MM AKSHELLS INC.

SERVICE&QUALITY

MM AKSHELLS INC.

Mud Pump Parts Catalog

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MM AKSHELLS Mud Pump Parts List

Triplex Mud Pumps Manufacturers and Brands			
NATIONAL	**GD**	**EMSCO**	**OILWELL**
7P50	PAH-275	F350/500/650	A350PT
8P80	PZ-7	F800	A560/600PT
9P100	PZ-8	F1000	A850PT
10P130	PZ-9	FB1300	A100PT
12P160	PZ-10	FB1600	A1400PT
14P220	PZ-11	FC2200	A1700PT
IDECO	**DRILLMEC**	**WEATHERFORD**	**BOMCO**
T500	7TS600	MP-5	F500
T800	9T800	MP-8	F800/F1000
T1000	9T1000	MP-10	F1300
T1300	12T1600	MP-13/16	F1600
T1600	14T2200	E-447	F1600HL
		E-2200	F2200HL
TSC	**LEWCO**	**AMERICAN BLOCK**	**EWECO**
WF-400	W-440	K-800	E-447
WF-700	W-446	K-1000	E-600
WF-1300	WH-1312	K-1300	E-800
WF-1600	WH-1612	K-1600	E-1100
WF-2000	W-1712		E-1300
WF-2200	W-2214/W-2215		E-1600
HONGHUA	**LS NOV**	**WIRTH**	**Rongsheng**
F500	3NB500C	TPK-1000	W440/446
F800	3NB800C	TPK-1600	F500
F1000	3NB1000C	TPK-2000	F800
F1300	3NB1300C	TPK-2200	F1000
F1600	3NB1600		F1600L
F1600HL/F2200HL	F-1600/F-1600L		
Other Mud pumps and Parts brands: Southwest, Mud King, Baker, Texma, Skytop, RG, Ellis Williams, Brewster			
Disclaimer: MM AKSHELLS Inc. is in no way affiliated with any of the reference manufacturers and company names and Brands and /or part numbers are for reference purposes only.			

Liners

MM chrome alloy sleeved liners, hardened liners, hardened / chrome plated liners and Zirconia liners. MM also supplies genuine U.S. made rubber and urethane liner seals. All our liner products are exchangeable with OEM products and meet or exceed API-7K standards.
All our liners are made with a high strength forged steel shell machined to fit triplex pumps and fitted with high pressure lip sleeve. The liner is precision machined to exact tolerances to keep the liner concentric. The sleeve is manufactured to the bore tolerances specified by API to provide longer life by reducing gaps between the liner bore and piston.

Zirconia Liner

MM's zirconia liner offers lifetime cost savings, significantly longer service, and better performance. and safer operation than those made of more commonly used alumina ceramic. MM's zirconia liner is a proprietary Zirconium-based matrix that has significantly improved mechanical characteristics.
◎ Zirconia has three important property advantages compared to alumina.
◎ Zirconia exhibits better impact strength.

◎ Zirconia is harder than alumina.

◎ Zirconia can be honed to finer surface than alumina.
Finished to 4 RMS,

◎Zirconia liners - provide a surface finish that's three to four times finer than alumina.

◎ Rated for all drilling operations up to 7500 PSI

◎ Bore hardness of 92-94 Rockwell

◎ ID tolerances of +.010”/ -.000”

◎ Surface finish of 4 - 8 RMS

◎ Hardness i s HV 0.3 kg/mm – 1100/1200 (92 - 94 Rc)

◎ High pressure design to prevent slippage

◎ Liner sizes are available from 4½” to 7” for all popular mud pump

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High Chrome Sleeve Liner

The outer hull, or body, of the liner is a high strength forging. MM uses forgings exclusively to ensure the consistent quality. The sleeves are centrifugally cast in the MM facilities by skilled craftsmen. It has the maximum amount of chrome for the base metal and MM adds molybdenum to increase the hardness depth. The sleeve is then inserted into the hull at a tightness that exceeds its counterparts. The liner is rated to match the pressure rating of the pump per liner size.

-Rated for all drilling operations up to 5,000 PSI and 7500 PSI
-Bore hardness is 62 - 69 Rockwell
-Plip design to prevent inner sleeve slippage
-Extremely long service life

Chrome Plated Liner

MM chrome plates the same outer hull in lieu of sleeve to a maximum thickness. It is then machined and polished it into a mirror.

