BLACKHAWK

centrifugal pump

Maintenance and Operations Manual

Version 1.8a

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Index

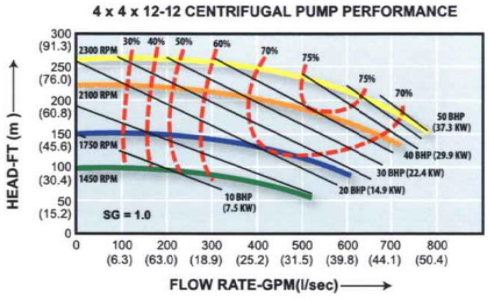
Section 1

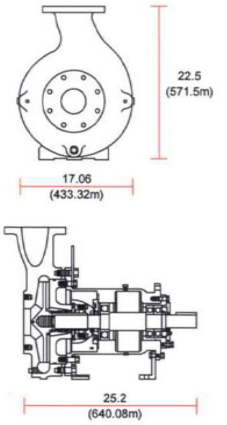
Introduction

- This manual covers Duncan Industrial Solutions models 350.205, 350.2056, 350.1241, 350.1242, 350.1243, 350.1244, 350.202, 350.203

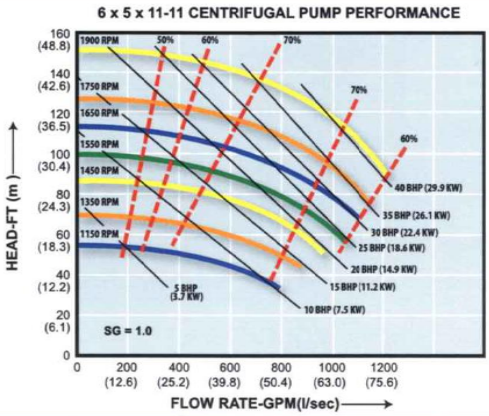
Three basic models to choose from:

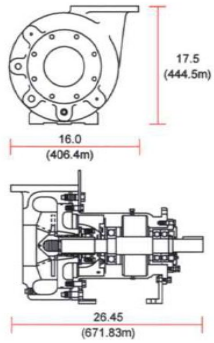
Model 350.205 Series
4" x 4" x 12"
Up to 750 GPM and 250 Ft. Head.



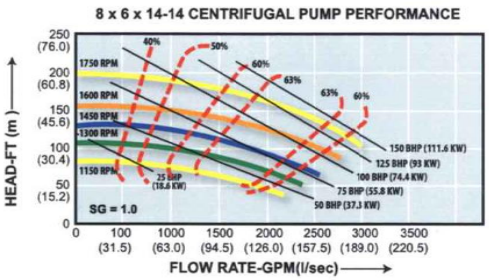


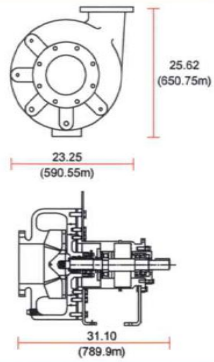
Model 350.1240 Series
6" x 5" x 11"
Up to 1200 GPM and 150 Ft. Head.



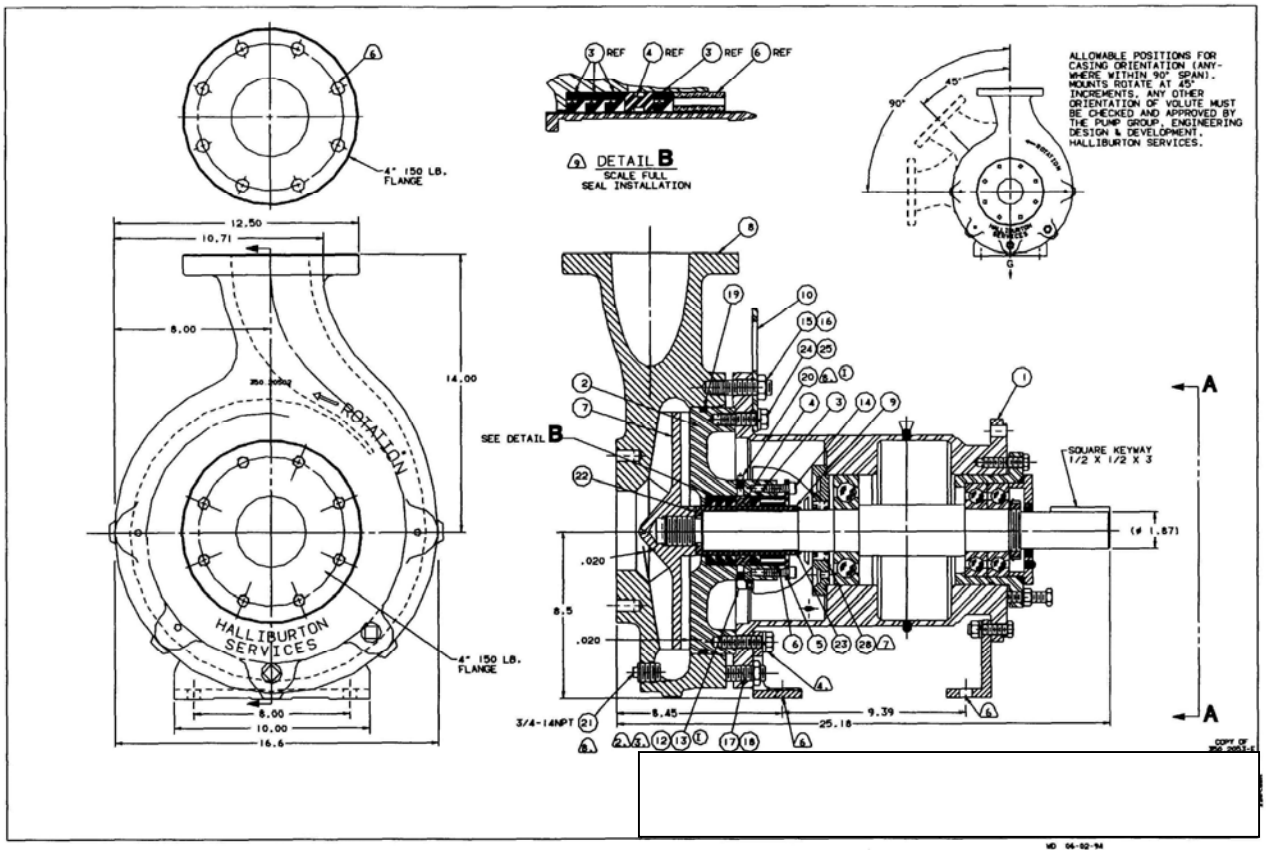


Model 350.202 Series
8" x 6" x 14"
Up to 2700 GPM and 150 Ft. Head.





