PHOENIX
TECHNOLOGY SERVICES

PERFORMANCE DRILLING
MOTOR HANDBOOK
V5

Introduction

Phoenix is committed to delivering unmatched drilling solutions for our clients. We have an extensive performance drilling motor fleet to ensure that we have the necessary configurations for each drilling application. Phoenix has fully equipped motor service, inspection and repair facilities where we build, test and repair all of our own motors ensuring the highest level of quality control.

Our fleet is always growing and we are always looking for new innovations; other configurations may be available that are not listed in this book. If you require additional information please contact your Phoenix representative.

The majority of Phoenix's motors utilize Hard Rubber. This stator rubber produces more torque and higher differential pressure. Hard Rubber is also less likely to swell downhole when running oil based mud.

General Guidelines

1. For maximum stator life and fewer failures, it is recommended running at no more than 80% of maximum differential pressure. Do not pump more than the recommended circulation rates, as premature stator failure and internal washing may occur.

2. When a motor stall occurs, shut down the rotary table and shut down the pumps completely (if possible) before slowly lifting the motor off bottom. If this procedure is not followed correctly, premature stator damage or backed off connections can occur. Refer to the recommended Hoisting Off Bottom Procedures on Page 12.

3. For winter conditions, ensure the motor is properly warmed up before running it downhole as the motor could be frozen internally (i.e. frost plug). See Mud Motor Cold Weather Handling Procedure on Page 11.

4. It is suggested to surface check the motor and check the dump sub to ensure it closes. Also check that there are no leaks once it is closed.

5. Always double check the adjustable connection. Do not touch any other connections as they may be left handed threads on some of the motors, these connections could possibly back off or loosen if improperly adjusted.

Torque Specifications

On-Site Connections for Atlas Motor (ft-lb)

Connection	5.25"	5.76"	6.63"	7.12"	7.25"	9.00"
Thread Protector	N/A	9,000	12,000	13,000	13,000	40,000

On-Site Connections for Ultra Motor (ft-lb)

Connection	5.14"	6.5"
Thread Protector	6,000	10,000
Adjustable	16,000	28,000

On-Site Connections for NOV Motor (ft-lb)

Connection		5.13"	6.5"	6.75"	7.75"	9.625"
Thread Protector		6,000	10,000	12,000	20,000	35,000

Note: 4.75" motors are torqued to the same specifications as a 5" motor. A 6.25" motor is torqued to the same specifications as a 6.5" motor.

Motor Components

Top Assembly Options

Top Sub

At the top end of the motor you will find the top sub. The top sub is the crossover between the power section and the rest of the BHA. Most top subs are bored to accommodate a float.

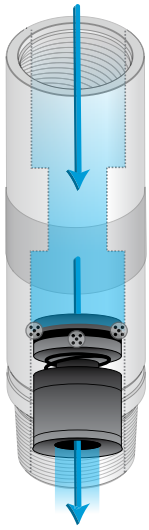
Dump Sub

A dump sub can be used instead of a top sub, allowing fluid within the motor to drain out. When tripping into the hole, fluid may bypass the motor and can flow into the drill string. The use of a dump sub allows the drill string to drain out in hole, as opposed to on the rig floor.

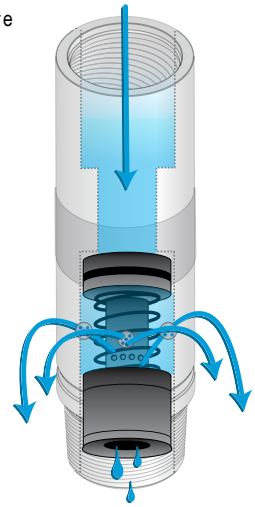
Figure 1 illustrates the dump sub when activated by pump flow. When fluid is being pumped down the drill string, the flow pushes a spring loaded piston down, covering the port holes. This forces all fluid through the dump sub and into the power section.

Figure 2 illustrates how without flow, the spring pushes the piston

Figure 1



Figure



up, allowing fluid to pour out through the portholes.

Like a top sub, a dump sub can also be bored for float. The addition of a float sub is available upon request.

Rotor Catch & Rotor Catch Sub

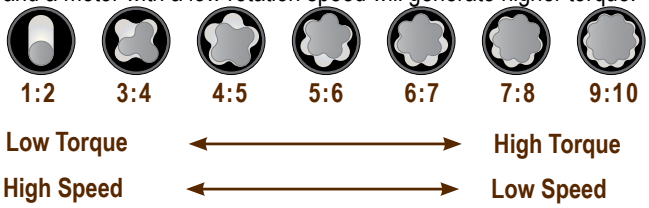
The rotor catch is designed to retrieve the motor should a motor housing failure occur. If a connection or housing failure occurs, the rotor catch mandrel will drop down and engage in the rotor catch sub. This will potentially make it possible to trip the tool out without losing anything downhole.

Note: if you continue to heavily pump after the rotor catch has been

Power Section

A rotor and stator together make a power section. The stator has one more lobe than the rotor which creates a cavity for fluid to flow through. As fluid flows through the power section, the hydraulic energy is transformed creating the differential pressure that transmits torque to the rotor then through the transmission and bearing section.

A power section with a high rotation speed will produce lower torque, and a motor with a low rotation speed will generate higher torque.



Adjustable Assembly & Fixed Housing

Adjustable Assembly

The stator externally connects the power section to the bearing assembly.

Phoenix's most common adjustable can be set to a maximum of 3˚. The following are available adjustable settings: 0.39˚, 0.78˚, 1.15˚, 1.50˚, 1.83˚, 2.12˚, 2.38˚, 2.60˚, 2.77˚, 2.89˚, 2.97˚, 3.00˚.

The adjustable assembly is stenciled with "Tong Here" on the housing above, and below the adjusting ring. This indicates where it is safe to place tongs. If the area is not painted brown, and stenciled with "Tong Here", you risk the chance of crushing

the housing with the tongs.

Fixed Housing

A fixed housing like the adjustable connects the bearing pack to the stator, but it is not adjustable.

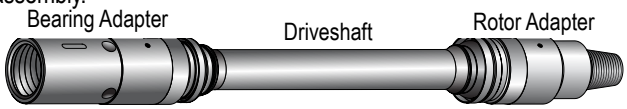
Fixed housings are not adjustable, but are fixed at certain angle. Fixed housings are available in 0˚, 1.50˚, 1.75˚, 1.83˚, 2.00˚, 2.12˚, 2.25˚, and 2.38˚, and must be specially requested. Please contact your Phoenix representative for availability.

Driveline Assembly

The driveline assembly is comprised of a bearing adapter, driveshaft, and rotor adapter. It connects the rotor to the bearing assembly and is housed by the adjustable.

The rotor adapter connects the rotor to the driveshaft on the top end, and the bearing adapter connects the bearing assembly to the driveshaft on the lower end.

As fluid is pumped down the power section the rotor spins. As the rotor spins so does the driveshaft, which directly spins the bearing assembly.



Bearing Assembly

The bearing assembly is comprised of a bearing mandrel. The top end is connected to the driveline, and at the bottom end is the bit box.

Contained within three housings that cover the bearing mandrel are the on bottom and off bottom races and bearings, along with a piston pressured oil reserve.

Several different seals and wipers keep oil and mud apart while the

ID Band on Bit Box

As illustrated in the example below, there is an ID band on the bit box of a motor which is stamped with important information.

There are two pieces of identification stamped into the ID band of the bit box. You'll find a stamp that describes the motor type, size, and motor number. The second stamp is a PTS number, this is a Phoenix part tracking number.

Motor type, size and motor number

PTS Number

The **first** digits are the motor type:

- 24XH = NOV 24XH Series
- G = Ultra Motor Series

The **second** digits are the motor size:

- 127mm = 5" Motor
- 165mm = 6.5" Motor
- 170mm = 6.75" Motor

The **third** digits are the motor number:

- 61 = Motor #61

Stabilizer/Offset Kick Pad

All motors with a thread protector that are 4.75" or larger can have a stabilizer or a offset kick pad installed. Please contact your Phoenix representative for details of stabilizers and offset kick pad size availability.

A stabilizer can assist in maintaining a particular hole angle, and increase the yield of the motor with regards to angle change.

Build rates for stabilized motors are based on stabilizers that are 1/8" smaller than the hole size.

The offset kick pad and stabilizers are torqued to the same torque as the thread protector.

Offset kick pads require setting shims which come in a variety of thicknesses that allow the offset kick pad to be properly installed. When the offset kick pad is torqued the wear pad needs to align with the kick pad on the adjusting ring, as shown by the dotted line.

Setting Adjustable

1. Determine Motor Size

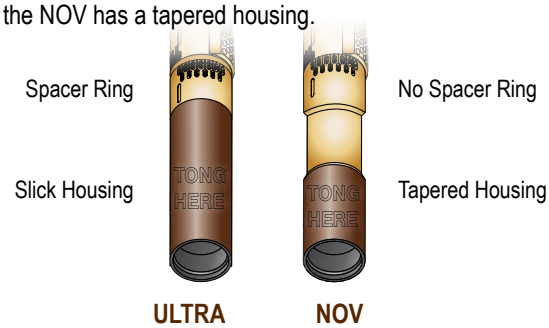
The top end of the adjustable is the lock housing, also known as the adapter housing. On the next page, there are illustrations showing where the lock housing is found on the adjustable.

See Torque Specifications table on Page 2.

2. Determine Motor Type

There are two different motor types available with similar adjustable's for the 5" and 6.5" sizes. These two types are the NOV motor and the Ultra motor. You can determine the type of motor by looking at the information on the ID band.

The two main visible differences are found at the adjustable settings and the offset/kick housing. The Ultra has a spacer ring that covers the teeth of the adjustable, where the NOV adjustable has no spacer and the housings face off. Secondly, the Ultra has a slick housing, where the NOV has a tapered housing.



3. Adjust Bend Setting

The middle of the adjustable is painted gold to highlight the adjustable settings, and to indicate that tongs are not to be placed here.

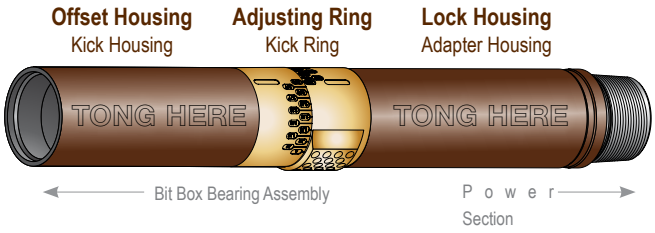
The top lock housing and bottom offset housing are painted brown and stenciled with "Tong Here". These are the only two areas where tongs can be placed to set the adjustable.

With tongs on the top and bottom housings break the joint. Next spin the lock housing two full turns using chain tongs. This will allow the adjusting ring to slide up, disengaging the teeth connecting the adjusting ring and offset housing.

With chain tongs you can now spin the adjusting ring between 0˚ and 3˚. Do not overspin past 3˚.

With the correct setting in place the adjusting ring will slide down, engaging the two sets of teeth. Notice that the degree setting will align on both housings.

Apply liberal amounts of dope to the teeth and the top and bottom faces of the adjusting ring. Make-up the lock housing to the adjusting ring with chain tongs, then torque to specified amount depending on



Performance Drilling Motors

Performance Drilling Motors are also called Mud Motors or Positive Displacement Drilling Motors.

The power section of a motor converts the hydraulic energy of drilling fluid flow to mechanical energy in the form of torque output for the drill bit.

A power section consists of a helical shaped rotor and stator. The rotor is typically made of steel and is either chrome plated or carbide plated depending on the drilling application. For brine applications Phoenix prefers to send a carbide rotor to withstand the higher chloride contents present in brine. The stator is a heat-treated steel tube lined with a helical shaped elastomeric insert.

During drilling operations, high pressure fluid is pumped into the top end of the power section, where it fills the first set of open cavities. The pressure differential across two adjacent cavities

forces the rotor to turn. As this occurs, adjacent cavities are opened allowing the fluid to flow progressively down the length of the power section. Opening and closing of the cavities occur in a continuous, pulsationless manner causing the rotor to rotate at a speed that is proportional to drilling fluid flow rate.

The rotor has one less lobe than the stator, and when the two are assembled, a series of cavities are formed along the helical curve of the power section. Each of the cavities is sealed from adjacent cavities by seal lines. Phoenix's Fit Calculator aids in finding the adequate fit necessary for any given power section configuration and drilling parameters requested by the client.

Pressure Rating and Slip

The pressure rating of a motor is the differential pressure at which a power section should operate to achieve optimum stator life. The recommended differential pressure of a power section is the summation of the pressure ratings for each individual stage. A stage is typically defined as one pitch length of the stator.

The pressure differential rating for an individual stage generally ranges from 100–300 psi and depends on the number of lobe, pitch length, compression fit, and the elastomers physical properties. If all other conditions remain consistent, higher pressure per stage usually means a shorter stator life.

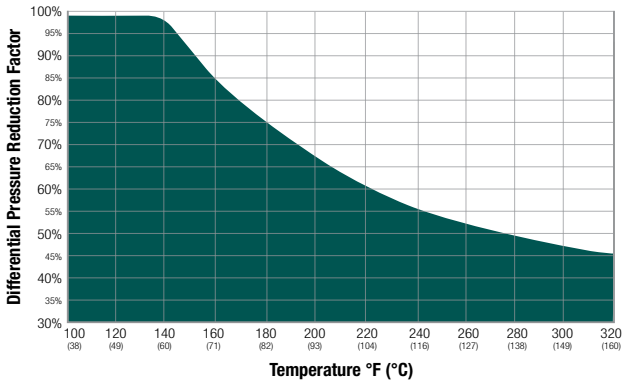
In many cases users will target to operate the motors at differential pressures just below stalling conditions. This practice results in a significant reduction of the stator's life.

Slip is caused when high pressure fluid blows past the rotor and stator seal lines. Slip results in a reduction of the power section's speed and is defined as the percent that the rotor speed was reduced below the theoretical maximum for a given flow rate.

The power sections maximum recommendations are in most cases set at the peak efficiency. Peak efficiency is the highest possible output of mechanical horse power as a result of the hydraulic horse power being put into the motor (flow and pressure). The misconception is that by increasing the hydraulic horse power that goes into the motor (flow and pressure) it will increase the output of mechanical horse power. In actuality by exceeding the maximum recommendations, the mechanical speed and torque decrease. The end result is stalling, decreased penetration rate, and/or failure. Simply stated, exceeding the maximum recommendations creates poor performance.

Temperature De-Rating of Power Sections

The mechanical properties of the elastomer in the power section are reduced at elevated temperatures. It is recommended to de-rate the maximum differential pressure that the power section is operated to avoid premature failure. Refer to the Differential Pressure



De-Rating for Temperature chart for the recommended reduction factor to apply to the maximum recommended operating differential pressure of the power section.

Differential Pressure De-Rating for Temperature

Failure Mechanisms

One of the most challenging aspects of utilizing power sections for drilling operations is understanding and predicting a failure. Power section failures are primarily due to destruction of the stator elastomer. Rotor failures due to wear or chemical attack are rare compared to stator failures. Elastomer failures may be classified as those which result in a reduction in performance and those which are catastrophic.

Policies & Procedures

BHA Handling Procedures

Make-up is the most important single factor when handling/picking up the BHA. However, it is only one of many rig level practices necessary for downhole drilling components to perform at optimal levels. The following checklist can be used as a guide for making-up bottom hole assembly drill string components.

Unloading

The unloading of collars should be done by lifting them from the transportation vehicle onto the pipe rack. Collars should never be rolled off the vehicle or dropped onto the racks.

Thread Protectors

Cast steel thread protectors with a lifting bail provide a means of dragging the collar into the "V" door while protecting the shoulders and threads. The lifting bail makes the pick up safer and easier. The pin should also be protected. When picking up a collar with a lift sub, the lift sub pin should be cleaned, inspected and lubricated on each trip.

Cleaning and Lubrication

Thread protectors should be removed, all rust preventative coating washed off threads, and the threads dried. A good grade of drill collar lubricant containing 60% finely powdered metallic lead or 40–60% finely powdered metallic zinc should be applied to the threads and shoulders. Phoenix procedures require Jet Lube Kopre Kote be used as thread lubricant. Every thread and face must be lubricated in order to avoid galling on make-up. Do not rely on make-up to spread used lubricant, apply with a brush on entire seal face and threads, every time. Make a practice of lubricating a new thread; making it up hand tight with the chain tongs, breaking it out, and relubricating it. This procedure works the lubricant into the surfaces and avoids galling of threads and shoulders on the initial make-up.

Regulating Make-Up

Use the make-up torque recommended for the specific joint size, outside diameter, and bore of the collars. The make-up torque should be adjusted by multiplying the value from the table by the dope friction factor, which can be found on the label on the dope bucket. If in doubt, use a value of one. Make-up the collars with a slow and steady line pull. Continue torquing until reaching the required pull with the tongs at a right angle to the line pull. The torque is determined by the line pull itself multiplied by the effective tong length measured at a right angle to the line pull. A tong cocked at any other angle reduces the effective tong length, and reduces the make-up torque applied. Using a jerking action on the tong line momentarily increases the line pull but it may not move the collars because of their great weight. It is essential that line pull be measured when applied with a slow, steady pull.

Breaking Out

Drill collars properly made-up will break out at approximately the same line pull as used to make them up. If the shoulders are kept tight the joint cannot leak and the lubricant cannot be washed away. When joints are hard to break it usually means they have been operated loose so the lubricant has been washed away and replaced by drilling mud. To avoid hard to break joints, keep the lubricant in place by taking the joint to the recommended torque specifications.

Handling Subs

If subs are dirty or damaged, the handling subs transfer the dirt and damage to every thread and seal face in the drill collar string.

Stabbing

Avoid dropping the pin into the box threads with the weight of the collar not supported, or stabbing the pin into the box shoulder, this causes thread and seal face damage. Collars should be threaded to seal face with chain tongs to avoid damage.

Rotate the Break

On trips the breaks should be rotated so that each joint can be examined every second or third trip. The box shoulder should be wiped clean and examined for evidence of proper make-up.

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A shoulder that is bright and shiny all the way across with small circumferential scratches like a phonograph record, has been properly tightened. A shoulder face that is discolored around the outside of the edge, or that has patches or bright spots and discolored blue or gray areas, has been operated loose, and fluid has been getting between the shoulders. Fluid cutting and erosion indicate a damaged shoulder or extremely loose connection.

Draining the Motor

Generally the drill string will drain automatically if a dump sub has been installed on to the motor. However, the motor will still retain fluid until manually drained. Once the bit is recovered on surface rotate the bit and bit box in a clockwise direction to drain the motor through the bottom. Additionally, it is recommended clean water be put through the top of the motor while the bit box is rotated clockwise with the rotary table. This cleans and flushes the power section and should minimize the effects of the drilling fluid on the motor while it is being shipped or stored.

Note: Rotating the bit box in a clockwise direction will drain the motor through the bottom, but one of the internal connections may back off and unscrew. For this reason this method of drainage should be performed carefully.

Laying Down

When laying down drill collars thread protectors should be installed on the rig floor. A tag line should be used to control the collars while laying down. The catwalk should be kept clear of other collars, pipes and subs to prevent damage from other tools being laid down.

Transportation

During transport the drill collar should be supported at each end and also at mid-length. Tie-down chains should be applied only at points of support. Thread protectors and installed lift subs should be put in the sub basket.

Storage

Before storing the drill collars they should be cleaned and if necessary reface the shoulders with a shoulder refacing tool. Fins on threads should be removed and a rust preventative applied to the connections The drill collar connection is a tapered threaded jack screw that forces the shoulders together to form a seal. This seal acts as a structural member to make the pin equally as strong in bending as the box when made up to the recommended torque. The threads do not form a seal. For good drill collar performance: properly lubricate shoulders and threads with drill collar compound, use proper torque (must be measured), and immediately repair any minor damage.

Mud Motor Cold Weather Handling

There are two main challenges with motors in cold weather. Firstly, thermal contraction effects the steel and elastometer of the stator resulting in stress on the bonding agent. Secondly, the stator rubber loses all elastic properties as stator rubber embrittlement occurs at temperatures below -20ºC (-4ºF).

- Handle motors and stators with care; especially at cold temperatures. Speak to the loader operator to ensure proper handling is completed.
- Warm motors at temperatures below 0ºC (32ºF) by indirect steam to the stator tube by tenting it under poly or using a steam blanket. Do not apply steam directly to the stator rubber by steaming inside of the motor.
- Alternatively, the motor can be warmed by immersing in drilling fluid for an hour prior to being pumped on, larger motors may require more time. Mud temperature and type will affect the warming process greatly. If the BHA pressures up solid then the surface equipment should be checked to confirm alignment. Rest the BHA for 20 minutes before pumping again at a very low rate. Pump every 20 minutes for one hour and call your Coordinator.
- If a motor incurs a shock (ie: dropped) below -20ºC (-4ºF) that motor should not be run.

Hoisting Off Bottom

Below are the procedures for pulling off bottom with a performance drilling motor that must be adhered to on any Phoenix job. These procedures must be followed by all Directional Drillers and Clients to ensure motor performance is not negatively impacting drilling operations.

Pulling Off Bottom While Drilling in Rotary Mode

A) Top Drive System

- Allow WOB to drill off
- Differential pressure should be as close to zero as practical
- Stop top drive rotary
- Allow residual torque in the drill pipe to relax
- Begin to lift drill string slowly while paying close attention to weight indicator
- At the first sign of excessive drag, stop hoisting and observe
- Reverse direction if necessary

B) Rotary Table Drive System

- Allow WOB to drill off
- Differential pressure should be as close to zero as practical
- At KD, stop rotary
- Allow residual string torque to relax to equilibrium
- Begin to lift drill string slowly while paying close attention to weight indicator
- At the first sign of excessive drag, stop hoisting and observe
- Reverse direction if necessary

Pulling Off Bottom While Drilling in Slide Mode

A) Top Drive System

- Allow differential pressure to drill off as far as practical
- Pick up the string while controlling the release of any trapped torque
- Ensure the bit has completely disengaged the rock face, and residual string torque has been released, continue hoisting an additional 6–10 ft (2–3 m)
- Ensure the hole drag is not excessive and residual string torque has been released

B) Rotary Table Drive System

- Allow differential to drill off as far as practical
- Hoist while monitoring hole drag and differential pressure
- Ensure the bit has completely disengaged the rock face, and residual string torque has been released, continue hoisting an additional 6–10 ft (2–3 m)

Stalling

If too much WOB is applied, the torque required to keep the bit turning creates a higher differential pressure than the seal between the rotor and stator elastomer can maintain. The drilling fluid breaks the seal and leaks through the power section without turning the rotor, so bit ceases rotation, or stalls. An increase in standpipe pressure will occur and penetration will cease. As the fluid leaks past, it erodes the elastomeric liner, which makes further stalling more likely and damages the liner, eventually leading to chunking.

Stalling generates large pressure pulses, creating torque spikes that can cause chunking, connection back off, or fracture of driveline components. Motor stall should be avoided, but when it occurs, it should be quickly remedied. If the bit is picked up off bottom while drilling, the 'trapped' torque within the drill string will be released uncontrollably, potentially causing damage to downhole components or causing connections to back off. This is especially true when a stall has occurred. If a stall condition occurs the following procedures should be followed as soon as possible. Refer to the applications for specific instructions.

