



# Aardvark

PACKERS



## Packer

# Applications and Usage



# History



Aardvark evolved and got its name from inventing the first horizontal drilling rig. A D4 dozer frame, we mounted a drilling rail and drill head to create an animal that resembled an Aardvark. Several of these rigs were made. Most of them went to South America in the gold and copper mines in Chile. Others have several thousand miles of horizontal holes drilled all over the US.

We then discovered that there could be a better way to install the PVC casing and screen for the dewatering. Aardvark Corporation created Hydrophilic Industries. We went from napkin sketches to invent a flush joint thread. That thread was tested then presented to ASTM and in use today as F480 designation..

Aardvark now focuses strictly on the packer business, manufacturing Inflatable, Mechanical and Fixed End Packers and their accessories.



# What is a Packer ??

A packer is a plug, used to seal a borehole or casing. Once the seal is made, several procedures can be accomplished.

- Injection
- Pumping out
- Isolation between packers
- Zone sampling

Markets:

Civil Construction, Dam Repair, Geotechnical Testing, Discreet Sampling, Grout Injection,





Geotechnical / Grouting

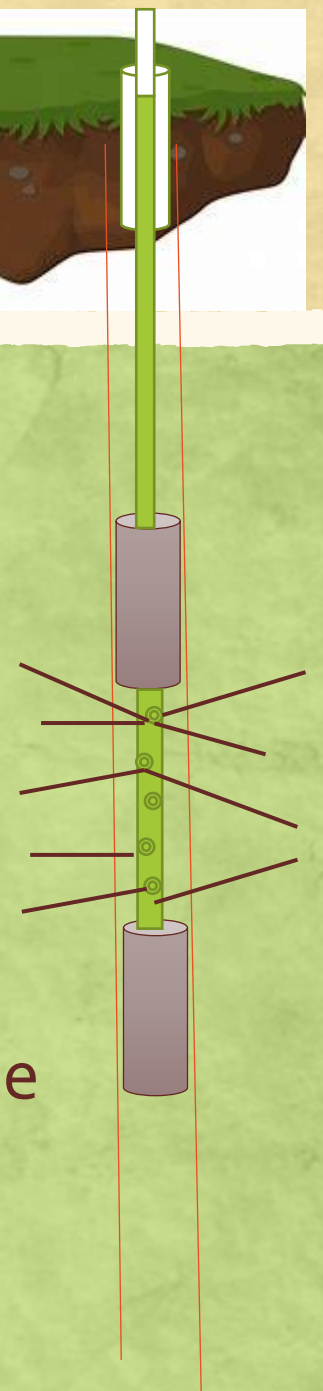
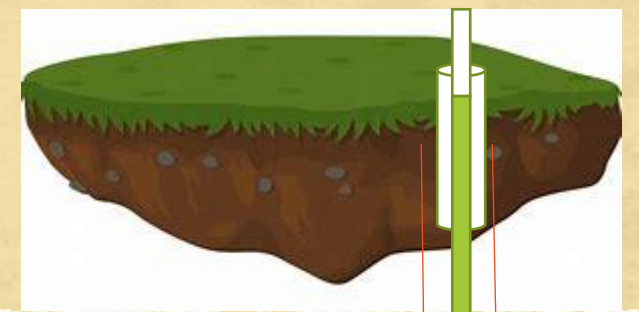
Environmental

Mechanical (surface set)



# Applications

- Environmental: Isolated water sampling, Injection, Soil vapor extraction, Multiple zone testing, replacing nested wells.
- Geotechnical: Lugeon Testing, Slug tests, Permeability testing, Low pressure Oil-Gas wells.
- Mining: Ceiling grout, water control.
- Civil construction: Slope stabilization, Dam Repair, Bridge footings.
- Horizontal Wells: Testing, grouting, Remediation and injection.



