 4-1/8" | 7" | 9,000 |
| 6-1/4" x 2-1/4" | 4-1/2 IF | 3-1/2" | 121,900 | 7-11/16" | 4-9/16" | 8-3/16" | 20,000 |

Additional sizes are available upon request.



Jar Tester



OVERVIEW

The Logan Jar Tester is a versatile machine for setting, checking, or testing pull loads of a variety of tools with outer diameters up to 11 inches. The Logan Jar Tester is capable of exerting tension or compression loads in a controlled manner. The Logan Jar Tester provides an effective and accurate means for shop testing hydraulic jars; setting and checking pull loads of mechanical rotary jars, safety joints, bumper subs, and other similar tools; and testing formation tools. It is especially useful when many such tools must be maintained on a recurring basis.

CONSTRUCTION

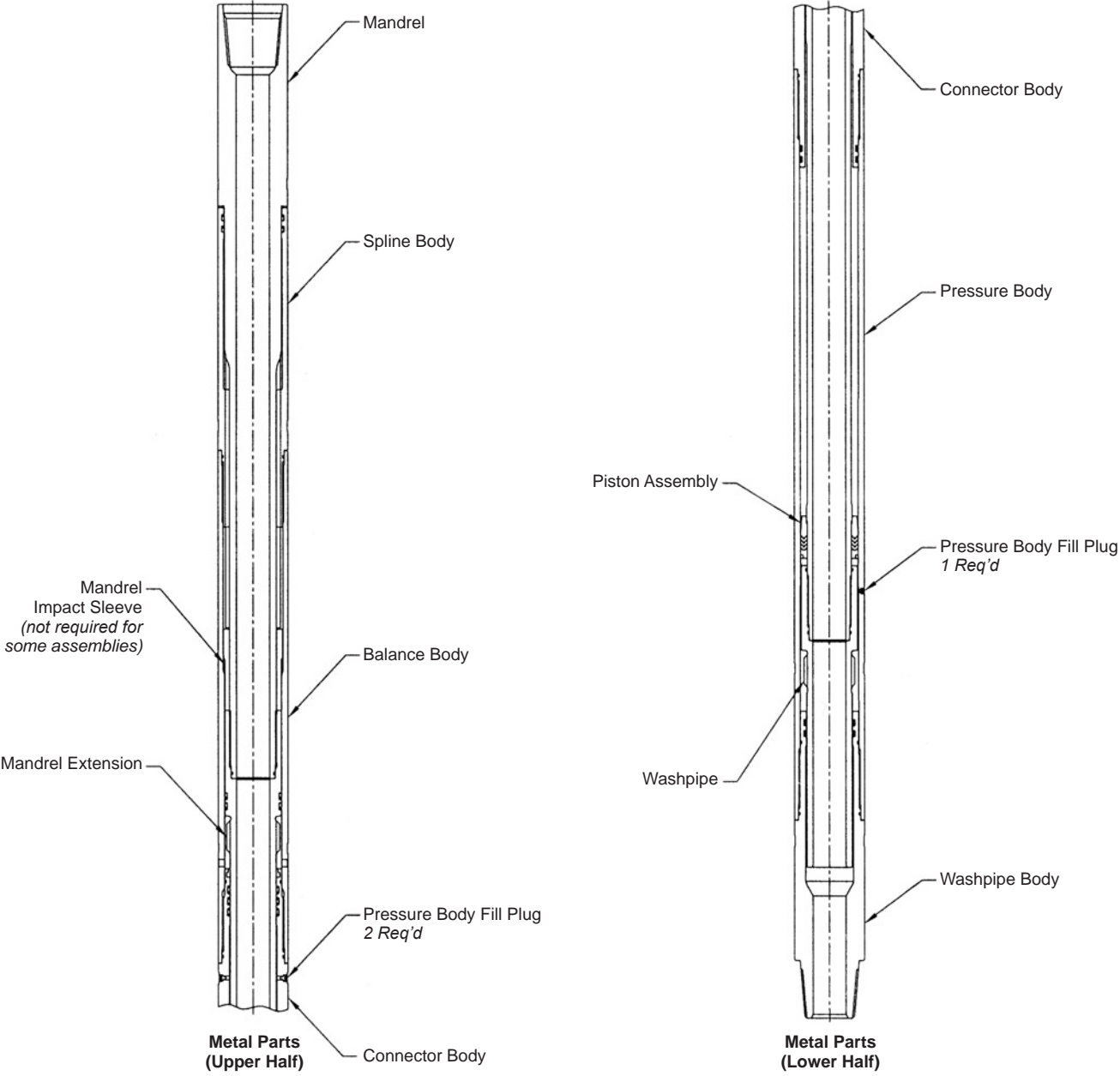
The Logan Jar Tester is composed of two basic components: a frame and a prime mover. A pull plate and crosshead cradle the tool to be tested. The crosshead is attached to a hydraulic cylinder that supplies the tensile or compressive load. The prime mover, which is also referred to as the power-pak, is an electric, motor-driven hydraulic power supply. It is composed of a hydraulic pump, an electric motor, a hydraulic reservoir, a start/stop switch, a pressure gauge, a filter, and appropriate valve fittings to properly operate and maintain the system.

All components of the Logan Jar Tester are manufactured from high-grade materials. All main load bearing members are made from selected heat-treated alloy steel for maximum strength and durability.