Model 350.205 4x4x12-12
Buna-N Lip Seals



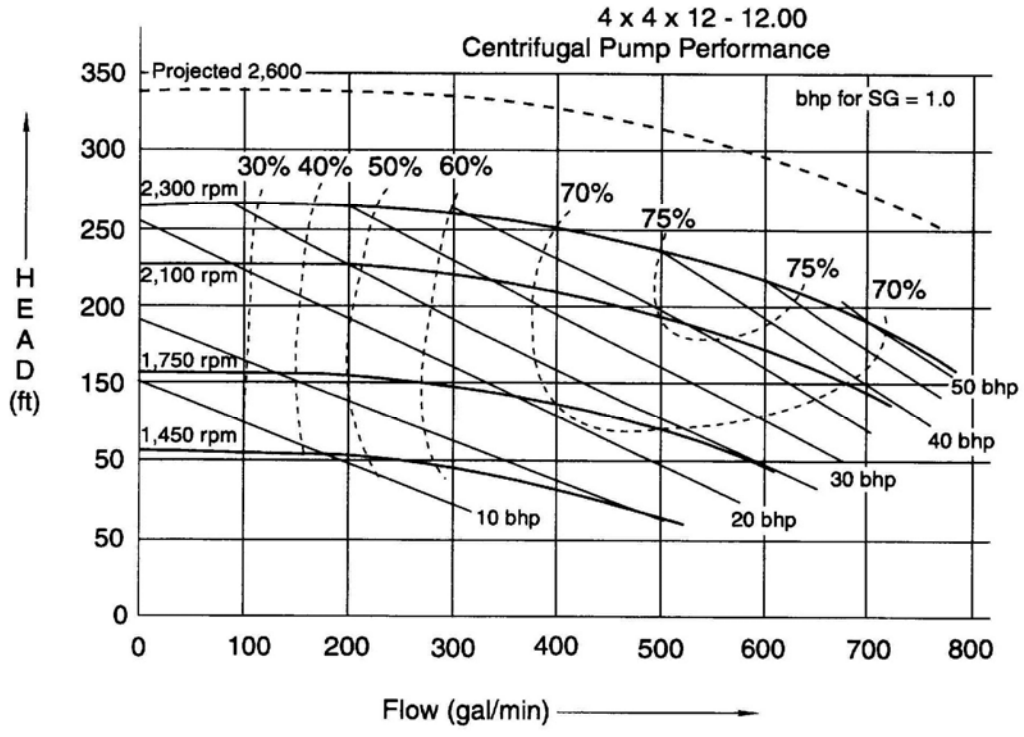


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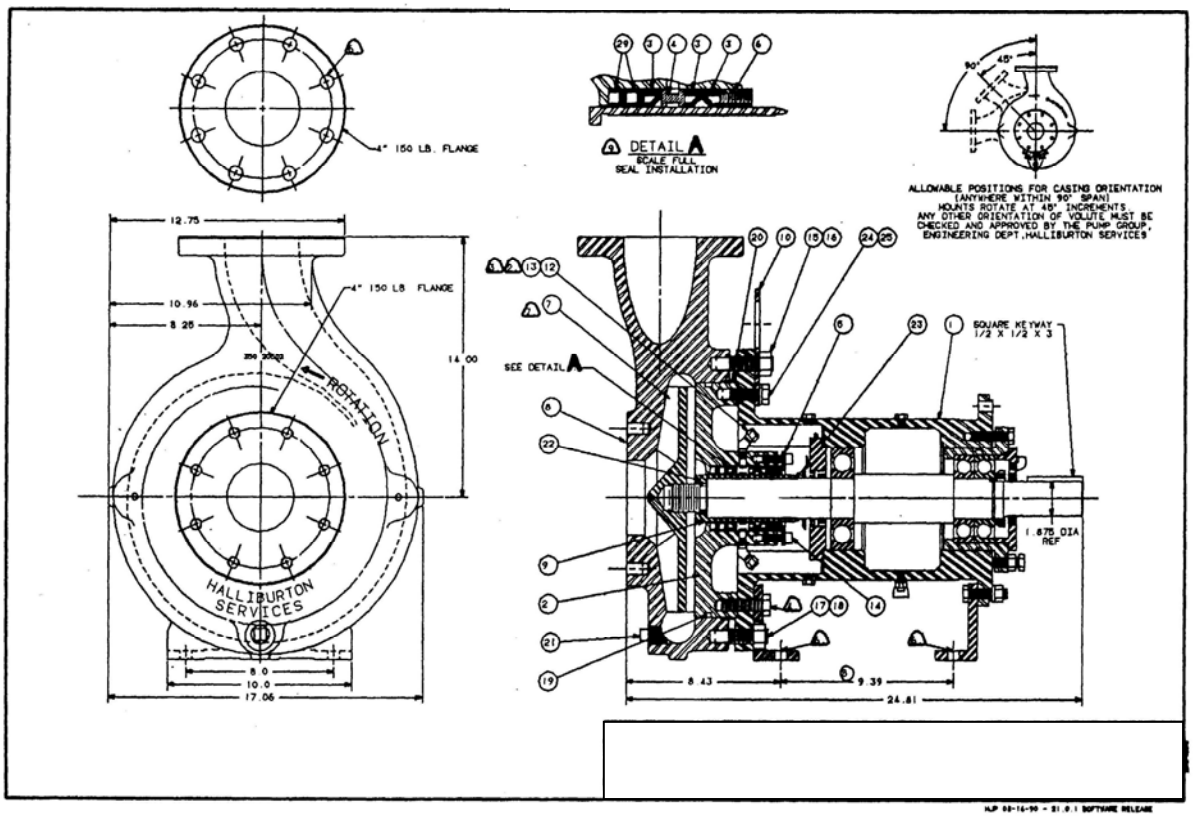
Figure 6.4—Performance curve for 4 × 4 × 12 centrifugal pumps with 14-in. impellers

Model 350.2056 4x4x12-12
Halar Impeller, Teflon Seals



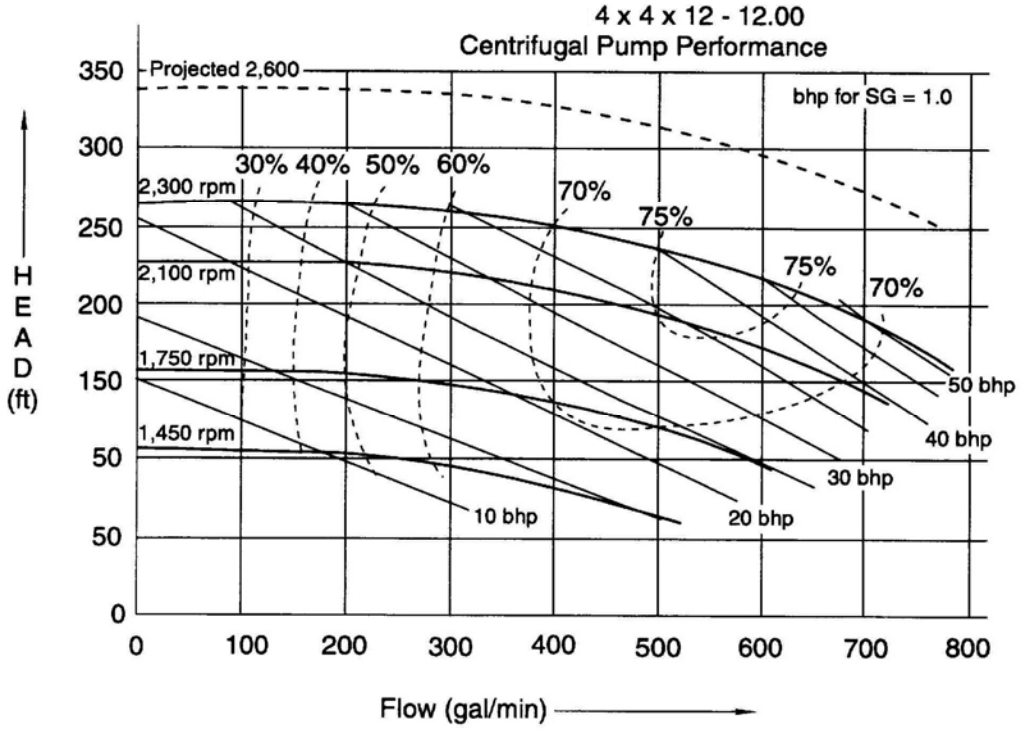


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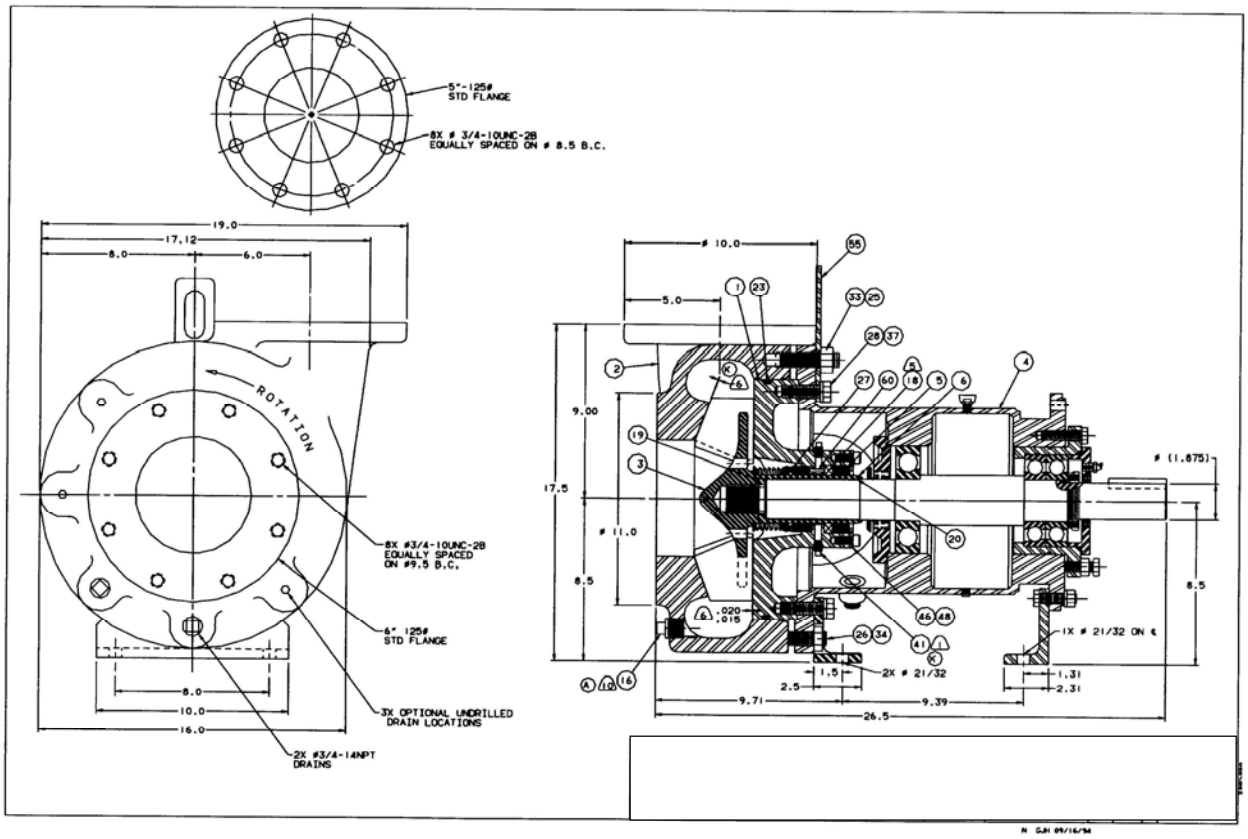
Figure 6.4—Performance curve for 4 × 4 × 12 centrifugal pumps with 14-in. impellers

Model 350.1241 6x5x11-10
Mechanical Seal



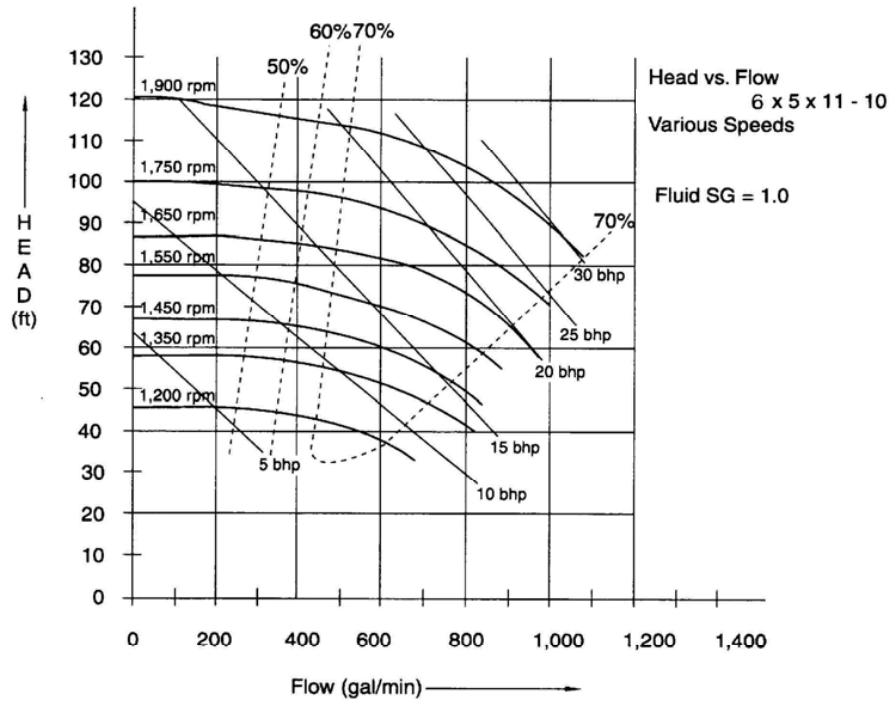
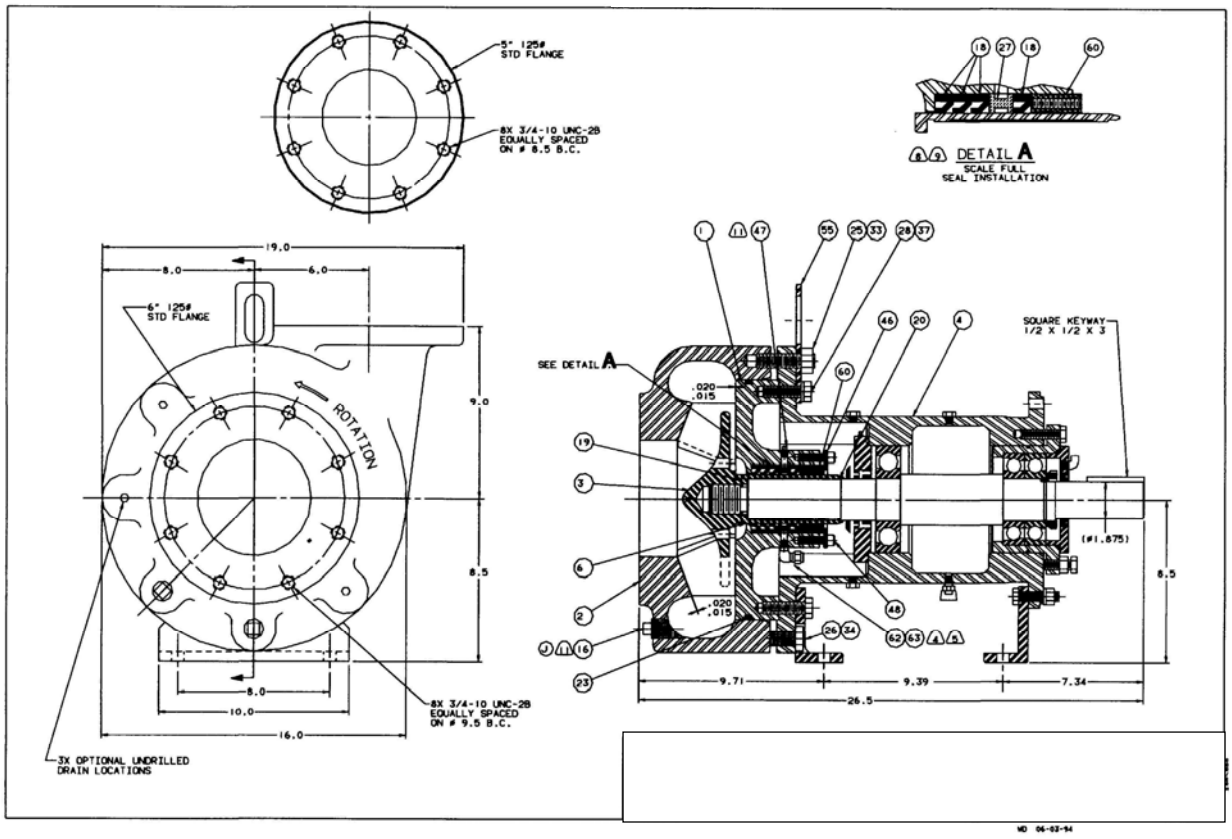