# Injection Packers: How they work.....

asdf

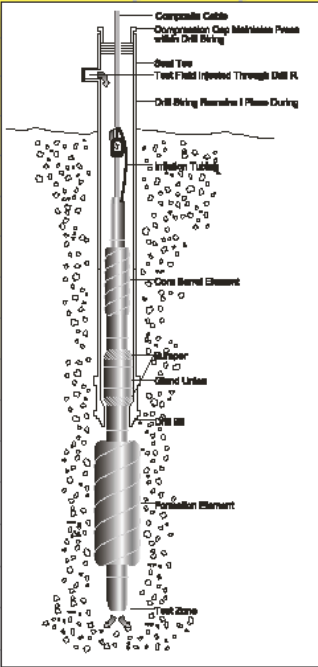


# Wireline Packers

**A A R D V A R K**

**TIGRE TIERRA®**

## WIRELINE PACKERS




The Tigre Tierra® Wireline Inflatable Packer System is a time saving method of conducting permeability testing during core drilling. The test is carried out with the drill string in place, reducing the time required to test in open or unstable formations. Available for all makes of wireline core barrels, Tigre Tierra Wireline Packers are easily repaired in the field in just minutes.

Our wireline packers incorporate a bumper that rests inside the throat of the drill bit. This positions both glands and protects the drill bit. When one bumper is worn, the gland union can be reversed and a new bumper placed toward the drill bit. The glands are constructed of steel-reinforced natural rubber, while the center tube is made of quality 304 grade stainless steel.

A compression cap on the Tigre Tierra Seal Tee Assembly prevents pressure loss around the composite cable during testing. The composite cable itself is composed of a high pressure nylon tube for inflation, and a steel cable to lower and retrieve the wireline packer. The seal tee terminates the drill string and has a one inch NPT port for injection purposes.

For testing specific zones, a Tigre Tierra Zone Packer can be attached easily to the lower end of the wireline. The wireline packer is inverted, and the zone packer is connected by using a perforated tube the length of the required test zone. An inflation tube connects the wireline packer and zone packer for simultaneous inflation.

**AARDVARK**  
**PACKERS** 

Back in the 70's, Aardvark teamed up with Boart Longyear to create a wireline packer system. This became a valuable timesaver as the core casing and bit could be left in the hole while the permeability testing was being conducted.

The 2 element packer is lowered via our composite cable and the casing is filled with water from a pump at the surface creating the flow test. These packers are still popular today using N, H and P series tooling.

# 7500 sq/ft of manufacturing

Currently, we have 7500 sq/ft of manufacturing space with additional 20,000 sq/ft available to expand.

4 CNC mills, 2 CNC lathes, 2 engine lathes, EDM machines, welding, Presses, CAD software and in-house engineering.



# Repair capability



Our packers are made with modular components. This allows easy field repair or you can send them back to us and we can rebuild them as needed.

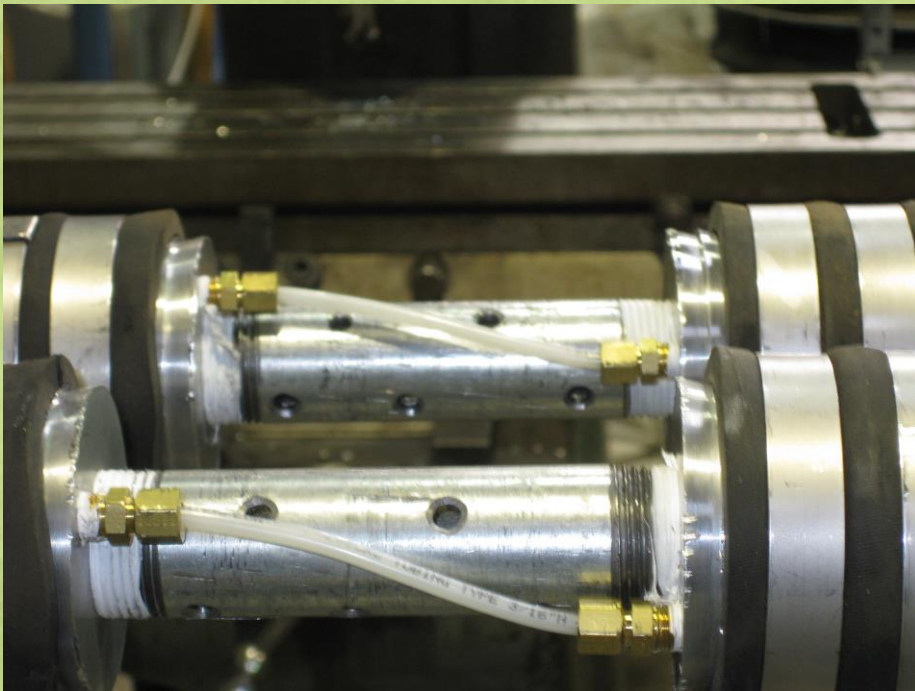
The elements are the majority of the cost to repair. If the element is good, the repair may only be a couple of hundred dollars.