Pulling Off Bottom for Motor Stall in Rotary or Slide Mode

At first sign of stalled motor:

- Stop string rotation or release rotation brake (if in slide mode)
- Immediately reduce pump rate completely
- Bleed SPP off at surface through standpipe if possible
- Allow residual string torque to release slowly
- Lift drill string to disengage bit completely from formation

Pulling Off Bottom for Stalled Drill String in Rotary Mode

Before pulling off bottom:

- Reduce pump rate completely, stop string rotation, and

Vibration Mitigation Axial Flow

Surface Measurement or Symptom

- Large WOB fluctuations
- Top-Drive stalling
- Erratic toolface control
- Reduced ROP

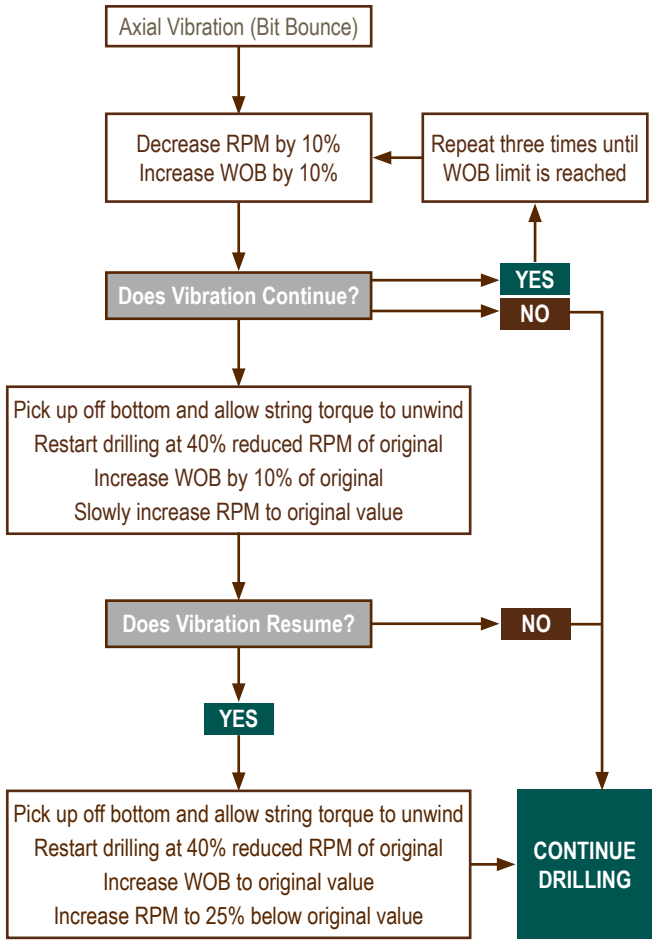
Downhole Measurement

- MWD tool erratic readings
- Missed decodes
- Increased Z-vibe counts

Post Run Evidence

- Premature failure of motor bearings
- Broken or chipped cutters
- Eccentric stabilizer wear
- BHA failure

Solutions While Drilling



Vibration Mitigation Lateral Flow

Surface Measurement or Symptom

- Increased surface torque
- Loss of toolface control
- Reduced ROP
- Erratic rotary torque

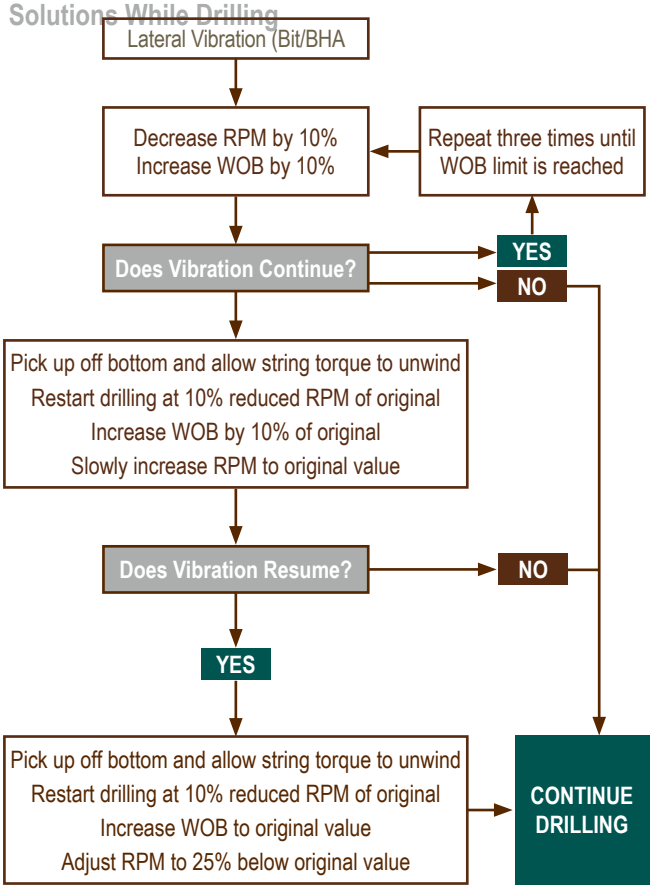
Downhole Measurement

- MWD tool erratic readings
- Missed decodes
- Increased XY vibe counts
- Increased downhole torque

Post Run Evidence

- Bit cutter/insert damages (typically on shoulder or gauge rows)
- Broken PDC blades
- Eccentric BHA wear
- Eccentric stabilizer wear
- BHA failure

Solutions While Drilling



Vibration Mitigation Torsional Flow - BHM

Surface Measurement or Symptom

- Topdrive stalling
- Increased delta surface torque
- RPM/torque cycling
- Loss of toolface
- Reduced ROP

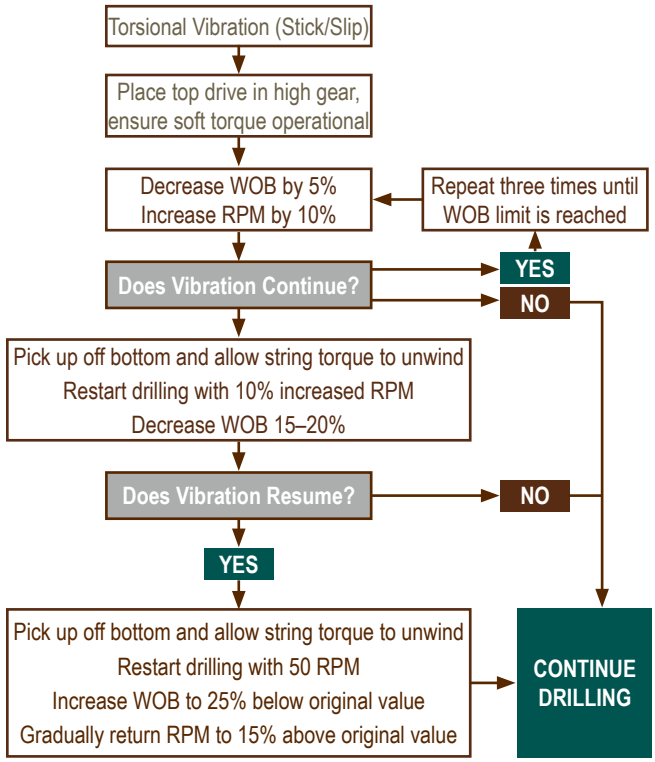
Downhole Measurement

- Increased delta downhole torque
- Increased torsional acceleration
- Increased stick/slip indicator
- Downhole collar RPM > surface RPM
- Loss of real-time data/measurement
- Increased lateral shocks
- Increased shock count

Post Run Evidence

- Cutters/inserts damaged, typically on nose and taper
- Overtorqued connections
- Twist-offs and washouts
- Eccentric stabilizer wear
- BHA failure

Solutions While Drilling



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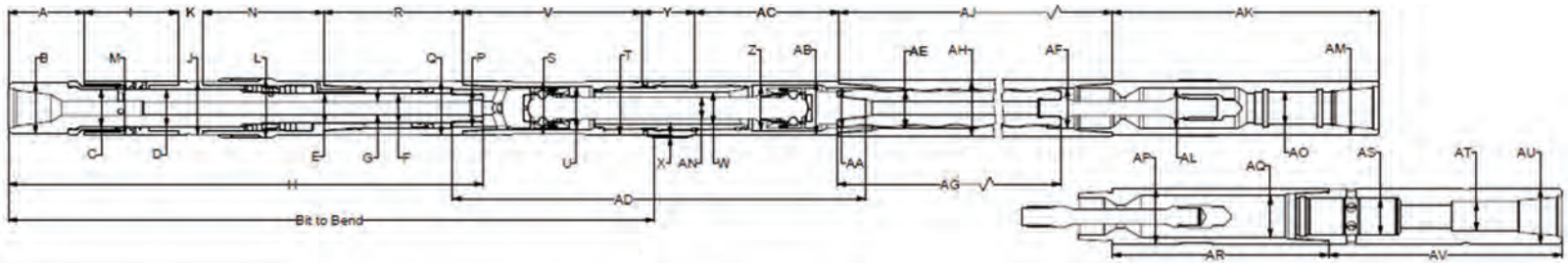
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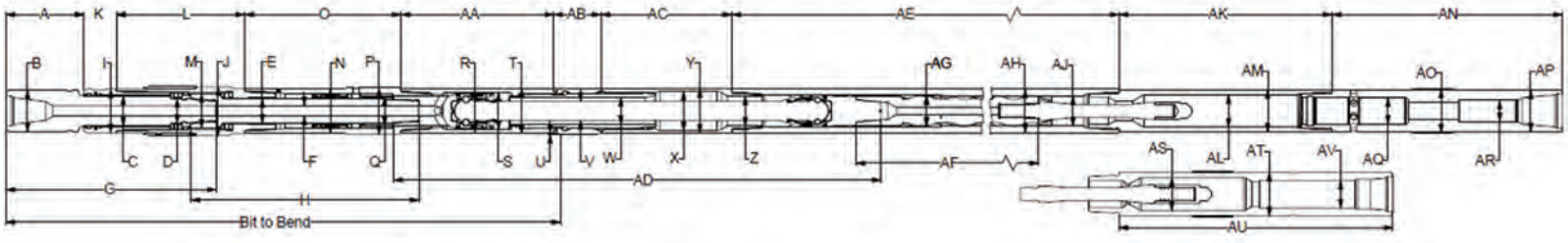
Dimension Description	Dimension	in	mm	Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	7.25	184.15	**Length of Adjusting Ring**	Y	5.44	138.18
Bearing Mandrel Diameter	B	4.75	120.65	**ID of Lock Housing**	Z	3.46	87.88
Bearing Mandrel Diameter	C	3.62	91.95	**Bore of Lock Housing**	AA	3.56	90.42
Bearing Mandrel Diameter	D	3.50	88.90	**OD of Lock Housing**	AB	5.13	130.30
Bearing Mandrel Diameter	E	2.78	70.61	**Length from Adjusting Ring to Stator**	AC	15.00	381.00
Bearing Mandrel Diameter	F	2.50	63.50	**Length of Drive Shaft**	AD	41.02	1041.91
Length of Bearing Mandrel	H	49.22	1250.19	**Length Stator to Top of US Fin-Catch Top Sub**	AK	31.50	800.10
Length of Housing Flow Restrictor	I	8.44	214.38	**Bore of US Fin-Catch Top Sub**	AL	3.75	95.25
OD of Bearing Housing	J	4.82	122.43	**OD of US Fin-Catch Top Sub**	AM	5.00	127.00
Length of Bearing Housing	K	3.25	82.55	**OD of Driveshaft**	AN	2.19	55.63
Thrust Housing Diameter at Sleeve Connection	L	5.38	136.65	**Bore of Throat of US Fin-Catch Top Sub**	AO	2.85	72.39
OD of Housing Flow Restrictor	M	4.82	122.43	**OD of CAN Top Sub**	AP	4.88	123.95
Length of Thrust Housing	N	12.31	312.67	**ID of CAN Top Sub**	AQ	3.75	95.25
OD of Piston Housing	Q	4.95/5.13	125.73/130.30	**Length Stator to Top of CAN Top Sub**	AR	24.50	622.30
Length of Piston Housing	R	15.64	397.26	**Bore of Dump Sub**	AS	3.01	76.45
OD of Offset Housing	S	4.98	126.49	**Bore of Dump Sub**	AT	2.44	61.98
OD of Offset Housing	T	5.13	130.30	**OD of Dump Sub**	AU	4.81	122.17
ID of Offset Housing	U	4.30	109.22	**Length Top Sub to Top of Dump Sub**	AV	26.50	673.10
Length End of Piston Housing to Adjusting Ring	V	17.45	443.23	**Bit to Adjustable Bend**		**64.34**	**1634.24**
Offset of Pad	X	0.23	5.84	**Bit to Fixed Bend**		**58.14**	**1476.76**

PHX 514 Ultra

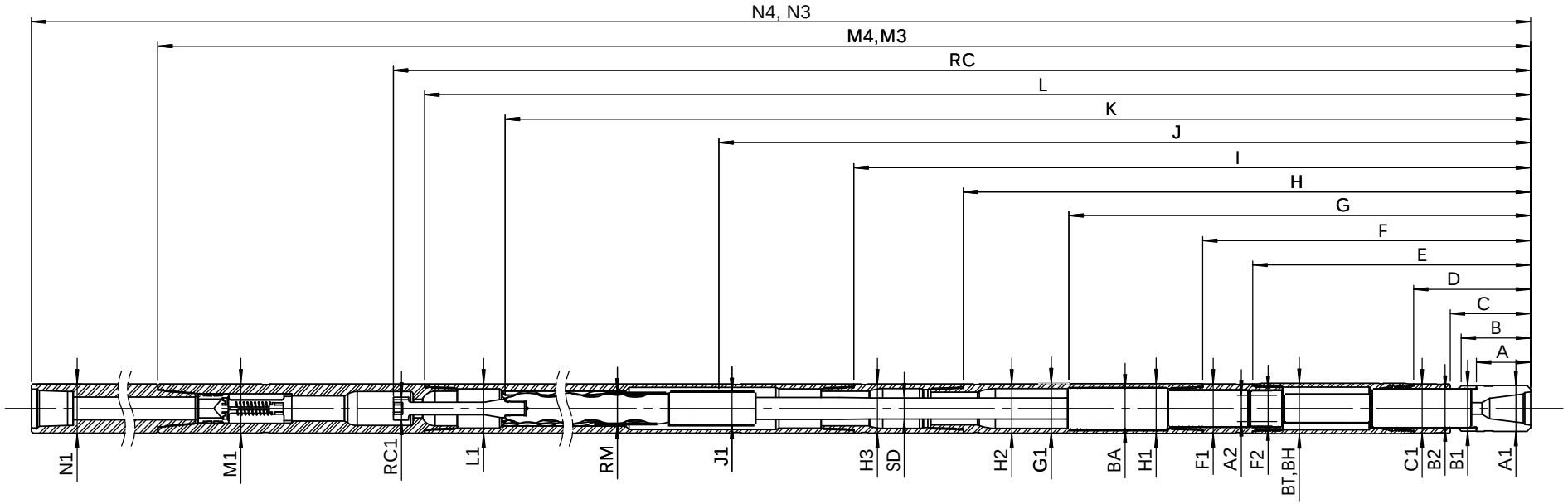


Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	8.86	225.04
Bearing Mandrel Diameter	B	4.81	122.17
Bearing Mandrel Diameter	C	3.50	88.90
Bearing Mandrel Diameter	D	2.88	73.15
Washpipe Diameter	E	2.86	72.64
Length of Bearing Mandrel	G	24.15	613.41
Length of Washpipe	H	28.56	725.42
OD of End Cap	I	5.00	127.00
OD of Bearing Housing	J	5.56	141.22
Length of End Cap Bottom to Bearing Housing Bottom	K	3.75	95.25
Length of Bearing Housing	L	17.13	435.10
Washpipe Diameter	M	4.15	105.41
OD of Piston Housing	N	5.13	130.30
Length of Piston Housing	O	18.00	457.20
OD of Piston Housing	P	5.31	134.87
OD of Offset Housing	R	4.98	126.49
OD of Offset Housing	T	5.13	130.30
OD of Drive Shaft	V	2.19	55.63

Dimension Description	Dimension	in	mm
OD of Lock Housing	Y	5.13	130.30
Bore of Lock Housing	Z	3.46	87.88
Length End of Piston Housing to Adjusting Ring	AA	17.53	445.26
Length of Adjusting Ring	AB	5.43	137.92
Length from Adjusting Ring to Stator	AC	15.06	382.52
Length of Drive Shaft	AD	41.98	1066.29
Length Stator to Top of CAN Top Sub	AK	24.50	622.30
ID of CAN Top Sub	AL	3.75	95.25
OD of CAN Top Sub	AM	4.88	123.95
Length Top Sub to Top of Dump Sub	AN	26.50	673.10
OD of Cladding on Dump Sub	AO	5.05	128.27
OD of Dump Sub	AP	4.81	122.17
Bore of Dump Sub	AQ	3.01	76.45
Bore of Dump Sub	AR	2.44	61.98
Bore of US Top Sub	AS	3.75	95.25
OD of US Top Sub	AT	5.00	127.00
Length of US Top Sub	AU	31.50	800.10
Bore of US Top Sub	AV	3.16	80.26
Bit to Adjustable Bend		**66.08**	**1678.43**
Bit to Fixed Bend		**59.24**	**1504.70**

5.25 Atlas Fishing Diagram

REVISIONS							
ECN	ZONE	REV.	COS.	USER	DESCRIPTION	DATE	APPROVED
12134		A	0	LV	Initial Release	10-May-2022	AC



FISHING DIAGRAM DIMENSIONS

		BIT BOX TO MOTOR XO - NC40	BIT BOX TO MOTOR XO - NC38	MOTOR XO Ø	BIT BOX TO TOP SUB - NC40	BIT BOX TO TOP SUB - NC38	TOP SUB Ø	ROTOR CATCH	ROTOR CATCH HEAD Ø	STATOR END	STATOR Ø	BIT BOX TO ROTOR END	ROTOR MAJOR Ø	BIT BOX TO ROTOR START	ROTOR HEAD Ø	STATOR START	SHAFT Ø	BENT SUB END	BENT SUB BOTTOM Ø	BENT SUB SMALL Ø	SPACER SUB Ø	BIT BOX TO BEND (BTB)	WEAR PAD Ø	BEARING ADAPTER Ø	UPPER BEARING HOUSING END	UPPER BEARING HOUSING Ø	DIVERTER ADAPTER MAJOR Ø	DIVERTER ADAPTER MINOR Ø	BEARING HOUSING END	BEARING HOUSING START	BEARING HOUSING THREADED Ø	BEARING HOUSING END Ø	LOWER NUT	LOWER NUT Ø	LOWER MALE BEARING END	LOWER MALE BEARING MAJOR Ø	LOWER MALE BEARING MINOR Ø	BIT BOX	BIT BOX MAJOR Ø	MANDREL Ø
	SERIES	N4	N3	N1	M4	M3	M1	RC	RC1	L	L1	K	RM	J	J1	I	SD	H	H1	H2	H3	G	G1	BA	F	F1	F2	F3	E	D	BT	BH	C	C1	B	B1	B2	A	A1	A2
525 ATLAS	5137857	374.28	374.77	5.25	350.78	350.78	5.25	326.62	2.46	322.28	5.13	314.68	3.14	86.68	3.40	72.28	2.25	60.58	5.31	5.25	5.25	49.31	5.36	4.18	35.03	5.25	3.73	3.68	29.68	12.50	-	5.38	8.59	5.25	7.42	4.84	3.91	5.79	4.90	2.80
	5006788	399.28	399.77	5.25	375.78	375.78	5.25	350.62	2.46	347.28	5.25	338.68	3.30	86.68	3.40	72.28	2.25	60.58	5.31	5.25	5.25	49.31	5.36	4.18	35.03	5.25	3.73	3.68	29.68	12.50	-	5.38	8.59	5.25	7.42	4.84	3.91	5.79	4.90	2.80
	5007870	399.28	399.77	5.25	375.78	375.78	5.25	350.62	2.46	347.28	5.25	338.68	3.32	86.68	3.40	72.28	2.25	60.58	5.31	5.25	5.25	49.31	5.36	4.18	35.03	5.25	3.73	3.68	29.68	12.50	-	5.38	8.59	5.25	7.42	4.84	3.91	5.79	4.90	2.80
	50067117	399.28	399.77	5.25	375.78	375.78	5.25	350.62	2.46	347.28	5.25	338.68	3.28	86.68	3.40	72.28	2.25	60.58	5.31	5.25	5.25	49.31	5.36	4.18	35.03	5.25	3.73	3.68	29.68	12.50	-	5.38	8.59	5.25	7.42	4.84	3.91	5.79	4.90	2.80

NOTE:
1. ALL DIMENSIONS ARE INCHES.

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ±1 BEND ±3
X.X ± .030
X.XX ± .015
X.XXX ± .005

BREAK ALL EDGES

SURFACE FINISHED 125

	NAME	DATE
DESIGNED BY:	LV	10-May-2022
APPROVED BY:	AC	13-May-2022
REVISED BY:		

PHOENIX TECHNOLOGY SERVICES
285119 Bluegrass Drive, Rocky View, AB T1X0P5

LAST SAVED: 16-May-2022

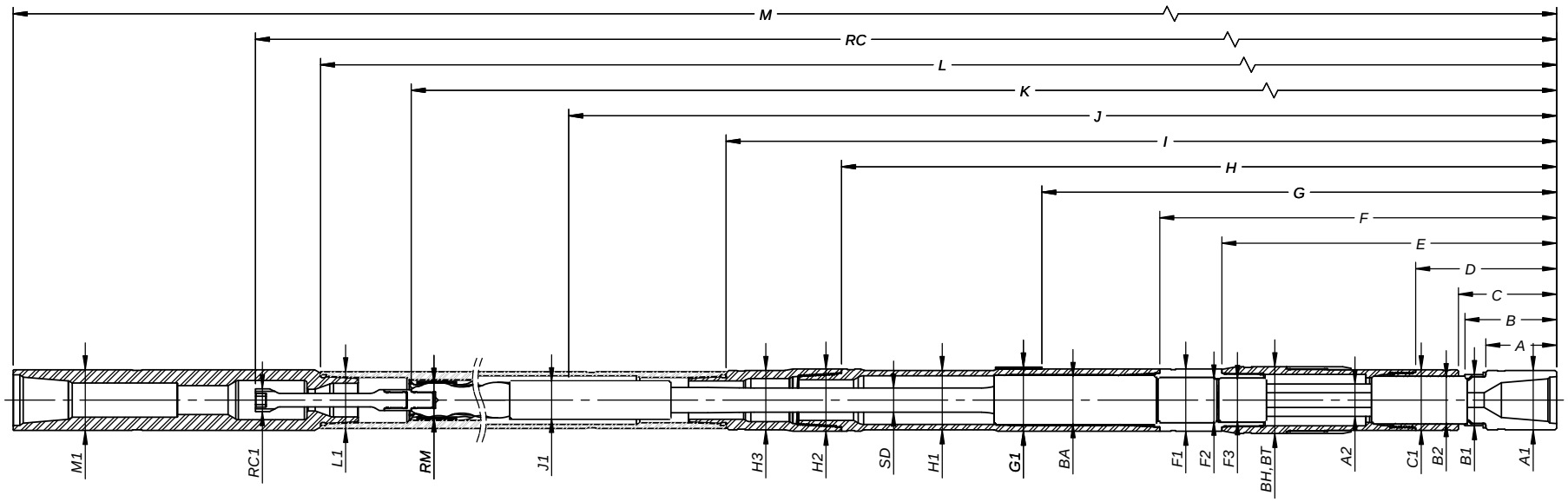
NAME: **525 Motor Assembly Fishing Diagram**

PART NUMBER: **55-13-602904** REV: **A.0**

WEIGHT (Lbs): 1800 SIZE: **B** SHEET: 1 of 1

5.76 Atlas Fishing Diagram

REVISIONS							
ECN	ZONE	REV.	COS.	USER	DESCRIPTION	DATE	APPROVED
12134		A	0	LV	Initial Release	22-Jul-2021	AC



FISHING DIAGRAM DIMENSIONS

	SERIES	BIT BOX TO MOTOR XO - NC40	BIT BOX TO MOTOR XO - NC38	MOTOR XO Ø	BIT BOX TO TOP SUB - NC40	BIT BOX TO TOP SUB	TOP SUB Ø	ROTOR CATCH	ROTOR CATCH HEAD Ø	STATOR END	STATOR Ø	BIT BOX TO ROTOR END	ROTOR MAJOR Ø	BIT BOX TO ROTOR START	ROTOR HEAD Ø	STATOR START	SHAFT Ø	BENT SUB END	BENT SUB BOTTOM Ø	BENT SUB SMALL Ø	SPACER SUB Ø	BIT BOX TO BEND (BTB)	WEAR PAD Ø	BEARING ADAPTER Ø	UPPER BEARING HOUSING END	UPPER BEARING HOUSING Ø	DIVERTER ADAPTER MAJOR Ø	DIVERTER ADAPTER MINOR Ø	BEARING HOUSING END	BEARING HOUSING START	BEARING HOUSING THREADED Ø	BEARING HOUSING END Ø	LOWER NUT	LOWER NUT Ø	LOWER MALE BEARING END	LOWER MALE BEARING MAJOR Ø	LOWER MALE BEARING MINOR Ø	BIT BOX	BIT BOX MAJOR Ø	MANDREL Ø
		N4	N3	N1	M4	M	M1	RC	RC1	L	L1	K	RM	J	J1	I	SD	H	H1	H2	H3	G	G1	BA	F	F1	F2	F3	E	D	BT	BH	C	C1	B	B1	B2	A	A1	A2
576 ATLAS	5137857	-	-	-	-	355.49	5.63	334.02	2.11	326.99	5.25	319.58	3.14	91.58	3.40	76.99	2.50	66.29	5.50	5.76	5.50	47.72	5.95	4.38	36.79	5.76	3.93	3.83	31.03	13.06	6.18	6.25	9.10	5.63	8.50	4.75	4.18	6.56	5.50	3.00
	50067117	-	-	-	-	380.49	5.63	358.02	2.11	351.99	5.25	343.58	3.28	91.58	3.40	76.99	2.50	66.29	5.50	5.76	5.50	47.72	5.95	4.38	36.79	5.76	3.93	3.83	31.03	13.06	6.18	6.25	9.10	5.63	8.50	4.75	4.18	6.56	5.50	3.00
	5006788	-	-	-	-	380.49	5.63	358.02	2.11	351.99	5.25	343.58	3.30	91.58	3.40	76.99	2.50	66.29	5.50	5.76	5.50	47.72	5.95	4.38	36.79	5.76	3.93	3.83	31.03	13.06	6.18	6.25	9.10	5.63	8.50	4.75	4.18	6.56	5.50	3.00
	5007870	-	-	-	-	380.49	5.63	358.02	2.11	351.99	5.25	343.58	3.32	91.58	3.40	76.99	2.50	66.29	5.50	5.76	5.50	47.72	5.95	4.38	36.79	5.76	3.93	3.83	31.03	13.06	6.18	6.25	9.10	5.63	8.50	4.75	4.18	6.56	5.50	3.00
	5257870	-	-	-	-	380.49	5.63	358.02	2.11	351.99	5.25	343.58	3.32	91.58	3.40	76.99	2.50	66.29	5.50	5.76	5.50	47.72	5.95	4.38	36.79	5.76	3.93	3.83	31.03	13.06	6.18	6.25	9.10	5.63	8.50	4.75	4.18	6.56	5.50	3.00
	5507870	-	-	-	-	380.49	5.63	358.02	2.11	351.99	5.25	343.58	3.32	91.58	3.40	76.99	2.50	66.29	5.50	5.76	5.50	47.72	5.95	4.38	36.79	5.76	3.93	3.83	31.03	13.06	6.18	6.25	9.10	5.63	8.50	4.75	4.18	6.56	5.50	3.00

NOTE:
1. ALL DIMENSIONS ARE INCHES

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ±1 BEND ±3
X.X ± .030
X.XX ± .015
X.XXX ± .005

SURFACE FINISHED 125

BREAK ALL EDGES

	NAME	DATE
DESIGNED BY:	LV	21-Jul-2021
APPROVED BY:	AC	13-May-2022
REVISED BY:		

PHOENIX TECHNOLOGY SERVICES
285119 Bluegrass Drive, Rocky View, AB T1X0P5

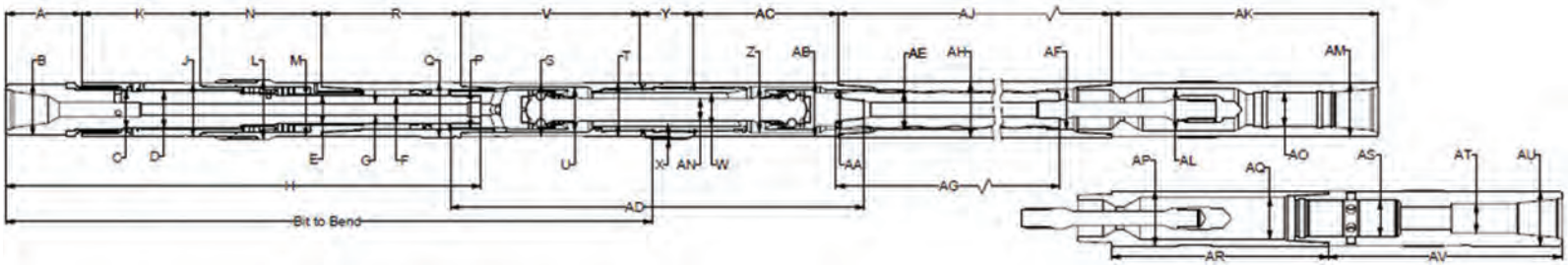
LAST SAVED: 16-May-2022

NAME: **576 Motor Assembly Fishing Diagram**

PART NUMBER: **58-13-1000776** REV: **A.0**

WEIGHT (Lbs): SIZE: **B** SHEET: 1 of 1

650-24XH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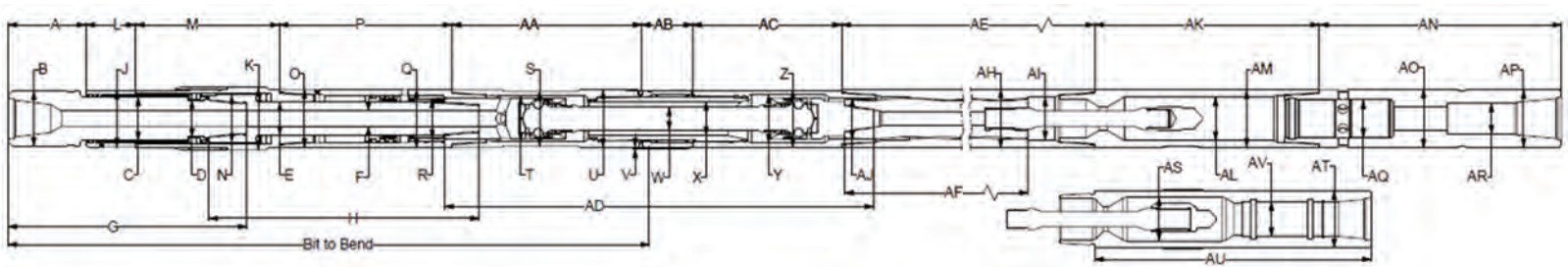
Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	9.15	232.41
Bearing Mandrel Diameter	B	6.25	158.75
Bearing Mandrel Diameter	C	4.63	117.60
Bearing Mandrel Diameter	D	4.50	114.30
Bearing Mandrel Diameter	E	3.50	88.90
Bearing Mandrel Diameter	F	3.50	88.90
Length of Bearing Mandrel	H	57.00	1447.80
OD of Bearing Housing	J	6.38	162.05
Length of Bearing Housing	K	14.25	361.95
Thrust Housing Diameter at Sleeve Connection	L	7.13	181.10
OD of Thrust Housing	M	6.46	164.08
Length of Thrust Housing	N	14.50	368.30
OD of Piston Housing	Q	6.60	167.64
Length of Piston Housing	R	16.75	425.45
OD of Offset Housing	S	6.25	158.75
OD of Offset Housing	T	6.50	165.10
Length End of Piston Housing to Adjusting Ring	V	21.50	546.10
Length of Adjusting Ring	Y	6.26	159.00