All Logan Jar Testers are completely assembled and tested before shipment. The unit requires very little maintenance. However, usual wear parts must be occasionally replaced.

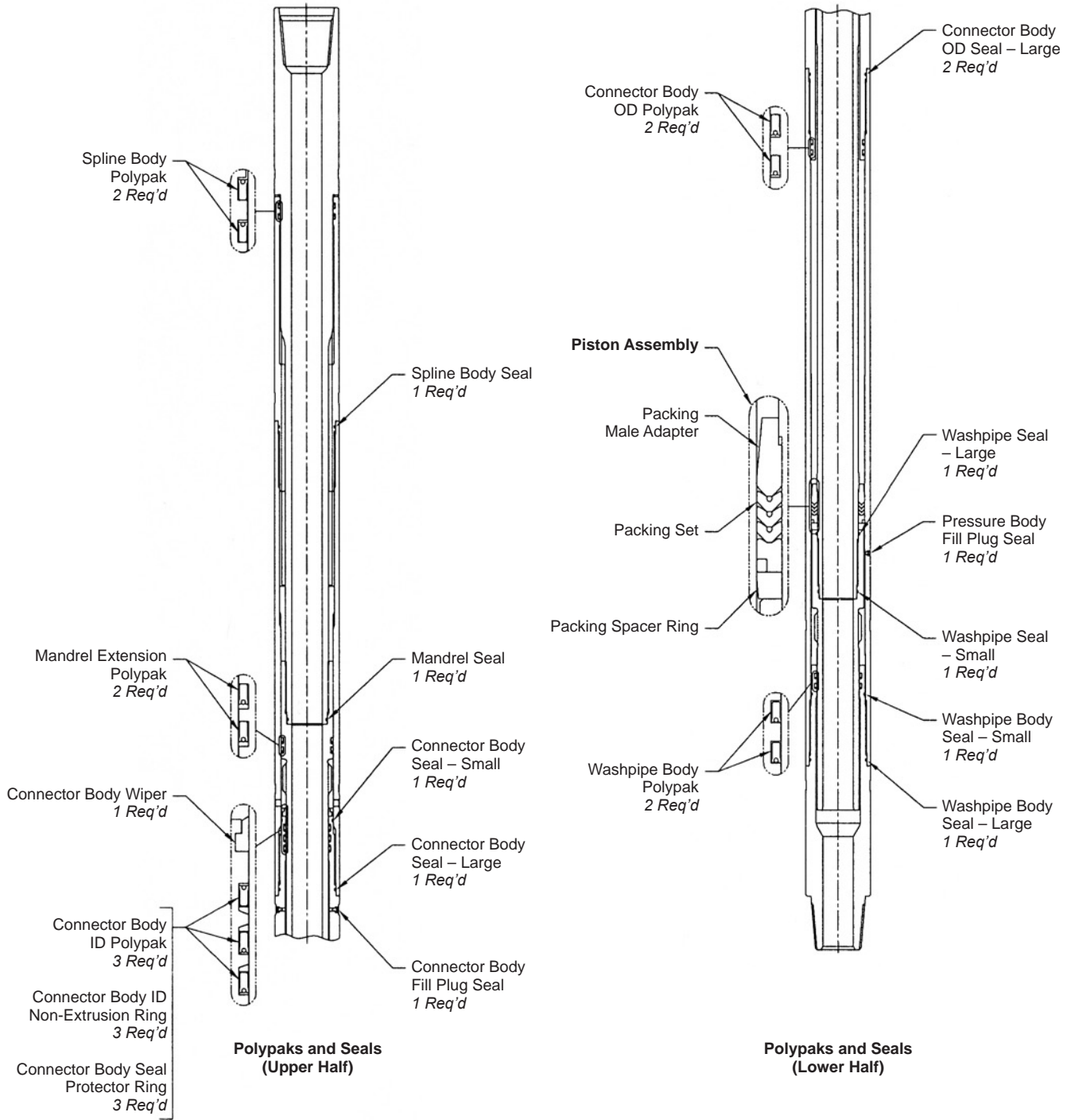


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Superior Energizer Strength Data

CHART A — SPECIFICATIONS

| COMPLETE ASSEMBLY | 614-306 | 614-312 | 614-313 | 614-375 | 614-377 | 614-376 |
|--|---|-------------|-------------|---------------|--------------|-------------|
| OUTSIDE DIAMETER (INCHES) | 3-1/16 | 3-1/8 | 3-1/8 | 3-3/4 | 3-3/4 | 3-3/4 |
| INSIDE DIAMETER (INCHES) | 1-1/2 | 1 | 1-1/2 | 1-1/2 | 1-1/4 | 1-7/8 |
| CONNECTION | 2-3/8 EUE | 2-3/8 REG | 2-7/8 PAC | 2-3/8 API IF | 2-3/8 API IF | 2-3/8 EUE |
| LENGTH (FEET & INCHES) | 12' - 4" | 8' - 6" | 12' - 4" | 11' - 10-1/2" | ... | ... |
| STROKE (INCHES) | 6 | 6 | 6 | 10 | ... | ... |
| FLOATER POSITION (INCHES) | MEASURED DISTANCE FROM FLOATER TO END OF FLOATER BODY | | | | | |
| STANDARD TEMPERATURE | 8 | 8 | 8 | 6-5/8 | 9 | 8-3/4 |
| HIGH TEMPERATURE | 9-3/4 | 9-3/4 | 9-3/4 | 11 | 11 | 10-3/4 |
| DRILL COLLAR WEIGHT RANGE (LBS) | 300 – 4,000 | 300 – 4,000 | 300 – 4,000 | 400 – 6,000 | 400 – 6,000 | 400 – 6,000 |
| PUMP OPEN AREA (SQ IN) | 3 | 3 | 3 | 4 | 4 | 4 |

