Operation & Maintenance Manual
Model 2100 HDD Pump

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Weatherford Safety Instructions

- Do not perform any operation, maintenance, or lubrication of this equipment until you have read and understood the information provided to you in this manual and any additional information provided by the manufacture of the equipment the pump was supplied with. If you have any questions please contact Weatherford (281) 449-1383.
- Never attempt a service procedure until you are certain all pressure has been removed from the pump and the drive is disengaged and locked out.
- Never operate the pump without a relief valve, rupture disk, or other type of overpressure safety device properly installed.
- Never exceed the rated pressure or speed of the pump for any reason.
- Never operate the pump without proper guards in place for all moving parts.
- Use caution when solvents are used to clean or degrease equipment. Most solvents are highly flammable.

Weatherford cannot anticipate every possible circumstance that might involve a potential hazard, therefore the warnings listed in this publication are not inclusive. As the user, you must decide if a particular operating mode, repair technique, or tool is safe before performing or using. Contact Weatherford or your Weatherford equipment dealer for the most complete and current information before starting any repair job. Contact Weatherford any time if you are unsure about any procedure involving Weatherford equipment.

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General Features

The Weatherford 2100HDD piston pump is specially designed for horizontal drilling service. The 2100HDD pump is equipped with a carbon steel forged fluid end and a forged steel crankshaft for added strength and load carrying capacity. Weatherford HDD pumps come standard with high performance rubber pistons, steel hardened liners and abrasion resistant API mud valves. Optional expendables are also available to meet your specific mud pumping needs.

Weatherford supplies many different types of drive connections. Weatherford HDD pumps come standard with a key way crankshaft and can be driven by an engine, electric motor or hydraulic motor. Many HDD pump models have optional drive connections that allow the hydraulic motors to be directly coupled to the pump frame to save space and weight. Some hydraulic motor drives incorporate an external gear reduction system. If your pump is equipped with an external gear reducer, consult the manufacturer for information about operation, service, and maintenance procedures required for the equipment. Weatherford HDD pumps do not share common oil reservoirs with gear reducers.

Weatherford does not provide complete liner wash systems for the HDD pump series however every Weatherford HDD pump does come equipped with a liner wash manifold and connections to install the complete liner wash system. OEMs are expected to furnish the complete liner wash system. Each liner wash system is different, but all incorporate a re-circulation tank, circulation pump, and an assortment of hoses, tubing and nozzles that direct the wash stream to the back of the piston. Once the wash water has been sprayed on the piston, drain piping collects it and transfers it back to the supply tank.

The purpose of the liner wash is to provide a small amount of water to the back of the piston during operation to cool and lubricate the piston. Without this wash water, friction between the piston and liner generates excessive heat that can cause premature failure of the piston. Never operate your pump without a clean supply of liner wash water to each of the three pistons.

Suction System Information

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Weatherford pumps require a minimum Net Positive Suction Head (NPSH) for proper operation. The calculation of NPSH available for a specific pump system is a function of pump size, speed, fluid temperature, suction pump diameter and length, and a host of other factors. Weatherford has provided some general guidelines that will work in the majority of installations.

Weatherford recommends that suction pipe be as short and directly routed from the source as possible. Always use suction piping at least one pipe size larger than the pump inlet. Use caution with flexible (fire) type hoses that can kink and restrict flow area. Weatherford also recommends that a booster pump be used on all 2100HDD pump installations. The booster pump should be sized to provide between 20-50 psi AT THE PUMP INLET CONNECTION PORT UNDER ALL OPERATING CONDITIONS AND SPEEDS.

Storage Procedure

Weatherford pumps come from the factory prepared for storage periods of up to six (6) months in proper environmental conditions. Indoor storage in a dry, temperature-controlled location is always recommended. If pumps are to be stored short term (less than six (6) months) in a severe environment, they should be prepared using the procedures outlined in the "Short Term Storage For Severe Environments" section below. If the pump is to be stored, or is inactive, for periods in excess of six (6) months, it is necessary to prepare the pump as outlined in the "Long Term Storage" section.

Short Term Storage

If the pump is stored in an indoor, temperature controlled environment for less than six (6) months, no special steps are required to prepare it for storage. As a general rule, pumps in corrosive fluid applications should drain fluid end, flush with water or other suitable rust preventative, and blow dry using compressed air whenever idle for periods in excess of one (1) week. In severe environments drain any fluid from pump and spray the inside of both the fluid cylinder and power end with a coat of preservative oil. Plug both the suction discharge ports of the fluid cylinder and place a weather resistant covering over the pump.