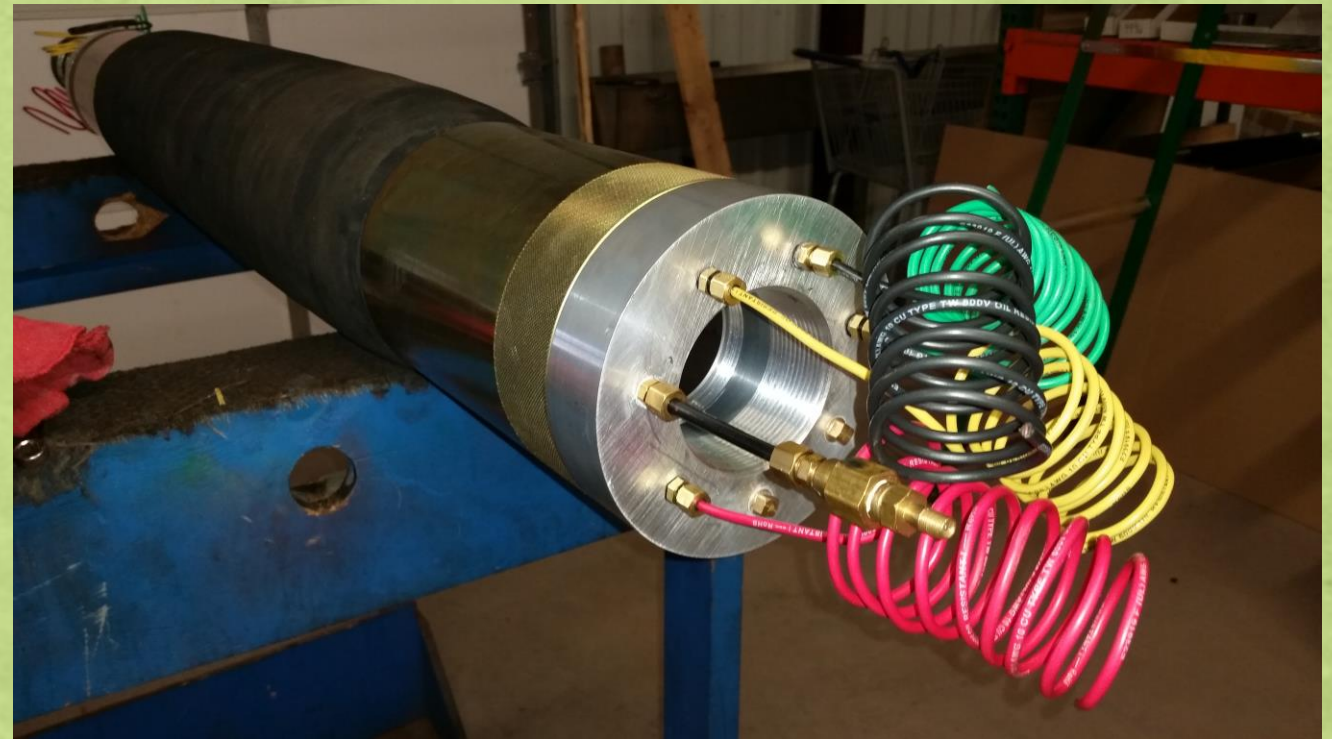
# Custom Modular Configurations



Fixed end packers for zone injection



Model 713 set up for submersible pump



FOR INFLATION WITH NITROGEN GAS OR AIR



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

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

$$G = [(Dp - Dw) \times .43] + Sp + [(Dp - Dw) \times .43 \times .2]$$

**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):

$$( \quad .43 \text{ water} \quad .6 \text{ grout} \quad )$$

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

## The Nuts and Bolts.....

It is important to calculate whether ANY packer will be able to perform correctly in your application.

# Packer Inflation Pressure Formula

<b>Dp</b>		Depth to top of packer (feet)						
<b>Dw</b>		Depth to static water level in well (feet)						
<b>Sp</b>		Unconfined packer pressure rating for the well size (PSI)						
<b>Pp</b>		Injection pump pressure (PSI)						
						<b><i>Inflation Pressure at gauge (PSI)</i></b>		
<b>Packer Inflation Pressure for a <b>withdraw</b> test (pump out)</b>					<b>G=</b>	<b>0</b>	<b><i>PSI</i></b>	
<b>Packer Inflation Pressure for an <b>injection</b> test (pump in) <u>Water</u></b>					<b>G=</b>	<b>0</b>	<b><i>PSI</i></b>	