CHART B — STRENGTH AND TEST DATA

| COMPLETE ASSEMBLY | 614-306 | 614-312 | 614-313 | 614-375 | 614-377 | 614-376 |
|---|--------------|--------------|--------------|---------------|---------------|---------------|
| JAR TESTER LOW TEST PULL LOAD MINIMUM / MAXIMUM (LBS) | 7,000/12,000 | 9,000/12,000 | 7,000/12,000 | 12,000/16,000 | 12,000/16,000 | 12,000/16,000 |
| JAR TESTER STANDARD PULL TEST (LBS) | 18,000 | 30,000 | 18,000 | 35,000 | 35,000 | 35,000 |
| FIELD LOAD — MAX PULL LOAD | 36,000 | 55,000 | 36,000 | 72,000 | 72,000 | 51,000 |
| LIFT LOAD AFTER JARRING JAR FULLY EXTENDED TENSILE @ YIELD (LBS) | 185,000 | 253,000 | 185,000 | 330,000 | 330,000 | 285,000 |
| TORQUE @ YIELD (FT-LBS) | 4,200 | 7,500 | 4,200 | 14,500 | 14,500 | 9,650 |

CHART C — RECOMMENDED TIGHTENING TORQUES (FT-LBS)

| COMPLETE ASSEMBLY | 614-306 | 614-312 | 614-313 | 614-375 | 614-377 | 614-376 |
|--|---------|---------|---------|---------|---------|---------|
| SPLINE BODY TO BALANCE BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,650 | 5,000 |
| MANDREL TO MANDREL EXTENSION | 500 | 600 | 500 | 700 | 700 | 1,500 |
| BALANCE BODY TO CONNECTOR BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,650 | 5,000 |
| CONNECTOR BODY TO PRESSURE BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,650 | 5,000 |
| MANDREL EXTENSION TO WASHPIPE | 500 | 600 | 500 | 700 | 700 | 1,500 |
| PRESSURE BODY TO WASHPIPE BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,650 | 5,000 |



Superior Energizer Strength Data

CHART A — SPECIFICATIONS

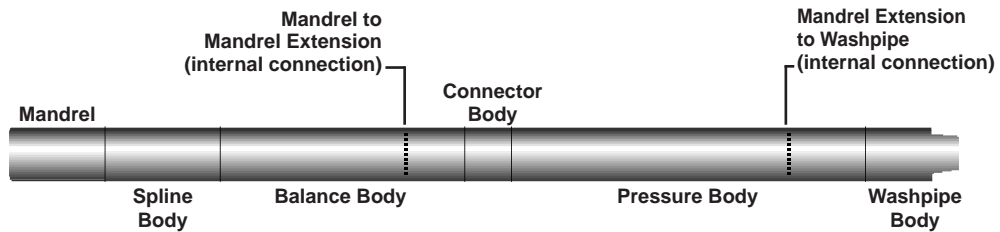
| COMPLETE ASSEMBLY | 614-425 | 614-450 | 614-475 | 614-625 | 614-775 |
|--|---|-------------|------------|----------------|-----------------|
| OUTSIDE DIAMETER (INCHES) | 4-1/4 | 4-1/2 | 4-3/4 | 6-1/4 | 7-3/4 |
| INSIDE DIAMETER (INCHES) | 2 | 2-3/8 | 2-1/4 | 2-1/4 | 3 |
| CONNECTION | 2-7/8 IF | 2-7/8 EUE | 3-1/2 IF | 4-1/2 IF | 6-5/8 REG |
| LENGTH (FEET & INCHES) | 11' - 4" | ... | 11' - 6" | 13' - 8" | 15' - 7" |
| STROKE (INCHES) | 6-3/16 | ... | 7 | 8-3/16 | 8-1/2 |
| FLOATER POSITION (INCHES) | MEASURED DISTANCE FROM FLOATER TO END OF FLOATER BODY | | | | |
| STANDARD TEMPERATURE | 9 | 9 | 10-3/4 | 10-3/4 | 11 |
| HIGH TEMPERATURE | 11 | 11 | 11-1/2 | 11-1/2 | 12-1/2 |
| DRILL COLLAR WEIGHT RANGE (LBS) | 400 – 6,000 | 400 – 6,000 | 500 – 8000 | 8,500 – 15,000 | 12,200 – 21,000 |
| PUMP OPEN AREA (SQ IN) | 6 | 7-1/2 | 7 | 11 | 16 |