Long Term Storage

Long-term storage is defined as any period when the pump is in storage or idle for periods in excess of six (6) months. Remove the piston cup seals and store them in a separate location with a controlled environment where they are protected from UV exposure. If the pump has been in service, flush the fluid end with water to clean out any of the remaining drilling mud then blow the fluid end dry using compressed air. Drain any remaining oil from the pump power end, then remove the power end cover to expose the drive components.

Never store the pump on the floor or ground. Always place it on a shelf or pallet that is several inches above ground level. Cover the entire pump with a canvas or plastic tarp. Periodically inspect the unit and rotate the crankshaft by hand several turns during each inspection. Drain and replace the rust inhibitor after every six (6) months of storage. Before operating the pump, drain the preservative and lubricating oil mixture from the power end. Reinstall the appropriate plugs, caps, and piston cup seals, and any other components that were removed for storage. Once these steps have been completed, fill with oil and follow normal start-up procedures.

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Precautions during Freezing Weather Conditions

Freezing weather can cause problems for equipment when pumping water-based fluids that expand in volume when changing from a liquid to a frozen solid state. For example, when water is left in a pump fluid end and exposed to freezing temperatures, the expansion of the water as it freezes can rupture the fluid cylinder of the pump and cause permanent equipment damage or personal injury.

Whenever the pump is stored or idle in conditions that are near or below freezing, any water-based fluids should be removed from the pump. The best way to do this is to run the pump for a few seconds with the suction and discharge lines disconnected or open to atmosphere. If possible, lift up the suction valve seats to insure that all fluid is drained from the pumping chamber between the suction and discharge valves. As an alternative to the previous procedure, a compatible antifreeze solution can be re-circulated through the fluid end. RV antifreeze, propylene glycol, is often used for this purpose.

Lubrication Requirements

Weatherford pumps are supplied without oil in the crankcase and must be filled with oil prior to startup. The Weatherford 2165HDD pump requires 7.5 gallons (28.4 liters) of oil.

TYPICAL CHARACTERISTICS: The physical and chemical characteristics of this oil are shown below. These Oils are premium quality, lead free, heavy-duty industrial gear lubricants. Additives are included to provide extreme pressure and anti-wear characteristics, rust and corrosion protection, increased oxidation stability, and improved resistance to foaming and excellent high load performance.

Approved Lubricants

CHARACTERISTICS	MOBIL GEAR OIL 630	EXXON SPARTON EP 220	TEXACO MEROPA 220	SHELL OMALA 220	CHEVERON NL - GEAR LUBE 220
GRAVITY - F API	26.5	24.1	26.2	25-27	26.0
SPECIFIC GRAVITY	0.896	0.894	---	---	---
POUR POINT - F (C)	0 (-18)	0	0	0	0
FLASH POINT - F (C)	425 (218)	415	450	425	440
VISCOSITY	---	---	---	---	---
SUS at 100 F (37.8 C)	1045/1165	1166	1080	950/1050	1050
SUS at 100 F (37.8 C)	92	88.2	90	89/95	104
CST at 40 C	198/220	220	220	205/227	198/220
CST at 100 C	18.0	17.0	17.5	17.4/19.2	18.0
VISCOSITY INDEX	95	90	92	98	95- MIN.
COLOR ASTM	7.0	7.0	---	5.5/ 7.0	8+
CHANNEL POINT- of (C)	-25 (-32)	25	---	---	---
RUST - ASTM D 665	PASS	PASS	PASS	PASS	PASS
TIMKIN OK LOAD – LB. , ASTM D 2782	70	60	60	60	60
US STEEL EXTRA- DUTY GEAR OIL NO. 222	PASS	PASS	PASS	PASS	PASS
US STEEL EXTRA- DUTY GEAR OIL NO. 224	PASS	PASS	PASS	PASS	PASS
EZG TEST- NO. STAGES PASSED	13	11	11	11	11
ISO / ASTM VISCOSITY GRADE (VG) C	220	220	---	---	---
AGMA LUBRICANT NO.	5 EP	5 EP	5 EP	5 EP	5 EP

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Service Procedures

Weatherford pumps are designed to simplify all required maintenance. In addition to maintaining clean crankcase oil at the proper level, the pistons, valves, and oil seals are all normal expendable items that will eventually wear out and require replacement. This section covers all normal service procedures on the fluid end of the pump. Weatherford drive ends do not require routine maintenance and overhaul procedures may require special tools, equipment, or training. If you suspect your pump requires drive end service, contact Weatherford or your equipment dealer for assistance.

