Inflatable Packer Manual

TIGRE®

Purchase Date:__________________

This manual belongs in Rig / Shop # ________________

Aardvark Packers LLC
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INTRODUCTION

The Tigre Tierra® Packer is a sliding head inflatable packer that expands radially and contracts axially as pneumatic or hydraulic pressure is applied. Steel cable reinforcement within the packer gland element permits uniform expansion over the entire length of the element and allows the outer rubber cover to extrude into borehole irregularities and fractures, creating an effective seal over the entire length of the packer gland element.

Inflation pressure is introduced into the packer through a port on the packer head that is tapped for a standard male tube connector. For inflation tubing, Aardvark Packers recommends 3/16-inch outside diameter (OD) nylon rated at 2,500 psi burst. This tubing allows the user to operate the packer under extreme hydrostatic head conditions nor possible with lower pressure-rated tubing.

Four major components make up the Tigre Tierra® Packer:

- Fixed Head
- Gland Element
- Center Tube
- Sliding Head

Both packer heads are tapped with either 1/8-inch NPT or 10-32 threads to permit simultaneous use of multiple packers. The inflation fluid is transmitted through the packer in the annulus between the center tube and the gland element. All packers are shipped with a plug in the sliding head which must be replaced with a tube connector for multiple packer use.

Stamped on the circumference of the fixed head of each packer is the maximum internal pressure that can be applied when the packer is inflated to its maximum diameter. This is the pressure at which maximum gland element expansion occurs. Pressure in excess of this rates pressure voids the warranty.

NOTE: When a Tiger Tierra® Packer is confined within an open or cased borehole of known diameter, it is possible to exceed the rated free-air pressure without jeopardizing the warranty. See the pressure curves in this booklet or call Aardvark Packers LLC for details.

CAUTION: Compressed gases, such as nitrogen and compressed air, are extremely dangerous, and misuse of these gases can cause serious injury. Follow instructions on the compressed gas bottles.

If the packer is tested or inflated above ground, do not test or inflate above 25% of the unconfined rated pressure stamped on the fixed head of the packer. Stay clear of either end of the packer when testing or inflating the packer above ground.

Gases such as nitrogen and compresses air are extremely dangerous. Misuse of the gases or of the packers that they operate can result in serious injury. Use extreme caution.

Either pneumatic or hydraulic packer inflation is acceptable, although pneumatic inflation is recommended for standard packer system. Recommended inflation fluids include compressed air, inert gases (such as nitrogen or carbon dioxide) and water.
Exposure to hydrocarbons will damage the packer gland element, and subsequent use will void the Aardvark Packers warranty. If the packer is to be operated under these conditions, it must be Viton®-clad.

Prior to first use, all connections made on site should be tested at 25 PSI for leaks, and the gauge or regulator on the source of inflation pressure should be calibrated to assure accurate readings. Faulty regulators are a prime case of packer failure.

Aardvark’s Tiger Tierra® Packers are tested and serialized before shipping. The serial number appears on the circumference of the fixed head, next to the maximum internal packer pressure.

**SINGLE PACKER OPERATION**

The fixed head is normally oriented uphill during single packer operation. After connecting the inflation tube to the connector on the fixed packer head, run the packer to the desired depth on the drill rods, grout rods or iron pipe. Then connect the inflation tube to the pressure regulator.

With the regulator adjustment lever backed off to zero pressure, open supply valve on the source of inflation pressure. Slowly and gradually increase pressure to the packer by adjusting the regulator. Final gauge pressure should not exceed the total of rated packer pressure plus hydrostatic pressure above the packer. If you have any questions about inflation pressure, please contact Aardvark Packers LLC.

When testing or grouting through the packer is completed, release inflation pressure and allow enough time for the gland element to relax to its at – rest diameter. You can tell when the gland element is properly deflated by inserting the inflation tubing into a cup of water. When bubbles cease to appear in the water, the element is deflated. You can then retrieve the packer or reposition it in the borehole for further testing.

If your system includes a pump and in-line adapters are not used, be sure to allow extra wire between the sliding head and the pump.