CHART B — STRENGTH AND TEST DATA

| COMPLETE ASSEMBLY | 614-425 | 614-450 | 614-475 | 614-625 | 614-775 |
|--|---------------|---------------|---------------|---------------|---------------|
| JAR TESTER LOW TEST PULL LOAD MINIMUM / MAXIMUM (LBS) | 12,000/16,000 | 12,000/16,000 | 15,000/20,000 | 18,000/26,000 | 18,000/26,000 |
| JAR TESTER STANDARD PULL TEST (LBS) | 35,000 | 30,000 | 50,000 | 100,000 | 100,000 |
| FIELD LOAD — MAX PULL LOAD | 75,000 | 60,000 | 100,000 | 200,000 | 275,000 |
| LIFT LOAD AFTER JARRING | | | | | |
| JAR FULLY EXTENDED TENSILE @ YIELD (LBS) | 375,000 | 360,000 | 505,000 | 1,000,000 | 1,600,000 |
| TORQUE @ YIELD (FT-LBS) | 18,500 | 12,000 | 18,100 | 40,800 | 79,000 |

CHART C — RECOMMENDED TIGHTENING TORQUES (FT-LBS)

| COMPLETE ASSEMBLY | 614-425 | 614-450 | 614-475 | 614-625 | 614-775 |
|--|---------|---------|---------|---------|---------|
| SPLINE BODY TO BALANCE BODY | 5,000 | 3,500 | 9,090 | 20,000 | 39,000 |
| MANDREL TO MANDREL EXTENSION | 1,500 | 700 | 1,800 | 7,000 | 12,500 |
| BALANCE BODY TO CONNECTOR BODY | 5,000 | 3,500 | 9,090 | 20,000 | 39,000 |
| CONNECTOR BODY TO PRESSURE BODY | 5,000 | 3,500 | 9,090 | 20,000 | 39,000 |
| MANDREL EXTENSION TO WASHPIPE | 1,500 | 700 | 1,000 | 4,800 | 10,500 |
| PRESSURE BODY TO WASHPIPE BODY | 5,000 | 3,500 | 9,090 | 20,000 | 39,000 |



RECOMMENDED TIGHTENING TORQUES (FT-LBS)

| | | | | | | |
|--|-------|-------|-------|-------|-------|-------|
| SPLINE BODY TO BALANCE BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,500 | 3,650 |
| BALANCE BODY TO CONNECTOR BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,500 | 3,650 |
| CONNECTOR BODY TO PRESSURE BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,500 | 3,650 |
| MANDREL TO MANDREL EXTENSION | 500 | 600 | 500 | 700 | 700 | 700 |
| PRESSURE BODY TO FLOATER BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,500 | 3,650 |
| MANDREL EXTENSION TO WASHPIPE | 500 | 600 | 500 | 700 | 700 | 700 |
| FLOATER BODY TO WASHPIPE BODY | 2,100 | 2,700 | 2,100 | 3,500 | 3,500 | 3,650 |



Superior Energizer

| TOOL JOINT CONNECTION | 2-3/8 EUE | 2-3/8 API REG | 2-7/8 PAC | 2-3/8 API IF | 2-3/8 API IF | 2-3/8 EUE | 2-7/8 API IF |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| OUTSIDE DIAMETER — INCHES | 3-1/16 | 3-1/8 | 3-1/8 | 3-3/4 | 3-3/4 | 3-3/4 | 4-1/4 |
| INSIDE DIAMETER — INCHES | 1-1/2 | 1 | 1-1/2 | 1-1/2 | 1-1/4 | 1-7/8 | 2 |
| COMPLETE ASSEMBLY Logan Part No. | 614-306 | 614-312 | 614-313 | 614-375 | 614-377 | 614-376 | 614-425 |