Replacing Piston Cup Seals and Liners

Pistons should be replaced whenever leakage increases to the point it becomes a steady stream, not individual drops. For maximum uptime between service, Weatherford always recommends that users replace all three pistons when service is required, not just the one that shows signs of leakage.

- Pump several gallons of clean water through the pump before service to remove the majority of mud or polymer from the fluid end components.
- Bleed of all pressure inside pump fluid end. Shut valve on inlet piping if provided to prevent flow of liquid into the pump during service.
- Remove cradle cover to expose the pistons and cylinder liners. If a liner wash system is installed on your pump, remove any piping or nozzles that might interfere with removal of the piston cylinders.
- Use a socket wrench to remove the front valve cover plate hex nuts (35), then remove the front valve cover plate (18).
- Slowly rotate the pump crankshaft at least one complete revolution until one piston is fully forward (5) in its cylinder/liner. Remove the piston rod clamp & nuts (not shown) from the intermediate piston rod (6). Rotate the pump crankshaft till the intermediate piston rod is fully back (towards the power end of the pump). This will provide working clearance for the removal of the piston seal assembly.
- First by hand, pull the piston rod (1) and piston seal assembly back through the cylinder/liner, in the direction towards the power end. If the piston rod and piston seal assembly back out easily, remove the assemblies to a workbench for inspection and repair. If the piston rod and piston assembly can not be removed by hand, remove the piston hub nut (7) from the piston seal assembly and back out the piston rod by hand or Insert a wooden dowel rod (or pipe with padded contact edge) through the front valve cover plate port and with a mallet and tap the piston rod (1) through the cylinder/liner until it can be removed from the back of the cylinder/liner by hand. Then, Insert a wooden dowel rod (or pipe with padded contact edge) through the front valve cover plate port and with a mallet tap the piston seal assembly (5) till the piston seal assembly falls out through the back of the cylinder/liner. Repeat this procedure to remove the remaining two piston assemblies.
- Once the piston seal assemblies are removed, use Weatherford's liner gland removal tool #0364074 to remove the liner gland (3). Once the liner gland is removed, with a firm grip, back out the cylinder/liner by hand. Take all components to a workbench for further inspection.

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- Inspect the ID of the cylinder/liner and make sure the surface is smooth and free of grooves or other defects caused by excessive wear. Replace the liner square seal (9) and cylinder/liners (4) if necessary. Take care to REPLACE all 3 piston seal assemblies (5) and 3 piston rod seals (2), and any other components that are worn or damaged from excessive wear, to insure maximum service life of pump and pump expendables.
- When old and worn parts have been replaced, re-assemble new piston seal assembly (5) onto the piston rod (1) and tighten down the piston hub nut (7). Press piston rod w/ piston seal assembly into the loose cylinder/liner. Lubricating the piston seal will make the installation process easier.
- Install cylinder/liner with components inside into the piston liner holder and tighten the liner gland with Weatherford's liner gland tool #0364074. Rotate crankshaft and move the piston rod appropriately so that the piston clamp assembly can be fastened. Repeat this process with all 3 cylinder/liners.

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Replacing Standard API Valves

Valves require replacement whenever pump pulsations levels begin to increase resulting in rough, erratic operation. Inability to maintain proper discharge pressure is another sign that valves have worn to the point where they require replacement. For maximum pump performance, Weatherford recommends that all 6 complete valve assemblies be replaced whenever this service is performed, not just the valve (or components of the valve) that show visible signs of damage.

- Pump several gallons of clean water through the pump before service to remove the majority of mud or polymer from the fluid end components.
- Bleed of all pressure inside pump fluid end. Shut valve on inlet piping if provided to prevent flow of liquid into the pump during service.
- Remove both the top valve cover plates (12) and front valve cover plates (18), and the suction manifold plugs (21). By hand remove the discharge valves from the discharge valve seats. Insert Weatherford valve removal tool #0364070 to remove the discharge valve seats from the pump. To remove suction valves, insert a hollow pipe through the bottom of the suction manifold plug ports so that the pipe comes in contact with the bottom of the valve seat (NOT VALVE STEM). Tap on pipe till the suction valve becomes loose then remove suction valve by hand, through the front valve cover plate port.
- The suction valve can also be removed by removing the suction valve from the suction valve seat, then inserting the API valve removal tool through the top valve cover plate port. By inserting a socket wrench through both the suction manifold plug port (to secure the jam nuts on the valve stem) and top valve cover plate port, the valve can be loosened by turning the socket wrench counter clockwise through the top valve cover plate port.
- When installing new valves be sure to replace both top valve cover cap o-ring (29) and front valve cover cap o-ring (33) with NEW o-rings, and press valve seats into fluid end until there is a tight fit.