Features:

• Single high strength forged steel hull construction.

• Optional chrome plating to reach hardness of 62 RC. Corrosion resistance, free deformation.

Pistons

MM Pistons are made to precise tolerances and include a variety of materials yielding extended service life.
Piston materials include the following from 3” to 7-1/2” sizes to accommodate for all types of drilling conditions, mud properties and temperatures reaching up to 350°F.

MM provides a full range of mud pump pistons for both triplex and duplex pumps.

Replaceable Rubber Piston
Long Life Urethane Bonded Piston
High Temperature Bonded Piston
Bullnose Piston
Flex Lip Piston

Features:

Rated for all drilling operations
High tensile strength
Maximum operating temperature is 350°F
High pressure mud pump service
Extended service life

Urethane Bonded Piston

These pistons are constructed of urethane, bonded to a solid metal hub. Double durometer urethane is designed to provide optimum performance in oil base or water base mud and high drilling pressures.

Features:

- Rated for all drilling operations
- Maximum operating temperature is 180°F
- High pressure mud pump service
- Extended service

MM AKSHELLS Mud Pump Parts List

Replaceable Rubber Piston

MM's replaceable rubber pistons are made with nitrile rubber to resist extrusion and abrasion. These pistons are fully interchangeable with most other manufacturers' products. Available sizes are from 3" through 7½" and series are A, B, K and L. If flange is not worn past these marks, rubber kit can be installed.

Fabric anti-extrusion devices reduce extrusion of the rubber even at maximum pressure rating.

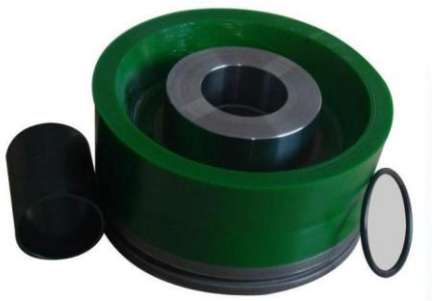
Features:

- High tensile strength
- Rated for all drilling operations
- Maximum operating temperature is 250°F
- Extended service life

Green Duo piston

The Green Duo piston is a bonded dual durometer piston that is highly resistant to abrasion and tear. The bonded Construction resists extrusion under pressure and restricts movement to reduce the build-up of heat.

The Green Duo piston is recommended for systems with oil or synthetic based mud. It is also recommended for water-based muds when weighs 11 lbs./gal or over. The Green Duo piston is not recommended for clear water or seawater pumping due to the lack of lubricity of these fluids. As in all urethane pistons, the backflush requirement is recommended at 14 gal/min or greater for each piston.



Features:

-Temperature resistance up to 180℉ (82℃)

-Can be operated in pressures up to 6300 psi

-Backflush requirement is 14 gal/min or greater for each piston

-Not recommended for clear water or seawater pumping due to lack of lubricity of these fluids

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Blue Lightning Piston

The Blue Lightning piston is manufactured from an engineered elastomeric compound that delivers excellent resistance to tear, abrasion and extrusion while maintaining high mechanical properties. A unique anti-extrusion feature, coupled with a premium elastomer, improves service life while

Anti-Extrusion Feature

The anti-extrusion feature is a significant feature of the Blue Lightning. Manufactured from a proprietary bearing material that expands upon installation, this feature reduces friction by reducing or eliminating contact between the steel piston body and the liner wall. Additional benefits include reduced extrusion of the urethane and dramatically increased run times, even in pressures above 5000 psi. The bearing even reduces liner wear and liner damage over other piston designs. The Blue Lightning can be operated under pressures of up to 7500 psi.

White Lightning bonded piston

Bonded polyurethane piston designed for operation in extreme drilling environments.

White Lightning bonded piston is manufactured from an engineered elastomeric compound that delivers excellent resistance to tear, abrasion, chemical attacks and extrusion while maintaining high mechanical properties.

Features/Benefits

- Increased run times up to 7500 PSI
- Consistent run times
- Reduced cost per operating hour
- Reduced maintenance and downtime
- Flex Lip design for decreased liner wear

Elastomer compound which provides:

Increased resistance to water, oil, and aggressive synthetic drilling fluids

Temperature resistance up to 230o F (110 o C)

Increased abrasion and particle embedment resistance

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Bull nose Piston

Manufactured from highly engineered urethane homogenous compound, Bull nose Piston outperforms all other polyurethane pistons on today's market. The compound provides superior resistance to tears, abrasion, and extrusion, and is capable of operating in fluid temperature from -20°F up to 225°F. It is compatible with water, oil and synthetic designed piston head is composed of two different urethanes compounds bonded together for superior performance.