Figure 6.1—Performance curve for 6 × 5 × 11 centrifugal pumps with 10-in. impellers

Model 350.1242 6x5x11-10
Buna-N Lip Seals



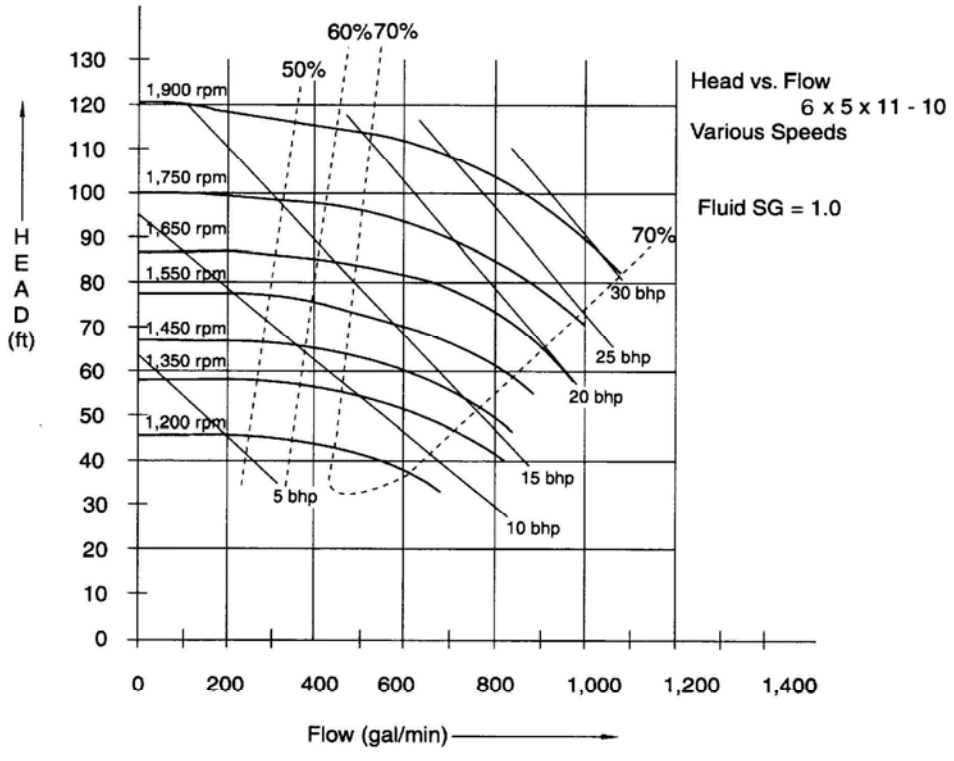
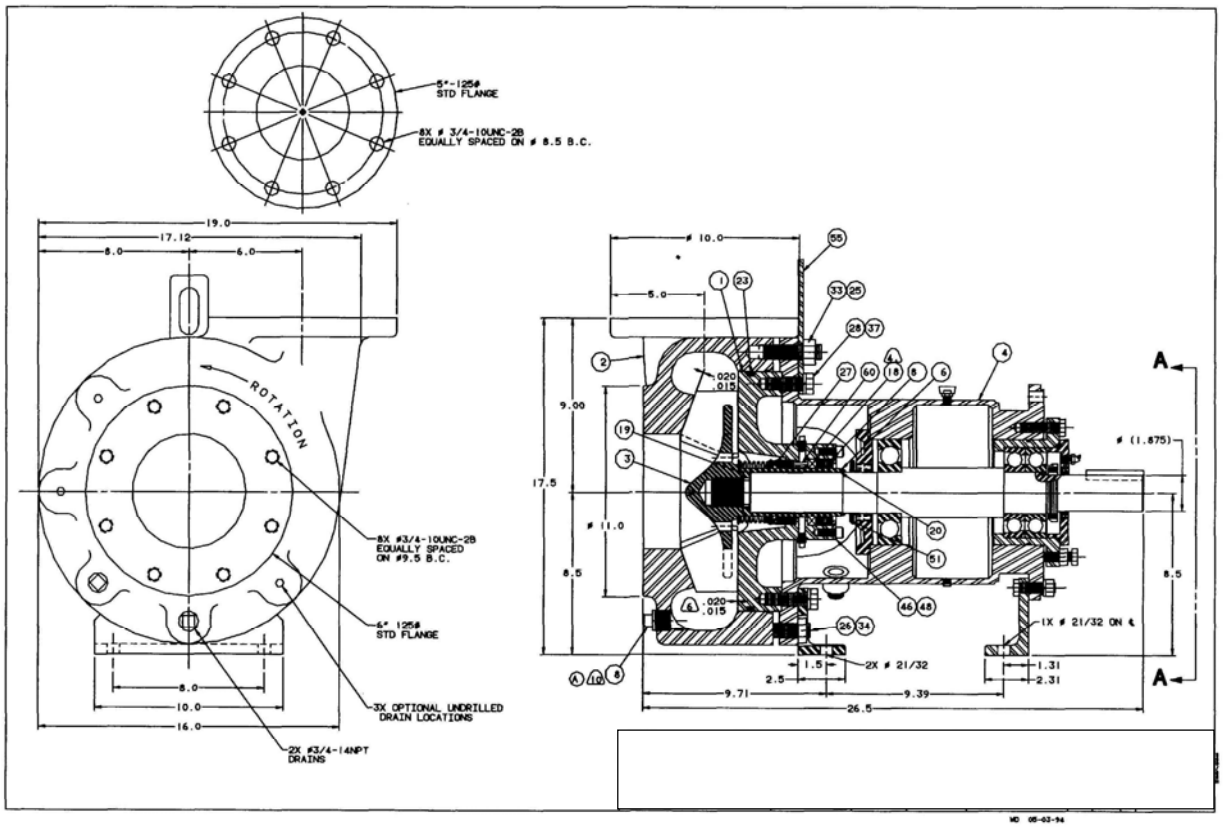


Figure 6.1—Performance curve for 6 × 5 × 11 centrifugal pumps with 10-in. impellers