<b>Packer Inflation Pressure for an <b>injection</b> test (pump in) <u>Grout</u></b>					<b>G=</b>	<b>0</b>	<b><i>PSI</i></b>	

You can download this table from our website for use in the field as needed !

[www.aardvarkpackers.com](http://www.aardvarkpackers.com)



# Un-Confined versus CONFINED



Un-Confined pressure means what the packer will inflate to without it being confined to a borehole. On a work bench or in the back of a service truck. This pressure is fairly low.

As an example, our model 34B has an at rest diameter of 2.13". It has a maximum inflation diameter of 5.0". With any packer, the larger the inflated diameter, the less available pressure can be achieved.

Model 34B:

Maximum Un-Confined pressure is 185 psi.

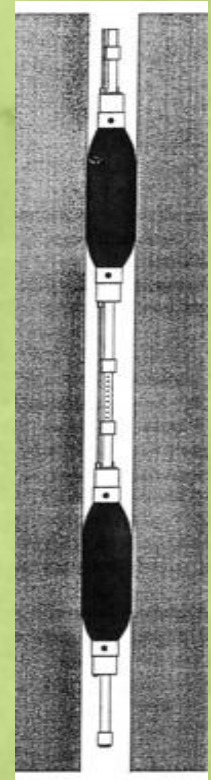
When confined (inflated in a 3" hole the maximum total pressure is 700 psi)  
(inflated in a 4" hole the maximum pressure drops to 325 psi)

A difference of 400 psi in just a 1" diameter change.

# Some things to consider:

- Hole diameter
  - Depth of the packer
  - Static water level
  - Will you be pumping out or injecting
- 
- Type of formation
  - Any caustics or oxidizers in the water

Softer formations can be challenging for any type of packer. Sands, clay, gravels etc. can heave or expand the downhole conditions and make the packer not able to create a seal.