Dimension Description	Dimension	in	mm
ID of Lock Housing	Z	5.53	140.46
Bore of Lock Housing	AA	4.79	121.67
OD of Lock Housing	AB	6.50	165.10
Length from Adjusting Ring to Stator	AC	17.31	439.67
Length of Drive Shaft	AD	49.61	1260.09
Length Stator to Top of US Fin-Catch Top Sub	AK	32.00	812.80
Bore of US Fin-Catch Top Sub	AL	5.00	127.00
OD of US Fin-Catch Top Sub	AM	6.50	165.10
OD of Driveshaft	AN	2.65	67.31
Bore of US Fin-Catch Top Sub	AO	4.00	101.60
OD of CAN Top Sub	AP	6.56	166.62
ID of CAN Top Sub	AQ	5.00	127.00
Length Stator to Top of CAN Top Sub	AR	26.00	660.40
Bore of Dump Sub	AS	4.26	108.20
Bore of Dump Sub	AT	3.50	88.90
OD of Dump Sub	AU	6.56	166.62
Length Top Sub to Top of Dump Sub	AV	28.00	711.20
Bit to Adjustable Bend		**76.15**	**1934.21**
Bit to Fixed Bend		**60.15**	**1527.81**

650 PHX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Bit to Bend
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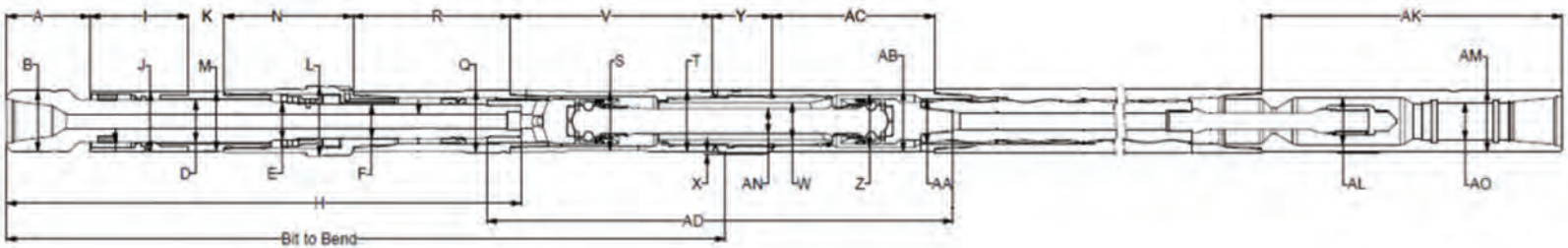
Dimension Description	Dimension	in	mm	Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	7.77	197.36	**OD of Lock Housing**	Z	6.50	165.10
Bearing Mandrel Diameter	B	6.38	162.05	**Length End of Piston Housing to Adjusting Ring**	AA	21.96	557.78
Bearing Mandrel Diameter	C	4.75	120.65	**Length of Adjusting Ring**	AB	5.86	148.84
Bearing Mandrel Diameter	D	4.33	109.98	**Length from Adjusting Ring to Stator**	AC	17.25	438.15
Bearing Mandrel Diameter	E	3.98	101.09	**Length of Drive Shaft**	AD	49.61	1260.09
Washpipe Diameter	F	3.75	95.25	**Bore of Lock Housing**	AJ	4.79	121.67
Length of Bearing Mandrel	H	23.38	593.85	**Length Stator to Top of CAN Top Sub**	AK	26.00	660.40
Length of Washpipe	I	34.31	871.47	**ID of CAN Top Sub**	AL	5.00	127.00
OD of End Cap	J	6.64	168.66	**OD of CAN Top Sub**	AM	6.56	166.62
OD of Bearing Housing	K	7.25	184.15	**Length Top Sub to Top of Dump Sub**	AN	28.00	711.20
Length of End Cap Bottom to Bearing Housing Bottom	L	4.63	117.60	**OD of Cladding on Dump Sub**	AO	6.73	170.94
Length of Bearing Housing	M	17.75	450.85	**OD of Dump Sub**	AP	6.56	166.62
Washpipe Diameter	N	5.60	142.24	**Bore of Dump Sub**	AQ	4.26	108.20
OD of Piston Housing	O	6.56	166.62	**Bore of Dump Sub**	AR	3.50	88.90
Length of Piston Housing	P	20.00	508.00	**Bore of US Top Sub**	AS	5.00	127.00
OD of Piston Housing	Q	6.75	171.45	**OD of US Top Sub**	AT	6.50	165.10
OD of Offset Housing	S	6.25	158.75	**Length of US Top Sub**	AU	32.00	812.80
OD of Offset Housing	U	6.56	166.62	**Bore of US Top Sub**	AV	4.00	101.60
OD of Drive Shaft	W	2.65	67.31	**Bit to Adjustable Bend**		**72.99**	**1853.95**
				Bit to Fixed Bend		**55.65**	**1413.51**

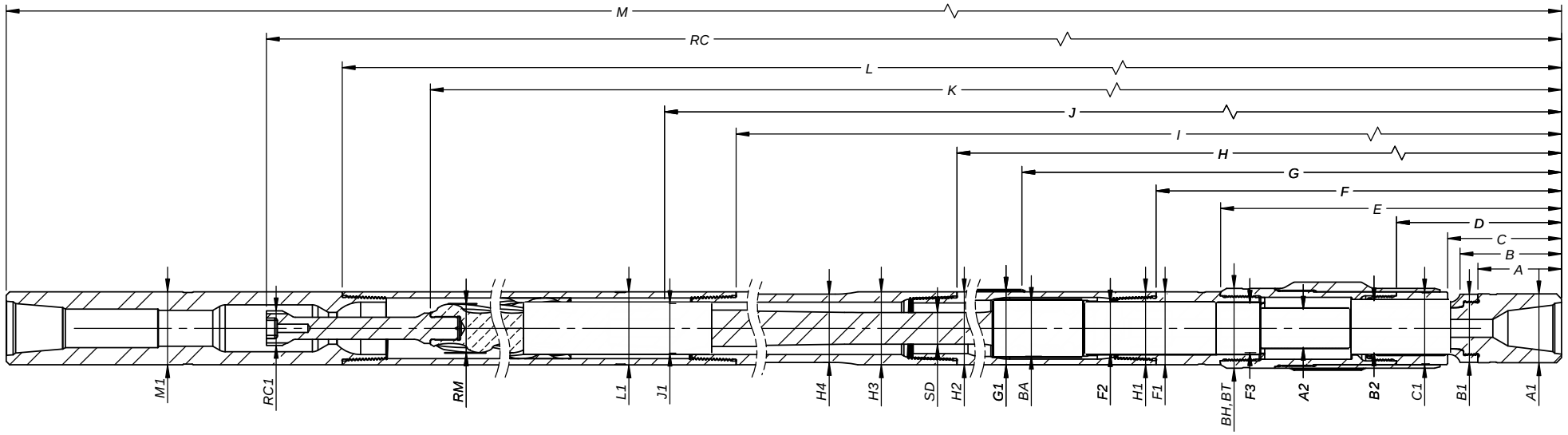
650 36B



Dimension Description	Dimension	in	mm	Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	8.90	226.06	**Length End of Piston Housing to Adjusting Ring**	V	22.00	558.80
Bearing Mandrel Diameter	B	6.50	165.10	**ID of Splined Mandrel**	W	3.91	99.31
Bearing Mandrel Diameter	D	4.50	114.30	**Offset of Pad**	X	0.25	6.35
Bearing Mandrel Diameter	E	4.00	101.60	**Length of Adjusting Ring**	Y	6.13	155.70
Bearing Mandrel Diameter	F	3.63	92.20	**ID of Lock Housing**	Z	5.48	139.19
Length of Bearing Mandrel	H	54.80	1391.92	**Bore of Lock Housing**	AA	4.54	115.32
Length of Bottom Piston Housing	I	10.16	258.06	**OD of Lock Housing**	AB	6.50	165.10
OD of Bottom Piston Housing	J	6.63	168.40	**Length from Adjusting Ring to Stator**	AC	17.25	438.15
Length of Bearing Housing	K	4.36	110.74	**Length of Drive Shaft**	AD	46.48	1180.59
Thrust Housing Diameter at Sleeve Connection	L	7.38	187.45	**Length Stator to Top of US Fin-Catch Top Sub**	AK	32.00	812.80
OD of Bearing Housing	M	6.63	168.40	**Bore of US Fin-Catch Top Sub**	AL	5.00	127.00
Length of Thust Housing	N	13.74	349.00	**OD of US Fin-Catch Top Sub**	AM	6.50	165.10
OD of Piston Housing	Q	6.63	168.40	**OD of Driveshaft**	AN	2.65	67.31
Length of Piston Housing	R	15.30	388.62	**Bore of US Fin-Catch Top Sub**	AO	4.00	101.60
OD of Offset Housing	S	6.25	158.75	**Bit to Adjustable Bend**		**74.46**	**1891.28**
OD of Offset Housing	T	6.50	165.10	**Bit to Fixed Bend**		**57.96**	**1472.18**

6.63 Atlas Fishing Diagram

REVISIONS							
ECN	ZONE	REV.	COS.	USER	DESCRIPTION	DATE	APPROVED
12026		A	0	CX	Creation of Drawing	08-May-2021	AC
		A	1	LV	Updated table	28-Jun-2021	AC
	A5	A	2	LV	Updated table	10-Jan-2022	AC



FISHING DIAGRAM DIMENSIONS

	SERIES	BIT BOX TO MOTOR XO	BIT BOX TO TOP SUB	TOP SUB Ø	ROTOR CATCH	ROTOR CATCH HEAD Ø	STATOR END	STATOR Ø	BIT BOX TO ROTOR END	ROTOR MAJOR Ø	BIT BOX TO ROTOR START	ROTOR HEAD Ø	STATOR START	SHAFT Ø	BENT SUB END	BENT SUB BOTTOM Ø	BENT SUB SMALL Ø	SPACER SUB MAJOR Ø	SPACER SUB MINOR Ø	BIT BOX TO BEND (BTB)	WEAR PAD Ø	BEARING ADAPTER Ø	UPPER BEARING HOUSING END	UPPER BEARING HOUSING Ø	DIVERTER ADAPTER MAJOR Ø	DIVERTER ADAPTER MINOR Ø	BEARING HOUSING END	BEARING HOUSING START	BEARING HOUSING THREADED Ø	BEARING HOUSING END Ø SLICK OR IBS	LOWER NUT	LOWER NUT Ø	LOWER MALE BEARING END	LOWER MALE BEARING MAJOR Ø	LOWER MALE BEARING MINOR Ø	BIT BOX	BIT BOX MAJOR Ø	MANDREL Ø
	SERIES	N	M	M1	RC	RC1	L	L1	K	RM	J	J1	I	SD	H	H1	H2	H3	H4	G	G1	BA	F	F1	F2	F3	E	D	BT	BH	C	C1	B	B1	B2	A	A1	A2
663 ATLAS	663 7/8 6.9	-	406.91	6.63	383.29	3.14	376.41	6.63	367.91	4.669	107.71	4.50	101.41	2.88	68.81	6.63	6.63	6.63	6.20	50.00	6.78	5.06	36.81	6.63	4.58	4.47	30.95	14.99	7.25	6.63	10.34	6.59	9.22	6.18	4.73	7.59	6.25	3.44
	663 5/6 8.4	-	406.91	6.63	383.29	3.14	376.41	6.63	367.91	4.573	107.71	4.50	101.41	2.88	68.81	6.63	6.63	6.63	6.2	50	6.78	5.06	36.81	6.63	4.58	4.47	30.95	14.99	7.25	6.63	10.34	6.59	9.22	6.18	4.73	7.59	6.25	3.44
	663 5/6 9.4	-	406.91	6.63	383.29	3.14	376.41	6.63	367.91	4.522	107.71	4.50	101.41	2.88	68.81	6.63	6.63	6.63	6.20	50.00	6.78	5.06	36.81	6.63	4.58	4.47	30.95	14.99	7.25	6.63	10.34	6.59	9.22	6.18	4.73	7.59	6.25	3.44

A.2

NOTE:
1. ALL DIMENSIONS ARE INCHES.

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ±1 BEND ±3
X.X ± .030
X.XX ± .015
X.XXX ± .005

SURFACE FINISHED 125

BREAK ALL EDGES

	NAME	DATE
DESIGNED BY:	CX	08-May-2021
APPROVED BY:	AC	05-Aug-2021
REVISED BY:	LV	10-Jan-2022

PHOENIX TECHNOLOGY SERVICES
285119 Bluegrass Drive, Rocky View, AB T1X0P5

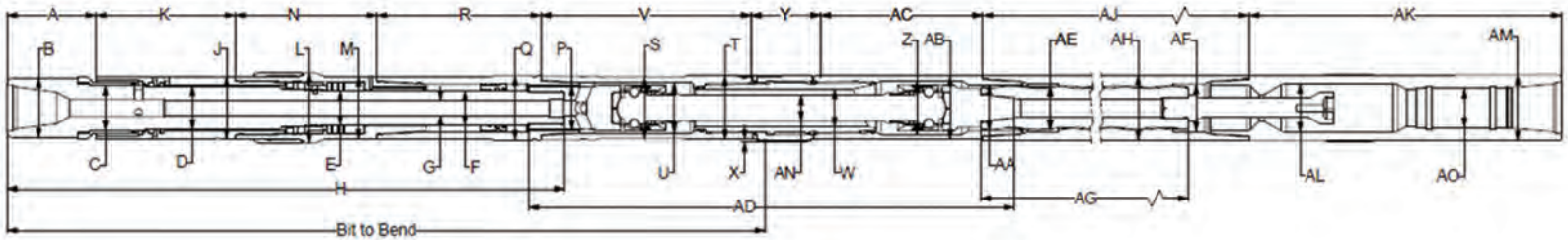
LAST SAVED: 10-Jan-2022

NAME: **663 Mud Lube Motor Fishing Diagram**

PART NUMBER: **60-13-1000753** REV: **A.2**

WEIGHT (Lbs): 3174.100 SIZE: **B** SHEET: 1 of 1

675-24XH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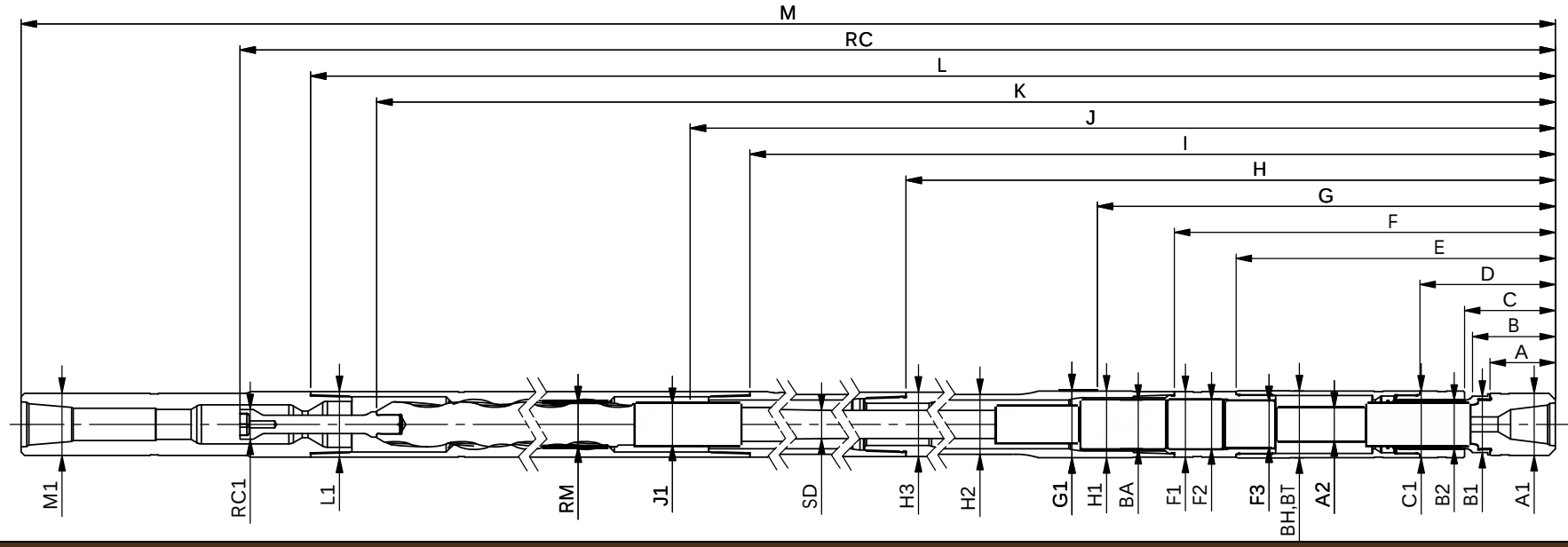
AD
AG
Bit to Bend

Dimension Description	Dimension	in	mm	Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	11.70	297.18	**Length End of Piston Housing to Adjusting Ring**	V	21.38	543.05
Bearing Mandrel Diameter	B	6.75	171.45	**ID of Splined Mandrel**	W	4.20	106.68
Bearing Mandrel Diameter	C	5.00	127.00	**Offset of Pad**	X	0.19	4.83
Bearing Mandrel Diameter	D	4.75	120.65	**Length of Adjusting Ring**	Y	6.13	155.70
Bearing Mandrel Diameter	E	3.75	95.25	**ID of Lock Housing**	Z	5.91	150.11
Bearing Mandrel Diameter	F	3.75	95.25	**Bore of Lock Housing**	AA	4.83	122.68
Length of Bearing Mandrel	H	59.25	1504.95	**OD of Lock Housing**	AB	7.13	181.10
OD of Bearing Housing	J	6.87	174.50	**Length from Adjusting Ring to Stator**	AC	17.50	444.50
Length of Bearing Housing	K	10.35	262.89	**Length of Drive Shaft**	AD	51.22	1300.99
Length of Thrust Housing	N	19.85	504.19	**Length Stator to Top of US Fin-Catch Top Sub**	AK	32.00	812.80
OD of Piston Housing	Q	6.88	174.75	**Bore of US Fin-Catch Top Sub**	AL	5.00	127.00
Length of Piston Housing	R	15.50	393.70	**OD of US Fin-Catch Top Sub**	AM	6.75	171.45
OD of Offset Housing	S	6.90	175.26	**OD of Driveshaft**	AN	3.00	76.20
OD of Offset Housing	T	7.13	181.10	**Bore of US Fin-Catch Top Sub**	AO	4.00	101.60
				Bit to Adjustable Bend		**77.53**	**1969.26**

7.12 Atlas Fishing Diagram

REVISIONS							
ECN	ZONE	REV.	COS.	USER	DESCRIPTION	DATE	APPROVED
		A	1	LV	Updated Table	21-Jul-2021	AC
12134	A4	A	2	LV	Delete 2nd Sheet	10-May-2022	AC



FISHING DIAGRAM DIMENSIONS

	SERIES	BIT BOX TO MOTOR XO	MOTOR XO Ø	BIT BOX TO TOP SUB	TOP SUB Ø	ROTOR CATCH	ROTOR CATCH HEAD Ø	STATOR END	STATOR Ø	BIT BOX TO ROTOR END	ROTOR MAJOR Ø	BIT BOX TO ROTOR START	ROTOR HEAD Ø	STATOR START	SHAFT Ø	BENT SUB END	BENT SUB BOTTOM Ø	BENT SUB SMALL Ø	BENT SUB TOP Ø	BIT BOX TO BEND (BTB)	WEAR PAD Ø	BEARING ADAPTER Ø	UPPER BEARING HOUSING END	UPPER BEARING HOUSING Ø	DIVERTER ADAPTER MAJOR Ø	DIVERTER ADAPTER MINOR Ø	BEARING HOUSING END	BEARING HOUSING START	BEARING HOUSING THREADED Ø	BEARING HOUSING END Ø	LOWER NUT	LOWER NUT Ø	LOWER MALE BEARING END	LOWER MALE BEARING MAJOR Ø	LOWER MALE BEARING MINOR Ø	BIT BOX	BIT BOX MAJOR Ø	MANDREL Ø
		N	N1	M	M1	RC	RC1	L	L1	K	RM	J	J1	I	SD	H	H1	H2	H3	G	G1	BA	F	F1	F2	F3	E	D	BT	BH	C	C1	B	B1	B2	A	A1	A2
712 ATLAS	7257875	-	-	417.30	6.75	393.86	3.22	385.80	7.13	378.98	5.024	117.48	4.50	110.80	3.06	78.73	7.13	6.50	7.00	49.65	7.40	5.25	41.45	7.13	5.30	4.90	34.74	14.74	8.00	7.30	9.89	7.25	9.02	6.13	5.25	7.10	6.75	3.54
	7257885	-	-	417.30	6.75	393.86	3.22	385.80	7.13	378.98	4.885	117.48	4.50	110.80	3.06	78.73	7.13	6.50	7.00	49.65	7.40	5.25	41.45	7.13	5.30	4.90	34.74	14.74	8.00	7.30	9.89	7.25	9.02	6.13	5.25	7.10	6.75	3.54
	7258960	-	-	417.30	6.75	393.86	3.22	385.80	7.13	378.98	4.898	117.48	4.50	110.80	3.06	78.73	7.13	6.50	7.00	49.65	7.40	5.25	41.45	7.13	5.30	4.90	34.74	14.74	8.00	7.30	9.89	7.25	9.02	6.13	5.25	7.10	6.75	3.54
	7254584	-	-	417.30	6.75	393.86	3.22	385.80	7.13	378.98	4.669	117.48	4.50	110.80	3.06	78.73	7.13	6.50	7.00	49.65	7.40	5.25	41.45	7.13	5.30	4.90	34.74	14.74	8.00	7.30	9.89	7.25	9.02	6.13	5.25	7.10	6.75	3.54

NOTE:
1. ALL DIMENSIONS ARE INCHES.

A.2

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ±1 BEND ±3
X.X ± .030
X.XX ± .015
X.XXX ± .005

SURFACE FINISHED 125

BREAK ALL EDGES

	NAME	DATE
DESIGNED BY:	LV	05-May-2021
APPROVED BY:	AC	13-May-2022
REVISED BY:	LV	12-May-2022

PHOENIX TECHNOLOGY SERVICES
285119 Bluegrass Drive, Rocky View, AB T1X0P5

LAST SAVED: 16-May-2022

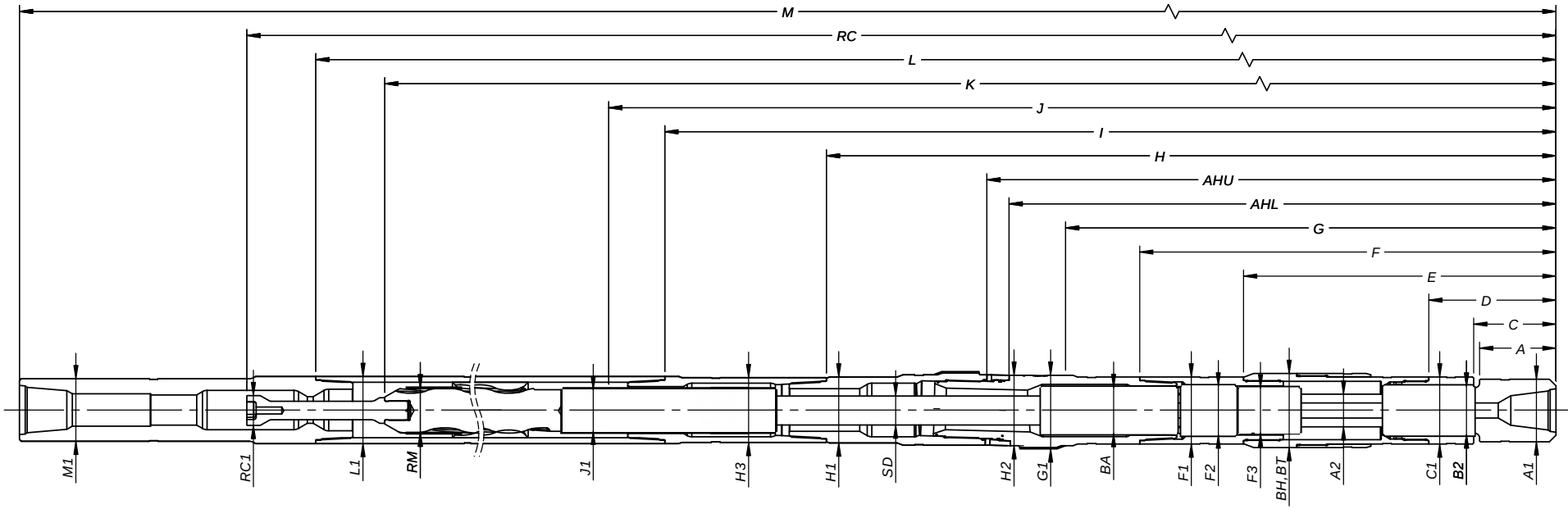
NAME: **712 Motor Assembly Fishing Diagram**

PART NUMBER: **54-13-1000754** REV: **A.2**

WEIGHT (Lbs): 0.000 SIZE: **B** SHEET: 1 of 1

7.25 Atlas Fishing Diagram

REVISIONS							
ECN	ZONE	REV.	COS.	USER	DESCRIPTION	DATE	APPROVED
12134		A	0	LV	Initial Release	10-Mayl-2022	AC