Model 350.1243 6x5x11-11
Mechanical Seal



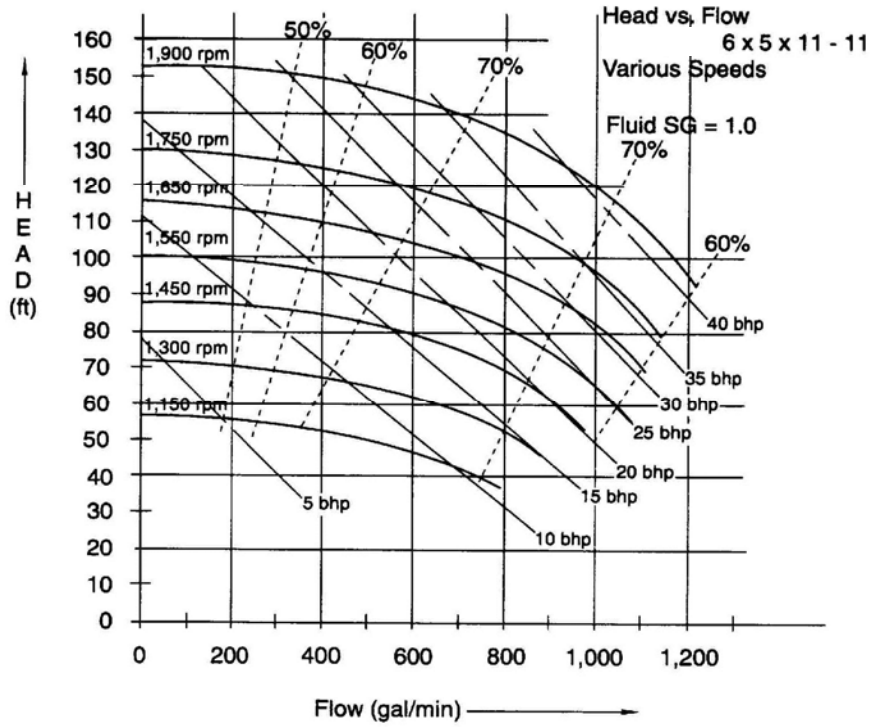


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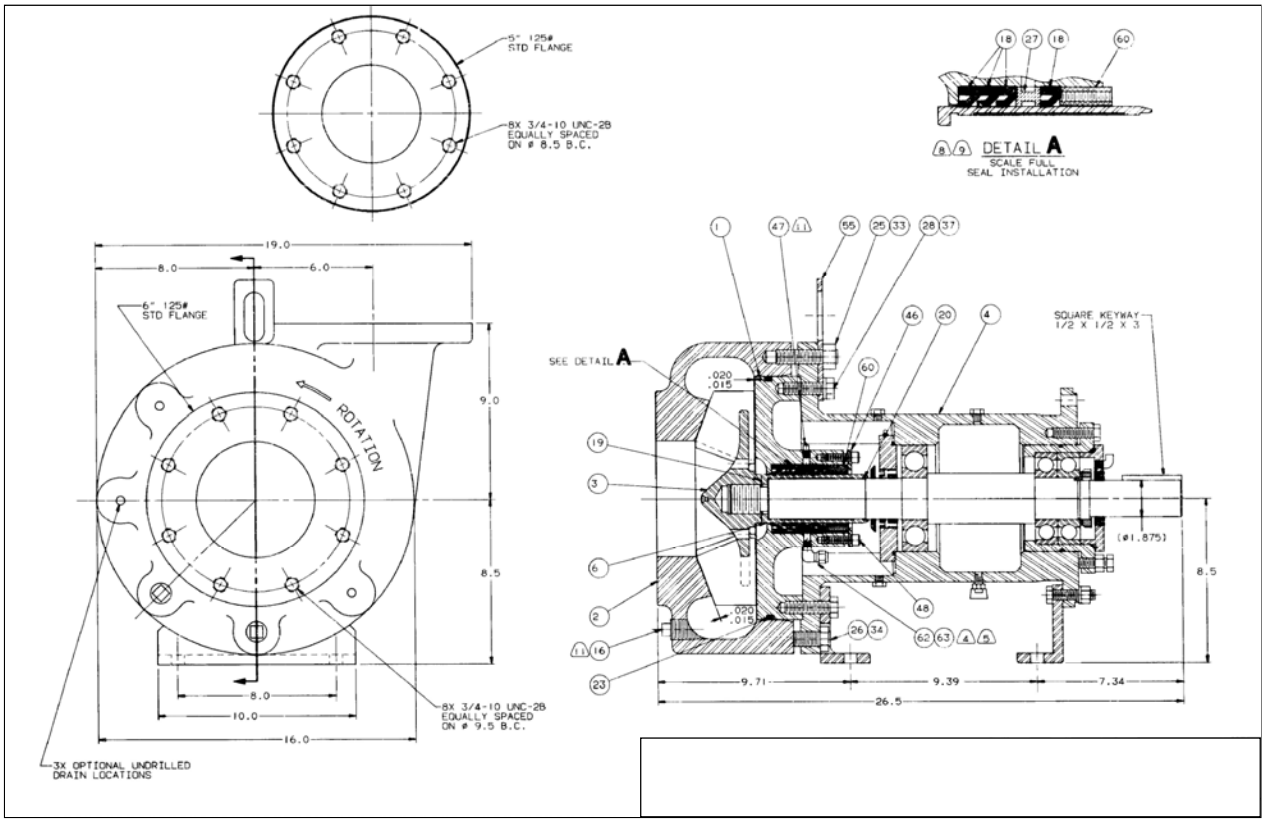
Figure 6.2—Performance curves for 6 × 5 × 11 centrifigal pumps with 11-in. impellers

Model 350.1244 6x5x11-11
Buna-N Lip Seals



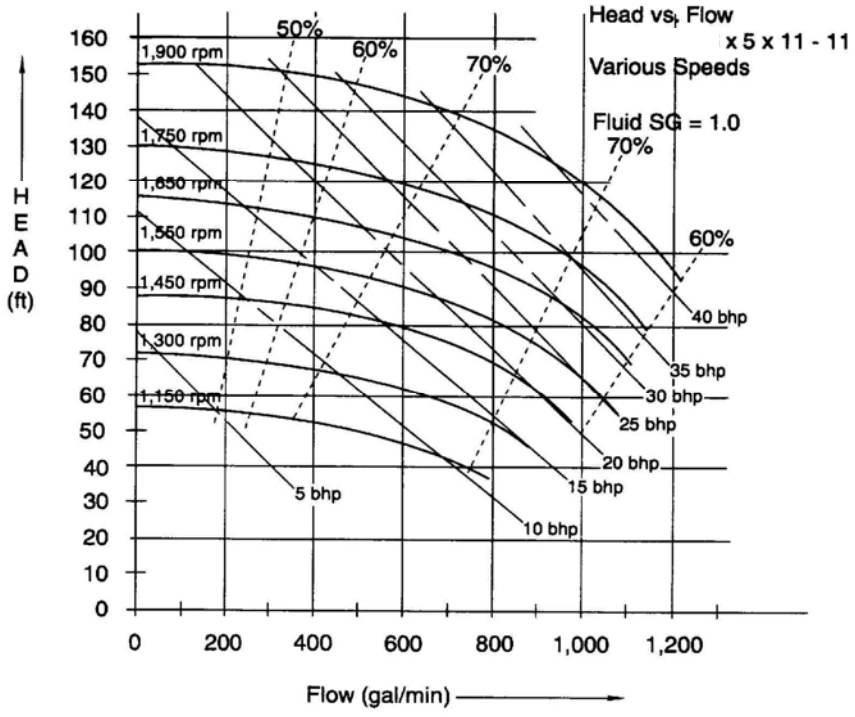


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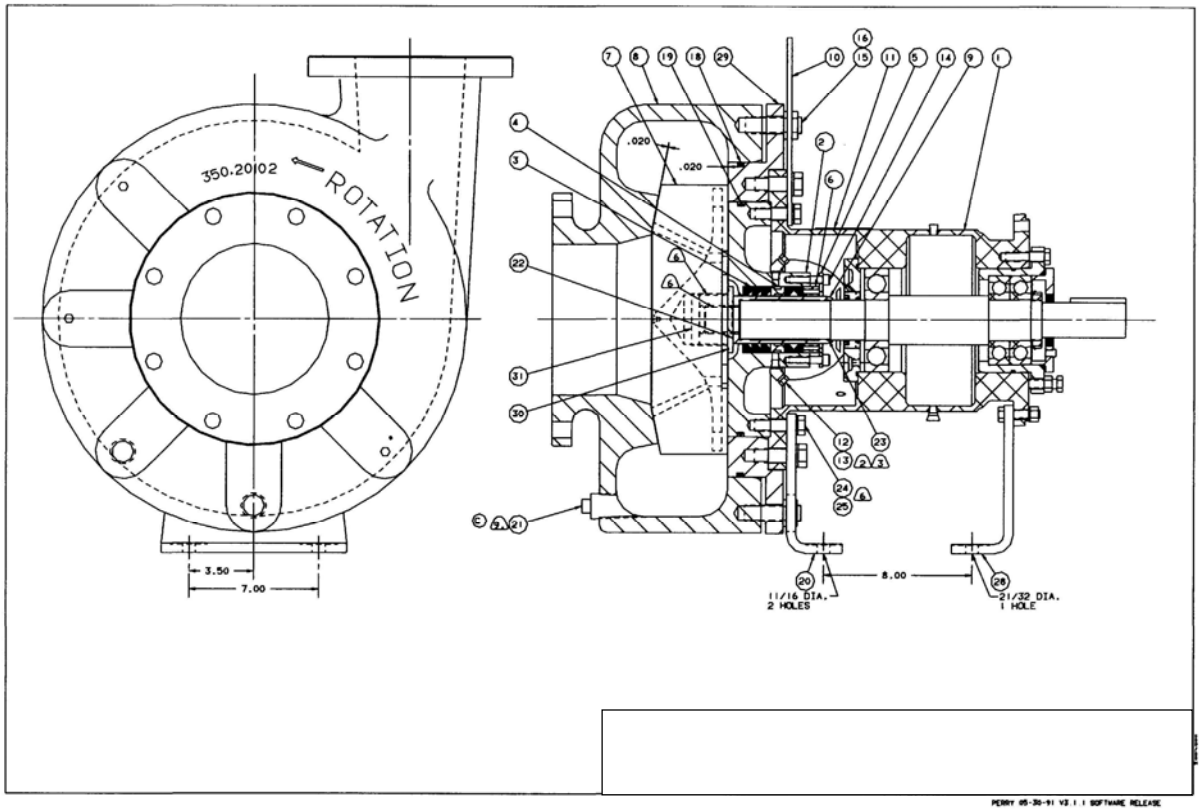
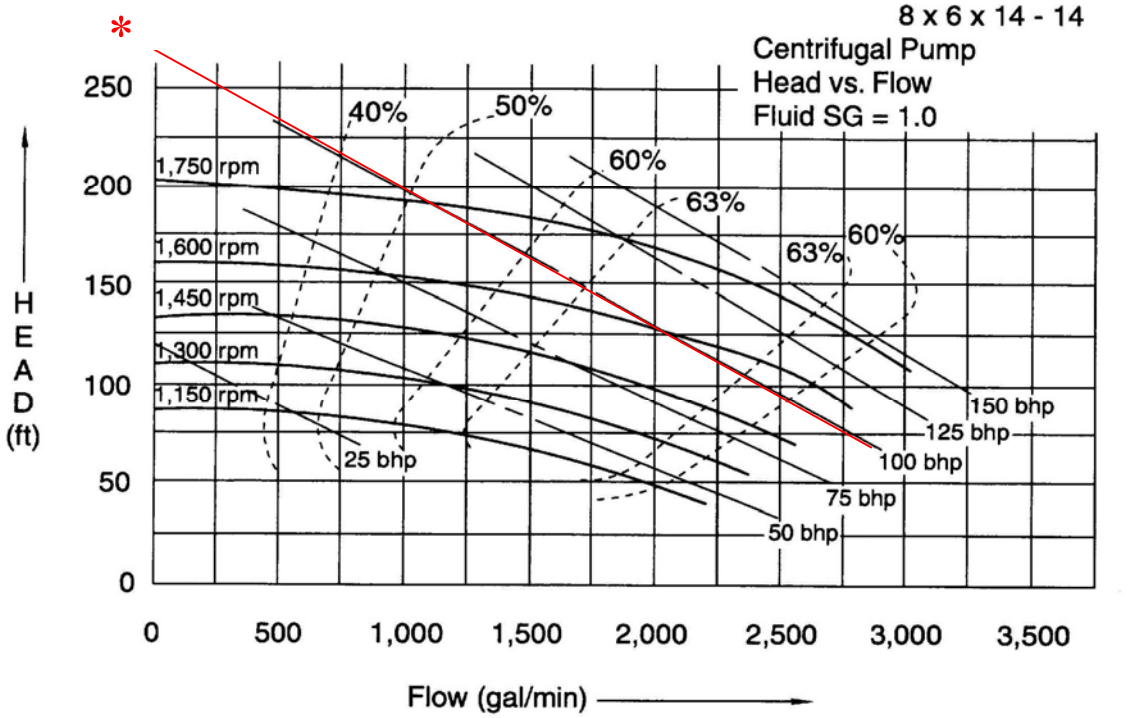
Figure 6.2—Performance curves for 6 × 5 × 11 centrifigal pumps with 11-in. impellers