Features:

- The piston body, while made of high strength alloy steel, is compatible with existing piston rods
- Resistant to high pressure, abrasion, heat and extrusion
- Averages 30%+ longer life than offer mud pump pistons
- Dual-durometer bonded urethane allows for longer piston life
- "Bull nose" lip design provides better sealing to reduce flush system contamination

Bull nose Extreme Piston

Designed to perform in the harshest of drilling conditions, its oil-resistant high-temperature premium urethane homogenous compound has excellent abrasion resistance, low friction surface, and high tensile strengths. It is compatible with all applications and mud types and will withstand operating temperatures from -20°F up to 350°F with pressures up to 7500psi. Superior design and ultra-durable quality adds value through increased run times in extreme conditions, reduced maintenance, and reduced cost per pumping hour.

Features:

- Wide Temperature Range, -20°F to 350°F, 7500 psi.
- "Bull nose" lip design provides better sealing to reduce flush system contamination
- Fully compatible with all types of drilling and mud during any point of the drilling process

Valves & Seats

MM manufactures a wide variety of valves and seats, for the following applications, among others: workover pumps; high pressure well service fracturing pumps; cementing pumps; and mud pumps.

Cross Arms/4-Web Valve & Seat

The Cross Arms Valve is a 4-Web Center Guided Valve System. This Valve has a replaceable Insert that is retained by a screw on plate with hammer lugs. Available in heavy duty standard temperature and high temperature versions. Oxide coated to fight corrosion while in storage. Available with standard API seats and “modified” API seats.

Design Benefits:

Large metal-to-metal seat bearing area, longer wear life for metal wear areas

4-Web Seat Design Maximizes Bearing Area and makes Seat Pulling easier

This stem guided valve and seat assembly weightless and provides reasonable value at an economical price.

Operating Temperature:

Standard Insert – Temperature Up to 160°F (71°C)

High temperature (HC) Insert - 200°F (93°C)

Bonded Valve

MM introduces a new and improved full open valve with bonded insert. The bonded valve has replaced the slip-on insert to provide a tighter fit. This design is permanently bonded to the valve body. This reduces the tendency for fluids to penetrate between the polyurethane insert and the valve body; preventing failure. This bonded polyurethane insert is also used to minimize shock when the valve closes.

Design benefits:

High tensile strength

Enhanced Sealing Capabilities

Improved Shock Absorption

Premature sealing failure prevention

Double Angle Valve

The Double Angle Valve is a 3-Web Center Guided Valve System. This Valve has a replaceable “Snap-In” Insert, available in standard temperature and high temperature versions. Oxide coated to fight corrosion while in storage. Available with standard API seat and “modified” API seats.

Design Benefits:

Large metal-to-metal seat bearing area, longer wear life for metal wear areas.

3-web seat design maximizes bearing area and makes seat puller easier.

Lightweight design for stable operation at high pump speeds.

Operating Temperatures:

Standard Insert – Temperature Up to 160°F (71°C)

High temperature (HC) Insert - 200°F (93°C)

MM AKSHELLS Mud Pump Parts List

Full Open Mud Pump Valves & Seats

Made Strong to Last Long

The Heavy-Duty Valve is a bonded urethane valve that will hold up to the most hostile drilling environment.
The HD Valves will withstand High Pressure, High Temperature and High Solids.

Superior Performance, Long Run Life, Excellent Abrasion Resistance and Sealing Surface coupled with the highest rated Chemically resistant urethane makes the HD Valve an excellent choice for any drilling application.

Features:

- Unique urethane bonding anchor
- Reliable with the highest quality control
- High Temperature Urethane
- Excellent extrusion and abrasion resistance
- The strongest urethane bond of any valve for increased service life

- Excellent chemical resistance
- 7500+ psi rated
- 300°F rated urethane
- Carburized and heat treated

MM AKSHELLS Mud Pump Parts List

Southwest ND Style Valve

The ND (Roughneck Style) Valve is a full open type of valve that is fully interchangeable with Roughneck valves and seats. The full open design of seat promotes loading of the seat deck in the fluid end module. This valve is available with a standard polyurethane insert or a high temperature insert (add “HC” to the end of the valve part number.