FISHING DIAGRAM DIMENSIONS

	SERIES	BIT BOX TO TOP SUB	TOP SUB Ø	ROTOR CATCH	ROTOR CATCH HEAD Ø	STATOR END	STATOR Ø	BIT BOX TO ROTOR END	ROTOR MAJOR Ø	BIT BOX TO ROTOR START	ROTOR HEAD Ø	STATOR START	SHAFT Ø	BENT SUB END	BENT SUB BOTTOM Ø	BENT SUB SMALL Ø	SPACER SUB Ø	ADJUSTABLE HOUSING UPPER	ADJUSTABLE HOUSING LOWER	BIT BOX TO BEND (BTB)	WEAR PAD Ø	BEARING ADAPTER Ø	UPPER BEARING HOUSING END	UPPER BEARING HOUSING Ø	DIVERTER ADAPTER MAJOR Ø	DIVERTER ADAPTER MINOR Ø	BEARING HOUSING END	BEARING HOUSING START	BEARING HOUSING THREADED Ø	BEARING HOUSING END Ø	LOWER NUT	LOWER NUT Ø	LOWER MALE BEARING END	LOWER MALE BEARING MAJOR Ø	LOWER MALE BEARING MINOR Ø	BIT BOX	BIT BOX MAJOR Ø	MANDREL Ø
	SERIES	M	M1	RC	RC1	L	L1	K	RM	J	J1	I	SD	H	H1	H2	H3	AHU	AHL	G	G1	BA	F	F1	F2	F3	E	D	BT	BH	C	C1	B	B1	B2	A	A1	A2
725 ATLAS	7257875	403.22	6.75	378.66	3.22	371.22	7.25	363.78	4.890	102.28	4.50	96.22	3.13	78.78	7.13	7.60	7.00	61.45	59.05	52.94	7.94	4.98	44.95	7.25	5.30	4.90	33.74	13.74	8.00	7.30	8.89	7.25	-	-	5.26	8.25	6.75	3.54
	7257885	403.22	6.75	378.66	3.22	371.22	7.25	363.78	4.890	102.28	4.50	96.22	3.13	78.78	7.13	7.60	7.00	61.45	59.05	52.94	7.94	4.98	44.95	7.25	5.30	4.90	33.74	13.74	8.00	7.30	8.89	7.25	-	-	5.26	8.25	6.75	3.54
	7258960	403.22	6.75	378.66	3.22	371.22	7.25	363.78	4.890	102.28	4.50	96.22	3.13	78.78	7.13	7.60	7.00	61.45	59.05	52.94	7.94	4.98	44.95	7.25	5.30	4.90	33.74	13.74	8.00	7.30	8.89	7.25	-	-	5.26	8.25	6.75	3.54
	7254584	403.22	6.75	378.66	3.22	371.22	7.25	363.78	4.890	102.28	4.50	96.22	3.13	78.78	7.13	7.60	7.00	61.45	59.05	52.94	7.94	4.98	44.95	7.25	5.30	4.90	33.74	13.74	8.00	7.30	8.89	7.25	-	-	5.26	8.25	6.75	3.54

NOTE:
1. ALL DIMENSIONS ARE INCHES

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ±1 BEND ±3
X.X ± .030
X.XX ± .015
X.XXX ± .005

SURFACE FINISHED 125

BREAK ALL EDGES

	NAME	DATE
DESIGNED BY:	LV	10-May-2022
APPROVED BY:	AC	13-May-2022
REVISED BY:		

PHOENIX TECHNOLOGY SERVICES
285119 Bluegrass Drive, Rocky View, AB T1X0P5

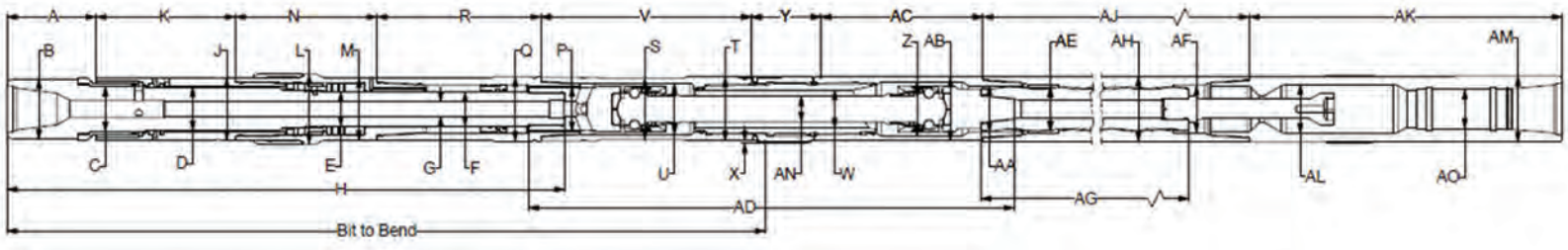
LAST SAVED: 13-May-2022

NAME: **725 Motor Assembly Fishing Diagram**

PART NUMBER: **54-13-1000777** REV: **A.0**

WEIGHT (Lbs): 1190.346 SIZE: **B** SHEET: 1 of 1

775-24X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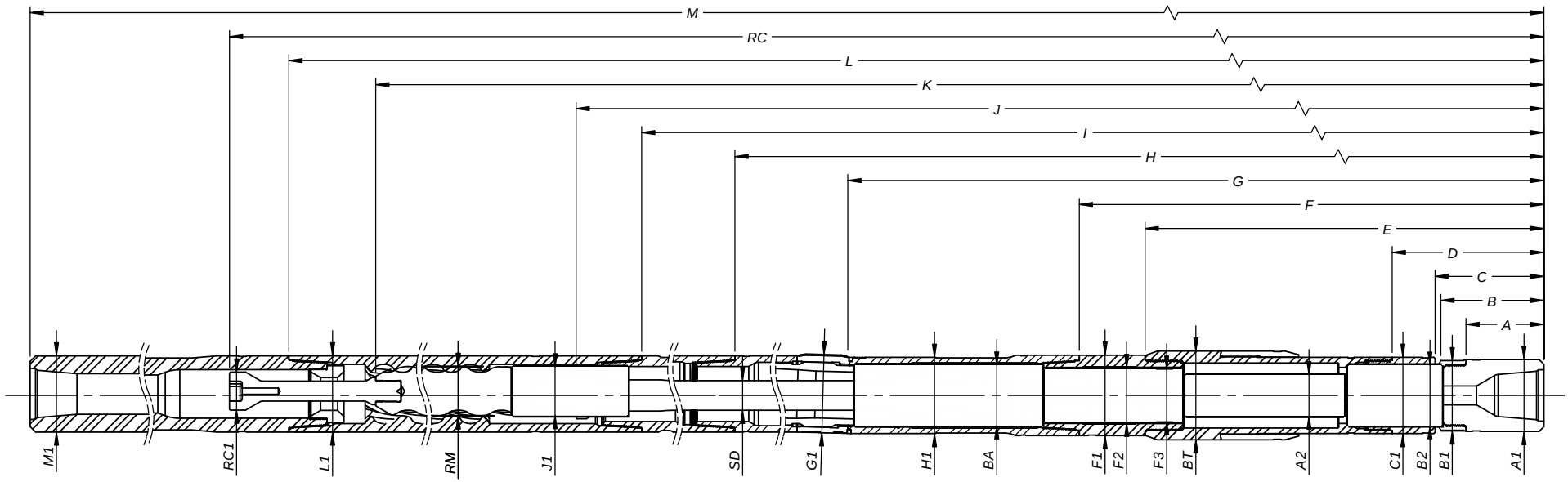
Bit to Bend

Dimension Description	Dimension	in	mm	Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	10.00	254.00	**OD of Driveshaft**	S	5.56	141.22
Bearing Mandrel Diameter	B	7.63	193.80	**OD of Offset Housing**	T	7.75	196.85
Bearing Mandrel Diameter	C	5.66	143.76	**Length End of Piston Housing to Adjusting Ring**	V	21.67	550.42
Bearing Mandrel Diameter	D	5.63	143.00	**Length of Adjusting Ring**	Y	6.38	162.05
Bearing Mandrel Diameter	E	5.50	139.70	**Bore of Lock Housing**	AA	5.78	146.81
Bearing Mandrel Diameter	F	4.25	107.95	**OD of Lock Housing**	AB	7.75	196.85
Length of Bearing Mandrel	H	58.38	1482.85	**Length from Adjusting Ring to Stator**	AC	18.38	466.85
OD of Bearing Housing	J	8.10	205.74	**Length of Drive Shaft**	AD	51.72	1313.69
Length of Bearing Housing	K	11.80	299.72	**Length Stator to Top of US Top Sub**	AK	31.50	800.10
Thrust Housing Diameter at Sleeve Connection	L	9.25	234.95	**Bore of US Top Sub**	AL	5.20	132.08
OD of Thrust Housing	M	8.50	215.90	**OD of US Top Sub**	AM	7.75	196.85
Length of Thrust Housing	N	20.88	530.35	**OD of Driveshaft**	AN	2.88	73.15
OD of Piston Housing	Q	7.75	196.85	**Bore of US Top Sub**	AO	4.60	116.84
Length of Piston Housing	R	12.50	317.50	**Bit to Adjustable Bend**		**76.85**	**1951.99**

9.00 Atlas Fishing Diagram

REVISIONS							
ECN	ZONE	REV.	COS.	USER	DESCRIPTION	DATE	APPROVED
12134		A	0	LV	Initial Release	24-Jun-2021	AC



FISHING DIAGRAM DIMENSIONS

	SERIES	BIT BOX TO TOP SUB	TOP SUB Ø	ROTOR CATCH	ROTOR CATCH HEAD Ø	STATOR END	STATOR Ø	BIT BOX TO ROTOR END	ROTOR MAJOR Ø	BIT BOX TO ROTOR START	ROTOR HEAD Ø	STATOR START	SHAFT Ø	BENT SUB END	BENT SUB BOTTOM Ø	BENT SUB SMALL Ø	SPACER SUB Ø	BIT BOX TO BEND (BTB)	WEAR PAD Ø	BEARING ADAPTER Ø	UPPER BEARING HOUSING END	UPPER BEARING HOUSING Ø	DIVERTER ADAPTER MAJOR Ø	DIVERTER ADAPTER MINOR Ø	BEARING HOUSING END	BEARING HOUSING START	BEARING HOUSING THREADED Ø	BEARING HOUSING END Ø	LOWER NUT	LOWER NUT Ø	LOWER MALE BEARING END	LOWER MALE BEARING MAJOR Ø	LOWER MALE BEARING MINOR Ø	BIT BOX	BIT BOX MAJOR Ø	MANDREL Ø
		M	M1	RC	RC1	L	L1	K	RM	J	J1	I	SD	H	H1	H2	H3	G	G1	BA	F	F1	F2	F3	E	D	BT	BH	C	C1	B	B1	B2	A	A1	A2
900 ATLAS	9007870	471.23	9.00	414.75	4.50	405.73	9.00	397.47	5.83	138.47	5.83	130.73	3.50	106.73	9.50	9.00	9.00	82.25	9.25	7.15	54.88	9.50	6.61	6.21	47.12	17.92	10.50		12.86	9.00	12.18	8.30	7.13	9.21	8.50	4.87
	9008940	471.23	9.00	414.75	4.50	405.73	9.00	397.47	5.81	138.47	5.83	130.73	3.50	106.73	9.50	9.00	9.00	82.25	9.25	7.15	54.88	9.50	6.61	6.21	47.12	17.92	10.50		12.86	9.00	12.18	8.30	7.13	9.21	8.50	4.87
	9007884	496.23	9.00	439.75	4.50	430.73	9.00	422.47	6.33	138.47	5.83	130.73	3.50	106.73	9.50	9.00	9.00	82.25	9.25	7.15	54.88	9.50	6.61	6.21	47.12	17.92	10.50		12.86	9.00	12.18	8.30	7.13	9.21	8.50	4.87
	9006766	496.23	9.00	439.75	4.50	430.73	9.00	422.47	6.25	138.47	5.83	130.73	3.50	106.73	9.50	9.00	9.00	82.25	9.25	7.15	54.88	9.50	6.61	6.21	47.12	17.92	10.50		12.86	9.00	12.18	8.30	7.13	9.21	8.50	4.87
	9008257870	496.23	8.25	439.75	4.50	430.73	8.25	422.47	5.64	138.47	5.83	130.73	3.50	106.73	9.50	9.00	9.00	82.25	9.25	7.15	54.88	9.50	6.61	6.21	47.12	17.92	10.50		12.86	9.00	12.18	8.30	7.13	9.21	8.50	4.87

NOTE:
1. ALL DIMENSIONS ARE INCHES.

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES

TOLERANCES:
FRACTIONAL ± 1/32
ANGULAR: MACH ±1 BEND ±3
X.X ± .030
X.XX ± .015
X.XXX ± .005

BREAK ALL EDGES

SURFACE FINISHED 125

	NAME	DATE
DESIGNED BY:	LV	28-Jun-2021
APPROVED BY:	AC	13-May-2022
REVISED BY:		

PHOENIX TECHNOLOGY SERVICES
285119 Bluegrass Drive, Rocky View, AB T1X0P5

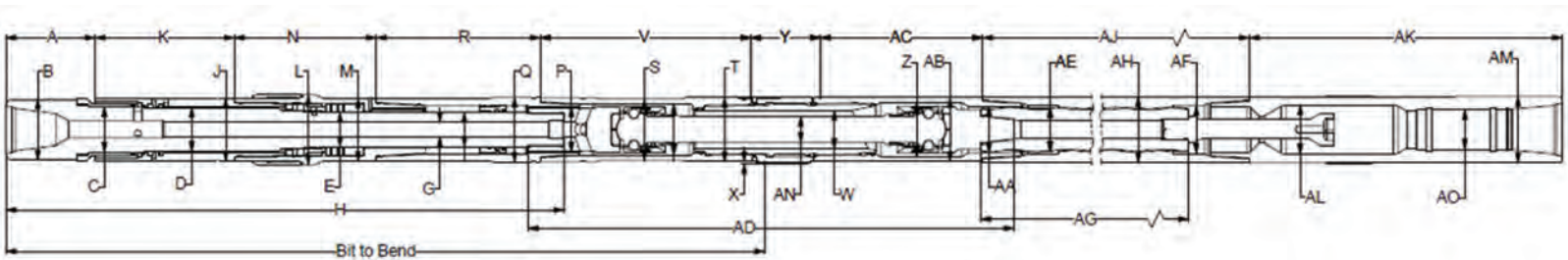
LAST SAVED: 13-May-2022

NAME: **900 Motor Assembly Fishing Diagram**

PART NUMBER: **57-13-602915** REV: **A.0**

WEIGHT (Lbs): 3757.798 SIZE: **B** SHEET: 1 of 1

962-24X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Bit to Bend

Dimension Description	Dimension	in	mm
Approx. Length Bottom Connection to Bearing Housing	A	16.31	414.27
Bearing Mandrel Diameter	B	9.63	244.60
Bearing Mandrel Diameter	C	6.75	171.45
Bearing Mandrel Diameter	D	6.50	165.10
Bearing Mandrel Diameter	E	5.00	127.00
Bearing Mandrel ID	G	2.25	57.15
Length of Bearing Mandrel	H	73.77	1873.76
OD of Bearing Housing	J	9.75	247.65
Length End of Bearing Housing to Thrust Housing	K	13.41	340.61
Thrust Housing Diameter at Sleeve Connection	L	10.75	-
OD of Thrust Housing	M	9.75	-
Length of Thrust Housing	N	23.32	592.33
OD of Piston Housing	Q	9.75	247.65

Dimension Description	Dimension	in	mm
Length of Piston Housing	R	17.50	444.50
OD of Driveshaft	S	9.12	231.65
OD of Offset Housing	T	9.63	244.60
Length End of Piston Housing to Adjusting Ring	V	25.30	642.62
ID of Splined Mandrel	W	5.00	127.00
Length of Adjusting Ring	Y	6.62	168.15
ID of Lock Housing	Z	7.88	200.15
Bore of Lock Housing	AA	6.75	171.45
OD of Lock Housing	AB	9.63	244.60
Length from Adjusting Ring to Stator	AC	23.58	598.93
Length of Drive Shaft	AD	62.75	1593.85
Length Stator to Top of US Top Sub	AK	18.50	469.90
OD of US Top Sub	AM	9.63	244.60
Bit to Adjustable Bend		**96.00**	**2438.40**

Atlas Configurations

5.13"	5.25"	5.76"	6.63"
Top Sub			
NC38 (3 1/2 IF) DS38	NC38 NC40 XT39	NC40 (4 FH) NC44	NC50 (4 1/2 IF) NC46 (4 1/2 XH)
Power Section (rpg)			
500 6/7 11.7 (0.90) *150-350 gpm* 500 6/7 6.4 ERT (0.80) *150-350 gpm* 500 6/7 8.8 (0.68) *150-400 gpm* 500 7/8 5.7 (0.522) *200-400 gpm* 500 7/8 7.0 (0.48) *150-400 gpm*	500 525 6/7 11.7 (0.90) *150-350 gpm* 500 6/7 6.4 ERT (0.80) *150-350 gpm* 525 6/7 10.5 (0.73) *225-425 gpm* 500 525 6/7 8.8 (0.68) *150-400 gpm* 500 7/8 5.7 (0.522) *200-400 gpm* 500 525 7/8 7.0 (0.48) *150-400 gpm*	500 525 550 6/7 11.7 (0.90) *150-350 gpm* 500 6/7 6.4 ERT (0.80) *150-350 gpm* 525 67 10.5 (0.73) *225-425 gpm* 575 6/7 11.8 (0.70 rpg) *250-500 gpm* 500 525 550 6/7 8.8 (0.68) *150-400 gpm* 500 7/8 5.7 (0.522) *200-400 gpm* 500 525 550 7/8 7.0 (0.48) *150-400 gpm*	663 5/6 9.4 (0.40) *300-700 gpm* 663 5/6 8.4 (0.35) *350-700 gpm* 663 6/7 7.8 (0.29) *350-700 gpm* 663 7/8 6.9 (0.25) *300-700 gpm*
Fixed Bend Options			
1.5 1.75 1.83 2 2.12 2.25 2.38 Straight fixed housing for RSS	1.25 1.5 1.75 1.83 2 2.12 2.25 Straight fixed housing for RSS	1.5 1.75 1.83 2 Straight fixed housing for RSS	1.5 1.75 1.83 2 2.12 2.25 2.38 Straight fixed housing for RSS
Adjustable Bend Options			
3	N/A	N/A	N/A
Stabilization			
True Slick Slick Sleeve Screw-On Stabilizer	True Slick Integral Blade Stabilizer	True Slick Slick Sleeve Screw-On Stabilizer Integral Blade Stabilizer	True Slick Slick Sleeve Screw-On Stabilizer Integral Blade Stabilizer Near bit kick pad
Bottom Connection			
3 1/2 REG DS38 Pin Down NC38 Box XT39 Pin Down NC35 Box As Required	3 1/2 REG DS38 Pin Down NC38 Box XT39 Pin Down NC35 Box As Required	3 1/2 REG NC40 Box XT39 Pin Down NC44 Pin Down Ptech As Required	4 1/2 REG NC50 Pin Down As Required

** Configurations based on availabilty*

** 5.76" Atlas is only for 6 3/4 hole size*

** When running 7.25" Atlas consult Phoenix guidelines for 8 1/2 hole size*

Atlas Configurations

7.12"	7.25"	8.00"	9.00"
Top Sub			
NC50 (4 1/2 IF) NC46 (4 1/2 XH)	NC50 (4 1/2 IF) NC46 (4 1/2 XH)	6 5/8 REG	6 5/8 REG
Power Section (rpg)			
712 4/5 8.4 (0.40) *450-750 gpm* 712 7/8 8.5 (0.27) *450-750 gpm* 712 7/8 7.5 (0.26) *500-750 gpm* 712 8/9 6.0 (0.20) *450-750 gpm* 663 5/6 9.4 (0.40) *300-700 gpm* 663 5/6 8.4 (0.35) *350-700 gpm* 663 6/7 7.8 (0.29) *350-700 gpm* 663 7/8 6.9 (0.25) *300-700 gpm*	725 4/5 8.4 (0.40) *450-750 gpm* 725 7/8 8.5 (0.27) *450-750 gpm* 725 7/8 7.5 (0.26) *500-750 gpm* 725 8/9 6.0 (0.20) *450-750 gpm* 675 7/8 5.0 (.29) *300-600 gpm* 675 7/8 5.7 (.24) *300-600 gpm* 675 4/5 7.0 (.49) *300-600 gpm*	800 7/8 5.9 (0.166) *400-900 gpm* 800 7/8 4.7 (0.11 rpg) *300 – 900 gpm*	900 7/8 7.0 (0.18) *400-1100 gpm* 900 7/8 8.4 (0.17) *550-1150 gpm* 825 7/8 7.0 (0.166) *400-1000 gpm* 900 6/7 6.6 (0.135) *600-1300 gpm* 900 8/9 4.0 (0.09) *600-1100 gpm*
Fixed Bend Options			
1.5 1.75 1.83 2 **2.12 **2.25	1.5 1.75 1.83 2 **2.12 **2.25 Straight fixed housing for RSS	Straight fixed housing for RSS	Straight fixed housing for RSS
Adjustable Bend Options			
	N/A	3	3
Stabilization			
True Slick Integral Blade Stabilizer	True Slick Slick Sleeve Integral Blade Stabilizer	Slick Sleeve Screw-On Stabilizer Integral Blade Stabilizer	Slick Sleeve Screw-On Stabilizer Integral Blade Stabilizer
Bottom Connection			
4 1/2 REG NC50 Pin Down As Required	4 1/2 REG NC50 Pin Down As Required	6 5/8 REG Box 6 5/8" REG Pin Down As Required	6 5/8 REG Box 6 5/8" REG Pin Down 7 5/8" REG As Required

** Configurations based on availabilty*

** 5.76" Atlas is only for 6 3/4 hole size*

** When running 7.25" Atlas consult Phoenix guidelines for 8 1/2 hole size*

*** 8.75 curve only*

5.00/5.13/5.14"

PHOENIX TECHNOLOGY SERVICES

5.00" Motor 4:5 Lobe 6.3 Stage

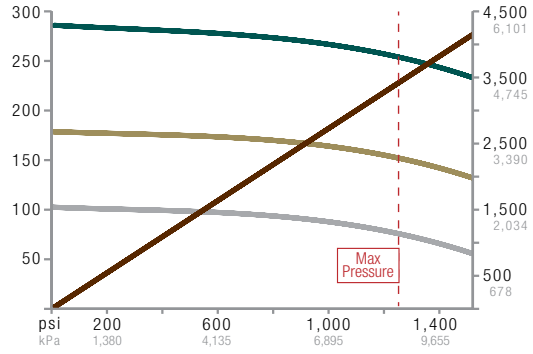
Hard Rubber

Performance Details

Max Diff Pressure	1,238	psi	8,532	kPa
Max Torque	3,373	lb-ft	4,573	N-m
Stall Torque	5,397	lb-ft	7,317	N-m
Flow Range	100–275	gpm	380–1,041	L/min
RPM	1.030	rev/gal	0.270	rev/L
Speed Range	103–284 rpm			

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.5	1.9	0.7	1.9	2.1	2.4
0.78°	5.1	4.5	3.2	4.5	4.4	4.6
1.15°	7.5	6.9	5.6	7.3	7.1	6.8
1.50°	9.8	9.1	7.9	9.9	9.8	9.5
1.83°	11.9	11.3	10.0	12.4	12.2	11.9
2.12°	13.8	13.2	11.9	14.6	14.4	14.1
2.38°	15.5	14.9	13.6	16.5	16.3	16.0
2.60°	16.9	16.3	15.0	18.1	18.0	17.7
2.77°	18.0	17.4	16.1	19.4	19.3	19.0
2.89°	18.8	18.2	16.9	20.3	20.2	19.9
2.97°	19.3	18.7	17.4	20.9	20.8	20.5
3.00°	19.5	18.9	17.6	21.1	21.0	20.7



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PHOENIX TECHNOLOGY SERVICES

5.00" Motor 4:5 Lobe 6.3 Stage

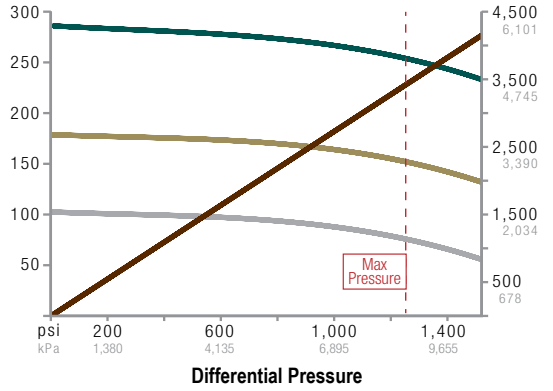
Hard Rubber

Performance Details

Max Diff Pressure	1,238	psi	8,532	kPa
Max Torque	3,373	lb-ft	4,573	N-m
Stall Torque	5,397	lb-ft	7,317	N-m
Flow Range	100–275	gpm	380–1,041	L/min
RPM	1.030	rev/gal	0.270	rev/L
Speed Range		103–284 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.5	1.9	0.7	1.9	2.1	2.4
0.78°	5.1	4.5	3.2	4.5	4.4	4.6
1.15°	7.5	6.9	5.6	7.3	7.1	6.8
1.50°	9.8	9.1	7.9	9.9	9.8	9.5
1.83°	11.9	11.3	10.0	12.4	12.2	11.9
2.12°	13.8	13.2	11.9	14.6	14.4	14.1
2.38°	15.5	14.9	13.6	16.5	16.3	16.0
2.60°	16.9	16.3	15.0	18.1	18.0	17.7
2.77°	18.0	17.4	16.1	19.4	19.3	19.0
2.89°	18.8	18.2	16.9	20.3	20.2	19.9
2.97°	19.3	18.7	17.4	20.9	20.8	20.5
3.00°	19.5	18.9	17.6	21.1	21.0	20.7



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PHOENIX TECHNOLOGY SERVICES

5.00" Motor 5:6 Lobe 6.7 Stage

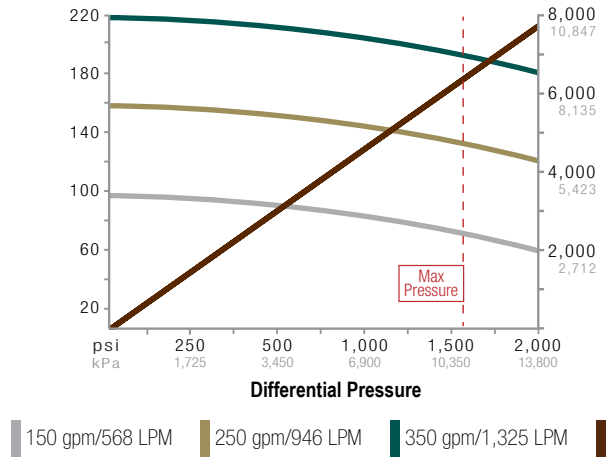
Hard Rubber

Performance Details

Max Diff Pressure	1,580	psi	10,900	kPa
Max Torque	6,330	lb-ft	8,600	N-m
Stall Torque	9,970	lb-ft	13,600	N-m
Flow Range	150–350	gpm	568–1,325	L/min
RPM	0.630	rev/gal	0.166	rev/L
Speed Range		90–220 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.3	1.7	0.6	1.7	1.8	2.1
0.78°	4.6	4.0	2.9	4.0	3.9	4.1
1.15°	6.7	6.2	5.1	6.5	6.4	6.1
1.50°	8.8	8.2	7.1	8.8	8.7	8.5
1.83°	10.7	10.2	9.0	11.0	10.9	10.7
2.12°	12.4	11.8	10.7	12.9	12.8	12.6
2.38°	13.9	13.4	12.2	14.7	14.6	14.3
2.60°	15.2	14.7	13.5	16.1	16.0	15.8
2.77°	16.2	15.6	14.5	17.3	17.1	16.9
2.89°	16.9	16.3	15.2	18.1	17.9	17.7
2.97°	17.4	16.8	15.7	18.6	18.5	18.2
3.00°	17.6	17.0	15.9	18.8	18.7	18.4