Model 350.202 8x6x14-14
Buna-N Lip seals





**Contact BlackHawk Pumps& Services for applications in excess of 100 HP.*

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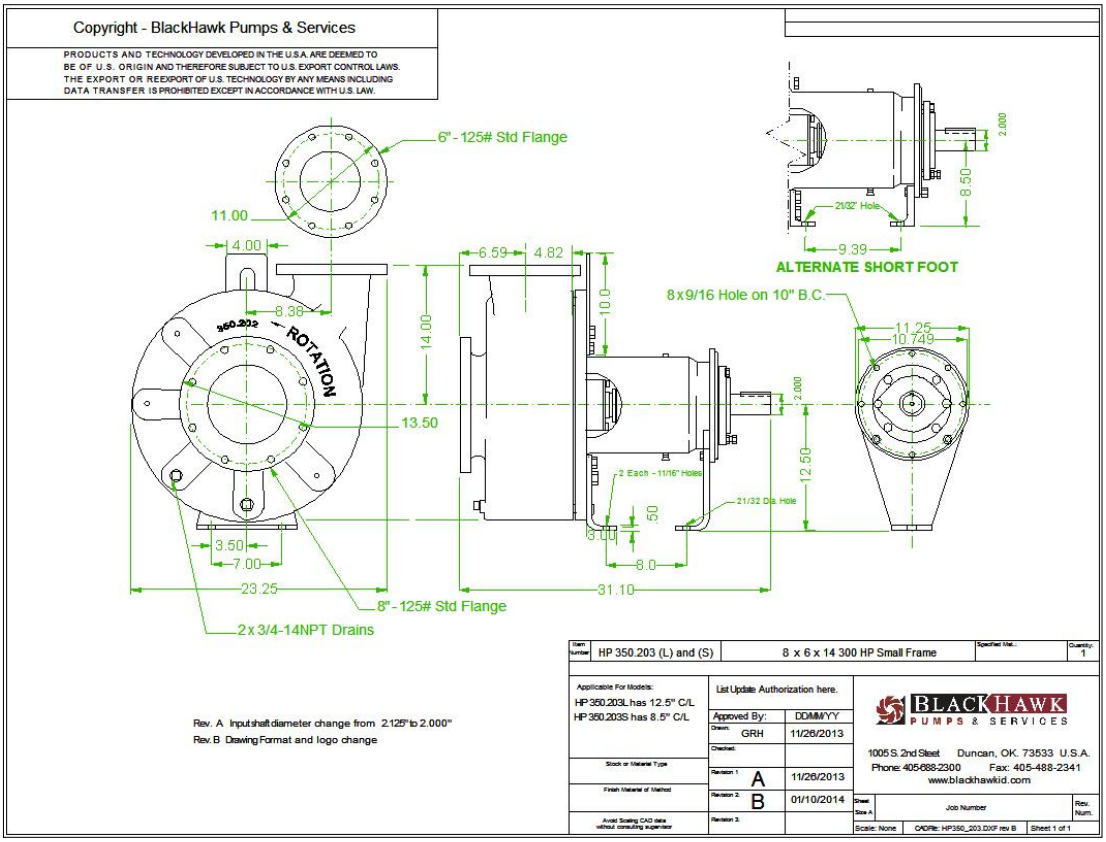
Figure 6.3—Performance curve for 8 × 6 × 14 centrifugal pumps with 14-in. impellers

Model 350.203 8x6x14-14
Buna-N Lip seals



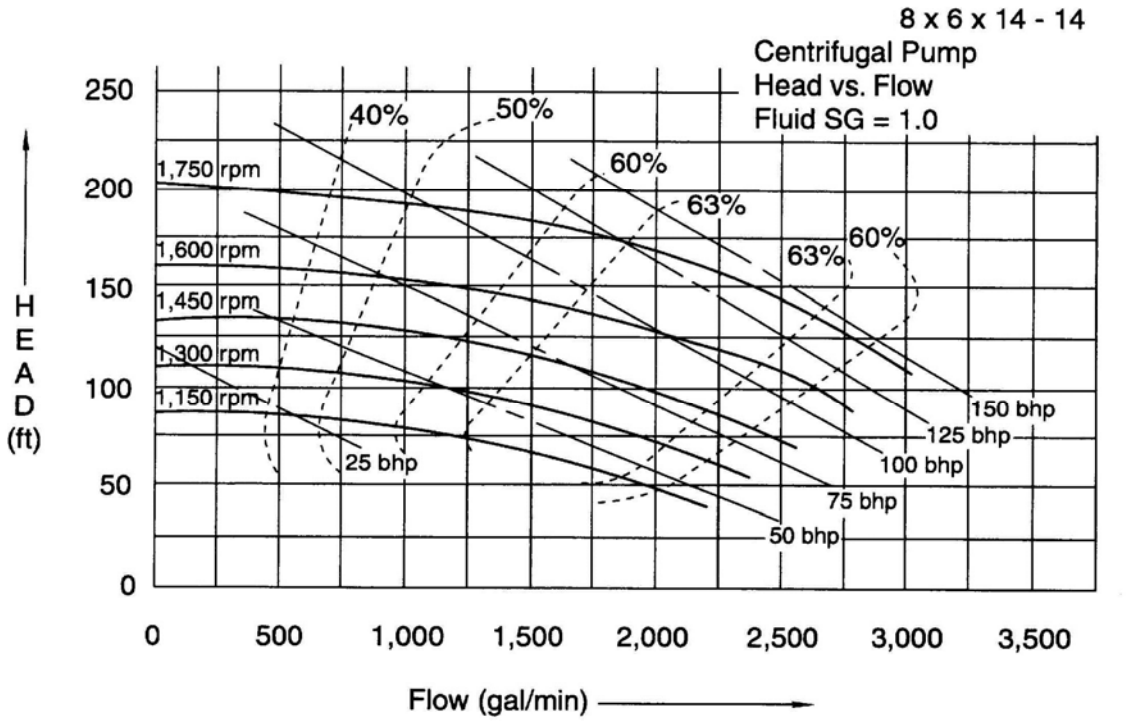
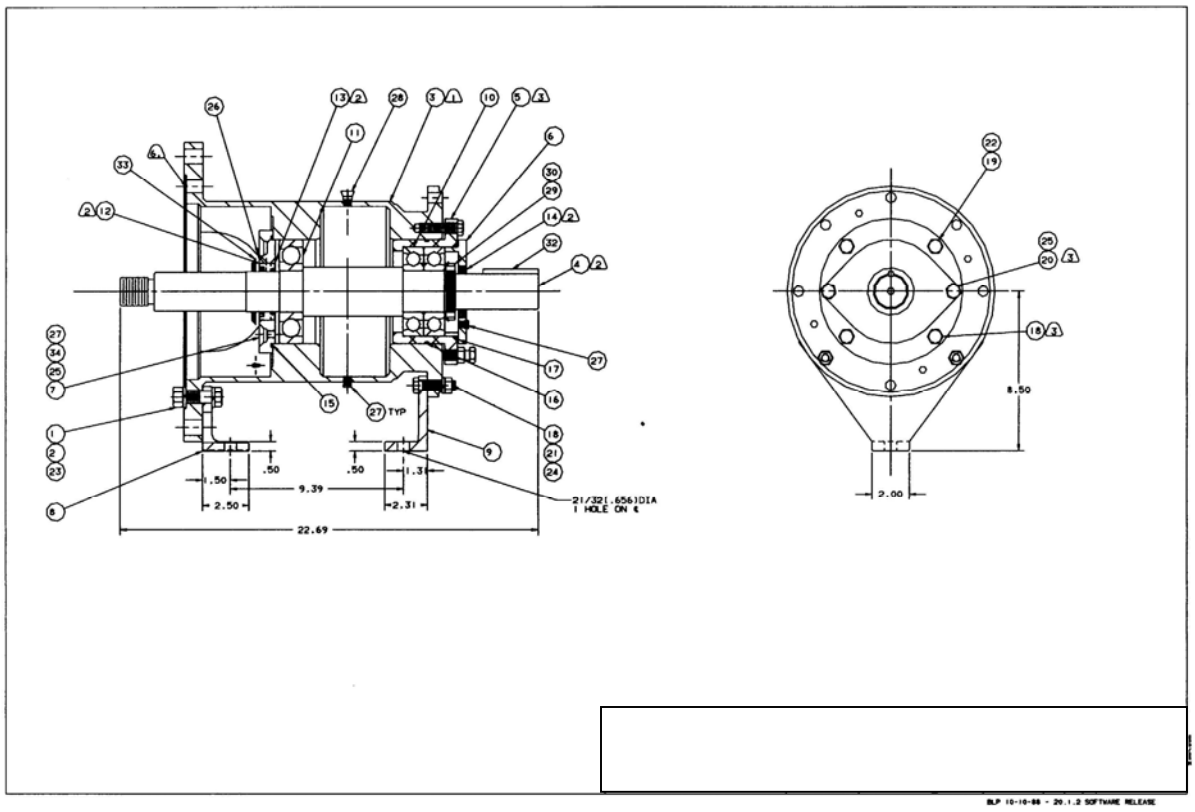


Figure 6.3—Performance curve for 8 × 6 × 14 centrifugal pumps with 14-in. impellers

Model 350.2016 Support Frame



Section 2
Operation

***Warning**: Failure to follow the operating instruction warnings of hazards or unsafe practices could result in injury or death.*

***Warning**: Before attempting to service the pump…..*

1. *Review the manual.*
2. *Disconnect or Lock Out all power to the pump to make sure the pump cannot be operated.*
3. *Close suction and discharge valves.*
4. *Check the pump temperature to make sure fluid has not overheated.*
5. *Vent the pump slowly.*
6. *Drain the pump.*

***Warning**:*
Do not attempt to pump volatile, corrosive, or flammable materials without reviewing the application with the manufacturer. Misapplication could damage the pump or endanger personnel as a result of pump failure.