COMPONENTS

| | | | | | | | | |
|---|-----------------------|------------------|----------------|------------------|----------------|-----|---------------|----------------|
| MANDREL | Logan Part No. | BX11 | BX10 | BX11 | BX12 | ** | BX18 | BX13 |
| MANDREL SEAL | Logan Part No. | 568-225 | ... | 568-225 | 568-225 | ** | ** | 568-229 |
| | No. Req'd. | ... | ... | 1 | 1 | ... | ... | 1 |
| SPLINE BODY | Logan Part No. | BX21 | BX20 | BX21 | BX22 | ** | BX28 | BX23 |
| SPLINE BODY SEAL | Logan Part No. | 568-230 | 568-230 | 568-230 | 568-234 | ** | ** | 568-238 |
| | No. Req'd. | 1 | 1 | 1 | 1 | ... | ... | 1 |
| SPLINE BODY POLYPAK | Logan Part No. | BD205-1 | BD205-1 | BD205-1 | BD202-3 | ** | ** | BD202-2 |
| | No. Req'd. | 2 | 2 | 2 | 2 | ... | ... | 2 |
| MANDREL SLEEVE | Logan Part No. | BX31 | BX30 | BX31 | ... | ** | BX38 | ... |
| BALANCE BODY | Logan Part No. | BX31 | BX40 | BX41 | BX42 | ** | BX48 | BX43 |
| MANDREL EXTENSION | Logan Part No. | BX51 | BX50 | BX51 | BX52 | ** | BX58 | BX53 |
| MANDREL EXTENSION POLYPAK | Logan Part No. | BD205-2 | BD205-2 | BD205-2 | BD201-2 | ** | ** | BX144-3 |
| | No. Req'd. | 2 | 2 | 1 | 2 | ... | ... | 2 |
| PISTON ASSEMBLY | Logan Part No. | BX61 | BX60 | BX61 | BX62 | ** | BX68 | BX63 |
| <i>Consists of:</i> | | | | | | | | |
| PACKING SET | Logan Part No. | BX61-1 | BX60-1 | BX61-1 | BX62-1 | ** | BX68-1 | BX63-1 |
| PACKING MALE ADAPTER | Logan Part No. | BX61-2 | BX60-2 | BX61-2 | BX62-2 | ** | BX68-2 | BX63-2 |
| PACKING SPACER RING | Logan Part No. | BX61-3 | BX60-3 | BX61-3 | BX62-3 | ** | BX68-3 | BX63-3 |
| CONNECTOR BODY | Logan Part No. | BX71 | BX70 | BX71 | BX72 | ** | BX78 | BX73 |
| CONNECTOR BODY WIPER | Logan Part No. | ... | ... | ... | BD71 | ** | ** | BD76 |
| CONNECTOR BODY ID POLYPAK | Logan Part No. | BD205-3 | BD200-3 | BD205-3 | BD201-3 | ** | ** | AQ29005 |
| | No. Req'd. | 3 | 3 | 3 | 3 | ... | ... | 3 |
| CONNECTOR BODY ID NON-EXTRUSION RING | Logan Part No. | L365-32 | L365-30 | L365-32 | BD231 | ** | ** | BD236 |
| | No. Req'd. | 2 | 2 | 2 | 3 | ... | ... | 3 |
| CONNECTOR BODY SEAL PROTECTOR RING | Logan Part No. | 8-228 | ... | 8-228 | ** | ** | ** | ** |
| | No. Req'd. | 2 | ... | 2 | ... | ... | ... | ... |
| CONNECTOR BODY OD PARBAK RING | Logan Part No. | ... | ... | ... | ... | ** | ** | ... |
| | No. Req'd. | ... | ... | ... | ... | ... | ... | ... |
| CONNECTOR BODY OD NON-EXTRUSION RING | Logan Part No. | L366-33.5 | BX160 | L366-33.5 | ... | ** | ** | ... |
| | No. Req'd. | 2 | 1 | 2 | ... | ... | ... | ... |
| CONNECTOR BODY SEAL (SMALL) | Logan Part No. | 568-228 | 568-330 | 568-228 | 568-232 | ** | ** | 568-236 |
| | No. Req'd. | 2 | 2 | 2 | 1 | ... | ... | 1 |
| CONNECTOR BODY SEAL (LARGE) | Logan Part No. | 568-230 | 568-230 | 568-230 | 568-234 | ** | ** | 568-238 |
| | No. Req'd. | 2 | 2 | 2 | 2 | ... | ... | 2 |
| CONNECTOR BODY FILL PLUG | Logan Part No. | AG10000 | AG10002 | AG10000 | AG10002 | ** | ** | AG10002 |
| | No. Req'd. | 2 | 2 | 2 | 2 | ... | ... | 2 |
| CONNECTOR BODY FILL PLUG SEAL | Logan Part No. | 568-005 | 568-006 | 568-005 | 568-006 | ** | ** | 568-006 |
| | No. Req'd. | 2 | 2 | 2 | 2 | ... | ... | 2 |

* Redress Kits include O-Ring Packing Sets, Polypak Kits, and Connector Body Wipers

** To be advised by engineering



Superior Energizer

| TOOL JOINT CONNECTION | 2-3/8 EUE | 2-3/8 API REG | 2-7/8 PAC | 2-3/8 API IF | 2-3/8 API IF | 2-3/8 EUE | 2-7/8 API IF |
|----------------------------------|-----------|------------------|-----------|-----------------|-----------------|--------------|-----------------|
| OUTSIDE DIAMETER — INCHES | 3-1/16 | 3-1/8 | 3-1/8 | 3-3/4 | 3-3/4 | 3-3/4 | 4-1/4 |
| INSIDE DIAMETER — INCHES | 1-1/2 | 1 | 1-1/2 | 1-1/2 | 1-1/4 | 1-7/8 | 2 |
| COMPLETE ASSEMBLY Logan Part No. | 614-306 | 614-312 | 614-313 | 614-375 | 614-377 | 614-376 | 614-425 |

COMPONENTS (CONTINUED)