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PHOENIX TECHNOLOGY SERVICES

5.00" Atlas 6:7 Lobe 6.4 Stage

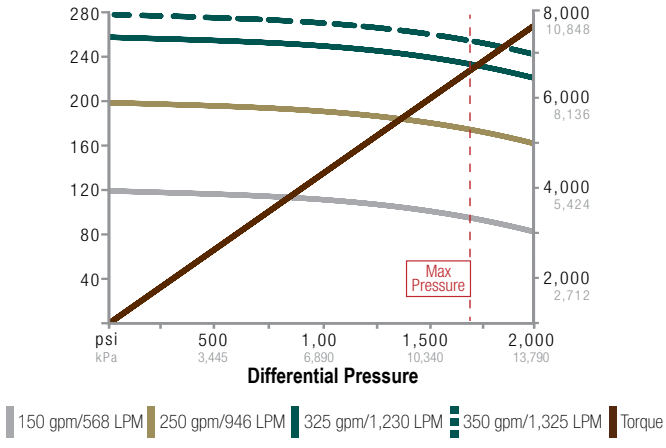
Evenwall

Performance Details

Max Pressure	Diff	1,708 psi	11,776 kPa
Max Torque		6,714 lb-ft	9,103 N-m
Stall Torque		12,508 lb-ft	16,958 N-m
Flow Range		150–325 (350*) gpm	568–1,230 (1,325*) L/min
RPM		0.800 rev/gal	0.210 rev/L

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	1.9	1.3	1.3	2.1	2.2	2.5
0.78°	4.6	3.9	2.6	4.6	4.5	4.8
1.15°	7.1	6.4	4.9	7.1	6.7	7.0
1.50°	9.5	8.7	7.3	9.5	8.8	9.0
1.83°	11.8	11.0	9.5	11.8	11.0	10.9
2.12°	13.8	12.9	11.4	13.7	12.9	12.7
2.38°	15.5	14.7	13.2	15.5	14.7	14.2
2.60°	17.0	16.2	14.6	17.0	16.2	15.5
2.77°	18.2	17.4	15.8	18.2	17.4	16.5
2.89°	19.0	18.2	16.6	19.0	18.2	17.2
2.97°	19.5	18.7	17.1	19.5	18.7	17.6
3.00°	19.7	18.9	17.3	19.7	18.9	17.8



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PHOENIX TECHNOLOGY SERVICES

5.00" Motor 6:7 Lobe 8.0 Stage

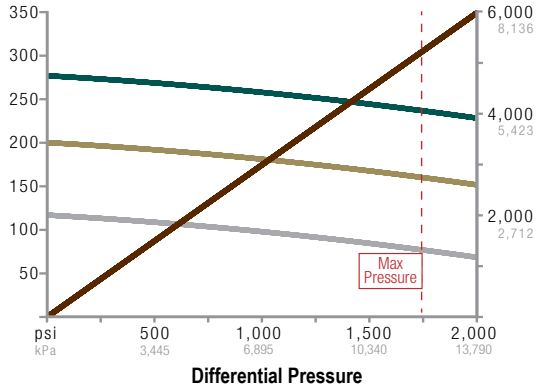
Hard Rubber

Performance Details

Max Diff Pressure	1,748	psi	12,048	kPa
Max Torque	5,840	lb-ft	7,917	N-m
Stall Torque	9,344	lb-ft	12,668	N-m
Flow Range	150–350	gpm	568–1,325	L/min
RPM	0.800	rev/gal	0.210	rev/L
Speed Range		120–282 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.3	1.7	0.6	1.7	1.8	2.1
0.78°	4.6	4.0	2.9	4.0	3.9	4.1
1.15°	6.7	6.2	5.1	6.5	6.4	6.1
1.50°	8.8	8.2	7.1	8.8	8.7	8.5
1.83°	10.7	10.2	9.0	11.0	10.9	10.7
2.12°	12.4	11.8	10.7	12.9	12.8	12.6
2.38°	13.9	13.4	12.2	14.7	14.6	14.3
2.60°	15.2	14.7	13.5	16.1	16.0	15.8
2.77°	16.2	15.6	14.5	17.3	17.1	16.9
2.89°	16.9	16.3	15.2	18.1	17.9	17.7
2.97°	17.4	16.8	15.7	18.6	18.5	18.2
3.00°	17.6	17.0	15.9	18.8	18.7	18.4



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PHOENIX TECHNOLOGY SERVICES

5.00" Atlas 6:7 Lobe 8.8 Stage

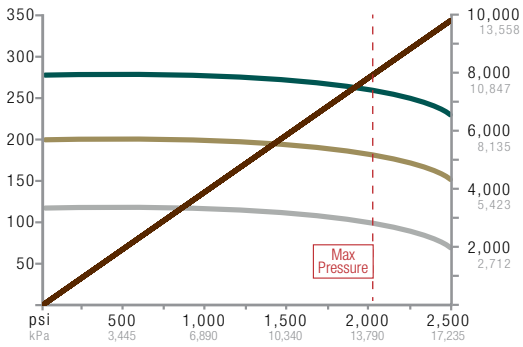
Hard Rubber

Performance Details

Max Diff Pressure	2,032	psi	14,010	kPa
Max Torque	8,014	lb-ft	10,684	N-m
Stall Torque	12,021	lb-ft	16,026	N-m
Flow Range	150–400	gpm	568–1,514	L/min
RPM	0.68	rev/gal	0.180	rev/L
Speed Range		102–272 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.2	1.3	0.6	1.6	1.7	2.0
0.78°	4.0	3.4	2.4	3.9	3.8	4.0
1.15°	6.2	5.8	4.7	6.4	6.3	6.0
1.50°	8.4	7.9	6.8	8.7	8.6	8.4
1.83°	10.4	9.9	8.7	11.0	10.8	10.6
2.12°	12.2	11.5	10.4	12.8	12.7	12.5
2.38°	13.6	13.1	11.9	14.6	14.5	14.2
2.60°	15.0	14.5	13.2	16.0	15.9	15.7
2.77°	16.0	15.4	14.2	17.2	17.0	16.7
2.89°	16.7	16.1	14.9	18.0	17.8	17.5
2.97°	17.2	16.6	15.4	18.5	18.4	18.0
3.00°	17.3	16.8	15.6	18.7	18.6	18.2



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PHOENIX TECHNOLOGY SERVICES

5.00" Motor 7:8 Lobe 2.6 Stage

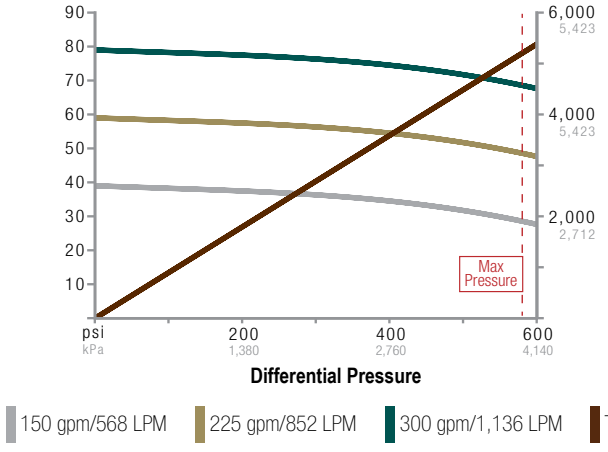
Hard Rubber

Performance Details

Max Diff Pressure	590	psi	4,030	kPa
Max Torque	5,250	lb-ft	7,120	N-m
Stall Torque	7,880	lb-ft	10,680	N-m
Flow Range	150–300	gpm	570–1,140	L/min
RPM	0.263	rev/gal	0.070	rev/L
Speed Range		39–79 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.4	1.8	0.6	1.8	1.9	2.2
0.78°	4.7	4.2	3.0	4.2	4.1	4.2
1.15°	7.0	6.4	5.3	6.8	6.6	6.4
1.50°	9.1	8.5	7.4	9.2	9.1	8.8
1.83°	11.1	10.6	9.4	11.5	11.4	11.1
2.12°	12.9	12.3	11.2	13.5	13.4	13.1
2.38°	14.5	13.9	12.7	15.3	15.2	14.9
2.60°	15.8	15.2	14.1	16.8	16.7	16.4
2.77°	16.8	16.3	15.1	18.0	17.9	17.6
2.89°	17.6	17.0	15.8	18.9	18.7	18.5
2.97°	18.1	17.5	16.3	19.4	19.3	19.0
3.00°	18.2	17.7	16.5	19.6	19.5	19.2



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PHOENIX TECHNOLOGY SERVICES

5.00" Motor 7:8 Lobe 3.7 Stage

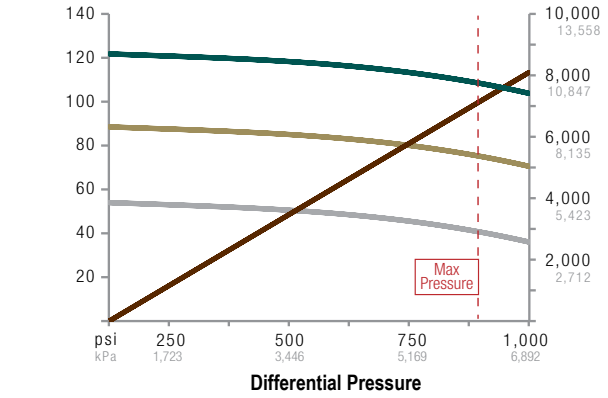
Hard Rubber

Performance Details

Max Diff Pressure	925	psi	6,378	kPa
Max Torque	6,894	lb-ft	9,347	N-m
Stall Torque	13,788	lb-ft	18,694	N-m
Flow Range	150–350	gpm	570–1,325	L/min
RPM	0.350	rev/gal	0.093	rev/L
Speed Range		53–123 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.4	1.8	0.6	1.8	1.9	2.2
0.78°	4.7	4.2	3.0	4.2	4.1	4.2
1.15°	7.0	6.4	5.3	6.8	6.6	6.4
1.50°	9.1	8.5	7.4	9.2	9.1	8.8
1.83°	11.1	10.6	9.4	11.5	11.4	11.1
2.12°	12.9	12.3	11.2	13.5	13.4	13.1
2.38°	14.5	13.9	12.7	15.3	15.2	14.9
2.60°	15.8	15.2	14.1	16.8	16.7	16.4
2.77°	16.8	16.3	15.1	18.0	17.9	17.6
2.89°	17.6	17.0	15.8	18.9	18.7	18.5
2.97°	18.1	17.5	16.3	19.4	19.3	19.0
3.00°	18.2	17.7	16.5	19.6	19.5	19.2



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PHOENIX TECHNOLOGY SERVICES

5.00" Motor 7:8 Lobe 3.8 Stage

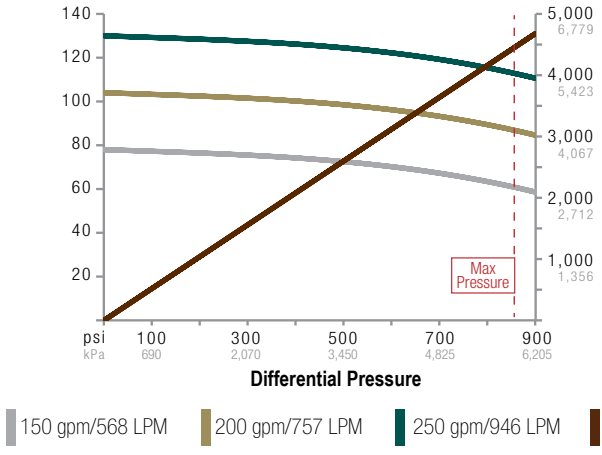
Hard Rubber

Performance Details

Max Diff Pressure	860	psi	5,900	kPa
Max Torque	4,450	lb-ft	6,030	N-m
Stall Torque	6,670	lb-ft	9,050	N-m
Flow Range	150–250	gpm	568–946	L/min
RPM	0.521	rev/gal	0.138	rev/L
Speed Range		78–140 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.7	2.0	0.7	2.1	2.2	2.6
0.78°	5.4	4.7	3.4	4.8	4.7	4.9
1.15°	8.0	7.3	6.0	7.8	7.6	7.3
1.50°	10.4	9.7	8.4	10.6	10.4	10.1
1.83°	12.7	12.0	10.7	13.3	13.1	12.7
2.12°	14.7	14.0	12.7	15.6	15.4	15.1
2.38°	16.5	15.8	14.5	17.7	17.5	17.2
2.60°	18.0	17.3	16.0	19.5	19.3	18.9
2.77°	19.2	18.5	17.2	20.8	20.7	20.3
2.89°	20.0	19.3	18.0	21.8	21.6	21.3
2.97°	20.6	19.9	18.6	22.4	22.3	21.9
3.00°	20.8	20.1	18.8	22.7	22.5	22.1



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PHOENIX TECHNOLOGY SERVICES

5.00" Atlas 7:8 Lobe 5.7 Stage

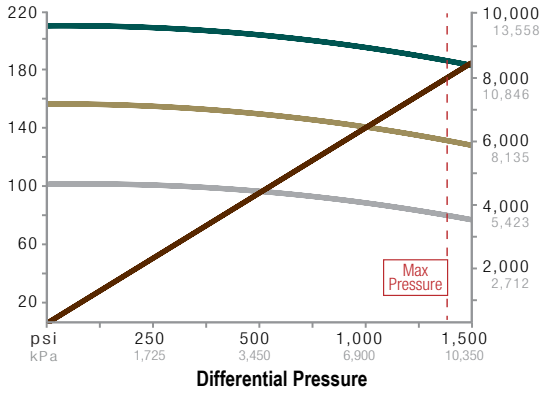
Hard Rubber

Performance Details

Max Diff Pressure	1,405	psi	9,687	kPa
Max Torque	7,749	lb-ft	10,506	N-m
Stall Torque	10,300	lb-ft	13,965	N-m
Flow Range	200–400	gpm	750–1,500	L/min
RPM	0.522	rev/gal	0.138	rev/L
Speed Range		105–210 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.3	1.7	0.6	1.7	1.8	2.1
0.78°	4.6	4.0	2.9	4.0	3.9	4.1
1.15°	6.7	6.2	5.1	6.5	6.4	6.1
1.50°	8.8	8.2	7.1	8.8	8.7	8.5
1.83°	10.7	10.2	9.0	11.0	10.9	10.7
2.12°	12.4	11.8	10.7	12.9	12.8	12.6
2.38°	13.9	13.4	12.2	14.7	14.6	14.3
2.60°	15.2	14.7	13.5	16.1	16.0	15.8
2.77°	16.2	15.6	14.5	17.3	17.1	16.9
2.89°	16.9	16.3	15.2	18.1	17.9	17.7
2.97°	17.4	16.8	15.7	18.6	18.5	18.2
3.00°	17.6	17.0	15.9	18.8	18.7	18.4



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PHOENIX TECHNOLOGY SERVICES

5.00" Motor 9:10 Lobe 2.1 Stage

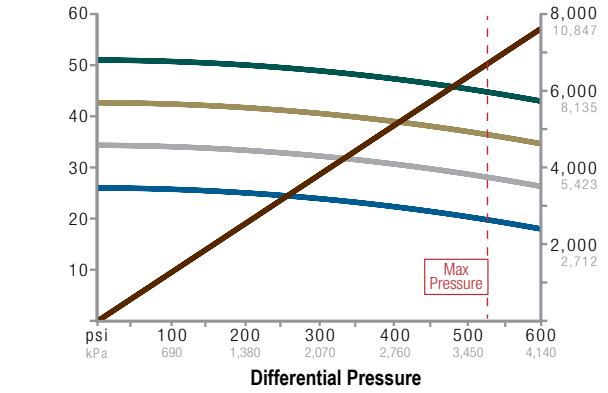
Hard Rubber

Performance Details

Max Diff Pressure	525	psi	3,620	kPa
Max Torque	7,610	lb-ft	10,318	N-m
Stall Torque	15,220	lb-ft	20,635	N-m
Flow Range	150–300	gpm	568–1,136	L/min
RPM	0.170	rev/gal	0.046	rev/L
Speed Range		26–51 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm	**6"** 152mm	**6.25"** 159mm	**6.75"** 171mm
0.39°	2.3	1.8	0.6	1.8	1.9	2.2
0.78°	4.7	4.1	3.0	4.2	4.0	4.2
1.15°	6.9	6.3	5.2	6.7	6.6	6.3
1.50°	9.0	8.4	7.3	9.1	8.9	8.7
1.83°	11.0	10.4	9.3	11.3	11.2	10.9
2.12°	12.7	12.1	11.0	13.3	13.2	12.9
2.38°	14.3	13.7	12.6	15.1	15.0	14.7
2.60°	15.6	15.0	13.9	16.6	16.5	16.2
2.77°	16.6	16.0	14.9	17.7	17.6	17.4
2.89°	17.3	16.8	15.6	18.6	18.4	18.2
2.97°	17.8	17.2	16.1	19.1	19.0	18.7
3.00°	18.0	17.4	16.3	19.3	19.2	18.9



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5.25"

PHOENIX TECHNOLOGY SERVICES

5.25" Atlas 4:5 Lobe 10.3 Stage

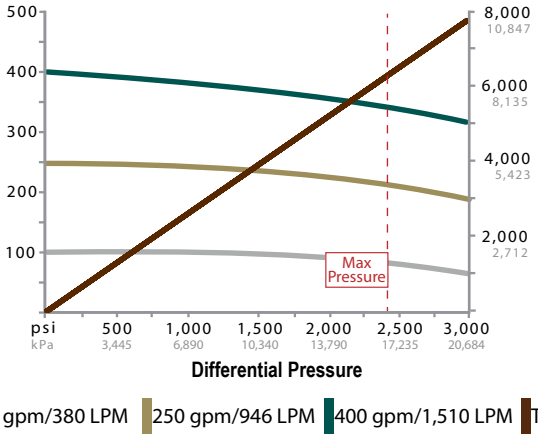
Hard Rubber

Performance Details

Max Diff Pressure	2,430	psi	16,700	kPa
Max Torque	6,320	lb-ft	8,600	N-m
Stall Torque	9,960	lb-ft	13,500	N-m
Flow Range	100-400	gpm	380–1,510	L/min
RPM	1.00	rev/gal	0.264	rev/L
Speed Range		100–400 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER (IBS)		
	Hole Size			Hole Size		
Bend Setting	**6.125"** 156mm	**6.25"** 159mm	**6.75"** 171mm	**6.125"** 159mm	**6.25"** 159mm	**6.75"** 171mm
1.50°	11.7	11.3	9.4	-	-	10.4
1.75°	13.6	13.1	11.3	-	-	12.4
1.83°	14.2	13.7	11.9	-	-	13.0
2.00°	15.5	15.0	13.2	-	-	14.4
2.12°	16.4	15.9	14.0	-	-	15.4
2.25°	17.3	16.9	15.0	-	-	16.5



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PHOENIX TECHNOLOGY SERVICES

5.25" Atlas 6:7 Lobe 8.8 Stage

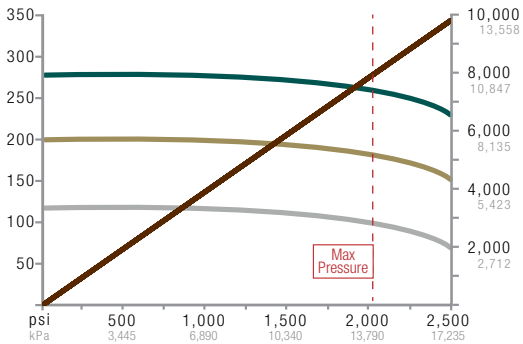
Hard Rubber

Performance Details

Max Diff Pressure	2,032	psi	14,010	kPa
Max Torque	8,014	lb-ft	10,684	N-m
Stall Torque	12,021	lb-ft	16,026	N-m
Flow Range	150–400	gpm	568–1,514	L/min
RPM	0.68	rev/gal	0.180	rev/L
Speed Range		102–272 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER (IBS)		
	Hole Size			Hole Size		
Bend Setting	**6.125"** 156mm	**6.25"** 159mm	**6.75"** 171mm	**6.125"** 159mm	**6.25"** 159mm	**6.75"** 171mm
1.50°	11.7	11.3	9.4	-	-	10.4
1.75°	13.6	13.1	11.3	-	-	12.4
1.83°	14.2	13.7	11.9	-	-	13.0
2.00°	15.5	15.0	13.2	-	-	14.4
2.12°	16.4	15.9	14.0	-	-	15.4
2.25°	17.3	16.9	15.0	-	-	16.5



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PHOENIX TECHNOLOGY SERVICES

5.25" Atlas 6:7 Lobe 10.5 Stage

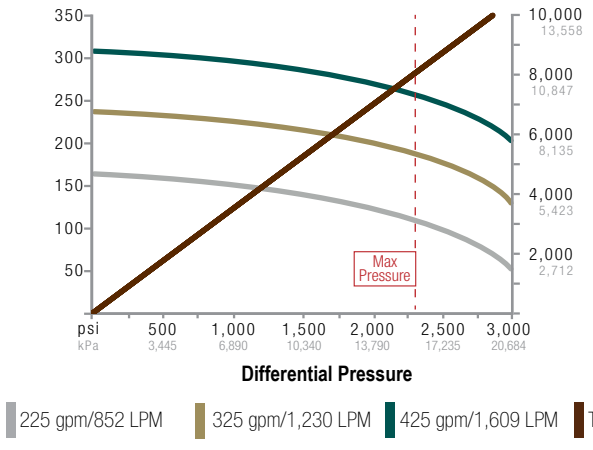
Hard Rubber

Performance Details

Max Diff Pressure	2,300	psi	15,858	kPa
Max Torque	8,090	lb-ft	10,969	N-m
Stall Torque	12,135	lb-ft	16,453	N-m
Flow Range	225-425	gpm	852–1,609	L/min
RPM	0.73	rev/gal	0.193	rev/L
Speed Range		164–310 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER (IBS)		
	Hole Size			Hole Size		
Bend Setting	**6.125"** 156mm	**6.25"** 159mm	**6.75"** 171mm	**6.125"** 159mm	**6.25"** 159mm	**6.75"** 171mm
1.50°	11.7	11.3	9.4	-	-	10.4
1.75°	13.6	13.1	11.3	-	-	12.4
1.83°	14.2	13.7	11.9	-	-	13.0
2.00°	15.5	15.0	13.2	-	-	14.4
2.12°	16.4	15.9	14.0	-	-	15.4
2.25°	17.3	16.9	15.0	-	-	16.5



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PHOENIX TECHNOLOGY SERVICES

5.25" Atlas 6:7 Lobe 11.7 Stage

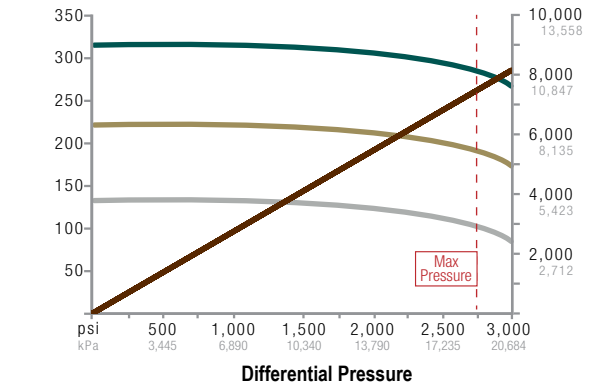
Hard Rubber

Performance Details

Max Diff Pressure	2,704	psi	18,781	kPa
Max Torque	7,328	lb-ft	9,935	N-m
Stall Torque	10,992	lb-ft	14,903	N-m
Flow Range	150–350	gpm	568–1,325	L/min
RPM	0.90	rev/gal	0.238	rev/L
Speed Range		135–315 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER (IBS)		
	Hole Size			Hole Size		
Bend Setting	**6.125"** 156mm	**6.25"** 159mm	**6.75"** 171mm	**6.125"** 159mm	**6.25"** 159mm	**6.75"** 171mm
1.50°	11.7	11.3	9.4	-	-	10.4
1.75°	13.6	13.1	11.3	-	-	12.4
1.83°	14.2	13.7	11.9	-	-	13.0
2.00°	15.5	15.0	13.2	-	-	14.4
2.12°	16.4	15.9	14.0	-	-	15.4
2.25°	17.3	16.9	15.0	-	-	16.5



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PHOENIX TECHNOLOGY SERVICES

5.25" Atlas 7:8 Lobe 5.7 Stage

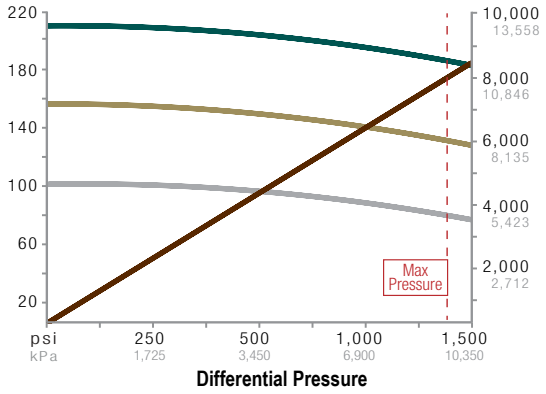
Hard Rubber

Performance Details

Max Diff Pressure	1,405	psi	9,687	kPa
Max Torque	7,749	lb-ft	10,506	N-m
Stall Torque	10,300	lb-ft	13,965	N-m
Flow Range	200–400	gpm	750–1,500	L/min
RPM	0.522	rev/gal	0.138	rev/L
Speed Range		105–210 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER (IBS)		
	Hole Size			Hole Size		
Bend Setting	**6.125"** 156mm	**6.25"** 159mm	**6.75"** 171mm	**6.125"** 159mm	**6.25"** 159mm	**6.75"** 171mm
1.50°	11.7	11.3	9.4	-	-	10.4
1.75°	13.6	13.1	11.3	-	-	12.4
1.83°	14.2	13.7	11.9	-	-	13.0
2.00°	15.5	15.0	13.2	-	-	14.4
2.12°	16.4	15.9	14.0	-	-	15.4
2.25°	17.3	16.9	15.0	-	-	16.5



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PHOENIX TECHNOLOGY SERVICES

5.25" Atlas 7:8 Lobe 7.0 Stage

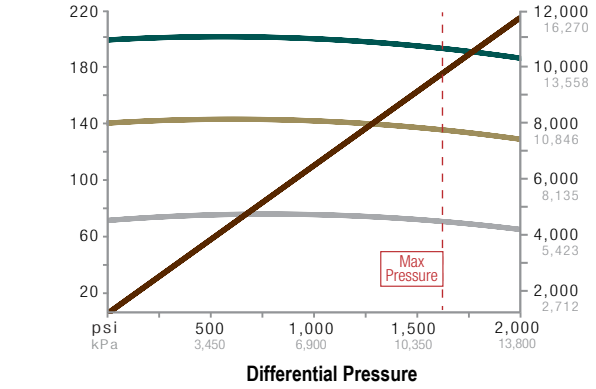
Hard Rubber

Performance Details

Max Diff Pressure	1,619	psi	11,163	kPa
Max Torque	9,783	lb-ft	13,264	N-m
Stall Torque	14,674	lb-ft	19,895	N-m
Flow Range	150–400	gpm	568–1,514	L/min
RPM	0.48	rev/gal	0.127	rev/L
Speed Range		72–192 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER (IBS)		
	Hole Size			Hole Size		
Bend Setting	**6.125"** 156mm	**6.25"** 159mm	**6.75"** 171mm	**6.125"** 159mm	**6.25"** 159mm	**6.75"** 171mm
1.50°	11.7	11.3	9.4	-	-	10.4
1.75°	13.6	13.1	11.3	-	-	12.4
1.83°	14.2	13.7	11.9	-	-	13.0
2.00°	15.5	15.0	13.2	-	-	14.4
2.12°	16.4	15.9	14.0	-	-	15.4
2.25°	17.3	16.9	15.0	-	-	16.5