***Warning**:*
DO NOT OPERATE THE PUMP UNLESS ALL GUARDS ARE IN PLACE. Exposed rotating parts can catch clothing, fingers or tools causing severe injury.

***Warning**:*
Do not run pump against a closed discharge for long periods of time. Doing so will cause pump components to deteriorate and could cause the fluid to boil, build pressure, and cause the casing to rupture.

***Warning**:*
Use lifting equipment that's in good operating condition and with adequate capacity to prevent injuries to personnel or damage to equipment.

Before Operation

The pump was inspected and tested before shipment from the factory. Before installation, inspect pump for which may have occurred during shipping such as:

1. Dents, cracks, damaged threads, etc.
2. Carefully read all warning labels.

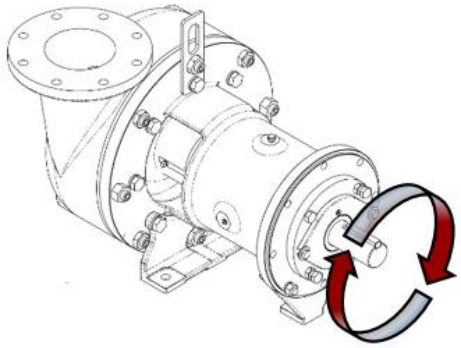
DANGER: Make sure all power sources are OFF and Locked Out before performing any service to the pump.

WARNING: BEFORE STARTING PUMP
Disconnect and remove coupling and briefly start motor to verify proper direction of rotation. Operation in the wrong rotation will cause severe damage to the pump. Rotation should be as follows:

All Pumps are Right-Hand Rotation Units –

CLOCKWISE when viewed from pump shaft end

COUNTERCLOCKWISE when viewed from the suction flange.



If rotation is in the wrong direction, shut off and lock out the power and switch any TWO legs of the three-phase circuit. This should correct the rotation.

If your pump is single phase unit, shut off and lock out the power and re-connect motor leads as indicated by the diagram inside the motor's junction box.

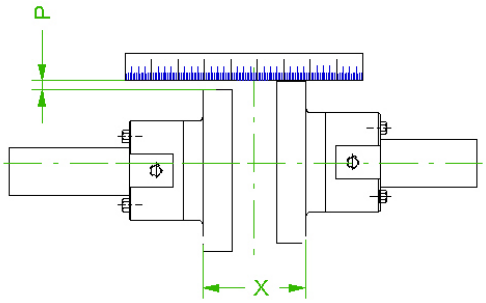
If the pump is power take off, engine, or hydraulic driven, consult your system designer.

Once the proper direction of rotation has been established and the piping has been connected it will be necessary to realign the pump and motor. (This is due to shifting during shipment and loads imposed on the pump by the piping system.)

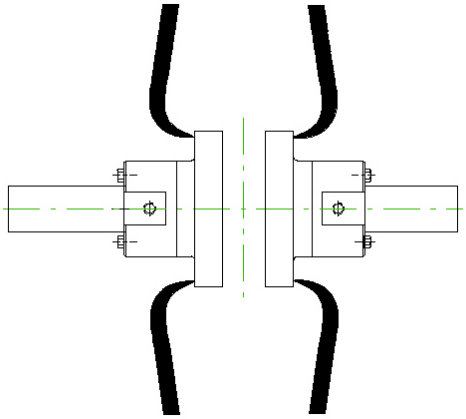
FAILURE TO PERFORM THE ABOVE WILL VOID THE WARRANTY!

Coupling Alignment

1. Check parallel alignment by placing a straightedge across the two coupling flanges and measuring the maximum offset at various points around the periphery of the coupling without rotating the coupling (see Figure 1). If the maximum offset exceeds the figure shown under "Parallel" in Figure 3, realign the shafts.
2. Check angular alignment with a micrometer, vernier, or caliper. Refer to X and X(max) dimensions in Figure 2. Measure from the outside of one flange to the outside of the other at intervals around the periphery of the coupling. Determine the maximum and minimum dimensions without rotating the coupling. These measurements must be within the range of X and X(max). If a correction is necessary, be sure to recheck the parallel alignment.



(Figure 1) Parallel



(Figure 2) Angular

Maximum RPM and Allowable Misalignment - Inch

		Types JE, JN, E & N EPDM				Type H Hytrel		
Sleeve Size	Maximum RPM	Parallel	Angular	X1	X(max)	Parallel	Angular	X
3	9200	0.01	0.035	1.188	1.223	-- -- --		
4	7600	0.01	0.043	1.5	1.543	-- -- --		
5	7600	0.015	0.056	1.938	1.994	-- -- --		
6	6000	0.015	0.07	2.438	2.508	0.01	0.016	2.5
7	5250	0.02	0.081	2.563	2.644	0.012	0.02	2.625
8	4500	0.02	0.094	2.938	3.032	0.015	0.025	3
9	3750	0.025	0.109	3.5	3.609	0.017	0.028	3.562
10	3600	0.025	0.128	4.063	4.191	0.02	0.032	4.125
11	3600	0.032	0.151	4.875	5.026	0.022	0.037	4.938
12	2800	0.032	0.175	5.688	5.863	0.025	0.042	5.75
13	2400	0.04	0.195	6.625	6.82	0.03	0.05	6.688
14	2200	0.045	0.242	7.75	7.992	0.035	0.06	7.812
16	1500	0.062	0.33	10.25	10.58	-- -- --		

(Figure 3)

Mounting the Hydraulic Motor Adapter

There are two hydraulic motor adapters available for use with the 350.2016 power frame. The process of mounting the adapter is similar for either model. Figure 2 shows the 278.89831 adapter assembly.

- (Legacy 278.89831) Cast Iron hydraulic motor mount.
- (104913-46432-247) Steel hydraulic motor mount.

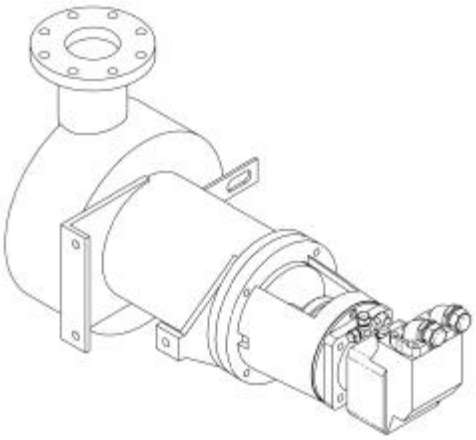


Figure 1

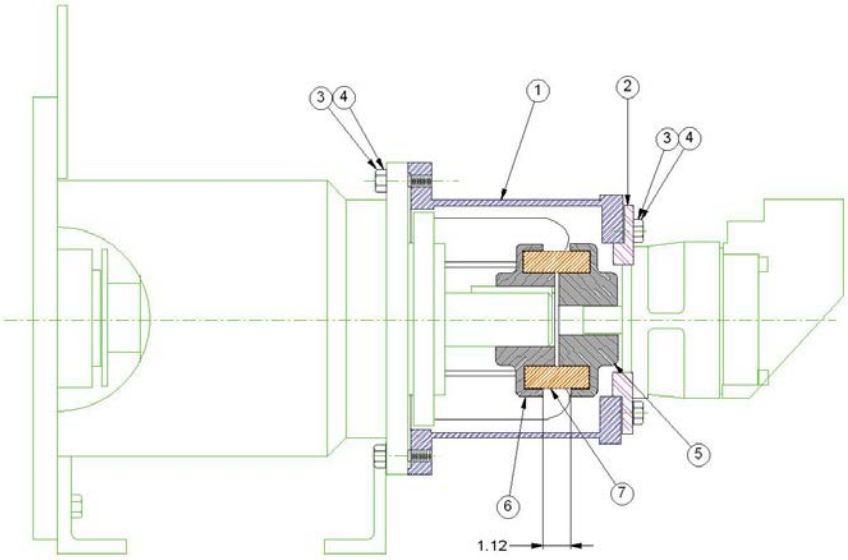
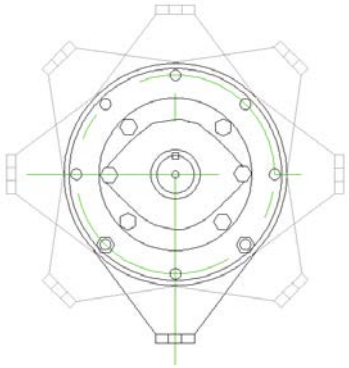


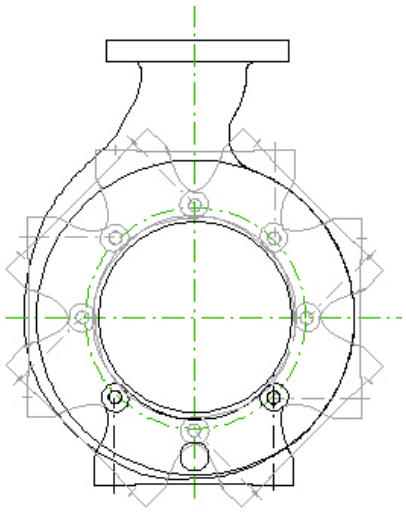
Figure 2

1. Mount the motor adapter (Item 1) to the integral mounting flange on the 350.2016 power frame. Make sure the piloted faces are aligned correctly. (Note: paint may need to be lightly sanded to insure a square fit).
2. Install 4-each 1/2NCx1-1/4" Grade 5 cap screws and lock washers (Items 3 & 4) through integral flange on the power frame and into the motor adapter (Item 1). Tighten securely.
3. Clean pump shaft. Slide 1-7/8" bore coupling half (Item 6) over shaft. DO NOT tighten set screw at this time.
4. Install Hytrel coupling sleeve and motor side coupling on pump side coupling.
5. Install the motor bracket (Item 2) to the hydraulic motor using 1/2NCx1-1/4" Grade 5 cap screws and lock washers (Items 3 & 4).
6. Install hydraulic motor and flange assembly into motor coupling half that's already mounted on the shaft.
7. Adjust coupling so that a gap of 1.12" is held between the coupling flange faces.
8. First tighten set screws on shaft to 20 – 23 ft.lbs. Then tighten set screw over key to 20 – 23 ft. lbs.