| | | | | | | | | |
|--------------------------------------|------------------------------|--------------|----------------|--------------|--------------|-----|-------|--------------|
| CONNECTOR BODY | Logan Part No. | ... | ... | ... | AQ29003 | ** | ** | AQ29005 |
| OD POLYPAK | No. Req'd. | ... | ... | ... | 2 | ... | ... | 2 |
| PRESSURE BODY | Logan Part No. | BX91 | BX90 | BX91 | BX92 | ** | BX98 | BX93 |
| PRESSURE BODY | Logan Part No. | AG10004 | AG10004 | AG10004 | AG10004 | ** | ** | AG10000 |
| FILL PLUG | No. Req'd. | 1 | 1 | 1 | 1 | ... | ... | 1 |
| PRESSURE BODY | Logan Part No. | ... | ... | ... | ... | ** | ** | 568-005 |
| FILL PLUG SEAL | No. Req'd. | ... | ... | ... | ... | ... | ... | 1 |
| WASHPIPE | Logan Part No. | BX101 | BX100 | BX101 | BX102 | ** | BX108 | BX103 |
| WASHPIPE SEAL (LARGE) | Logan Part No. No. Req'd. | ... | 568-130 1 | ... | 568-227 1 | ** | ** | 568-231 1 |
| WASHPIPE SEAL (SMALL) | Logan Part No. No. Req'd. | 568-224 1 | 568-221 1 | 568-224 1 | 568-225 1 | ** | ** | 568-229 1 |
| WASHPIPE BODY | Logan Part No. | BX111 | BX110 | BX111 | BX112 | ** | BX118 | BX113 |
| WASHPIPE BODY SEAL (LARGE) | Logan Part No. No. Req'd. | 568-230 1 | 568-230 1 | 568-230 1 | 568-234 1 | ** | ** | 568-238 1 |
| WASHPIPE BODY SEAL (SMALL) | Logan Part No. No. Req'd. | 568-228 1 | 568-228 1 | 568-228 1 | 568-232 1 | ** | ** | 568-236 1 |
| WASHPIPE BODY POLYPAK | Logan Part No. No. Req'd. | BD200-3 2 | BD205-2 2 | BD205-3 2 | BD201-3 2 | ** | ** | AQ29003 2 |
| REDRESS KITS * | Logan Part No. | BX121 | BX120 | BX121 | BX122 | ** | BX128 | BX123 |
| O-RING PACKING SET | Logan Part No. | BX131 | BX130 | BX131 | BX132 | ** | BX138 | BX133 |
| POLYPAK KIT | Logan Part No. | BX141 | BX140 | BX141 | BX142 | ** | BX148 | BX143 |
| <i>Consists of:</i> | | | | | | | | |
| SPLINE BODY POLYPAK | Logan Part No. No. Req'd. | BD205-1 2 | BD205-1 2 | BD205-1 2 | BD202-3 2 | ** | ** | BD202-2 2 |
| MANDREL EXTENSION POLYPAK | Logan Part No. No. Req'd. | BD205-2 1 | BD205-2 2 | BD205-2 1 | BD201-2 2 | ** | ** | BX144-3 2 |
| CONNECTOR BODY ID POLYPAK | Logan Part No. No. Req'd. | BD205-3 3 | BD200-3 3 | BD205-3 3 | BD201-3 3 | ** | ** | AQ29005 3 |
| CONNECTOR BODY OD POLYPAK | Logan Part No. No. Req'd. | ... | ... | ... | AQ29003 2 | ** | ** | AQ29005 2 |
| WASHPIPE BODY POLYPAK | Logan Part No. No. Req'd. | BD205-3 2 | BD205-2 2 | BD205-3 2 | BD201-3 2 | ** | ** | AQ29003 2 |
| MANDREL EXTENSION ASSEMBLY SLEEVE | Logan Part No. No. Req'd. | BD205-6 1 | BX140-5 ... | BD205-6 1 | BX201-6 1 | ** | ** | BD206-6 1 |

* Redress Kits include O-Ring Packing Sets, Polypak Kits, and Connector Body Wipers

** To be advised by engineering



Superior Energizer

| TOOL JOINT CONNECTION | 3-1/2 API IF | 4-1/2 API IF | 5-1/2 API REG | 6-5/8 API REG | | | |
|----------------------------------|-----------------|-----------------|------------------|------------------|--|--|--|
| OUTSIDE DIAMETER — INCHES | 4-3/4 | 6-1/4 | 6-3/4 | 7-3/4 | | | |
| INSIDE DIAMETER — INCHES | 2-1/4 | 2-1/4 | 2-3/4 | 3-1/16 | | | |
| COMPLETE ASSEMBLY Logan Part No. | 614-475 | 614-625 | 614-675 | 614-775 | | | |