Design benefits include:

Two piece welded design is better for high pumping speeds.

Balanced insert and seat area for better sealing & loading characteristics

Standard Insert – Temperature Up to 160°F (71°C) with Max Pressure of 7500 PSI High

Temp. (HC) Insert - Temperature 300°F (149°C) with Max Pressure of 7500 PSI

Well Service Pump Valve

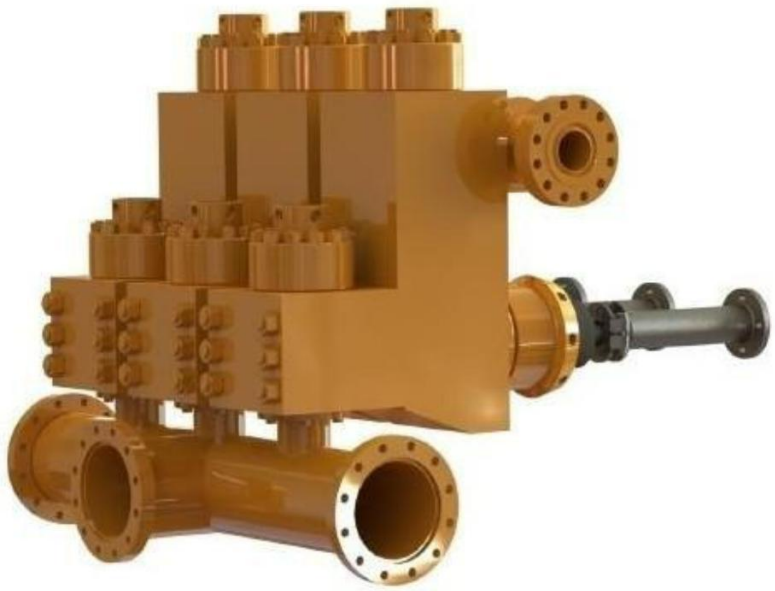
SPM Well Service Pump Valve is designed for maximum flow characteristics. SPM Well Service Pump Valve combines the strength of a forged alloy steel upper body with precision casting to minimize flow restriction and fluid turbulence.

- Low cost and superior performance
- Increased resistance to abrasion and extrusion

Fluid End Modules

MM's high-strength, triple reduction, forged steel triplex fluid end modules are made from 4135 alloy steel, heat treated for a long working life, machined to perfection and packaged for delivery with anti-corrosion protection. The precision-made jewelry, like the exterior finish, reflects the superior quality inside.

Features:
Completely interchangeable with OEM forged alloy steel.
Made on CNC boring mills.
Strict computer-controlled heat treat Procedures.
Rigid inspection.
Rated for all drilling operations up to 7,500 psi.



MM offers a complete line of interchangeable fluid end modules and accessories for triplex mud pumps. Fluid ends and components are interchangeable to OEM such as National, Emsco, Gardner Denver, Bomco, Ideco,Weatherford, Drillmec, Ewco, Honghua,Rongsheng, LS-NOW, Wirth and Oilwell. We offer both standard OEM style replacement parts and Two piece “L” Shaped fluid ends. Manufactured to the highest quality, our products offer the best performance and durability. 5000psi & 7500psi available.

MM AKSHELLS Mud Pump Parts List

Part Number List for Popular Model Pumps

Continental Emsco F-800 / 1000	6999-0086-02	6999-0087-02
Continental Emsco FB-1300 / 1600	6316-0357-00	6316-0356-00
Gardner Denver TEE	200PJH029B	200PJH029B-NS
Gardner Denver PAH	200PJH029B	200PJH029B-NS
Gardner Denver PZ-7/8/9	205PZL029D	205PZL029D-NS
Gardner Denver PZ-10/11	202PZL029B	202PZL029B-NS
Ideco T-800 / 1000	551-458	551-458-NS
Ideco T-1000 / 1300	551-122-01	551-122-01-NS
Oilwell A-850-PT / A-1100-PT	10300181	10300181 NS
Oilwell A-1400-PT / A-1700-PT	10300181	10300181 NS
National 8-P-80 Discharge	1291280	1291281
National 8-P-80 Suction	1290338	1290339
National 9-P-100 Discharge	1293240	1293241
National 9-P-100 Suction	1290338	1290339
National 10-P-130 Discharge	1290335	1290336
National 10-P-130 Suction	1290338	1290339
National 12-P-160 Discharge	1292240	1292241
National 12-P-160 Suction	1292243	1292244
National 14-P-220 Discharge	1295601	1295602
National 14-P-220 Suction	1295604	1295603