# Typical Application for grout injection

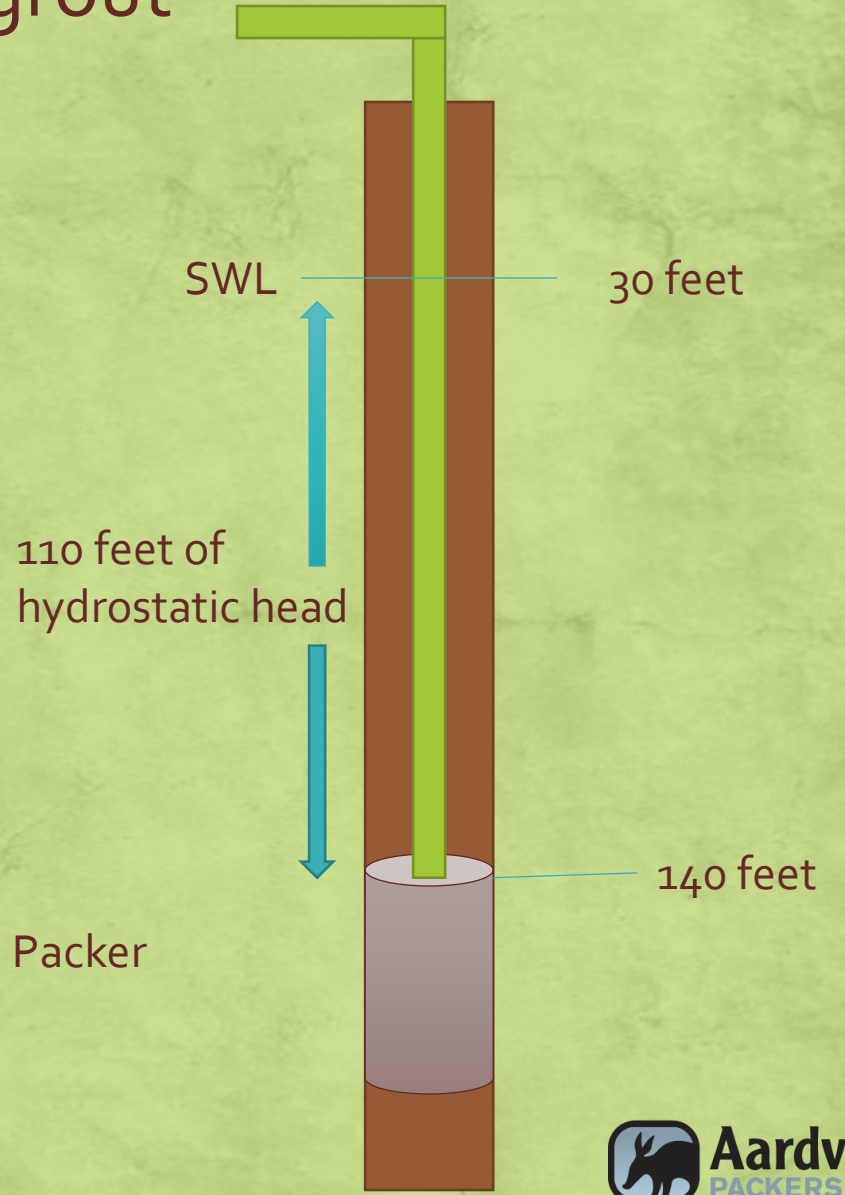
4" open hole

Packer depth will be 140 feet BTC

Static water level will be 30 feet BTC

Grout injection pressure will be 75 psi.

Packer Inflation Pressure Formula			
<b>Dp</b>	140	Depth to top of packer (feet)	
<b>Dw</b>	30	Depth to static water level in well (feet)	
<b>Sp</b>	60	Unconfined packer pressure rating for the well size (PSI)	
<b>Pp</b>	75	Injection pump pressure (PSI)	
			<i>Inflation Pressure at gauge (PSI)</i>
Packer Inflation Pressure for a <b>withdraw</b> test (pump out)			G= 117 PSI
Packer Inflation Pressure for an <b>injection</b> test (pump in) <b>Water</b>			G= 215 PSI
Packer Inflation Pressure for an <b>injection</b> test (pump in) <b>Grout</b>			G= 241 PSI



Model 34B Packer

34B will work!

Maximum inflation pressure in 4" hole is 325 psi.