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PHOENIX TECHNOLOGY SERVICES

5.25" Atlas 7:8 Lobe 8.3 Stage

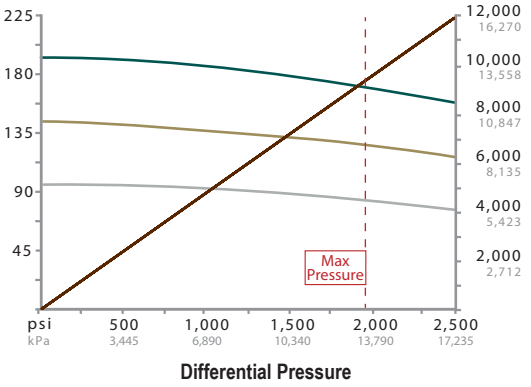
Hard Rubber

Performance Details

Max Diff Pressure	1,960	psi	13,500	kPa
Max Torque	9,370	lb-ft	12,700	N-m
Stall Torque	14,750	lb-ft	20,000	N-m
Flow Range	200–400	gpm	760–1,510	L/min
RPM	0.48	rev/gal	0.127	rev/L
Speed Range		96–192 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER (IBS)		
	Hole Size			Hole Size		
Bend Setting	**6.125"** 156mm	**6.25"** 159mm	**6.75"** 171mm	**6.125"** 159mm	**6.25"** 159mm	**6.75"** 171mm
1.50°	11.7	11.3	9.4	-	-	10.4
1.75°	13.6	13.1	11.3	-	-	12.4
1.83°	14.2	13.7	11.9	-	-	13.0
2.00°	15.5	15.0	13.2	-	-	14.4
2.12°	16.4	15.9	14.0	-	-	15.4
2.25°	17.3	16.9	15.0	-	-	16.5



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5.76"

PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 6:7 Lobe 8.8 Stage

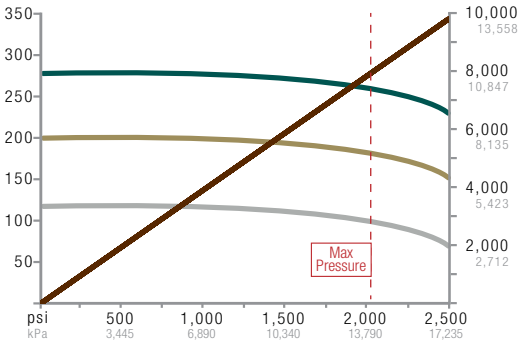
Hard Rubber

Performance Details

Max Diff Pressure	2,032	psi	14,010	kPa
Max Torque	8,014	lb-ft	10,684	N-m
Stall Torque	12,021	lb-ft	16,026	N-m
Flow Range	150–400	gpm	568–1,514	L/min
RPM	0.680	rev/gal	0.180	rev/L
Speed Range		102–272 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 6:7 Lobe 10.5 Stage

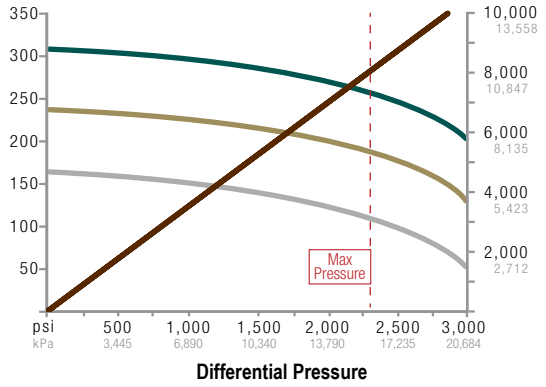
Hard Rubber

Performance Details

Max Diff Pressure	2,300	psi	15,858	kPa
Max Torque	8,090	lb-ft	10,969	N-m
Stall Torque	12,135	lb-ft	16,453	N-m
Flow Range	225-425	gpm	852–1,609	L/min
RPM	0.73	rev/gal	0.193	rev/L
Speed Range		164–310 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 6:7 Lobe 11.6 Stage

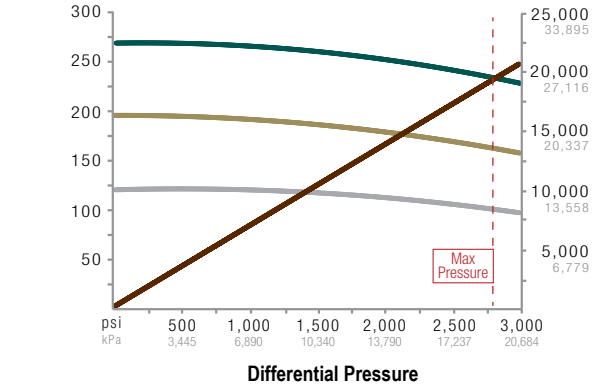
Hard Rubber

Performance Details

Max Diff Pressure	2,780	psi	19,167	kPa
Max Torque	11,600	lb-ft	15,727	N-m
Stall Torque	18,260	lb-ft	26,710	N-m
Flow Range	200–450	gpm	756–1,704	L/min
RPM	0.60	rev/gal	0.159	rev/L
Speed Range		120–270 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 6:7 Lobe 11.7 Stage

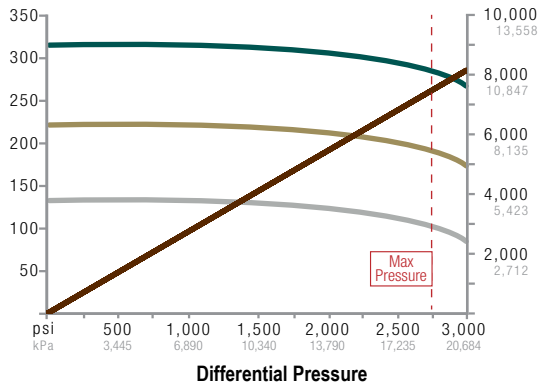
Hard Rubber

Performance Details

Max Diff Pressure	2,704	psi	18,781	kPa
Max Torque	7,328	lb-ft	9,935	N-m
Stall Torque	10,992	lb-ft	14,903	N-m
Flow Range	150–350	gpm	568–1,325	L/min
RPM	0.90	rev/gal	0.238	rev/L
Speed Range		135–315 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 6:7 Lobe 11.8 Stage

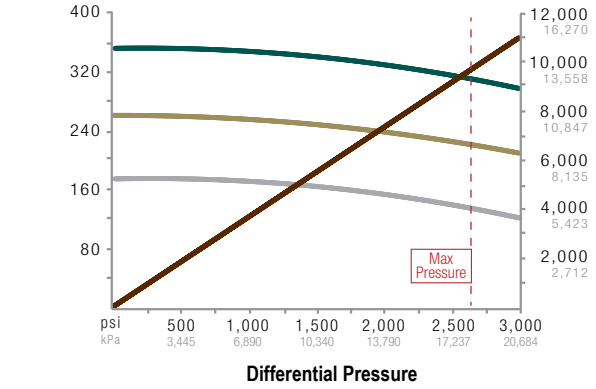
Hard Rubber

Performance Details

Max Diff Pressure	2,630	psi	18,133	kPa
Max Torque	9,690	lb-ft	13,138	N-m
Stall Torque	14,530	lb-ft	19,700	N-m
Flow Range	250–500	gpm	946–1,893	L/min
RPM	0.70	rev/gal	0.185	rev/L
Speed Range		175–350 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 7:8 Lobe 5.7 Stage

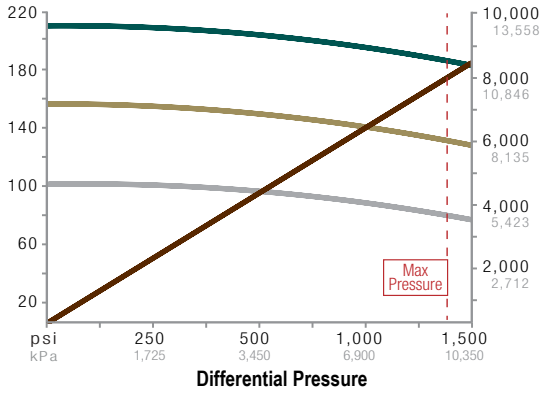
Hard Rubber

Performance Details

Max Diff Pressure	1,405	psi	9,687	kPa
Max Torque	7,749	lb-ft	10,506	N-m
Stall Torque	10,300	lb-ft	13,965	N-m
Flow Range	200–400	gpm	750–1,500	L/min
RPM	0.522	rev/gal	0.138	rev/L
Speed Range		105–210 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 7:8 Lobe 7.0 Stage

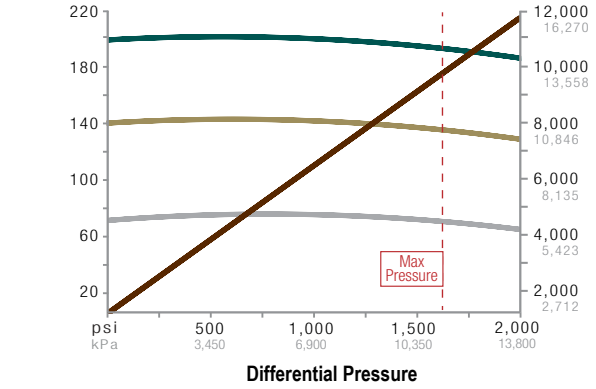
Hard Rubber

Performance Details

Max Diff Pressure	1,619	psi	11,163	kPa
Max Torque	9,783	lb-ft	13,264	N-m
Stall Torque	14,674	lb-ft	19,895	N-m
Flow Range	150–400	gpm	568–1,514	L/min
RPM	0.48	rev/gal	0.127	rev/L
Speed Range		72–192 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 7:8 Lobe 7.6 Stage

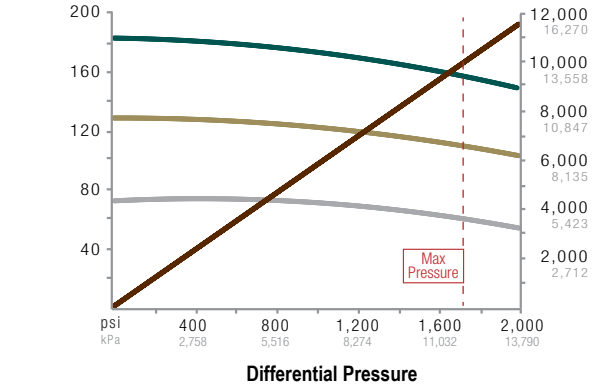
Hard Rubber

Performance Details

Max Diff Pressure	1,710	psi	11,790	kPa
Max Torque	10,110	lb-ft	13,707	N-m
Stall Torque	15,170	lb-ft	20,568	N-m
Flow Range	170–430	gpm	644–1,628	L/min
RPM	0.43	rev/gal	0.114	rev/L
Speed Range		73–185 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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PHOENIX TECHNOLOGY SERVICES

5.76" Atlas 7:8 Lobe 8.3 Stage

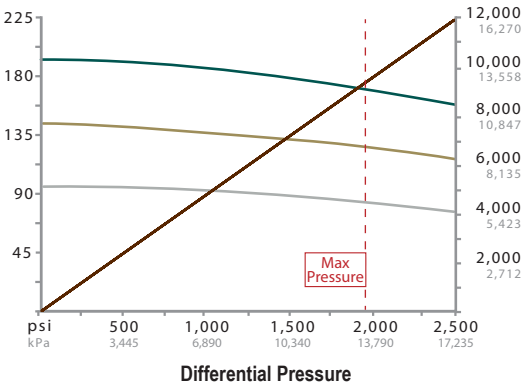
Hard Rubber

Performance Details

Max Diff Pressure	1,960	psi	13,500	kPa
Max Torque	9,370	lb-ft	12,700	N-m
Stall Torque	14,750	lb-ft	20,000	N-m
Flow Range	200–400	gpm	760–1,510	L/min
RPM	0.48	rev/gal	0.127	rev/L
Speed Range		96–192 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK	SINGLE STABILIZER	TWO STABILIZERS
	Hole Size	Hole Size	Hole Size
Bend Setting	**6.75"** 171mm	**6.75"** 171mm	**6.75"** 171mm
1.50°	10.6	10.3	9.1
1.75°	12.5	12.1	10.8
1.83°	13.1	13.2	11.8
2.00°	14.4	14.4	13.0
2.12°	15.2		



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6.50"

PHOENIX TECHNOLOGY SERVICES

6.50" Motor 4:5 Lobe 7.0 Stage

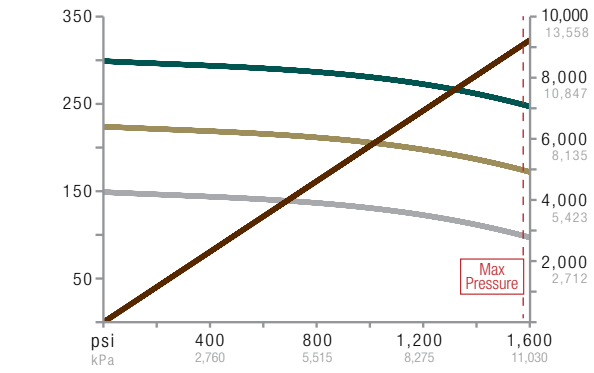
Hard Rubber

Performance Details

Max Diff Pressure	1,580	psi	10,860	kPa
Max Torque	9,090	lb-ft	12,330	N-m
Stall Torque	13,630	lb-ft	18,490	N-m
Flow Range	300–600	gpm	1,140–2,270	
RPM	0.497		0.131	rev/L
Speed Range		149–300 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.7	0.3	-	2.0	2.4	2.5
0.78°	4.1	2.8	2.3	4.3	4.4	4.6
1.15°	6.5	5.1	4.6	7.1	6.7	6.6
1.50°	8.7	7.4	6.8	9.7	9.3	9.2
1.83°	10.8	9.5	8.9	12.2	11.8	11.7
2.12°	12.6	11.3	10.8	14.3	14.0	13.8
2.38°	14.3	12.9	12.4	16.3	15.9	15.8
2.60°	15.7	14.3	13.8	17.9	17.6	17.4
2.77°	16.7	15.4	14.9	19.2	18.8	18.7
2.89°	17.5	16.2	15.6	20.1	19.7	19.6
2.97°	18.0	16.7	16.1	20.7	20.3	20.2
3.00°	18.2	16.9	16.3	20.9	20.5	20.4



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PHOENIX TECHNOLOGY SERVICES

6.50" Motor 6:7 Lobe 8.0 Stage

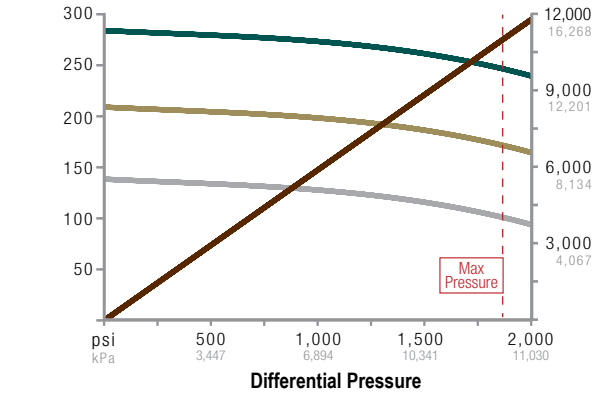
Hard Rubber

Performance Details

Max Diff Pressure	1,919	psi	13,231	kPa
Max Torque	10,928	lb-ft	14,816	N-m
Stall Torque	17,481	lb-ft	23,701	N-m
Flow Range	300–600	gpm	1,136–2,271	L/min
RPM	0.473	rev/gal	0.125	rev/L
Speed Range		141–283 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.6	0.3	-	1.9	2.2	2.3
0.78°	3.9	2.6	2.1	4.0	4.1	4.2
1.15°	6.0	4.8	4.3	6.6	6.3	6.1
1.50°	8.1	6.9	6.4	9.0	8.7	8.5
1.83°	10.1	8.8	8.3	11.3	10.9	10.8
2.12°	11.8	10.5	10.0	13.2	12.9	12.8
2.38°	13.3	12.1	11.6	15.0	14.7	14.6
2.60°	14.6	13.3	12.9	16.6	16.2	16.1
2.77°	15.6	14.4	13.9	17.7	17.4	17.3
2.89°	16.3	15.1	14.6	18.5	18.2	18.1
2.97°	16.8	15.5	15.0	19.1	18.8	18.7
3.00°	16.9	15.7	15.2	19.3	19.0	18.9



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PHOENIX TECHNOLOGY SERVICES

6.50" Motor 7:8 Lobe 2.0 Stage

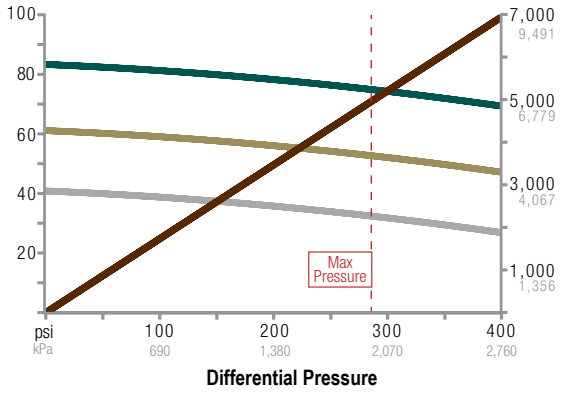
Hard Rubber

Performance Details

Max Diff Pressure	281	psi	1,934	kPa
Max Torque	5,215	lb-ft	7,070	N-m
Stall Torque	8,330	lb-ft	11,310	N-m
Flow Range	300–600	gpm	1,136–2,271	L/min
RPM	0.140	rev/gal	0.040	rev/L
Speed Range		42–85 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.7	0.3	-	2.1	2.5	2.6
0.78°	4.3	2.9	2.4	4.5	4.6	4.7
1.15°	6.7	5.3	4.8	7.4	7.0	6.8
1.50°	9.0	7.6	7.1	10.1	9.7	9.6
1.83°	11.2	9.8	9.2	12.7	12.3	12.1
2.12°	13.1	11.7	11.1	14.9	14.5	14.4
2.38°	14.8	13.4	12.9	17.0	16.6	16.4
2.60°	16.2	14.9	14.3	18.7	18.3	18.1
2.77°	17.3	16.0	15.4	20.0	19.6	19.4
2.89°	18.1	16.8	16.2	20.9	20.5	20.4
2.97°	18.7	17.3	16.7	21.5	21.2	21.0
3.00°	18.9	17.5	16.9	21.8	21.4	21.2



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PHOENIX TECHNOLOGY SERVICES

6.50" Motor 7:8 Lobe 2.9 Stage

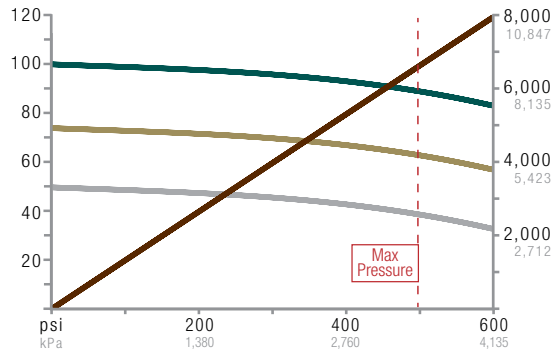
Hard Rubber

Performance Details

Max Diff Pressure	497	psi	3,423	kPa
Max Torque	7,846	lb-ft	10,637	N-m
Stall Torque	12,548	lb-ft	17,017	N-m
Flow Range	300–600	gpm	1,136–2,271	
RPM	0.170		0.045	rev/L
Speed Range		50–100 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.6	0.3	-	1.9	2.2	2.3
0.78°	3.9	2.6	2.1	4.0	4.1	4.2
1.15°	6.0	4.8	4.3	6.6	6.3	6.1
1.50°	8.1	6.9	6.4	9.0	8.7	8.5
1.83°	10.1	8.8	8.3	11.3	10.9	10.8
2.12°	11.8	10.5	10.0	13.2	12.9	12.8
2.38°	13.3	12.1	11.6	15.0	14.7	14.6
2.60°	14.6	13.3	12.9	16.6	16.2	16.1
2.77°	15.6	14.4	13.9	17.7	17.4	17.3
2.89°	16.3	15.1	14.6	18.5	18.2	18.1
2.97°	16.8	15.5	15.0	19.1	18.8	18.7
3.00°	16.9	15.7	15.2	19.3	19.0	18.9



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PHOENIX TECHNOLOGY SERVICES

6.50" Motor 7:8 Lobe 3.0 Stage Reg.

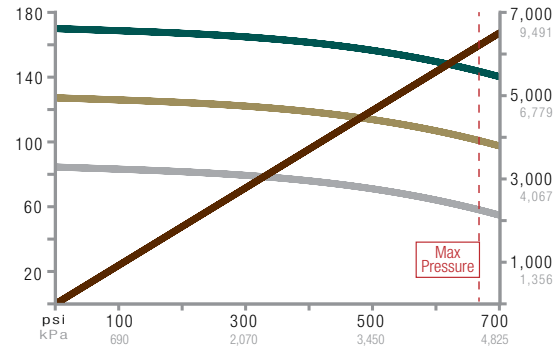
Hard Rubber

Performance Details

Max Diff Pressure	680	psi	4,650	kPa
Max Torque	6,280	lb-ft	8,510	N-m
Stall Torque	9,420	lb-ft	12,770	N-m
Flow Range	300–600	gpm	1,140–2,270	L/min
RPM	0.283	rev/gal	0.075	rev/L
Speed Range		84–170 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	2.2	0.4	-	2.7	3.4	3.6
0.78°	5.4	3.6	2.9	5.7	5.8	6.1
1.15°	8.4	6.7	6.0	9.4	8.8	8.6
1.50°	11.3	9.5	8.9	13.0	12.4	12.1
1.83°	14.0	12.3	11.6	16.4	15.7	15.5
2.12°	16.4	14.6	13.9	19.3	18.7	18.4
2.38°	18.5	16.8	16.1	22.0	21.3	21.1
2.60°	20.3	18.6	17.9	24.2	23.6	23.3
2.77°	21.7	20.0	19.3	25.9	25.3	25.0
2.89°	22.7	21.0	20.3	27.1	26.5	26.3
2.97°	23.3	21.6	20.9	28.0	27.3	27.1
3.00°	23.6	21.9	21.2	28.3	27.6	27.4



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PHOENIX TECHNOLOGY SERVICES

6.50" Motor 7:8 Lobe 3.0 Stage Slow

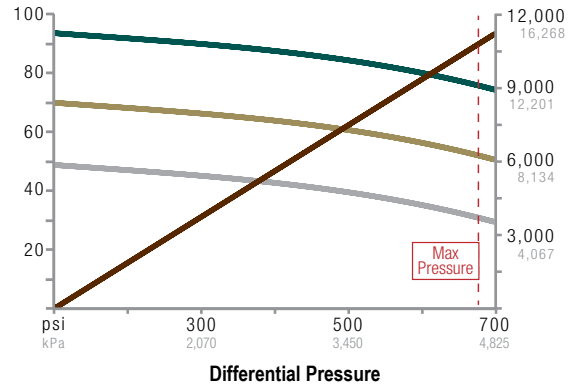
Hard Rubber

Performance Details

Max Diff Pressure	680	psi	4,650	kPa
Max Torque	10,800	lb-ft	14,640	N-m
Stall Torque	16,200	lb-ft	21,960	N-m
Flow Range	300–600	gpm	1,140–2,270	
RPM	0.155		0.041	rev/L
Speed Range		46–93 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.7	0.3	-	2.0	2.4	2.5
0.78°	4.1	2.8	2.3	4.3	4.4	4.6
1.15°	6.5	5.1	4.6	7.1	6.7	6.6
1.50°	8.7	7.4	6.8	9.7	9.3	9.2
1.83°	10.8	9.5	8.9	12.2	11.8	11.7
2.12°	12.6	11.3	10.8	14.3	14.0	13.8
2.38°	14.3	12.9	12.4	16.3	15.9	15.8
2.60°	15.7	14.3	13.8	17.9	17.6	17.4
2.77°	16.7	15.4	14.9	19.2	18.8	18.7
2.89°	17.5	16.2	15.6	20.1	19.7	19.6
2.97°	18.0	16.7	16.1	20.7	20.3	20.2
3.00°	18.2	16.9	16.3	20.9	20.5	20.4



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PHOENIX TECHNOLOGY SERVICES

6.50" Motor 7:8 Lobe 5.0 Stage

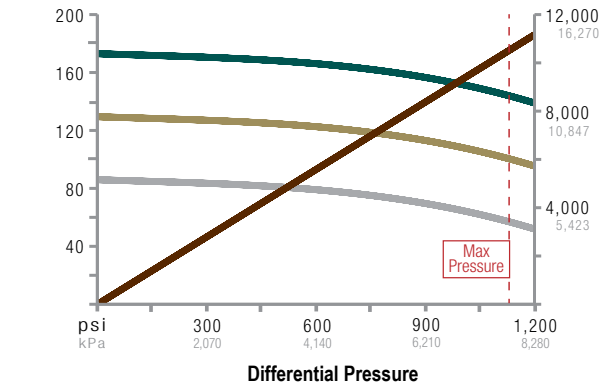
Hard Rubber

Performance Details

Max Diff Pressure	1,130	psi	7,760	kPa
Max Torque	10,460	lb-ft	14,190	N-m
Stall Torque	15,690	lb-ft	21,280	N-m
Flow Range	300–600	gpm	1,140–2,270	
RPM	0.288		0.076	rev/L
Speed Range		86–173 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.7	0.3	-	2.0	2.4	2.5
0.78°	4.1	2.8	2.3	4.3	4.4	4.6
1.15°	6.5	5.1	4.6	7.1	6.7	6.6
1.50°	8.7	7.4	6.8	9.7	9.3	9.2
1.83°	10.8	9.5	8.9	12.2	11.8	11.7
2.12°	12.6	11.3	10.8	14.3	14.0	13.8
2.38°	14.3	12.9	12.4	16.3	15.9	15.8
2.60°	15.7	14.3	13.8	17.9	17.6	17.4
2.77°	16.7	15.4	14.9	19.2	18.8	18.7
2.89°	17.5	16.2	15.6	20.1	19.7	19.6
2.97°	18.0	16.7	16.1	20.7	20.3	20.2
3.00°	18.2	16.9	16.3	20.9	20.5	20.4