The Material Properties of the Module

AISI 4130 LOW ALLOY STEEL FORGING API 6A 90K

I. Forgings shall comply with ASTM A 322, Grade 4130 and ASTM A 788 general requirements for steel forgings

II. Chemical Composition

Element	Weight Percent
Carbon (C)	0.28 – 0.33
Manganese (Mn)	0.40 – 0.80
Phosphorus (P)	0.025 Maximum
Sulfur (S)	0.025 Maximum
Silicon (Si)	0.15 – 0.35
Copper (Cu)	0.35 Maximum
Nickel (Ni)	0.50 Maximum
Chromium (Cr)	0.80 to 1.10
Molybdenum (Mo)	0.15 – 0.25
Vanadium (V)	0.03 Maximum
Aluminum (Al)	0.05 Maximum
Iron (Fe)	Base

III. Heat Treatment

A. Heat treatment shall conform to specifications required by latest revision of API 6A.

B. Required Mechanical Properties

Tensile Strength	110,000 psi (758 MPa) Minimum
Yield Strength, 0.2% Offset	90,000 psi (621 MPa) Minimum
Elongation, 2 inches	18 % Minimum
Reduction of Area	35 % Minimum
Hardness Range	229 – 255 HBN
Charpy Impact Test Temperature	-20°F (-29°C)
Charpy Absorbed Energy	20 Flt.Lts.. (27 J) Minimum Average
Longitudinal Direction 10 mm x 10 mm x 55 mm	14 Flt.Lts.. (19 J) Single Minimum

IV. Material Testing and Traceability

a. Material Test Report required
b. Tests to be performed in accordance with ASTM A 370
c. Ultrasonic examination to be performed per ASTM A 388 on each forging
d. Forging to be free of cracks, voids, laminations, or other defects
e. Heat identification number to be steel impression stamped on each forging, see Forge Drawing for location

“L” Shape Module for 7500 PSI Purpose

The market demand for 7500 psi land drilling has continued to increase and is forecasted to remain strong as drillers and operators seek to complete wells faster and more efficiently. MM has the expertise and ability to convert existing 5000 psi pump systems with our 7500-psi fluid end upgrade. In addition to replacing the existing valve-over-valve module with our proven L-Shaped design, a typical conversion also includes an upgraded liner retainer system, discharge cross/ strainer, high-pressure discharge manifold and 7500 psi pulsation dampener.

These modules create added value for contractors and operators by increasing the operating range of existing mud pump

Features/Benefits:

Maximum rated working pressure: 7500 psi
Individually forged, heat-treated alloy steel
Greater resistance to cracking, longer life
Hydro-statically tested and autofrettage for material integrity
Direct replacement for the current 7500 psi wide body module (same outside dimensions and same external and internal components except valve cover, bore seal and Falcon Spring retainer)

Available 7500 P.S.I. Models include:

- BOMCO F1600
- EMSCO FB1600
- GARDNER DENVER PZ11
- HH F1600
- NATIONAL 12P160
- OILWELL A1700PT
- IDECO T1600

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Fluid End Components

All modules and fluid end components offered are of high-strength, MM alloy steel, heat treated for a long working life and machined to precise tolerances. Each product is rated for all drilling operations up to 7500 PSI.

MM's module accessories offer full lines of cylinder heads, valve lock covers, cylinder head threaded rings, Cylinder head plugs, valve cover plugs, upper valve guides.
lower valve guides, liner threaded rings, liner locks, wear plates
and much more. The parts are precisely made to meet or exceed API-7K standards, and they are 100% exchangeable with OEM parts of all major pump models. Associated items include:

- Suction and Discharge modules
- Valve and Cylinder head plugs
- Valve and Cylinder head thread rings
- Valve and Cylinder head locks
- Valve guides
- Studs and nuts
- Strainers
- Rods, Piston, Extension, Sub
- Wear Plates
- Rod Clamps
- Gaskets
- Discharge Manifold
- Pulsation Dampener
- Safety/ Relief Valve
- Suction Manifold