# Typical Application for grout injection

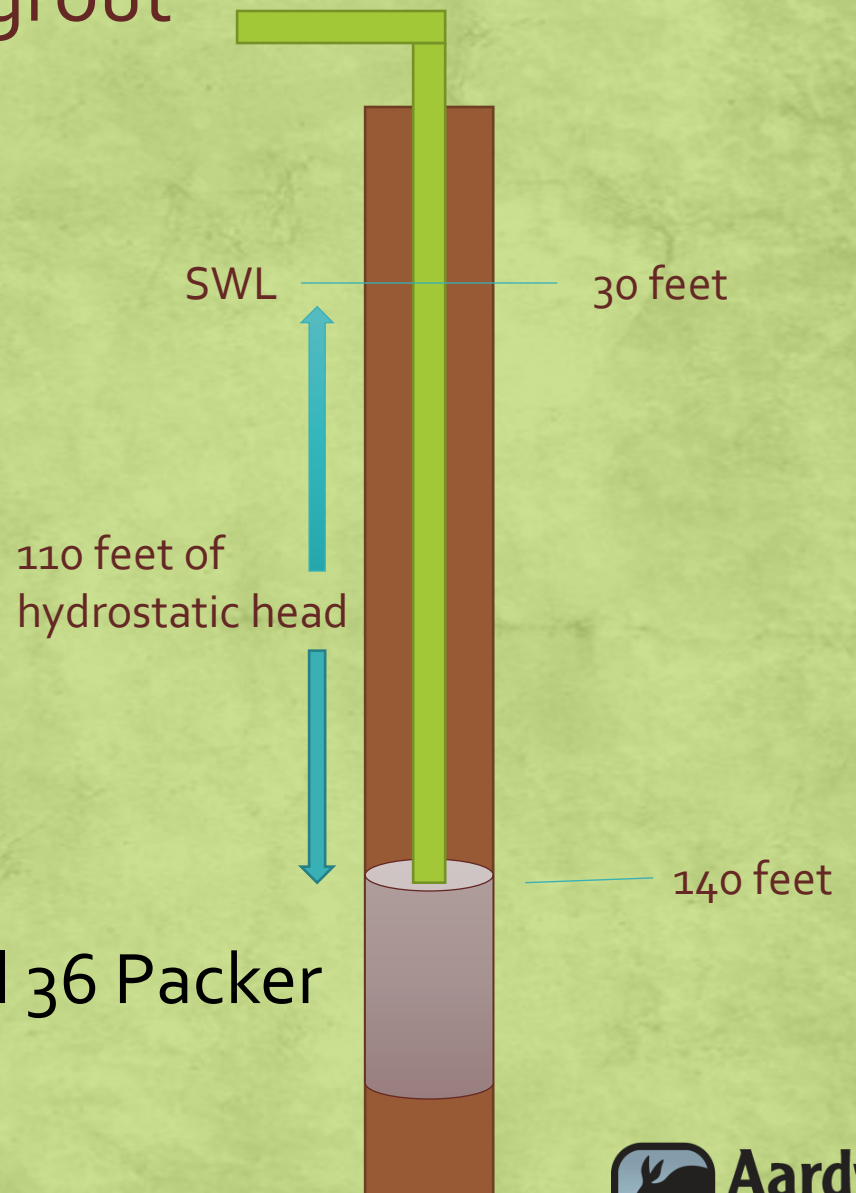
4" open hole

Packer depth will be 140 feet BTC

Static water level will be 30 feet BTC

Grout injection pressure will be 75 psi.