The packer also will function with the sliding head oriented uphill. However, care must be taken when retrieving a packer set in this orientation. In an uncased, irregular borehole, the sliding head may catch on a fracture during retrieval. Continued upward force will cause the gland element to expand mechanically and lodge in the hole.

**STRADDLE PACKER OPERATION**

For straddle or zone packer operation, the lower packer is oriented with the fixed head uphill. The center tube is capped. Add lengths of perforated steel tubing consistent with desired zone lengths to the fixed head of the lower packer. Connect a length of inflation tubing to the lower packer to join the two packers.

With the sliding head oriented uphill, connect the upper packers to the perforated steel tubing and the inflation tube from the lower packer. Finally, connect inflation tubing to the sliding head of the upper hole packer and begin running the packers into the borehole.

*Viton is a registered trademark of Dupont.*
As in single packer applications, gradually increase inflation pressure through the regulator until the gauge stabilizes on a reading that does not exceed rated packer pressure plus hydrostatic head. The zone is now packed off and injection of water or grout can begin. When testing or grouting is completed, release inflation pressure and allow sufficient time for the gland elements to relax to their at-rest diameters. The straddle system can then be retrieved or repositioned for further testing.

Other orientations are possible for each of the packers in a straddle system. These other orientations, however, will result in a packed-off borehole length that is not fixed and could vary according to borehole irregularities.

For instance, the preferred method for testing in open or unstable formations is to orient both packers with the fixed heads uphole. With this orientation, however, the sliding head of the upper packer will move away from the fixed head of the lower packer as packer inflation progresses. Allowance for this movement must be made by using Aardvark’s coiled inflation tube to connect the two packers across the zone. Depending on packer model, packer length and borehole size, this vertical movement will be between 2 and 12 inches.

As a result, whether your zone length is defined by distance between packer heads or by distance between gland seals, actual zone length will be greater than the as-measured zone length if the packers are oriented with both fixed and heads uphole.

NOTES
GLAND ELEMENT REPLACEMENT

1) Clean up the surface of the packer center tube by removing wrench marks and burrs with emery cloth or file.

   NOTE: Failure to do this may cause seal damage in Step 2.

2) Unthread the sliding head from the gland element fitting and remove from the packer.

3) Unthread the gland element from the fixed head and slide it down and off of the center tube.

4) Inspect the O-ring on each packer head and replace if required.

5) Inspect the seals in the sliding head and replace if required.

6) Slide the new gland element over the center tube and thread it to the fixed packer head.

   6.5) Apply 2 wraps of clear shipping tape around the threads of the center tube. This will assist in not tearing the seals as the head is slid past.

7) Push the sliding head on to the center tube and thread it into the gland element.

8) Attach the inflation tube to the fixed head and check for air leaks at all connections before running the packer into the borehole.

   CAUTION: Do not test or inflate above 25% of the unconfined rated pressure.
PACKER INFLATION PRESSURE FORMULA

FOR INFLATION WITH NITROGEN GAS OR AIR

\[ G = \text{Inflation pressure at gauge (PSI)} \]
\[ Dp = \text{Depth to top of packer (feet)} \]
\[ Dw = \text{Depth to static water level in well (feet)} \]
\[ Sp = \text{Unconfined packer pressure rating for the well size (PSI)} \]
\[ Pp = \text{Injection pump pressure (PSI)} \]

1) To calculate Packer Inflation Pressure for a withdraw test (pump out):

\[ G = [(Dp - Dw) \times 0.43] + Sp + [(Dp - Dw) \times 0.43 \times 0.2] \]

**NOTE:** This total must not exceed confined packer pressure rating for the well size.

2) To calculate Packer Inflation Pressure for an injection test (pump in):

\[ G = [(Dp \times \text{PSI per foot of Injection Fluid}) + Sp + Pp] \times 1.1 \]

**NOTE:** This pressure must not exceed confined packer pressure rating plus \((Dp - Dw) \times 0.43.**

**NOTES:**
UNCONFINED PRESSURE CURVES

UNCONFINED PRESSURE (PSI)