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Replacing Abrasion Resistant (AR) Valves

Weatherford abrasive service (AR) valves are secured to the fluid cylinder using a locking taper mechanism. A standard AR valve puller kit is required for the proper removal and replacement of these valves. This kit is available from Weatherford. Contact Weatherford or your equipment reseller for this part if required.

- Use a 1-1/2” socket wrench on the hex of the valve cage tool to unscrew and remove the valve cage.
- After the cage has been removed, lift the valve spring and valve out through the top valve cover plate port (for discharge valve) and front valve cover plate (for suction valve).
- The Weatherford valve puller tool must now be used to pull the discharge valve seat free of the fluid cylinder.

Weatherford Pump Warranty

Except as otherwise provided herein and subject to the limitations and conditions herein, Weatherford Artificial Lift Systems (WALS) warrants its products and services to be free from defects in workmanship and material under normal use and service for a period of one year from the date of shipment of the product, or one year from the performance of the service. NO OTHER WARRANTY EXPRESSED OR IMPLIED IS MADE AND ALL OTHER WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PURPOSE ARE HEREBY EXCLUDED. WALS obligations under this warranty shall be limited to repairing, replacing or issuing credit for, at Weatherford's option, ex-factory, any product or parts it finds to be defective in material or workmanship. The above shall be the customer's exclusive remedy with respect to products covered; in no event will WALS be liable for incidental, consequential, special or other damages of any nature.

Warranties will not apply and be void if the product or service has been subject to or suffered misuse, negligence, abuse, neglect, accident, or has not been installed or operated or repaired in accordance with applicable published instructions or has been installed in or operated under more severe conditions than those specified for the particular product or service or has been altered so as to affect its ability or reliability (except where such alteration has been accomplished with the prior written consent of WALS). Products sold by WALS, but manufactured by another company, will carry only the warranty of the manufacturer, and the customer will rely solely on that warranty. The liability of WALS for any loss or damage resulting to the customer or user or any third party from any defect in any product or service will not, in any case, exceed the selling price which WALS received from the customer for that product or service.

WALS does not warrant that any of the products sold by it, if used or sold in combination with other equipment or used in the practice of methods or processes, will not, by virtue of such combination or use, infringe patents of others and WALS shall not be liable for any patent infringement arising from, or by reason of, any such use or sale. Furthermore, WALS shall not be liable for any patent infringement arising from, or by reason of, any use or sale of any materials, equipment or products not of WALS's manufacture or for the use or sale of any materials, equipment or products or other goods specially made, in whole or in part, to the customer's design specifications.

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CLAIMS

Notice of defective products or services must be given in writing to WALS by the customer. The customer or user of the products must keep the products in unaltered condition for examination by WALS representative. Any machining, binding, welding, heating or altering of any kind done to the product in question after it is shipped from WALS's factory will invalidate any claim. All claims regarding shortages must be made in writing within thirty (30) days from receipt of the shipment, and all claims for breach of warranty or contract must be made within ten (10) days after discovery, or after such claims should have been discovered, or else be barred from any remedy.

Pump Trouble-shooting Guide

No flow from pump
- Tank is empty
- Inlet valve is closed
- Inlet strainer is clogged with debris
- Crankshaft is not turning

Insufficient pressure from pump ONLY
- Pump speed is too slow
- Relief valve improperly adjusted and bypassing fluid
- Oversize or worn nozzle on equipment
- Worn pump valves
- Excessive leakage from pump seals

Insufficient flow from pump ONLY
- Pump speed is too slow
- Relief valve improperly adjusted and bypassing fluid
- Worn pump valves
- Excessive leakage from pump seals

Insufficient flow OR pressure AND rough operation
- Valve Problem:
  - Pump valve stuck in open or closed position
  - Valve assembly is damaged or unseated
  - Valve seat is washed out
  - All pump cylinders not primed
  - inlet strainer is clogged with debris
- Excessive gas in liquid due to:
  - Air leaks in suction line or fittings
  - High spots in suction line that allow formation of gas pockets
  - Vortex in tank near inlet pipe opening
- Pump is cavitating due to:
  - Insufficient NPSHa (tank head or charge pressure)
  - Fluid viscosity is too high
  - Inlet line is too long and/or too small diameter