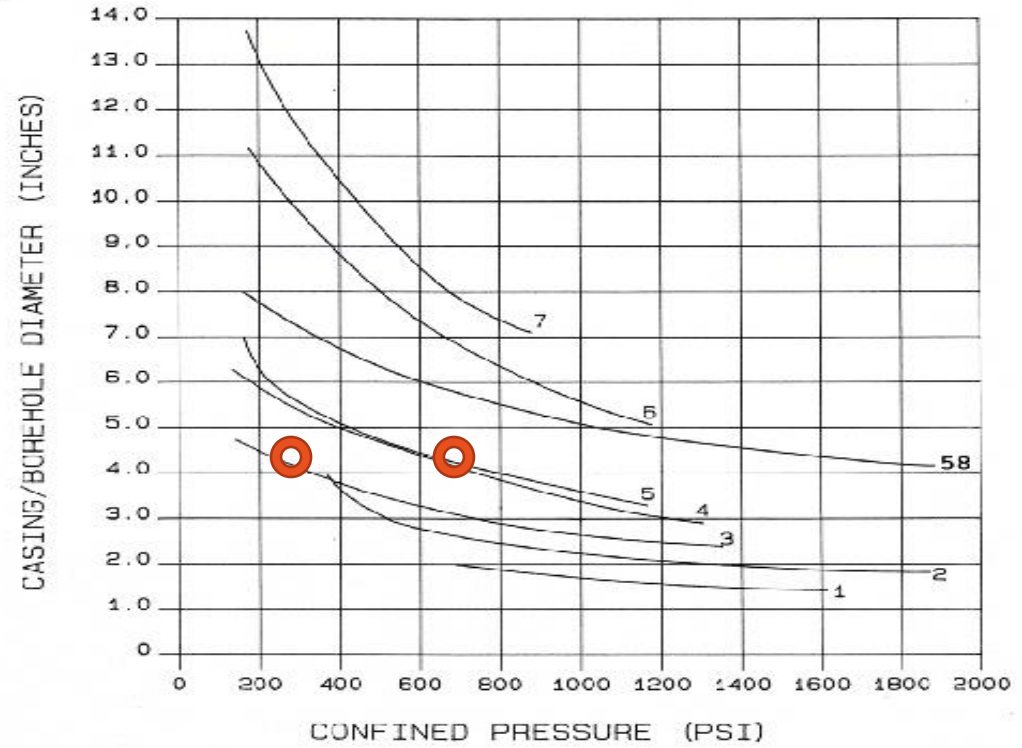
Packer Inflation Pressure Formula			
<b>Dp</b>	140	Depth to top of packer (feet)	
<b>Dw</b>	30	Depth to static water level in well (feet)	
<b>Sp</b>	50	Unconfined packer pressure rating for the well size (PSI)	
<b>Pp</b>	75	Injection pump pressure (PSI)	
			<i>Inflation Pressure at gauge (PSI)</i>
Packer Inflation Pressure for a <b>withdraw</b> test (pump out)			G= 107 PSI
Packer Inflation Pressure for an <b>injection</b> test (pump in) <b>Water</b>			G= 204 PSI
Packer Inflation Pressure for an <b>injection</b> test (pump in) <b>Grout</b>			G= 230 PSI



36 will work!

Maximum inflation pressure in 4" hole is 700 psi.