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PHOENIX TECHNOLOGY SERVICES

6.50" Motor 7:8 Lobe 5.7 Stage

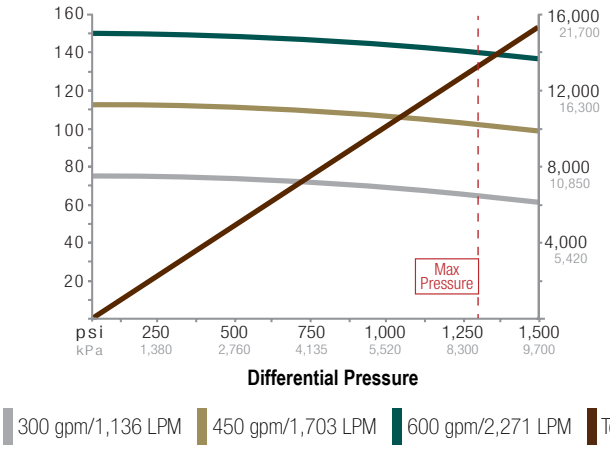
Hard Rubber

Performance Details

Max Diff Pressure	1,280	psi	8,840	kPa
Max Torque	13,720	lb-ft	18,600	N-m
Stall Torque	20,580	lb-ft	27,910	N-m
Flow Range	300–600	gpm	1,140–2,271	L/min
RPM	0.242	rev/gal	0.064	rev/L
Speed Range		75–150 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.1	1.1	1.0	1.9	2.0	2.3
0.78°	2.7	2.3	2.1	3.7	3.8	4.2
1.15°	4.7	4.3	3.1	5.5	5.5	5.9
1.50°	6.6	6.1	4.1	7.1	7.2	7.5
1.83°	8.4	7.9	5.8	8.7	8.7	9.0
2.12°	10.0	9.5	7.4	10.0	10.1	10.4
2.38°	11.4	10.9	8.7	11.4	11.3	11.6
2.60°	12.6	12.1	9.9	12.6	12.4	12.6
2.77°	13.5	13.0	10.8	13.5	13.0	13.4
2.89°	14.1	13.6	11.4	14.1	13.6	13.9
2.97°	14.6	14.1	11.9	14.6	14.1	14.3
3.00°	14.7	14.2	12.0	14.7	14.2	14.5



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6.63"

PHOENIX TECHNOLOGY SERVICES

6.63" Atlas 5:6 Lobe 8.4 Stage

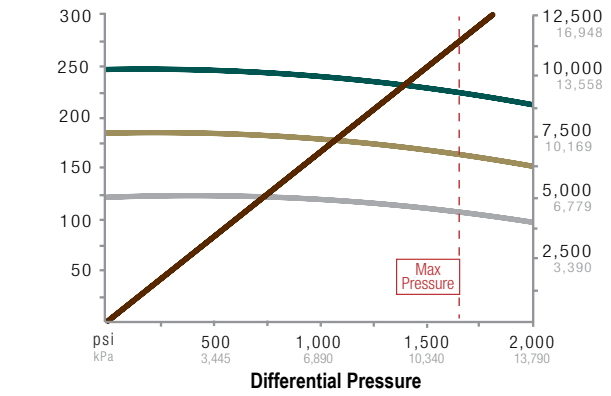
Hard Rubber

Performance Details

Max Diff Pressure	1,643	psi	11,328	kPa
Max Torque	11,324	lb-ft	15,353	N-m
Stall Torque	16,986	lb-ft	23,029	N-m
Flow Range	350–700	gpm	1,325–2,650	L/min
RPM	0.35	rev/gal	0.092	rev/L
Speed Range		123–246 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.1	-	-	2.1	2.4	2.5
0.78°	3.6	1.7	1.0	4.3	4.7	4.8
1.15°	5.9	4.0	3.3	6.5	6.8	6.8
1.50°	8.0	6.2	5.5	8.9	8.8	8.9
1.83°	10.1	8.3	7.5	11.1	10.8	10.7
2.12°	11.9	10.1	9.3	13.1	12.8	12.6
2.38°	13.5	11.7	11.0	14.9	14.5	14.4
2.60°	14.9	13.1	12.3	16.3	16.0	15.9
2.77°	15.9	14.1	13.4	17.5	17.2	17.0
2.89°	16.7	14.9	14.1	18.3	18.0	17.8
2.97°	17.2	15.4	14.6	18.9	18.5	18.4
3.00°	17.4	15.5	14.8	19.1	18.7	18.6



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PHOENIX TECHNOLOGY SERVICES

6.63" Atlas 5:6 Lobe 9.4 Stage

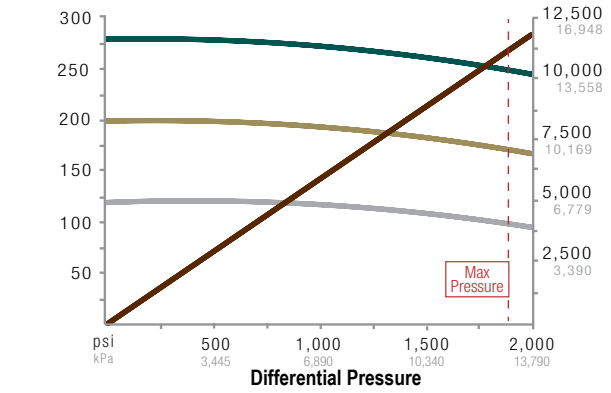
Hard Rubber

Performance Details

Max Diff Pressure	1,880	psi	12,962	kPa
Max Torque	11,214	lb-ft	15,204	N-m
Stall Torque	16,821	lb-ft	22,806	N-m
Flow Range	300–700	gpm	1,136–2,650	L/min
RPM	0.40	rev/gal	0.106	rev/L
Speed Range		119–279 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.1	-	-	2.1	2.4	2.5
0.78°	3.6	1.7	1.0	4.3	4.7	4.8
1.15°	5.9	4.0	3.3	6.5	6.8	6.8
1.50°	8.0	6.2	5.5	8.9	8.8	8.9
1.83°	10.1	8.3	7.5	11.1	10.8	10.7
2.12°	11.9	10.1	9.3	13.1	12.8	12.6
2.38°	13.5	11.7	11.0	14.9	14.5	14.4
2.60°	14.9	13.1	12.3	16.3	16.0	15.9
2.77°	15.9	14.1	13.4	17.5	17.2	17.0
2.89°	16.7	14.9	14.1	18.3	18.0	17.8
2.97°	17.2	15.4	14.6	18.9	18.5	18.4
3.00°	17.4	15.5	14.8	19.1	18.7	18.6



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PHOENIX TECHNOLOGY SERVICES

6.63" Atlas 6:7 Lobe 7.8 Stage

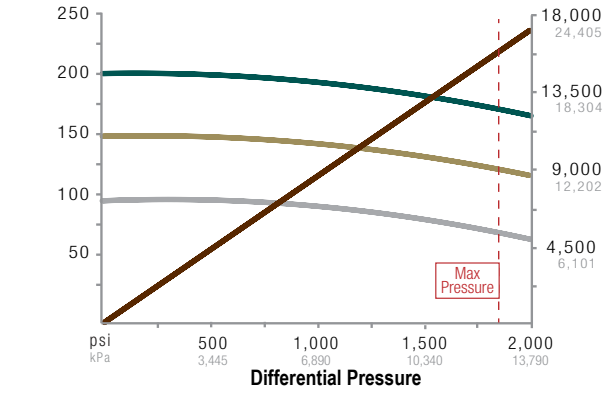
Hard Rubber

Performance Details

Max Diff Pressure	1,840	psi	12,687	kPa
Max Torque	15,730	lb-ft	21,327	N-m
Stall Torque	24,780	lb-ft	33,597	N-m
Flow Range	350–700	gpm	1,325–2,650	L/min
RPM	0.29	rev/gal	0.077	rev/L
Speed Range		101–203 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.1	-	-	2.1	2.4	2.5
0.78°	3.6	1.7	1.0	4.3	4.7	4.8
1.15°	5.9	4.0	3.3	6.5	6.8	6.8
1.50°	8.0	6.2	5.5	8.9	8.8	8.9
1.83°	10.1	8.3	7.5	11.1	10.8	10.7
2.12°	11.9	10.1	9.3	13.1	12.8	12.6
2.38°	13.5	11.7	11.0	14.9	14.5	14.4
2.60°	14.9	13.1	12.3	16.3	16.0	15.9
2.77°	15.9	14.1	13.4	17.5	17.2	17.0
2.89°	16.7	14.9	14.1	18.3	18.0	17.8
2.97°	17.2	15.4	14.6	18.9	18.5	18.4
3.00°	17.4	15.5	14.8	19.1	18.7	18.6



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PHOENIX TECHNOLOGY SERVICES

6.63" Atlas 7:8 Lobe 6.9 Stage

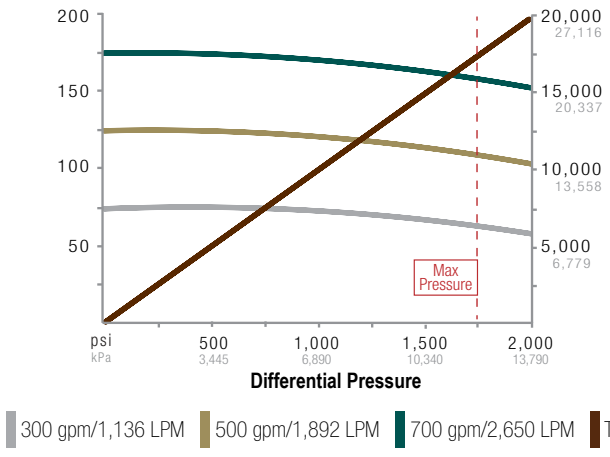
Hard Rubber

Performance Details

Max Diff Pressure	1,741	psi	12,004	kPa
Max Torque	17,575	lb-ft	23,828	N-m
Stall Torque	26,362	lb-ft	35,742	N-m
Flow Range	300–700	gpm	1,140–2,650	L/min
RPM	0.25	rev/gal	0.066	rev/L
Speed Range		75–175 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm	**7.875"** 200mm	**8.5"** 216mm	**8.75"** 222mm
0.39°	1.1	-	-	2.1	2.4	2.5
0.78°	3.6	1.7	1.0	4.3	4.7	4.8
1.15°	5.9	4.0	3.3	6.5	6.8	6.8
1.50°	8.0	6.2	5.5	8.9	8.8	8.9
1.83°	10.1	8.3	7.5	11.1	10.8	10.7
2.12°	11.9	10.1	9.3	13.1	12.8	12.6
2.38°	13.5	11.7	11.0	14.9	14.5	14.4
2.60°	14.9	13.1	12.3	16.3	16.0	15.9
2.77°	15.9	14.1	13.4	17.5	17.2	17.0
2.89°	16.7	14.9	14.1	18.3	18.0	17.8
2.97°	17.2	15.4	14.6	18.9	18.5	18.4
3.00°	17.4	15.5	14.8	19.1	18.7	18.6



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6.75"

PHOENIX TECHNOLOGY SERVICES

6.75" Motor 4:5 Lobe 7.0 Stage

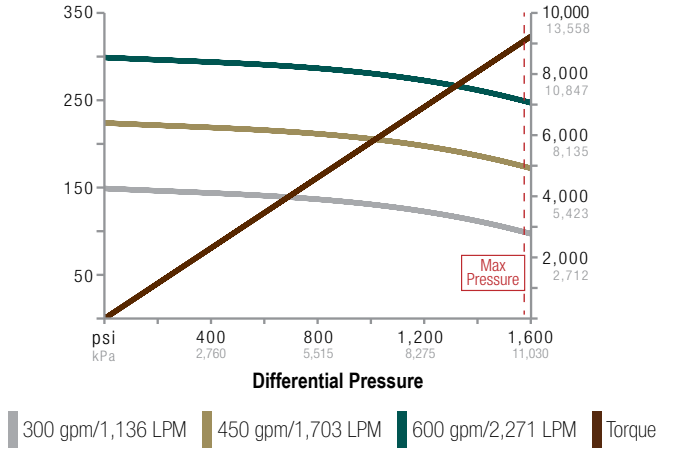
Hard Rubber

Performance Details

Max Diff Pressure	1,580	psi	10,860	kPa
Max Torque	9,090	lb-ft	12,330	N-m
Stall Torque	13,630	lb-ft	18,490	N-m
Flow Range	300–600	gpm	1,140–2,270	
RPM	0.497		0.131	rev/L
Speed Range		149–300 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	0.9	0.4	-	2.1	2.3	2.9
0.78°	3.3	2.8	0.5	4.1	4.2	4.9
1.15°	5.6	5.1	2.8	6.7	6.6	6.7
1.50°	7.7	7.2	5.0	9.3	9.2	8.5
1.83°	9.8	9.3	7.0	11.7	11.6	10.9
2.12°	11.5	11.0	8.8	13.8	13.7	13.0
2.38°	13.1	12.6	10.4	15.7	15.6	14.9
2.60°	14.5	14.0	11.7	17.3	17.2	16.5
2.77°	15.5	15.0	12.8	18.5	18.4	17.8
2.89°	16.3	15.8	13.5	19.4	19.3	18.6
2.97°	16.8	16.3	14.0	20.0	19.8	19.2
3.00°	16.9	16.4	14.2	20.2	20.1	19.4



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PHOENIX TECHNOLOGY SERVICES

6.75" Motor 6:7 Lobe 8.0 Stage

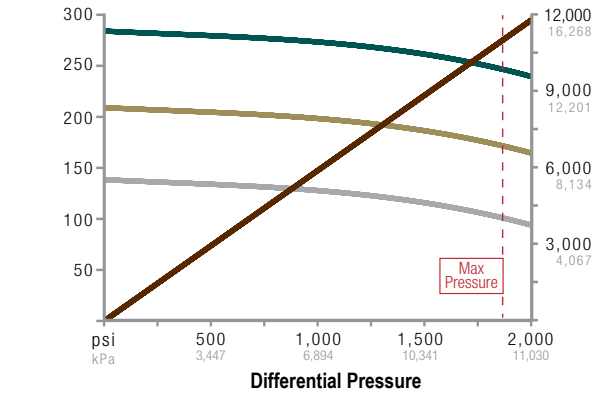
Hard Rubber

Performance Details

Max Diff Pressure	1,919	psi	13,231	kPa
Max Torque	10,928	lb-ft	14,816	N-m
Stall Torque	17,481	lb-ft	23,701	N-m
Flow Range	300–600	gpm	1,136–2,271	L/min
RPM	0.473	rev/gal	0.125	rev/L
Speed Range		141–283 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	0.9	0.4	-	1.8	1.9	2.3
0.78°	3.0	2.5	0.5	3.5	3.6	4.1
1.15°	5.0	4.6	2.5	5.8	5.7	5.8
1.50°	6.9	6.5	4.5	7.9	7.8	7.4
1.83°	8.8	8.3	6.3	10.0	9.9	9.4
2.12°	10.4	9.9	7.9	11.7	11.6	11.2
2.38°	11.8	11.3	9.3	13.3	13.2	12.8
2.60°	13.0	12.6	10.5	14.7	14.6	14.1
2.77°	13.9	13.5	11.5	15.7	15.6	15.2
2.89°	14.6	14.2	12.1	16.5	16.4	15.9
2.97°	15.1	14.6	12.6	17.0	16.9	16.4



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PHOENIX TECHNOLOGY SERVICES

6.75" Motor 7:8 Lobe 2.9 Stage

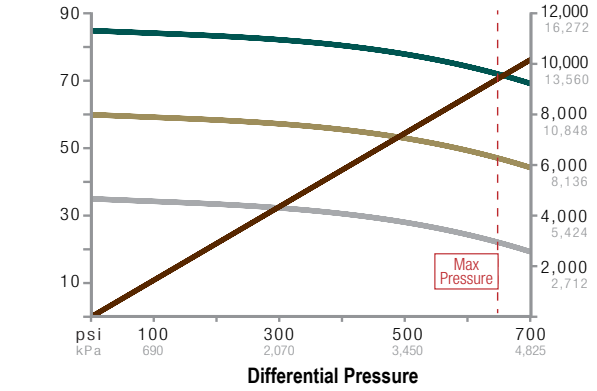
Hard Rubber

Performance Details

Max Diff Pressure	650	psi	4,500	kPa
Max Torque	9,600	lb-ft	13,020	N-m
Stall Torque	14,400	lb-ft	19,520	N-m
Flow Range	200–500	gpm	760–1,890	
RPM	0.170		0.045	rev/L
Speed Range		34–85 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	0.9	0.4	-	2.0	2.1	2.7
0.78°	3.1	2.7	0.5	3.9	4.0	4.6
1.15°	5.3	4.8	2.7	6.4	6.3	6.4
1.50°	7.3	6.9	4.7	8.8	8.7	8.1
1.83°	9.3	8.8	6.7	11.1	10.9	10.4
2.12°	11.0	10.5	8.4	13.1	12.9	12.4
2.38°	12.5	12.0	9.9	14.8	14.7	14.2
2.60°	13.8	13.3	11.2	16.3	16.2	15.7
2.77°	14.8	14.3	12.2	17.5	17.4	16.8
2.89°	15.5	15.0	12.9	18.3	18.2	17.7
2.97°	15.9	15.5	13.3	18.9	18.8	18.2
3.00°	16.1	15.6	13.5	19.1	19.0	18.4



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PHOENIX TECHNOLOGY SERVICES

6.75" Motor 7:8 Lobe 3.0 Stage Reg.

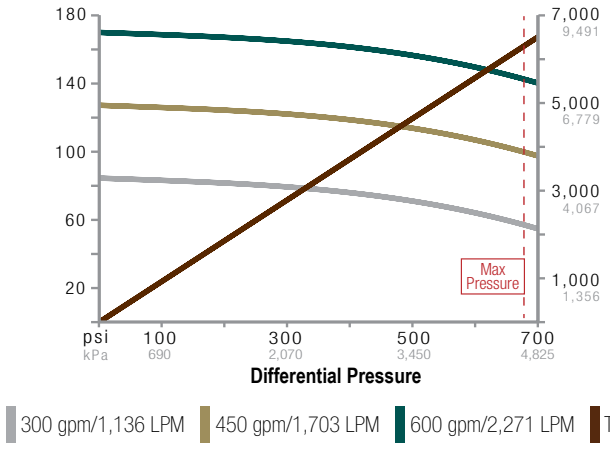
Hard Rubber

Performance Details

Max Diff Pressure	680	psi	4,650	kPa
Max Torque	6,280	lb-ft	8,510	N-m
Stall Torque	9,420	lb-ft	12,770	N-m
Flow Range	300–600	gpm	1,140–2,270	L/min
RPM	0.283	rev/gal	0.075	rev/L
Speed Range		84–170 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	1.2	0.5	-	3.0	3.3	4.4
0.78°	4.4	3.7	0.7	5.4	5.7	6.8
1.15°	7.4	6.7	3.7	9.1	8.8	9.0
1.50°	10.2	9.5	6.6	12.6	12.4	11.3
1.83°	12.9	12.2	9.2	16.0	15.7	14.6
2.12°	15.2	14.6	11.6	18.9	18.7	17.5
2.38°	17.3	16.7	13.7	21.5	21.3	20.2
2.60°	19.1	18.5	15.5	23.8	23.5	22.4
2.77°	20.5	19.8	16.9	25.5	25.2	24.1
2.89°	21.5	20.8	17.8	26.7	26.5	25.3
2.97°	22.1	21.5	18.5	27.5	27.3	26.2
3.00°	22.4	21.7	18.7	27.8	27.6	26.5



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PHOENIX TECHNOLOGY SERVICES

6.75" Motor 7:8 Lobe 3.0 Stage Slow

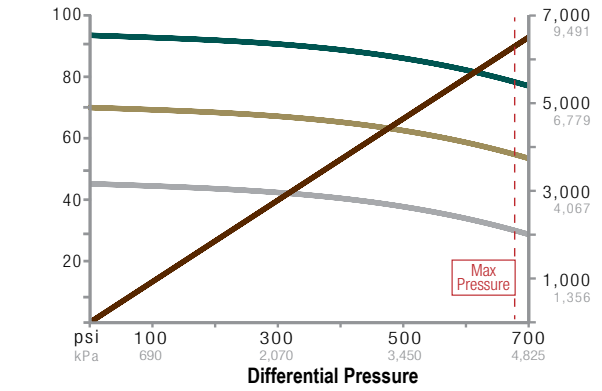
Hard Rubber

Performance Details

Max Diff Pressure	680	psi	4,650	kPa
Max Torque	10,800	lb-ft	14,640	N-m
Stall Torque	16,200	lb-ft	21,960	N-m
Flow Range	300–600	gpm	1,140–2,270	L/min
RPM	0.155	rev/gal	0.041	rev/L
Speed Range		46–93 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	0.9	0.4	-	2.2	2.3	3.0
0.78°	3.4	2.8	0.6	4.2	4.3	5.0
1.15°	5.7	5.2	2.9	6.9	6.7	6.8
1.50°	7.9	7.4	5.1	9.5	9.3	8.7
1.83°	9.9	9.4	7.1	11.9	11.8	11.1
2.12°	11.7	11.2	8.9	14.1	13.9	13.3
2.38°	13.4	12.9	10.6	16.0	15.9	15.2
2.60°	14.7	14.2	11.9	17.6	17.5	16.8
2.77°	15.8	15.3	13.0	18.9	18.8	18.1
2.89°	16.6	16.0	13.8	19.8	19.6	19.0
2.97°	17.1	16.5	14.3	20.4	20.2	19.6
3.00°	17.2	16.7	14.4	20.6	20.5	19.8



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PHOENIX TECHNOLOGY SERVICES

6.75" Motor 7:8 Lobe 3.5 Stage

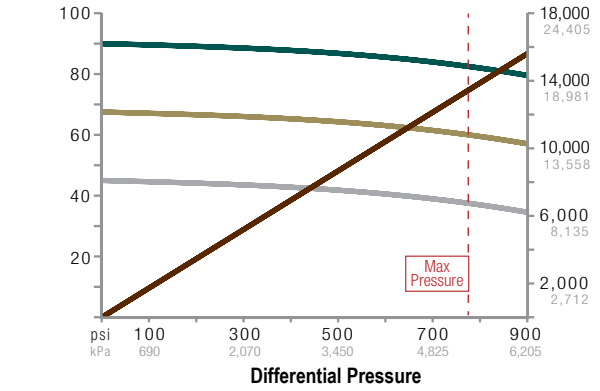
Hard Rubber

Performance Details

Max Diff Pressure	790	psi	5,430	kPa
Max Torque	13,500	lb-ft	18,300	N-m
Stall Torque	20,250	lb-ft	27,450	N-m
Flow Range	300–600	gpm	1,140–2,270	L/min
RPM	0.150	rev/gal	0.040	rev/L
Speed Range		45–90 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	0.8	0.4	-	1.9	2.0	2.5
0.78°	3.0	2.5	0.5	3.7	3.8	4.3
1.15°	5.1	4.6	2.6	6.1	6.0	6.1
1.50°	7.0	6.6	4.5	8.4	8.3	7.8
1.83°	8.9	8.4	6.4	10.5	10.4	9.9
2.12°	10.5	10.0	8.0	12.4	12.3	11.8
2.38°	11.9	11.5	9.4	14.1	14.0	13.5
2.60°	13.2	12.7	10.7	15.5	15.4	14.9
2.77°	14.1	13.7	11.6	16.7	16.5	16.0
2.89°	14.8	14.3	12.3	17.4	17.3	16.8
2.97°	15.2	14.8	12.7	18.0	17.8	17.3
3.00°	15.4	15.0	12.9	18.2	18.0	17.5



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PHOENIX TECHNOLOGY SERVICES

6.75" Motor 7:8 Lobe 5.0 Stage

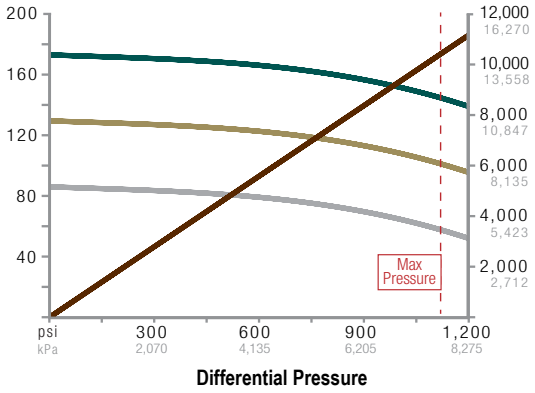
Hard Rubber

Performance Details

Max Diff Pressure	1,130	psi	7,760	kPa
Max Torque	10,460	lb-ft	14,190	N-m
Stall Torque	15,690	lb-ft	21,280	N-m
Flow Range	300–600	gpm	1,140–2,270	
RPM	0.288		0.076	rev/L
Speed Range		86–180 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	0.9	0.4	-	2.2	2.3	3.0
0.78°	3.4	2.9	0.6	4.2	4.3	5.0
1.15°	5.7	5.2	2.9	6.9	6.7	6.9
1.50°	7.9	7.4	5.1	9.5	9.4	8.7
1.83°	10.0	9.4	7.1	12.0	11.8	11.2
2.12°	11.8	11.3	9.0	14.1	14.0	13.3
2.38°	13.4	12.9	10.6	16.1	15.9	15.3
2.60°	14.8	14.3	12.0	17.7	17.5	16.9
2.77°	15.9	15.3	13.0	19.0	18.8	18.2
2.89°	16.6	16.1	13.8	19.8	19.7	19.1
2.97°	17.1	16.6	14.3	20.4	20.3	19.7
3.00°	17.3	16.8	14.5	20.7	20.5	19.9



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PHOENIX TECHNOLOGY SERVICES

6.75" Motor 7:8 Lobe 5.7 Stage

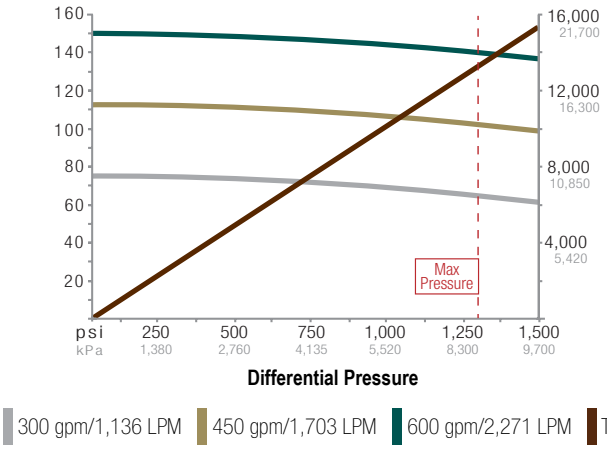
Hard Rubber

Performance Details

Max Diff Pressure	1,280	psi	8,840	kPa
Max Torque	13,720	lb-ft	18,600	N-m
Stall Torque	20,580	lb-ft	27,910	N-m
Flow Range	300–600	gpm	1,140–2,271	L/min
RPM	0.242	rev/gal	0.064	rev/L
Speed Range		75–150 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.39°	1.1	1.1	1.0	1.9	2.0	2.3
0.78°	2.7	2.3	2.1	3.7	3.8	4.2
1.15°	4.7	4.3	3.1	5.5	5.5	5.9
1.50°	6.6	6.1	4.1	7.1	7.2	7.5
1.83°	8.4	7.9	5.8	8.7	8.7	9.0
2.12°	10.0	9.5	7.4	10.0	10.1	10.4
2.38°	11.4	10.9	8.7	11.4	11.3	11.6
2.60°	12.6	12.1	9.9	12.6	12.4	12.6
2.77°	13.5	13.0	10.8	13.5	13.0	13.4
2.89°	14.1	13.6	11.4	14.1	13.6	13.9
2.97°	14.6	14.1	11.9	14.6	14.1	14.3
3.00°	14.7	14.2	12.0	14.7	14.2	14.5



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7.25"