Pump runs rough, knocks, or vibrates ONLY
- Loose piston assembly
- Valve assembly is damaged or has unseated
- Pump is cavitating due to:
  - Insufficient NPSHa (tank head or charge pressure)
  - Fluid viscosity is too high
  - Inlet line is too long and/or too small diameter
  - Worn or damaged power frame components
  - Pump is sucking air across worn piston cups

Suction pressure fluctuates rapidly
- Pump is cavitating

Fluid leaking from pump
- Piston cups are wearing and about to fail
- Fluid cylinder bolts are not properly tightened
- Fluid cylinder o-rings (or gaskets) are damaged
- Piston assembly o-rings are damaged

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Short piston seal life
- High abrasive particle content in fluid
- Wrong style or type of piston for service
- Piston liner is damaged
- Pump is cavitating (cylinders may run hot)
- Piston assembly o-ring is damaged
- Poor quality water used
- Pump is allowed to run dry for extended periods of time
- Liner wash system not properly maintained (if equipped)

Short valve life
- High abrasive particle content in fluid
- Valve assemblies only partially rebuilt during previous service
- Valve assemblies damaged do to improper installation techniques
- Poor quality water used
- Pump is cavitating

Cracked fluid cylinder
- Discharge pressure too high
- Pump exposed to freezing conditions without properly draining
- Hydraulic shock resulting from cavitation or entrained air
- Discharge valve is stuck shut
- Material or manufacturing defect

Crankshaft jerks or starts and stops rotation
- V-belts are loose and slipping (if equipped)
- Hydraulic system relief valve is chattering (if equipped):
- Attempting to operate pump at excessively high discharge pressure
- Discharge line is blocked or partially obstructed

Power end overheats (in excess of 180° F)
- Discharge pressure too high
- Low oil level
- Improper oil viscosity
- Contaminated power end oil
- Pump speed is too fast
- Pump is running backwards
- Couplings are misaligned
- V-belt drive tension is too tight
- Pump located too close to heat source
- Worn or damaged power frame bearings

Broken crankshaft or connecting rod
- Pump exposed to freezing conditions without proper draining
- Discharge pressure too high
- Suction pressure too high
- Hydraulic shock due to cavitation
- Material or manufacturing defect

Broken Fluid End Bolts
- Bolt or nut not properly torqued
- Discharge pressure too high
- Excessive piping loads on fluid end

Power end oil is contaminated
- Pump has been operated with failed piston cup for extended periods of time
- Use of high-pressure wash wand to clean near breather or oil seal areas
- Deflector shields are missing or damaged
- Crosshead extension oil seals are damaged or improperly installed
- Excessive capacity in liner wash system
- Improperly adjusted liner wash nozzle

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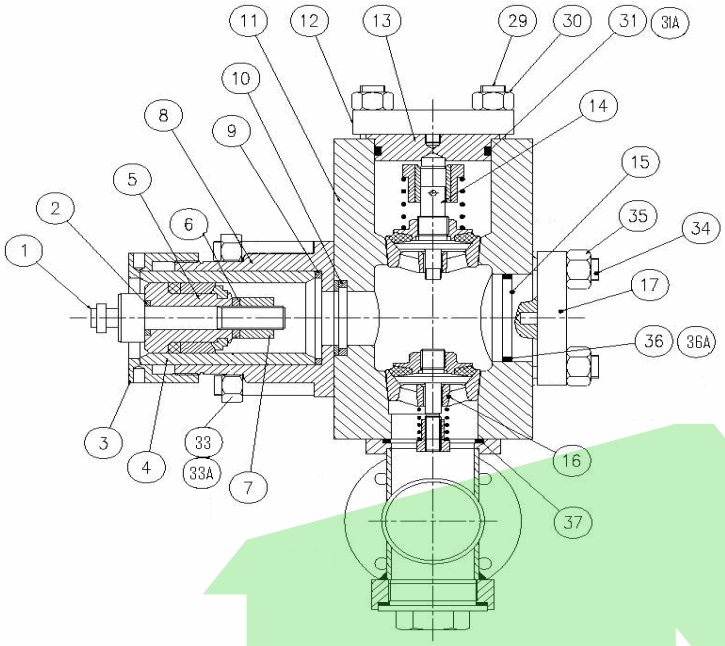
2100 HDD Pump Parts List