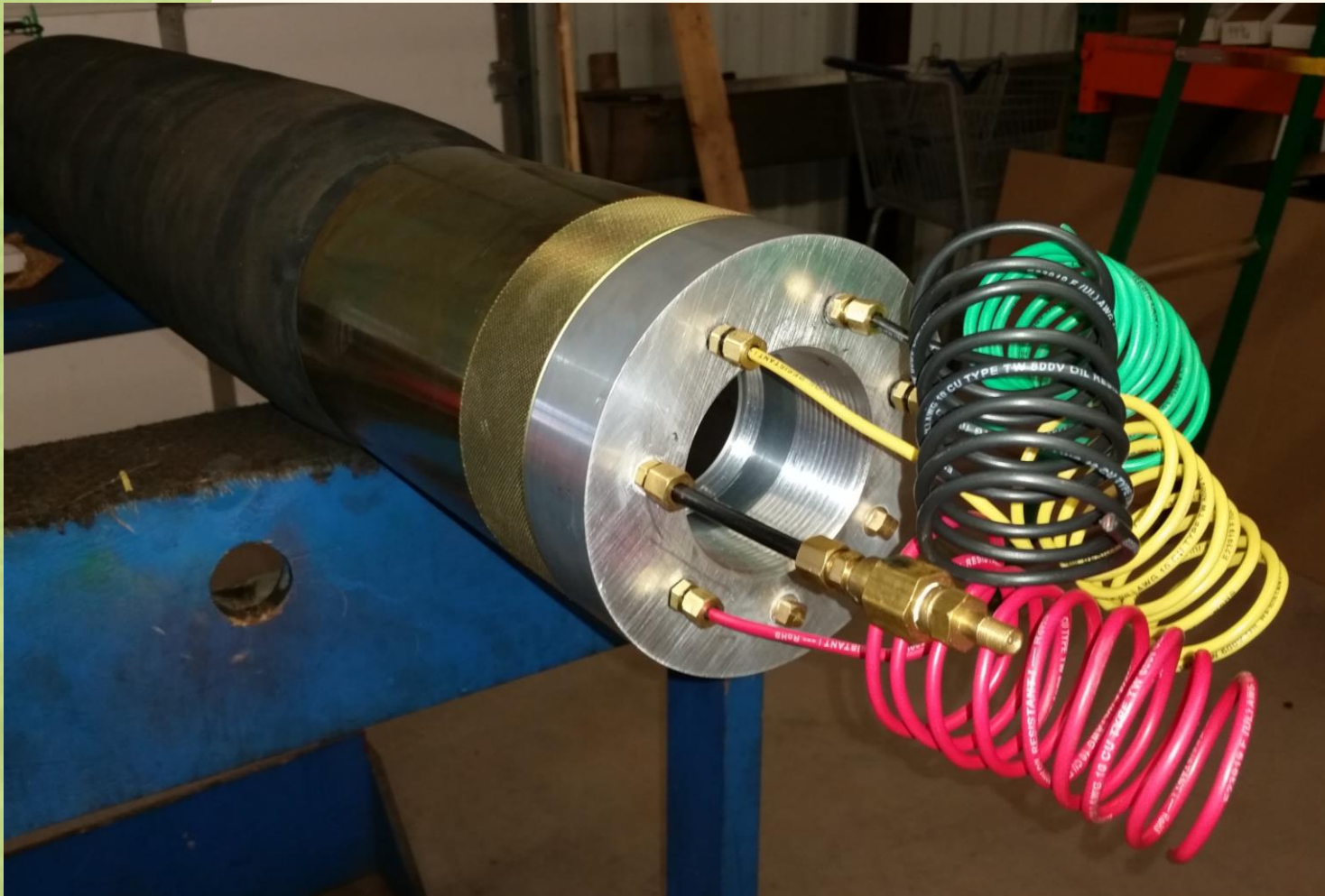
**CONFINED  
PRESSURE  
CURVES**



Legend

No.	Model
1	12
2	233
3	343
4	36
5	47
58	58 (New Size)
6	610
7	713

# Pump out applications



Our Models 47 and 58 now come available in 2" ID center tubes. This allows a small submersible pump to be lowered between the packers inside of the center tube.

We can also pre-wire most packers with pump wires where the user can splice a submersible pump below a packer.

In a straddle configuration, the use of a pump/packer mount will be needed.

# Building a solid relation..... Partnerships and Customer Service

Aardvark Packers the has a vast amount of packer and manufacturing knowledge and working with our clients needs and un-matched customer service from each, we work to fulfill your needs with the best cost effective solutions.



Aardvark aims to earn your trust, build a relationship and prove our worth.

# One stop shopping makes sense!

If Engineers want a permeability test? We have that covered as well. Water test flow meters, hoses, gauges and much, much more!

Aardvark will work directly if needed with the end user or Engineer to make sure the correct tools that can function together making your project run smoothly!