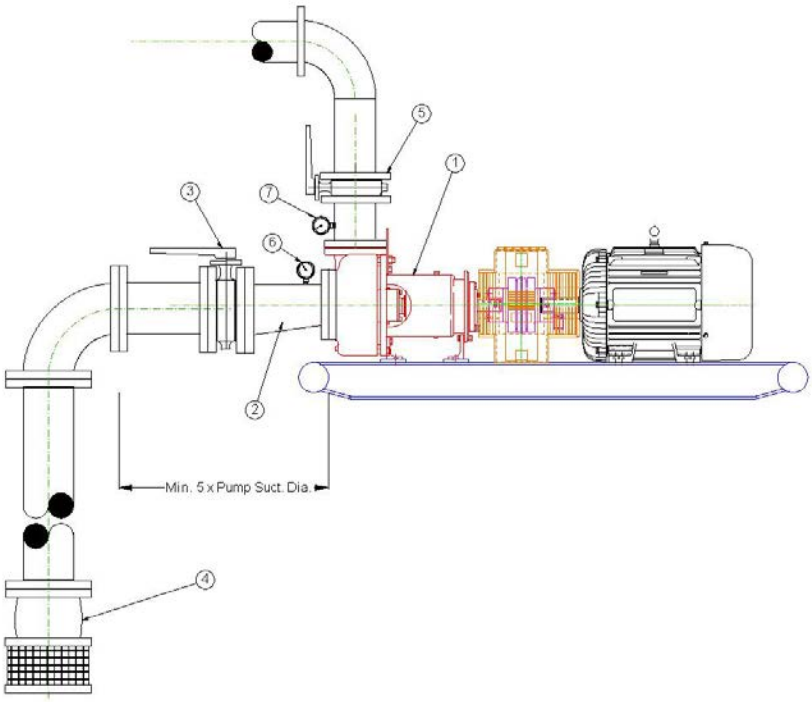
Changing Pump Discharge Orientation

The pump discharge can be easily rotated in 45 degree increments to match piping. This is accomplished removing the mounting feet and moving them to a different position on the pump frame. This avoids removing the pump casing and having to reset impeller clearances. Front and rear feet can even be placed different positions if required.





Pump Startup



Suggested Piping –

1. Pump
2. Eccentric Reducer
3. Suction Valve
4. Foot Valve
5. Discharge Valve
6. Suction Pressure Gauge
7. Discharge Pressure Gauge

- Suction piping should extend a minimum of 5 times the suction diameter from the first elbow.
- Suction pipe size should never be any smaller than pump suction pipe size.
- Suction valve should always remain fully open when pump is operating.
- Never operate the pump against a closed discharge valve for extended periods of time.
- Never use pump to support piping or force misaligned piping into place.
- Suction line should be designed to avoid air pockets.
- The suction line should always slope downhill away from pump.

Priming the Pump –

1. Open pump suction valve.
2. Vent air from pump and fill with liquid so that fluid covers the eye of the impeller.
3. Start pump and partially open discharge valve.
4. Slowly open discharge valve as discharge pressure stabilizes.
5. If pump fails to prime, shut down pump and repeat steps 1 thru 4.
6. If the pump still fails to prime, shut down pump and inspect for air leaks in the suction line.
7. DO NOT RUN PUMP DRY or with insufficient prime. Catastrophic damage to the mechanical seal or shaft lip seals will occur.

General Operation

Pump Records – Records of the pump data should be maintained whenever possible. These should include:

1. Pump serial number.
2. Pump model number and impeller diameter.
3. Pump shaft seal type.

Lubrication –

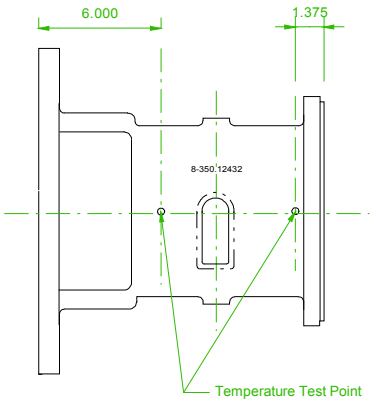
- **Bearings -** Bearings are grease lubed. They should be lubricated with 4-5 shots of grease after every 12 hours of operation or 5 jobs. The following NLGI2 grease types are approved for use in the pump bearings.
  1. Chevron Ulti-Plex Synthetic Grease EP
  2. Castrol Optipit
  3. Mystic JT6 Hi-Temp #2
  4. Lubrication Engineers Almaplex # 1275
- **Stuffing Box Lip Seals –** Stuffing box lip seals are flushed with pressurized oil at no greater than 5 – 7 psig. Seals should be flushed with Dexron III / Mercon automatic transmission fluid.

Environmental Conditions – before operating the pump make sure the following conditions are met:

- The pump contains liquid that is above the freezing point.
- Pump suction and discharge valves are open.

During Operation

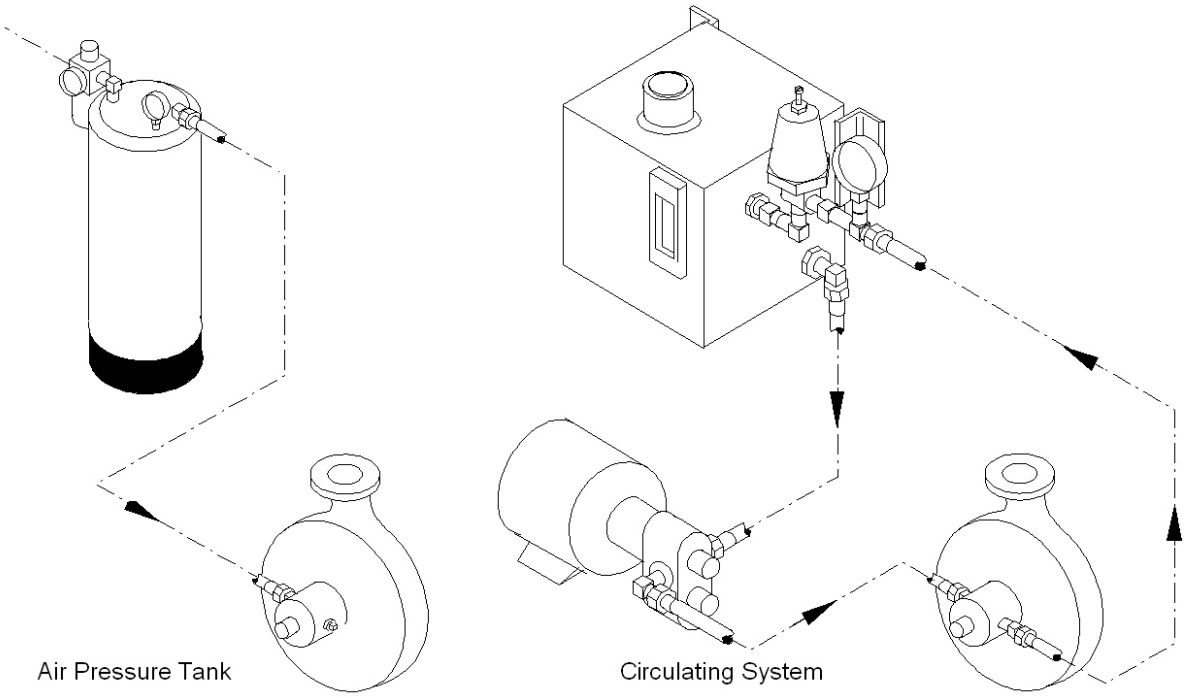
Maximum Pump Speed – The maximum recommended speeds for the pump are:
Model 350.205, 350.2056 - 2600 RPM
Model 350.1241, 350.1242, 350.1243, 350.1244 – 1800 RPM
Model 350.201, 350.202, 350.203 – 1800 RPM
this pump speed is exceeded, bearings may overheat and fail prematurely. Maximum bearing temperature (measured at the test points on bearing frame) should not exceed 220 deg. F. (Please consult manufacturer if these speeds need to be exceeded.)



Operating Guidelines for the Pump –

- DO NOT operate the pump dry.
- DO NOT operate the pump with the suction valve closed.
- DO NOT operate the pump with the discharge valve closed for more than 1 minute.
- If the pump must be throttled, use a discharge valve or restriction. NEVER throttle with a suction restriction or the suction valve.
- DO NOT operate the pump in reverse. Severe damage to the pump will occur.

Stuffing Box Lip Seals – Stuffing box lip seals are flushed with pressurized oil at no greater than 5 – 7 psig. Seals should be flushed with Dexron III / Mercon automatic transmission fluid. Fluid is supplied by either air pressurized oil supply tank (Legacy part #277.02161 or HP 30034 seal tank) or electric circulating pump system (part # HP 31007).



Mechanical Seals –

- The mechanical seal uses the process fluid for lubrication. DO NOT allow the mechanical seal to run dry or mechanical seal failure will occur.

After Operation

- DO NOT close the suction valve while pump is connected to a source of possible high pressure. Pumps are rated for a maximum of 150 PSIG.
- If slurry has been pumped, wash out the pump with water for several minutes while pumping at a high rate. If the pump speed can be changed, rapidly accelerate and decelerate the pump from near zero rpm to maximum rpm while washing out.
- If the slurry was cement, perform the previous process immediately. If this is not possible, pump other liquids through the pump until it can be thoroughly washed with clean liquids. Failure to flush the pump will allow the cement to solidify inside the pump.
- If the pump will be exposed to freezing temperatures before it is used again, remove the drain plugs and empty all liquids from the casing.

Section 3
Maintenance

***Warning**:*
Use lifting equipment that's in good operating condition and with adequate capacity to prevent injuries to personnel or damage to equipment.

***Warning**:*
Always use personal protective equipment like safety glasses to prevent eye injuries while performing any service work.

Disassembling the Pump

1. Mount pump securely to work bench by the rear mounting foot.

2. Attach lifting bail to pump discharge flange and use appropriate lifting equipment to support pump casing (Fig 1).

3. Remove retaining nuts (70.32916) and jam nuts (70.32992) from backside of casing. Remove casing from rotating assembly while supporting casing with appropriate lifting equipment.

4. Place shaft wrench over pump shaft (Fig. 3) and remove impeller by turning counter clockwise, allowing wrench to strike table (Fig. 2).

5. Remove the 4 cap screws that (70.43897) hold the stuffing box (350.12412) in place. Carefully remove stuffing box while allowing power frame to be supported by front mounting foot (Fig. 4).