ITEM	DESCRIPTION	QTY	JDE #
1	ROD, PISTON, 2100 HDD	3	00878746
2	SEAL, PISTON ROD, 2100 HDD	3	00901902
3	LINER RETAINER NUT 2100 HDD	3	00878750
4	LINER, 4" (100mm), 2100 HDD, CHROME	3	00303348
5	ASSEMBLY, PISTON SEAL, 4"	3	00303355
6	WASHER, LOCK, PISTON HUB	3	00724440
7	NUT, PISTON HUB	3	00724443
8	HOLDER, LINER, 2100 HDD	3	00906207
9	SEAL, SQUARE, LINER, 2100 HDD	3	00905206
10	SEAL, SQUARE, LINER HOLDER, 2100 HDD	3	00905207
11	CYLINDER, FLUID, 2100 HDD, 1045	1	00724448
12	PLATE, TOP VALVE COVER, 2100 HDD	3	00724450
13	CAP, TOP VALVE COVER, 2100 HDD	3	00879040
OPTIONAL	CAP, TOP VALVE COVER, FOR AR VALVES, 2100/2165 HDD WFT (NOT SHOWN)		1137357
14	VALVE, DISCHARGE, API	3	00303342
OPTIONAL	VALVE, ARN107, WFT (NOT SHOWN)		804685
15	CAP, FRONT VALVE COVER, 2100 HDD	3	00724453
16	VALVE, SUCTION, API	3	00303346
OPTIONAL	VALVE, ARN107, WFT (NOT SHOWN)		804685
17	PLATE, TOP VALVE COVER, 2100 HDD	3	00724465
29	STUD, M27 x 100, BLACK OXIDE	20	01133267
30	HEX NUT, M27	20	00912254
31	ORING, TOP VALVE CAP	3	00788843
31A	RING, BACK-UP, 130 x 120 x 2, TEFLON	3	01133268
33	STUD, M24 x 180, BLACK OXIDE	8	01133269
33A	NUT, HEX, M24	8	00912238
34	STUD, M30 x 105, BLACK OXIDE	12	01133267
35	NUT, HEX, M30	12	00912233
36	ORING, FRONT VALVE COVER CAP	3	00804683
36A	RING, BACK-UP, 125 x 115 x 2, TEFLON	3	01133271
37	ORING, 115 X 5.7	3	00907124

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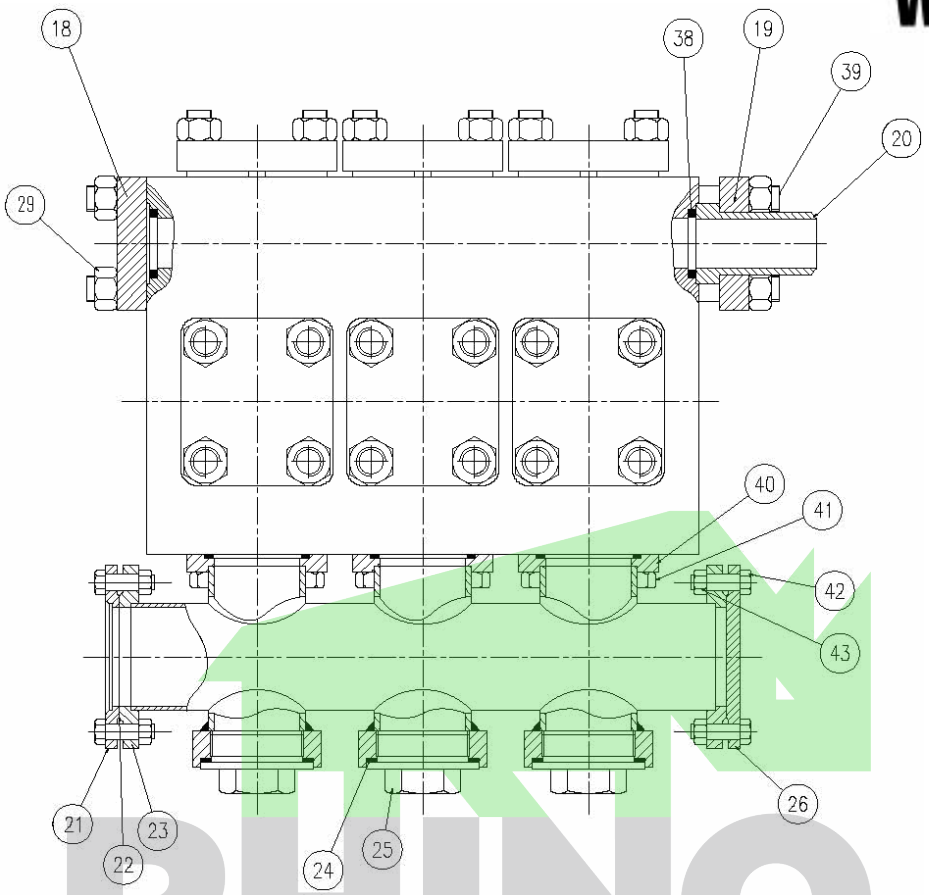