PHOENIX TECHNOLOGY SERVICES

7.25" Atlas 4:5 Lobe 8.4 Stage

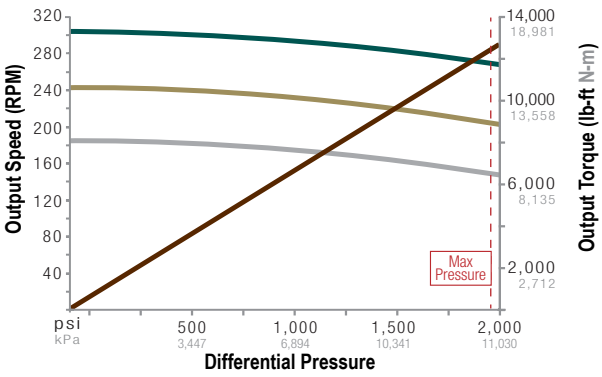
Hard Rubber

Performance Details

Max Diff Pressure	1,980	psi	13,652	kPa
Max Torque	12,420	lb-ft	16,839	N-m
Stall Torque	19,560	lb-ft	26,519	N-m
Flow Range	450–750	gpm	1,703–2,840	L/min
RPM	0.405	rev/gal	0.107	rev/L
Speed Range		182–304 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.78°	5.3	4.5	0.9	5.3	5.0	5.7
1.15°	7.9	7.1	3.4	7.9	7.3	8.0
1.50°	10.4	9.5	5.9	10.4	9.5	10.2
1.75°	12.1	11.3	7.6	12.1	11.3	11.8
1.83°	12.6	11.8	8.2	12.6	11.8	12.3
2.00°	13.8	13.0	9.3	13.8	13.0	13.3
2.12°	14.6	13.8	10.2	14.6	13.8	14.1
2.25°	15.5	14.7	11.1	15.5	14.7	14.9
2.38°	16.4	15.6	12.0	16.4	15.6	15.7
2.50°	17.3	16.5	12.8	17.3	16.5	16.5



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PHOENIX TECHNOLOGY SERVICES

7.25" Atlas 7:8 Lobe 7.5 Stage

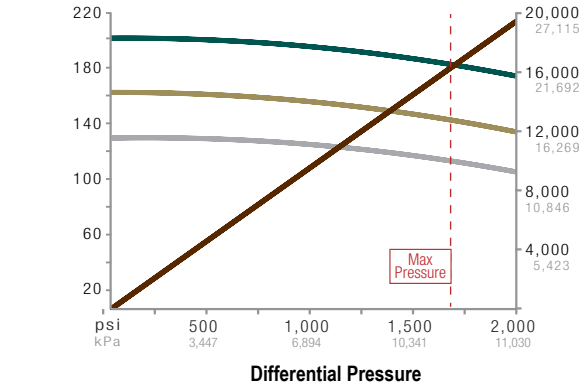
Hard Rubber

Performance Details

Max Diff Pressure	1,690	psi	11,630	kPa
Max Torque	16,510	lb-ft	22,390	N-m
Stall Torque	24,760	lb-ft	33,580	N-m
Flow Range	500–750	gpm	1,890–2,840	L/min
RPM	0.260	rev/gal	0.069	rev/L
Speed Range		130–200 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.78°	5.3	4.5	0.9	5.3	5.0	5.7
1.15°	7.9	7.1	3.4	7.9	7.3	8.0
1.50°	10.4	9.5	5.9	10.4	9.5	10.2
1.75°	12.1	11.3	7.6	12.1	11.3	11.8
1.83°	12.6	11.8	8.2	12.6	11.8	12.3
2.00°	13.8	13.0	9.3	13.8	13.0	13.3
2.12°	14.6	13.8	10.2	14.6	13.8	14.1
2.25°	15.5	14.7	11.1	15.5	14.7	14.9
2.38°	16.4	15.6	12.0	16.4	15.6	15.7



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PHOENIX TECHNOLOGY SERVICES

7.25" Atlas 7:8 Lobe 8.5 Stage

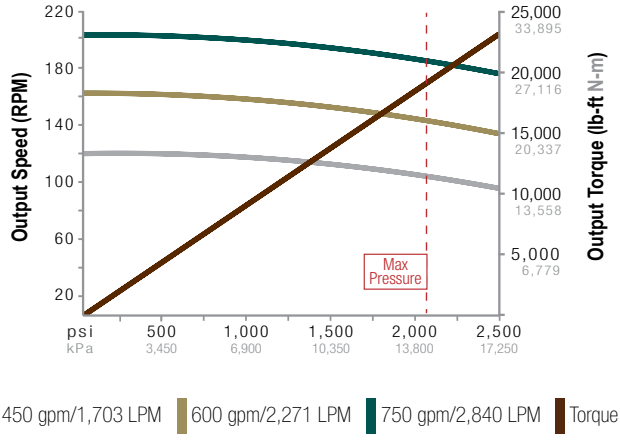
Hard Rubber

Performance Details

Max Diff Pressure	2,129	psi	14,679	kPa
Max Torque	19,050	lb-ft	25,828	N-m
Stall Torque	33,338	lb-ft	45,199	N-m
Flow Range	450–750	gpm	1,703–2,840	L/min
RPM	0.270	rev/gal	0.071	rev/L
Speed Range		121–203 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.78°	5.3	4.5	0.9	5.3	5.0	5.7
1.15°	7.9	7.1	3.4	7.9	7.3	8.0
1.50°	10.4	9.5	5.9	10.4	9.5	10.2
1.75°	12.1	11.3	7.6	12.1	11.3	11.8
1.83°	12.6	11.8	8.2	12.6	11.8	12.3
2.00°	13.8	13.0	9.3	13.8	13.0	13.3
2.12°	14.6	13.8	10.2	14.6	13.8	14.1
2.25°	15.5	14.7	11.1	15.5	14.7	14.9
2.38°	16.4	15.6	12.0	16.4	15.6	15.7



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PHOENIX TECHNOLOGY SERVICES

7.25" Atlas 8:9 Lobe 6.0 Stage

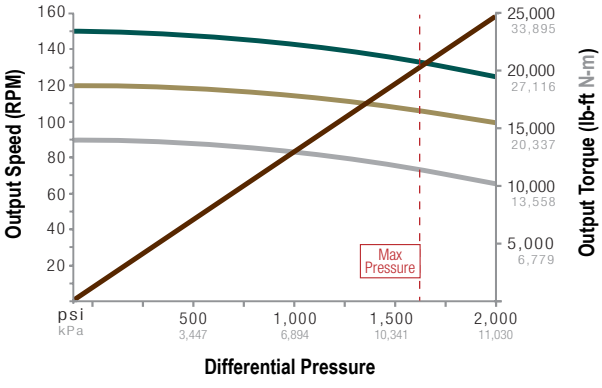
Hard Rubber

Performance Details

Max Diff Pressure	1,618	psi	11,156	kPa
Max Torque	20,237	lb-ft	27,434	N-m
Stall Torque	35,415	lb-ft	48,010	N-m
Flow Range	450–750	gpm	1,730–2,840	L/min
RPM	0.200	rev/gal	0.053	rev/L
Speed Range		90–150 rpm		

Predicted Build Rates (Fixed) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm	**8.5"** 216mm	**8.75"** 222mm	**9.875"** 251mm
0.78°	5.3	4.5	0.9	5.3	5.0	5.7
1.15°	7.9	7.1	3.4	7.9	7.3	8.0
1.50°	10.4	9.5	5.9	10.4	9.5	10.2
1.75°	12.1	11.3	7.6	12.1	11.3	11.8
1.83°	12.6	11.8	8.2	12.6	11.8	12.3
2.00°	13.8	13.0	9.3	13.8	13.0	13.3
2.12°	14.6	13.8	10.2	14.6	13.8	14.1
2.25°	15.5	14.7	11.1	15.5	14.7	14.9
2.38°	16.4	15.6	12.0	16.4	15.6	15.7



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7.75"

PHOENIX TECHNOLOGY SERVICES

7.75" Motor 4:5 Lobe 5.3 Stage

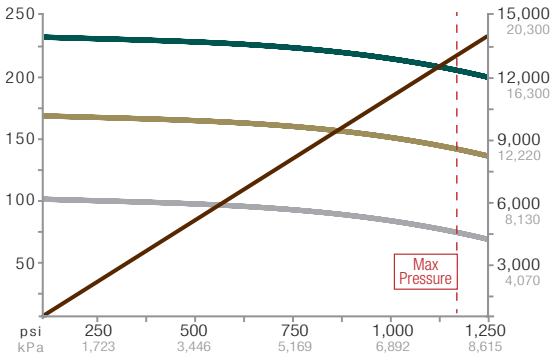
Hard Rubber

Performance Details

Max Diff Pressure	1,190	psi	8,220	kPa
Max Torque	13,310	lb-ft	18,050	N-m
Stall Torque	19,970	lb-ft	27,070	N-m
Flow Range	400–900	gpm	1,514–3,407	
RPM	0.253		0.067	rev/L
Speed Range		101–230 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm
0.39°	1.1	1.1	1.0	2.3	2.5	3.1
0.78°	2.2	2.1	2.1	4.1	4.4	4.9
1.15°	4.2	3.1	3.1	5.9	6.1	6.6
1.50°	6.1	4.9	4.0	7.6	7.8	8.2
1.83°	7.9	6.6	4.9	9.1	9.3	9.7
2.12°	9.5	8.2	5.6	10.5	10.7	11.1
2.38°	10.9	9.6	7.0	11.8	11.9	12.3
2.60°	12.1	10.8	8.1	12.8	13.0	13.3
2.77°	13.1	11.7	9.0	13.6	13.8	14.1
2.89°	13.7	12.4	9.6	14.2	14.4	14.6
2.97°	14.2	12.8	10.1	14.6	14.7	15.0
3.00°	14.3	13.0	10.2	14.7	14.9	15.2



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PHOENIX TECHNOLOGY SERVICES

7.75" Motor 7:8 Lobe 4.0 Stage

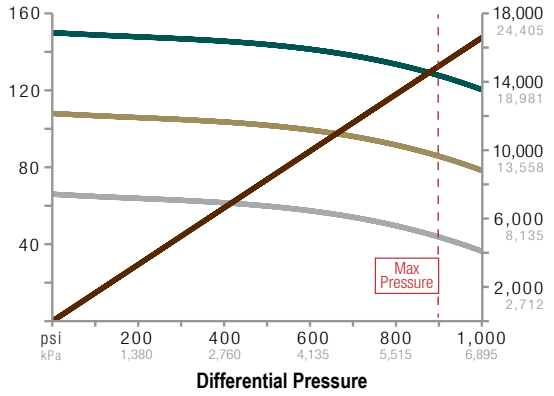
Hard Rubber

Performance Details

Max Diff Pressure	900	psi	6,210	kPa
Max Torque	14,930	lb-ft	20,240	N-m
Stall Torque	22,400	lb-ft	30,360	N-m
Flow Range	400–900	gpm	1,514–3,406	L/min
RPM	0.166	rev/gal	0.044	rev/L
Speed Range		66–150 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm
0.39°	0.7	-	-	2.3	2.8	3.8
0.78°	3.2	1.7	-	4.4	4.8	5.8
1.15°	5.6	4.0	0.7	7.0	6.7	7.7
1.50°	7.9	6.3	2.9	9.7	9.3	9.5
1.83°	10.0	8.4	5.1	12.3	11.8	11.3
2.12°	11.8	10.3	6.9	14.5	14.1	13.1
2.38°	13.5	12.0	8.6	16.5	16.1	15.1
2.60°	14.9	13.4	10.0	18.2	17.8	16.8
2.77°	16.0	14.5	11.1	19.5	19.1	18.1
2.89°	16.8	15.3	11.9	20.4	20.0	19.0
2.97°	17.3	15.8	12.4	21.1	20.6	19.6
3.00°	17.5	16.0	12.6	21.3	20.8	19.8



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8.00"/8.25"

PHOENIX TECHNOLOGY SERVICES

8.00" Atlas 7:8 Lobe 4.7 Stage

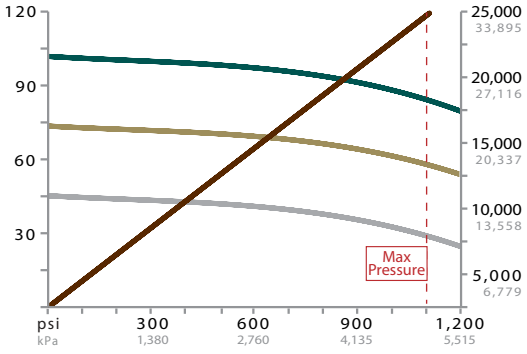
Hard Rubber

Performance Details

Max Diff Pressure	1,110	psi	7,653	kPa
Max Torque	24,440	lb-ft	33,136	N-m
Stall Torque	38,140	lb-ft	51,711	N-m
Flow Range	400–900	gpm	1,514–3,406	L/min
RPM	0.111	rev/gal	0.029	rev/L
Speed Range		44–100 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm
0.39°	-	-	-	1.7	1.9	2.5
0.78°	1.7	0.6	-	3.4	3.6	4.1
1.15°	3.6	2.4	-	5.3	5.2	5.7
1.50°	5.3	4.1	1.7	7.3	8.0	7.9
1.83°	6.9	5.7	3.3	9.1	8.9	8.6
2.12°	8.3	7.2	4.7	10.7	10.5	10.0
2.38°	9.6	8.4	6.0	12.2	11.9	11.4
2.60°	10.6	9.5	7.1	13.4	13.2	12.6
2.77°	11.5	10.3	7.9	14.3	14.1	13.6
2.89°	12.1	10.9	8.5	15.0	14.8	14.2
2.97°	12.5	11.3	8.9	15.5	15.2	14.7
3.00°	12.6	11.5	9.0	14.2	15.4	15.3



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PHOENIX TECHNOLOGY SERVICES

8.00" Atlas 7:8 Lobe 5.9 Stage

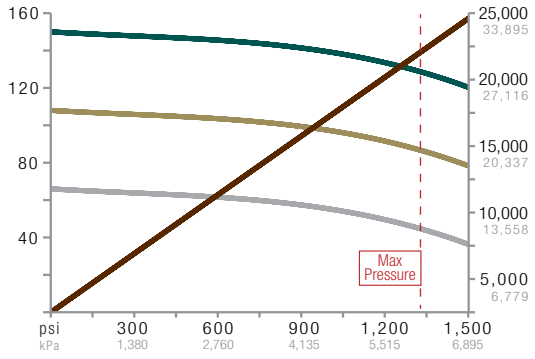
Hard Rubber

Performance Details

Max Diff Pressure	1,330	psi	9,150	kPa
Max Torque	22,020	lb-ft	29,860	N-m
Stall Torque	33,030	lb-ft	44,780	N-m
Flow Range	400–900	gpm	1,514–3,406	L/min
RPM	0.166	rev/gal	0.044	rev/L
Speed Range		66–150 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm	**9.875"** 251mm	**10.625"** 270mm	**12.25"** 311mm
0.39°	-	-	-	1.7	1.9	2.5
0.78°	1.7	0.6	-	3.4	3.6	4.1
1.15°	3.6	2.4	-	5.3	5.2	5.7
1.50°	5.3	4.1	1.7	7.3	8.0	7.9
1.83°	6.9	5.7	3.3	9.1	8.9	8.6
2.12°	8.3	7.2	4.7	10.7	10.5	10.0
2.38°	9.6	8.4	6.0	12.2	11.9	11.4
2.60°	10.6	9.5	7.1	13.4	13.2	12.6
2.77°	11.5	10.3	7.9	14.3	14.1	13.6
2.89°	12.1	10.9	8.5	15.0	14.8	14.2
2.97°	12.5	11.3	8.9	15.5	15.2	14.7
3.00°	12.6	11.5	9.0	14.2	15.4	15.3



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PHOENIX TECHNOLOGY SERVICES

8.25" Atlas 7:8 Lobe 7.0 Stage

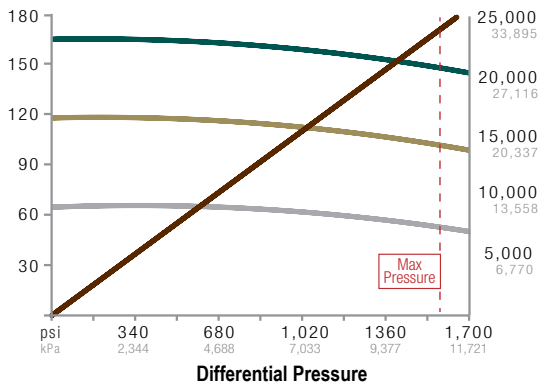
Hard Rubber

Performance Details

Max Diff Pressure	1,580	psi	10,894	kPa
Max Torque	24,130	lb-ft	32,716	N-m
Stall Torque	36,200	lb-ft	49,080	N-m
Flow Range	400–1,000	gpm	1,514–3,785	L/min
RPM	0.166	rev/gal	0.044	rev/L
Speed Range		66–166 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**12.25"** 311m	**14.75"** 375mm	**17.5"** 445mm	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm
0.39°	-	-	-	2.3	3.1	4.0
0.78°	-	-	-	4.0	4.7	5.6
1.15°	1.9	-	-	5.5	6.3	7.2
1.50°	3.5	-	-	7.0	7.7	8.7
1.83°	5.1	1.5	-	8.3	9.1	10.0
2.12°	6.5	2.9	-	9.7	10.3	11.2
2.38°	7.7	4.1	0.2	11.1	11.4	12.3
2.60°	8.7	5.2	1.2	12.3	12.3	13.2
2.77°	9.5	6.0	2.0	13.2	13.0	13.9
2.89°	10.1	6.5	2.6	13.8	13.5	14.4
2.97°	10.5	6.9	3.0	14.2	13.9	14.8
3.00°	10.6	7.1	3.1	14.4	14.0	14.9



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9.00"/9.625"

PHOENIX TECHNOLOGY SERVICES

9.00" Atlas 6:7 Lobe 6.6 Stage

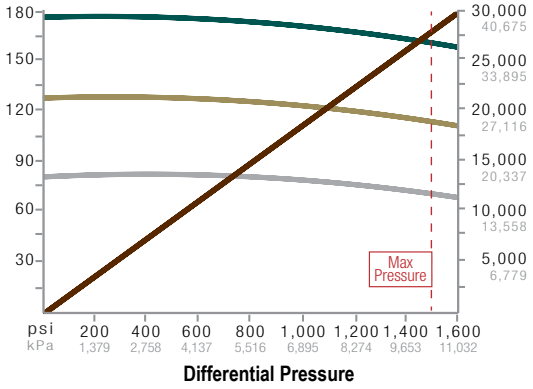
Hard Rubber

Performance Details

Max Diff Pressure	1,490	psi	10,273	kPa
Max Torque	28,340	lb-ft	38,424	N-m
Stall Torque	42,500	lb-ft	57,622	N-m
Flow Range	600–1,300	gpm	2,271–4,921	L/min
RPM	0.135	rev/gal	0.036	rev/L
Speed Range		81–176 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm
0.39°	-	-	-	2.2	3.0	3.4
0.78°	-	-	-	3.8	4.6	5.0
1.15°	1.8	-	-	5.4	6.1	6.6
1.50°	3.5	-	-	6.8	7.6	8.0
1.83°	5.0	1.4	-	8.3	9.0	9.4
2.12°	6.3	2.8	-	9.8	10.2	10.6
2.38°	7.6	4.0	0.1	11.2	11.3	11.7
2.60°	8.6	5.1	1.1	12.3	12.2	12.6
2.77°	9.5	5.9	1.9	13.2	12.9	13.3
2.89°	10.0	6.4	2.5	13.9	13.4	13.8
2.97°	10.4	6.8	2.9	14.3	13.7	14.1
3.00°	10.5	7.0	3.0	14.5	13.8	14.3



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PHOENIX TECHNOLOGY SERVICES

9.00" Atlas 7:8 Lobe 7.0 Stage

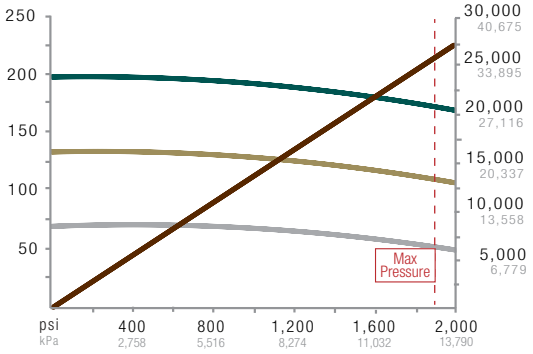
Hard Rubber

Performance Details

Max Diff Pressure	1,902	psi	13,114	kPa
Max Torque	26,204	lb-ft	35,527	N-m
Stall Torque	39,306	lb-ft	53,292	N-m
Flow Range	400–1,100	gpm	1,514–4,164	L/min
RPM	0.18	rev/gal	0.047	rev/L
Speed Range		72–198 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm
0.39°	-	-	-	1.9	2.6	3.5
0.78°	-	-	-	3.5	4.3	5.1
1.15°	1.7	-	-	5.0	5.8	6.6
1.50°	3.4	-	-	6.5	7.2	8.1
1.83°	4.9	1.7	-	8.0	8.6	9.4
2.12°	6.2	3.0	-	9.5	9.8	10.6
2.38°	7.5	4.2	0.8	10.8	10.9	11.7
2.60°	8.5	5.2	1.8	12.0	11.8	12.6
2.77°	9.3	6.0	2.6	12.8	12.5	13.3
2.89°	9.8	6.6	3.2	13.5	13.0	13.8
2.97°	10.2	7.0	3.5	13.9	13.3	14.1
3.00°	10.3	7.1	3.7	14.0	13.4	14.2



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PHOENIX TECHNOLOGY SERVICES

9.00" Atlas 7:8 Lobe 8.4 Stage

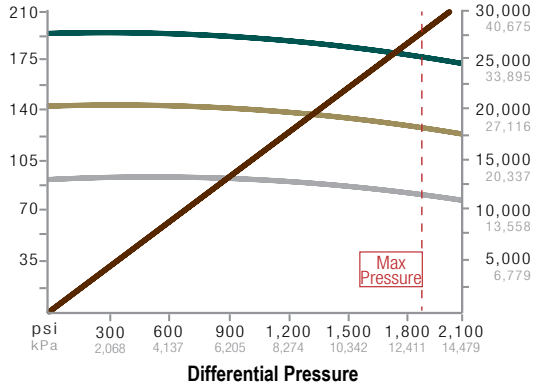
Hard Rubber

Performance Details

Max Diff Pressure	1,890	psi	13,031	kPa
Max Torque	28,280	lb-ft	38,342	N-m
Stall Torque	42,420	lb-ft	57,513	N-m
Flow Range	550–1,150	gpm	2,082–4,353	L/min
RPM	0.17	rev/gal	0.045	rev/L
Speed Range		94–196 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm
0.39°	-	-	-	2.2	3.0	3.4
0.78°	-	-	-	3.8	4.6	5.0
1.15°	1.8	-	-	5.4	6.1	6.6
1.50°	3.5	-	-	6.8	7.6	8.0
1.83°	5.0	1.4	-	8.3	9.0	9.4
2.12°	6.3	2.8	-	9.8	10.2	10.6
2.38°	7.6	4.0	0.1	11.2	11.3	11.7
2.60°	8.6	5.1	1.1	12.3	12.2	12.6
2.77°	9.5	5.9	1.9	13.2	12.9	13.3
2.89°	10.0	6.4	2.5	13.9	13.4	13.8
2.97°	10.4	6.8	2.9	14.3	13.7	14.1
3.00°	10.5	7.0	3.0	14.5	13.8	14.3



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PHOENIX TECHNOLOGY SERVICES

9.00" Atlas 8:9 Lobe 4.0 Stage

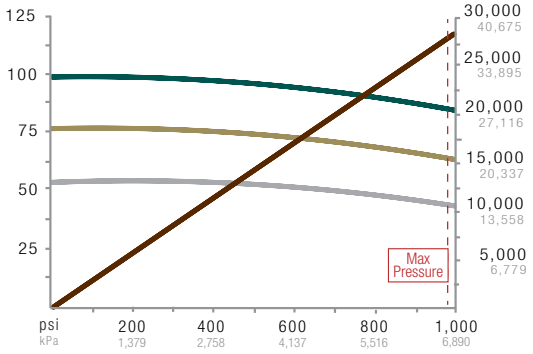
Hard Rubber

Performance Details

Max Diff Pressure	978	psi	6,743	kPa
Max Torque	27,815	lb-ft	37,712	N-m
Stall Torque	41,722	lb-ft	56,567	N-m
Flow Range	600–1,100	gpm	2,271–4,164	L/min
RPM	0.09	rev/gal	0.024	rev/L
Speed Range		54–99 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm
0.39°	-	-	-	1.9	2.6	3.5
0.78°	-	-	-	3.5	4.3	5.1
1.15°	1.7	-	-	5.0	5.8	6.6
1.50°	3.4	-	-	6.5	7.2	8.1
1.83°	4.9	1.7	-	8.0	8.6	9.4
2.12°	6.2	3.0	-	9.5	9.8	10.6
2.38°	7.5	4.2	0.8	10.8	10.9	11.7
2.60°	8.5	5.2	1.8	12.0	11.8	12.6
2.77°	9.3	6.0	2.6	12.8	12.5	13.3
2.89°	9.8	6.6	3.2	13.5	13.0	13.8
2.97°	10.2	7.0	3.5	13.9	13.3	14.1
3.00°	10.3	7.1	3.7	14.0	13.4	14.2



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PHOENIX TECHNOLOGY SERVICES

9.625" Motor 6:7 Lobe 5.0 Stage

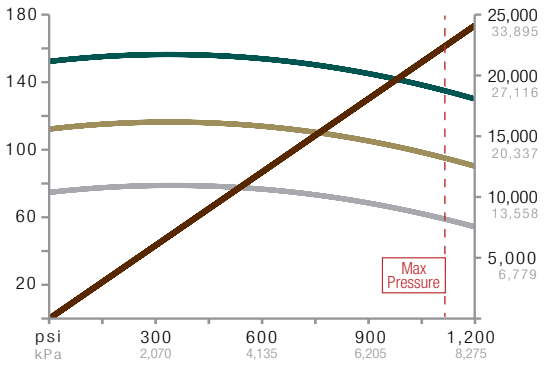
Hard Rubber

Performance Details

Max Diff Pressure	1,130	psi	7,760	kPa
Max Torque	22,840	lb-ft	30,970	N-m
Stall Torque	34,260	lb-ft	46,460	N-m
Flow Range	600–1,200	gpm	2,271–4,542	
RPM	0.127		0.034	rev/L
Speed Range		78–156 rpm		

Predicted Build Rates (Adj.) - Degrees/100ft (30m)

	SLICK			SINGLE STABILIZER		
	Hole Size			Hole Size		
Bend Setting	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm	**12.25"** 311mm	**14.75"** 375mm	**17.5"** 445mm
0.39°	1.0	1.0	1.0	2.4	3.2	4.0
0.78°	2.1	2.0	1.9	4.2	4.9	5.6
1.15°	3.2	3.0	2.8	5.9	6.6	7.2
1.50°	5.0	3.9	3.7	7.5	8.1	8.7
1.83°	6.8	4.7	4.5	9.0	9.6	10.1
2.12°	8.3	5.4	5.2	10.3	10.9	11.4
2.38°	9.7	6.2	5.9	11.5	12.0	12.5
2.60°	10.9	7.3	6.4	12.5	13.0	13.4
2.77°	11.8	8.2	6.8	13.3	13.8	14.2
2.89°	12.4	8.8	7.1	13.9	14.3	14.7
2.97°	12.9	9.2	7.3	14.2	14.7	15.0
3.00°	13.0	9.3	7.4	14.4	14.8	15.1



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