Legend
No.  Model
1    12
2    23B
3    34B
4    36
5    47
58   58 (New Size)
6    610
7    713
CONFINED PRESSURE CURVES

Legend
No.  Model
1    12
2    23B
3    34B
4    36
5    47
58   58 (New Size)
6    610
7    713
Inflatable Packer
Assembly
Model 12 - 36
# Inflatable Packers Parts List:

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*These parts also are available as kit # 9564

# Inflatable Grout Packers Parts List:

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*Models 23B are sold with a fixed head centre tube weldment.
** These parts also are available as kit #9564
Inflatable Grout

Packer Assembly

- Inflation Tube
- External Ferrule
- Adapter
- O-Ring
- Center Tube
- Gland Assembly
- O-Ring
- Sliding Head
- Scraper
- Seals
ADDITIONAL INFORMATION

CONDITIONS OF SALE

Prices
All prices shown are current, but are subject to change without notice. All are based on standard domestic packaging and so not include special overseas packaging or other requirements. Dealer, contractor and OEM discounts for volume orders are available.

Terms
Prior credit approval and non-delinquent status are necessary before shipping on open accounts. Our open account terms are Net 30 days. A 1-1/2% per month (18% per annum) charge is made on accounts exceeding 30 days. Accounts exceeding 60 days are considered delinquent.

Shipping
All shipments are F.O.B. shipping point. This means the carrier accepts all responsibility upon accepting the shipment at our dock. Therefore, any claims for loss or damage must be settled without delay between you and the carrier.

Claims & Returns
Claims for shortages or inaccurate filing or orders must be made to Aardvark Packers LLC within 10 days after receipt of goods. (An authorization number for return of goods will then be issued.) Include a copy of the invoice and bill of landing on which the goods were purchased. Reference the assigned authorization number. There is a 25% restocking charge on any items returned for credit or exchange when the error is not ours. Items returned without prior authorization will be refused.

Notice to The Buyer
AARDVARK PACKERS LLC WILL ENDEAVOR TO FURNISH SUCH ADVICE AS IT MAY BE ABLE TO supply with reference to use by Buyer of any material purchased, but AARDVARK PACKERS LLC makes no GUARANTEES and assumes no obligation or liability for the advice given verbally or in print or the results obtained. Buyer assumes all risk and liability which may result from the use of any material, whether used singly or in combination with other products. No suggestion for use shall be construed as a recommendation for its use in infringement on any existing patent.

WARRANTY & LIMITATION OF REMEDIES

Warranty
Aardvark Packers LLC warrants that for a period of three (3) months from the date of purchase, the products manufactured and sold by Aardvark shall be of workman-like quality and will operate properly if used and maintained properly.

THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE THEREOF.

Limitation of Remedies
The buyer’s exclusive remedy under this Warranty shall be the replacement or repair of any item proved to be defective; Aardvark Packers LLC shall not be liable for any incidental or consequential damages.

Any claims made under this Warranty must be presented to Aardvark Packers LLC within three (3) months after delivery of the product to the buyer. Aardvark Packers LLC shall have a reasonable time after notice of a claim made under this Warranty in which to exercise its option to replace or repair the item, and shall have the right to require that the allegedly defective item be returned, at the buyer’s expense, before recognizing any claim.
This Warranty shall not apply if the buyer repairs or alters an item without the prior written consent of Aardvark Packers LLC, or if the item is subject to abuse or misuse, neglect or accident.

IMPORTANT NOTICE:

Unless otherwise agreed in writing, Aardvark Packers LLC disclaims any warranties with respect to this product, the safety or suitability thereof, or the results obtained, whether expressed or implied, including, without limitation, any implied warranty of merchantability or fitness for a particular purpose and/or any other warranty. Buyers and users assume all risk, responsibility, and liability whatsoever for any and all injuries (including death), losses, or damages to persons or property arising from the use of this product, whether or not occasioned by the seller’s negligence or based on strict product liability or principles of indemnity or contribution. Aardvark Packers LLC neither assumes nor authorizes any person to assume for it any liability in connection with the use of this product.

AARDVARK PACKERS LLC
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Hillsborough, NJ 08844