COMPONENTS

| | | | | | | | |
|---|----------------|----------------|----------------|---------------|---------------|--|--|
| MANDREL | Logan Part No. | BX14 | BX15 | BX16 | BX17 | | |
| MANDREL SEAL | Logan Part No. | 568-232 | 568-236 | ** | ** | | |
| | No. Req'd. | 1 | 1 | ... | ... | | |
| SPLINE BODY | Logan Part No. | BX24 | BX25 | BX26 | BX27 | | |
| SPLINE BODY SEAL | Logan Part No. | 568-242 | 568-254 | ** | ** | | |
| | No. Req'd. | 1 | 1 | ... | ... | | |
| SPLINE BODY POLYPAK | Logan Part No. | BD202-1 | BD203-1 | ** | ** | | |
| | No. Req'd. | 2 | 2 | ... | ... | | |
| MANDREL SLEEVE | Logan Part No. | BX34 | ... | BX36 | BX37 | | |
| BALANCE BODY | Logan Part No. | BX44 | BX45 | BX46 | BX47 | | |
| MANDREL EXTENSION | Logan Part No. | BX54 | BX55 | BX56 | BX57 | | |
| MANDREL EXTENSION POLYPAK | Logan Part No. | BD202-2 | BD203-2 | ** | ** | | |
| | No. Req'd. | 2 | 2 | ... | ... | | |
| MANDREL EXTENSION WIPER | Logan Part No. | ... | BD223 | ... | BD224 | | |
| PISTON ASSEMBLY | Logan Part No. | BX64 | BX65 | BX66 | BX67 | | |
| <i>Consists of:</i> | | | | | | | |
| PACKING SET | Logan Part No. | BX64-1 | BX65-1 | BX66-1 | BX67-1 | | |
| PACKING | Logan Part No. | BX64-2 | BX65-2 | BX66-2 | BX67-2 | | |
| MALE ADAPTER | | | | | | | |
| PACKING SPACER RING | Logan Part No. | BX64-3 | BX65-3 | BX66-3 | BX67-3 | | |
| CONNECTOR BODY | Logan Part No. | BX74 | BX75 | BX76 | BX77 | | |
| CONNECTOR BODY | Logan Part No. | BX84 | BD73 | BX86 | BX87 | | |
| CONNECTOR BODY ID POLYPAK | Logan Part No. | BX144-3 | BD203-3 | ** | ** | | |
| | No. Req'd. | 3 | 3 | ... | ... | | |
| CONNECTOR BODY NON-EXTRUSION RING | Logan Part No. | BX154 | BD233 | ** | ** | | |
| | No. Req'd. | 3 | 3 | ... | ... | | |
| CONNECTOR BODY SEAL PROTECTOR RING | Logan Part No. | L375-41 | BD273 | ** | ** | | |
| | No. Req'd. | 3 | 3 | ... | ... | | |
| CONNECTOR BODY OD PARBAK RING | Logan Part No. | ... | ... | ** | ** | | |
| | No. Req'd. | ... | ... | ... | ... | | |
| CONNECTOR BODY NON-EXTRUSION RING | Logan Part No. | ** | ... | ** | ** | | |
| | No. Req'd. | ... | ... | ... | ... | | |
| CONNECTOR BODY SEAL (SMALL) | Logan Part No. | 568-239 | 568-250 | ** | ** | | |
| | No. Req'd. | 1 | 1 | ... | ... | | |
| CONNECTOR BODY SEAL (LARGE) | Logan Part No. | 568-242 | 568-252 | ** | ** | | |
| | No. Req'd. | 2 | 2 | ... | ... | | |
| CONNECTOR BODY FILL PLUG | Logan Part No. | AG10002 | AG10002 | ** | ** | | |
| | No. Req'd. | 2 | 2 | ... | ... | | |
| CONNECTOR BODY FILL PLUG SEAL | Logan Part No. | 568-006 | 568-006 | ** | ** | | |
| | No. Req'd. | 2 | 2 | ... | ... | | |
| CONNECTOR BODY OD POLYPAK | Logan Part No. | BD202-5 | BD203-5 | ** | ** | | |
| | No. Req'd. | 2 | 2 | ... | ... | | |

* Redress Kits include O-Ring Packing Sets, Polypak Kits, and Connector Body Wipers

** To be advised by engineering



Superior Energizer

| TOOL JOINT CONNECTION | 3-1/2 API IF | 4-1/2 API IF | 5-1/2 API REG | 6-5/8 API REG | | | |
|----------------------------------|-----------------|-----------------|------------------|------------------|--|--|--|
| OUTSIDE DIAMETER — INCHES | 4-3/4 | 6-1/4 | 6-3/4 | 7-3/4 | | | |
| INSIDE DIAMETER — INCHES | 2-1/4 | 2-1/4 | 2-3/4 | 3-1/16 | | | |
| COMPLETE ASSEMBLY Logan Part No. | 614-475 | 614-625 | 614-675 | 614-775 | | | |

COMPONENTS (CONTINUED)

| | | | | | | | |
|---------------------|----------------|---------|-----------|-------|-------|--|--|
| CONNECTOR BODY | Logan Part No. | ** | ** | | | | |
| OD POLYPAK | No. Req'd. | ... | ... | | | | |
| PRESSURE BODY | Logan Part No. | BX94 | BX95 | BX96 | BX97 | | |
| PRESSURE BODY | Logan Part No. | AG10000 | AG10000 | ** | ** | | |
| FILL PLUG | No. Req'd. | 1 | 1 | ... | ... | | |
| PRESSURE BODY | Logan Part No. | 568-005 | 568-005 | ** | ** | | |
| FILL PLUG SEAL | No. Req'd. | 1 | 1 | ... | ... | | |
| WASHPIPE | Logan Part No. | BX104 | BX105 | BX106 | BX107 | | |
| WASHPIPE SEAL | Logan Part No. | 568-234 | 568-238 | ** | ** | | |
| (LARGE) | No. Req'd. | 1 | 1 | ... | ... | | |
| WASHPIPE SEAL | Logan Part No. | 568-232 | 568-234 | ** | ** | | |
| (SMALL) | No. Req'd. | 1 | 1 | ... | ... | | |
| WASHPIPE BODY | Logan Part No. | BX114 | BX115 | BX116 | BX117 | | |
| WASHPIPE BODY SEAL | Logan Part No. | 568-242 | 568-252 | ** | ** | | |
| (LARGE) | No. Req'd. | 1 | 1 | ... | ... | | |
| WASHPIPE BODY SEAL | Logan Part No. | 568-240 | 568-250** | ** | | | |
| (SMALL) | No. Req'd. | 1 | 1 | ... | ... | | |
| WASHPIPE BODY | Logan Part No. | BX144-3 | BD203-3 | ** | ** | | |
| POLYPAK | No. Req'd. | 2 | 2 | ... | ... | | |
| REDRESS KITS * | Logan Part No. | BX124 | BX125 | BX126 | BX127 | | |
| O-RING PACKING SET | Logan Part No. | BX134 | BX135 | BX136 | BX137 | | |
| POLYPAK KIT | Logan Part No. | BX144 | BX145 | BX146 | BX147 | | |
| <i>Consists of:</i> | | | | | | | |
| SPLINE BODY | Logan Part No. | BD202-1 | BD203-1 | ** | ** | | |
| POLYPAK | No. Req'd. | 2 | 2 | ... | ... | | |
| MANDREL EXTENSION | Logan Part No. | BD202-2 | BD203-2 | ** | ** | | |
| POLYPAK | No. Req'd. | 2 | 2 | ... | ... | | |
| CONNECTOR BODY | Logan Part No. | BX144-3 | BD203-3 | ** | ** | | |
| ID POLYPAK | No. Req'd. | 3 | 3 | ... | ... | | |
| CONNECTOR BODY | Logan Part No. | BD202-5 | BD203-5 | ** | ** | | |
| OD POLYPAK | No. Req'd. | 2 | 2 | ... | ... | | |
| WASHPIPE BODY | Logan Part No. | BX144-3 | BD203-3 | ** | ** | | |
| POLYPAK | No. Req'd. | 2 | 2 | ... | ... | | |
| MANDREL EXTENSION | Logan Part No. | BX144-5 | BX145-5 | ** | ** | | |
| ASSEMBLY SLEEVE | No. Req'd. | 1 | 1 | ... | ... | | |