ITEM	DESCRIPTION	QTY	JDE #
18	PLATE, DISCHARGE COVER 2100 HDD	1	00724467
19	ADAPTER, DISCHARGE FLANGE 2100 HDD	1	00724469
20	FLANGE, DISCHARGE 2100 HDD	1	00724470
21	PLATE, SUCTION FLANGE COVER 2100 HDD	1	00724471
22	SEAL, SUCTION FLANGE 2100 HDD	2	00724474
23	SUCTION MANIFOLD 2100 HDD	1	00724475
24	RING, BACK-UP, 114 x 96 x 3, TEFLON	3	01133322
25	SUSTION MANIFOLD PLUG 2100 HDD	3	00724478
26	SUCTION FLANGE 2100 HDD	1	00724479
29	STUD, M27 x 100, BLACK OXIDE	4	01133267
38	ORING, 85 X 5.7	2	00891139
39	STUD, M27 x 120, BLACK OXIDE	4	00724562
40	SUCTION MANIFOLD WASHER	12	00885571
41	SUCTION MANIFOLD HEX SCREW	12	00775422
42	SUCTION FLANGE BOLT	12	01116298
43	SUCTION FLANGE NUT	12	00775979

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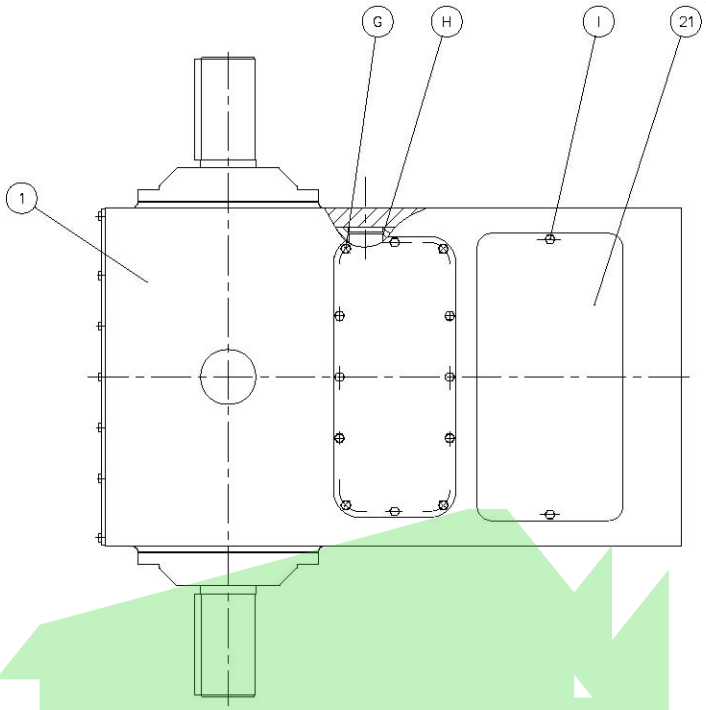

BILL OF MATERIALS			
ITEM	DESCRIPTION	QTY	JDE #
1	CRANK CASE, 2100 HDD	1	00725164
21	CRADLE COVER, 2100 HDD	1	00779158
G	HEX BOLT, M8x20MM	20	00779179
H	SNAP RING 55	6	00896677
I	HEX BOLT M8x20MM S.S.	2	00779186