| ENERGIZER FLUID | Logan Part No. | 50529-A | 50529-B | 50529-C | 50529-D | 50529-E | | |
|-----------------|----------------|----------|-----------|-----------|------------|------------|--|--|
| | Bowen No. | 50529-A | 50529-B | 50529-C | 50529-D | 50529 | | |
| | | 1 Gallon | 2 Gallons | 5 Gallons | 30 Gallons | 55 Gallons | | |

* Redress Kits include O-Ring Packing Sets, Polypak Kits, and Connector Body Wipers

** To be advised by engineering



Superior Energizer Service Kit

Note: Photos of parts are not actual size.



J1045-001
3/8" Fill Plug Adapter



J1046-001
7/16" Fill Plug Adapter



J1224-001
5/8" Fill Plug Adapter



J1086
1/4" Female Couplers



J1374
Hex Bushing



J1373
Box Coupler



J1376
Hose Fitting



J1085
1/4" Male Couplers



J1078
1/4" x 1" Pipe Nipple



J1073
Installation Tool



J1074
O-Ring Installation Tool

J1077
Fill Plug Wrench



J1075
Torx Head
Fill Plug Wrench



568010-100
O-Ring



568005-100
O-Rings



J1080
Line Filter



Superior Energizer Service Kit



Pump Hose



J1072
6 Ft. Exhaust Hose



J1069
Volume Pump



J1070
Metal Box

| | | |
|---|-----------------------|------------------|
| COMPLETE ASSEMBLY | Logan Part No. | 26000-055 |
| <i>Consists of:</i> | Bowen No. | 145213 |
| SEAL PROTECTOR RING | Logan Part No. | J1073 |
| INSTALLATION TOOL | Bowen No. | 625 |
| O-RING | Logan Part No. | J1074 |
| INSTALLATION TOOL | Bowen No. | 626 |
| FILL PLUG WRENCH — T30 TORX HEAD | Logan Part No. | J1075 |
| | Bowen No. | 359T |
| FILL PLUG WRENCH — ALLEN HEAD | Logan Part No. | J1077 |
| | Bowen No. | 620A |
| 1/4" x 1" PIPE NIPPLE | Logan Part No. | J1078 |
| | Bowen No. | 36953 |
| LINE FILTER | Logan Part No. | J1080 |
| | Bowen No. | 56565 |
| 1/4" MALE COUPLER | Logan Part No. | J1085 |
| | Bowen No. | 656 |
| 1/4" FEMALE COUPLER | Logan Part No. | J1086 |
| | Bowen No. | 655 |
| 3/8" BOX x 1/4" GALVANIZED BOX COUPLER | Logan Part No. | J1373 |
| | Bowen No. | ... |
| 1/8" BOX x 1/4" PIN HEX BUSHING | Logan Part No. | J1374 |
| | Bowen No. | ... |

| | | |
|--------------------------------------|-----------------------|-------------------|
| 1/4" 19 NPT PIN HOSE FITTING | Logan Part No. | J1376 |
| | Bowen No. | ... |
| 6 FT. EXHAUST HOSE | Logan Part No. | J1072 |
| | Bowen No. | 33435 |
| PUMP HOSE | Logan Part No. | ... |
| | Bowen No. | 2581 |
| VOLUME PUMP | Logan Part No. | J1069 |
| | Bowen No. | 2580 |
| METAL BOX | Logan Part No. | J1070 |
| | Bowen No. | 1995 |
| 5/8" FILL PLUG ADAPTER | Logan Part No. | J1224-001 |
| | Bowen No. | ... |
| 7/16" 20 NF FILL PLUG ADAPTER | Logan Part No. | J1046-001 |
| | Bowen No. | ... |
| 3/8" 24 NF FILL PLUG ADAPTER | Logan Part No. | J1045-001 |
| | Bowen No. | ... |
| O-RING | Logan Part No. | 568010-100 |
| | Bowen No. | 568010 |
| O-RING — 70 DURO NITRILE | Logan Part No. | 568005-100 |
| | Bowen No. | 568005 |

When ordering, please specify:
(1) Name and number of assembly or part

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