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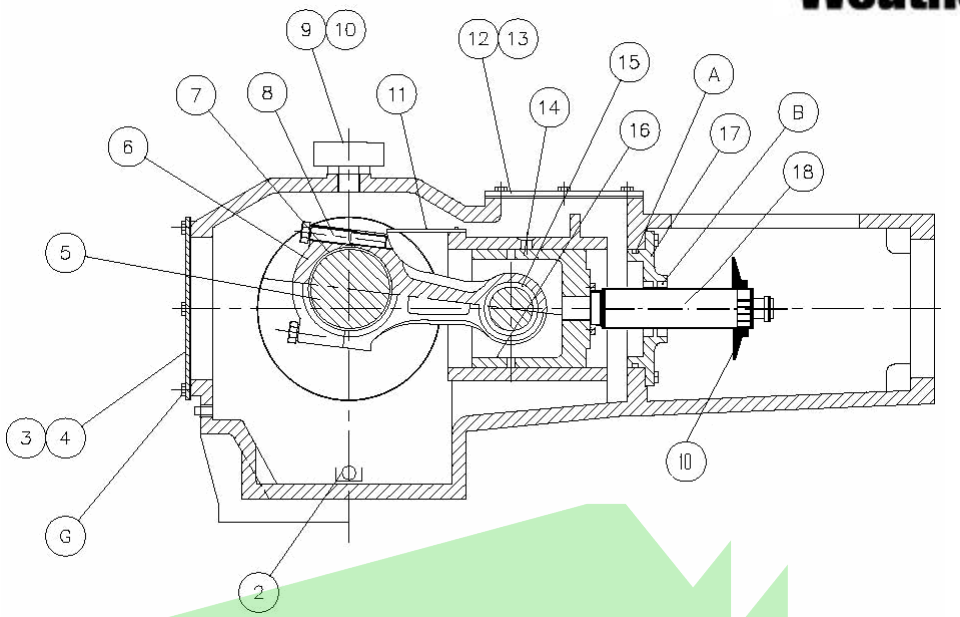

BILL OF MATERIALS			
ITEM	DESCRIPTION	QTY	JDE #
2	MAGNETIC BLOCK	1	00779110
3	REAR COVER, 2100 HDD	1	00958912
4	GASKET, REAR COVER, 2100 HDD	1	00958911
5	CRANKSHAFT (DOUBLE EXTENDED), 2100 HDD	1	00779117
6	CONNECTING ROD, 2100 HDD	3	00779115
7	INSERT BEARING, CONN. ROD, 2100 HDD	3	01114163
8	CONN. ROD BOLT, 2100 HDD	6	00779119
9	BREATHER	1	00779120
10	BAFFLE, 2100 HDD, RUBBER	1	00958913
11	OIL WIPER, 2100 HDD	1	00779142
12	TOP COVER, 2100 HDD	1	00958908
13	GASKET, TOP, 2100 HDD	1	00958909
14	CROSSHEAD, 2100 HDD	3	00779144
15	BUSHING, WRIST PIN, 2100 HDD	3	00779146
16	CROSSHEAD, WRIST PIN, 2100 HDD	3	00779148
17	STUFFING BOX, INT. ROD, 2100 HDD	3	01114200
18	INTERMEDIATE ROD, 2100 HDD	3	01133272
A	O-RING 150x5.7MM	3	00779159
B	OIL SEAL 50x70x12MM	6	00779167

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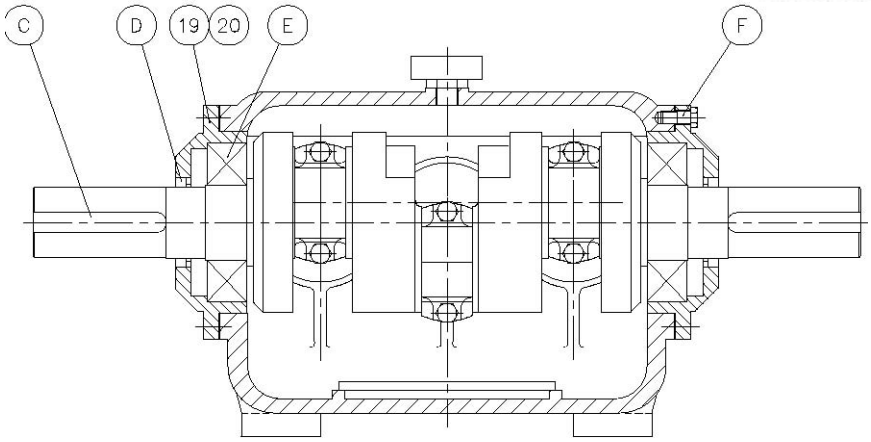

BILL OF MATERIALS			
ITEM	DESCRIPTION	QTY	JDE #
C	KEY 100, 25.06x13.52x158.36MM	2	00779166
D	OIL SEAL 90x110x12MM	2	00779160
E	BEARING 7319	2	00779168
F	HEX BOLT, M16x40MM	12	00779169
19	BEARING HOUSING, 2100 HDD	2	01114216
20	GASKET, BRG. HOUSING, 2100 HDD	2	00779155

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