Fig. 1


Fig. 2


Fig. 3

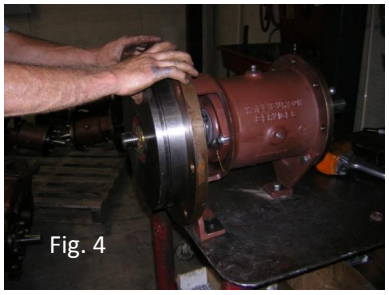


Fig. 4

6. Remove shaft sleeve (Fig. 5).

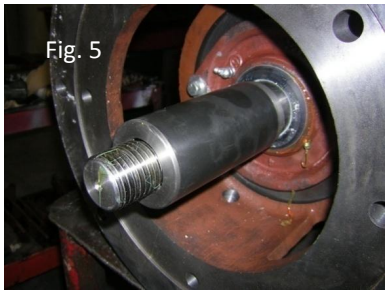


Fig. 5

7. Remove inboard bearing cap (350.12421) and shaft slinger (350.12434) (Fig 6).

8. Place rotating assembly face down and remove rear bearing housing retaining bolts.

9. Lift rear bearing housing, bearings and shaft from frame (Fig 7).


Fig. 6


Fig. 7

10. Remove rear bearing cap (350.12419).

11. Remove bearing retaining lock nut (70.09091) (Fig. 8).


Fig. 8

12. Use a bearing press to remove bearings (Fig. 9).


Fig. 9

Assembling the Pump

1. Press rear thrust bearings (70.04136) on shaft in a “back to back” configuration. (Fig. 10, Fig. 11) Bearings can also be installed using a bearing heater or they can be driven on using the appropriate driver.

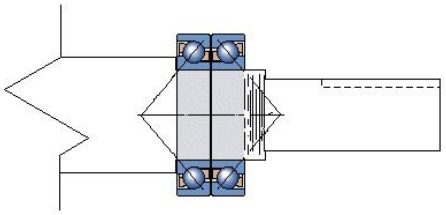


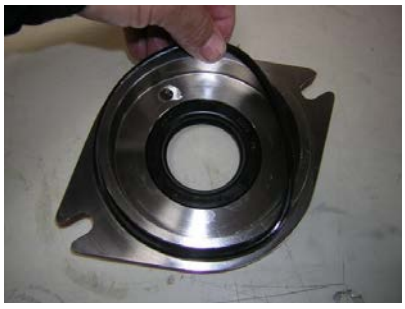
Fig. 11

Fig. 10

2. Install lock washer (70.09111) and lock nut (70.09091) (Fig. 12). Torque lock nut to 90 ft. lbs. Bend tab on lock washer to lock nut in position.

Fig. 12

3. Install lip seal (70.80606) into rear bearing cap (350.12419) using appropriate seal driver. Lip on seal should face towards outside. Install 45 deg. grease zerk (70.22931) in bearing cap. Install O-Ring (8.33988) around rear bearing cap. (Fig. 13).



4. Install shaft and bearing assembly in rear bearing housing (350.12418) (Fig. 14)

5. Slide rear bearing cap assembly (350.12419) over shaft and bolt to rear bearing housing using 3/8-16 x 1 hex cap screw, flat washer and lock washer (Fig. 15).

6. Install bearing housing O-ring (70.80612) over bearing housing (350.12418) (Fig. 16)

7. Install inboard bearing (70.80602) on threaded end of shaft. Bearing can be installed facing either direction. Use appropriate driver or press (Fig 16).

8. Carefully lower shaft and bearing assembly into frame. Care should be taken to keep shaft and bearings aligned with frame so they don't jam (Fig. 17).

9. Install 1/2"-13 jam nut (70.32989) on 1/2-13NC x 1-1/2" bolt (70.43868). Install in threaded hole in bearing housing. Remove guide pin. Install 1/2-13NC x 2" bolt (70.43872) thru same hole in bearing housing and into threaded hole in frame. Make sure bearing housing is bottomed out on frame (Fig. 18).

10. Install lip seal (70.80604) with lip facing in, on the back side of the bearing cap (350.12421) with appropriate seal driver (Fig. 19)

11. Install lip seal (70.80603), with lip facing out, in the front bearing cap (350.12421) with appropriate seal driver. Install grease zerk (70.22931) in 1/8" NPT hole so that connection faces out. Install (70.22933) grease zerk by driving into small hole on opposite side with small hammer (Fig. 20).

12. Lift power frame assembly and with hoist and place on assembly table (Fig. 21).

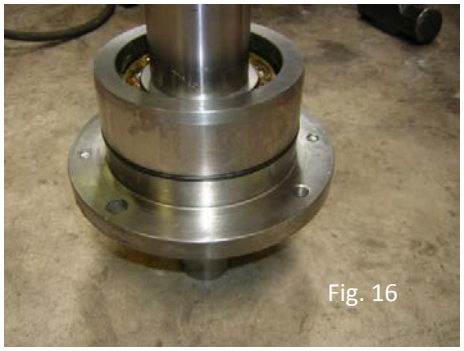


Fig. 16


Fig. 16


Fig. 17


Fig. 18


Fig. 19


Fig. 20


Fig. 21

13. Before detaching hoist, place front mounting foot (350.12422) underneath power frame assembly with foot facing toward back of frame. Slide bolt through foot and frame to hold in position. The hoist can now be removed from power frame (Fig. 22).


Fig. 22

14. Install front bearing cap assembly over shaft making sure not to damage lip seals using 3/8"-16NC x 1-1/4 cap screw (70.43816), washer (70.58806), and lock washer (Fig. 23).

15. Install shaft slinger (70.80603) on shaft . DO NOT lubricate shaft or slinger to facilitate installation. Flat side of slinger faces the bearing cap. Leave a gap of about 1/16" to 1/8" off bearing cap (Fig 23).


Fig. 23

16. Install shaft sleeve O-ring (70.80609), over shaft and slide to first step in shaft. Carefully slide shaft sleeve (350.12435) over shaft so it seats on O-ring (70.80609) (Fig 24).

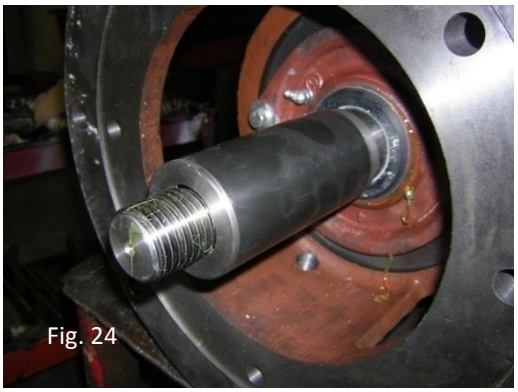


Fig. 24

Installing Shaft Lip Seals

17. Install three Buna-N lip seals (70.80607) with lips facing the bottom of the stuffing box using appropriate seal driver (Fig. 25)

18. Install lantern ring set (350.15293) (Fig. 26).

19. Install one Buna-N lip seal (350.80607) with lip facing bottom of stuffing box using appropriate seal driver. Hand pack with grease working grease into seals and lantern ring (Fig. 27).

20. Install ring gland (350.12427) with tapped holes facing up (Fig. 28).

21. Install gland plate (350.12429) using socket head cap screws (70.43374) (Fig. 29).

22. Tighten cap screws (70.43374) finger tight or torque to 100 in. oz. DO NOT OVER TIGHTEN OR SEALS WILL RUN TOO TIGHT ON SHAFT AND FAIL PREMATURELY (Fig. 30).

23. Install 1/8" pipe plugs (26.1) using Teflon sealant in top and bottom 1/8" NPT holes in stuffing box. Install 45 deg. hose adapter (70.96714) in 1/8" NPT hole in stuffing box 180 deg. apart using Teflon sealant. Hand tighten cap (70.77872) onto hose adapter (Fig. 31).

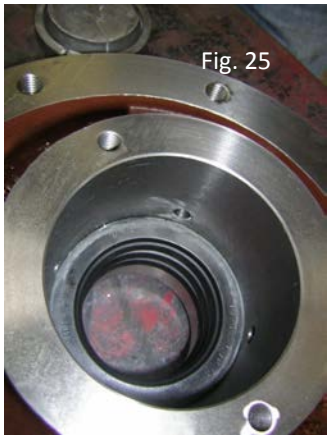


Fig. 25

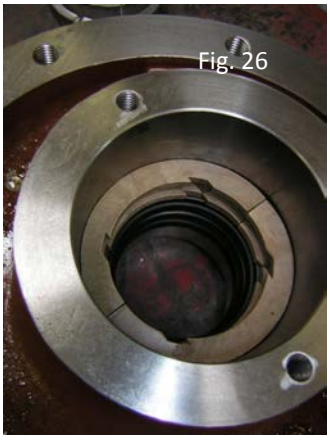


Fig. 26


Fig. 27


Fig. 28


Fig. 29


Fig. 30


Fig. 31

24. Carefully install stuffing box assembly over shaft , making sure to avoid damaging lip seals. Slide assembly onto shaft until it seats in the pilot dimension on power frame (Fig. 32).


Fig. 32

25. Install one each 5/8-11NC x 1-3/4" cap screw (70.43897) and 5/8 lock washer (70.58962) to hold stuffing box in position. *Make sure stuffing box assembly is supported by pilot dimension on frame and NOT the lip seals. Lip seals can be damaged if the weight of the stuffing box is allowed hang on them.* (Fig. 34).


Fig. 33

26. Install balance of four each 5/8-11NC x 1-3/4" cap screws and 5/8 lock washers through pump frame into stuffing box and tighten.
Use 3 each 5/8-11NC x 2" cap screws (70.43924) and 5/8 lock washer (70.58962) for bottom three holes that attach the foot (350.12422) to the frame.

27. Install O-ring (70.34019) in groove in stuffing box (350.12412). Spray with WD-40 to facilitate installation of pump casing (Fig. 34).


Fig. 34

28. Coat O-ring grove with Never-Seize or grease and install impeller O-ring (70.80608) in O-ring groove on back side of impeller (350.12414, 350.12431, 350.20501). Never-Seize or grease will hold o-ring in place during impeller installation (Fig. 35).

29. Install shaft wrench over keyed end of shaft. Apply never-seize to shaft threads and thread impeller clockwise onto shaft. Make sure bearing housing is bottomed out on frame so shaft extends completely through stuffing box.


Fig. 35

Setting Impeller Clearances

30. Using shaft wrench as a stop , spin impeller clockwise allowing wrench to strike the work table. Repeat this process several times until impeller is completely seated on shaft (Fig. 36). (Optional impeller wrench can be used to tighten impeller to 400 Ft. Lbs. See Section 6)


Fig. 36

31. Adjust clearance behind impeller using .014 inch feeler gauge. Use jacking bolts and retaining bolts on rear bearing housing to move impeller in or out. Using .014" feeler gauge check clearance behind impeller by cranking shaft to get a .014" average. Make adjustments as necessary (Fig. 37).


Fig. 37

32. Carefully tighten lock nuts on bearing housing jacking bolts to avoid making changes to impeller clearances (Fig. 38).

33. Using lifting eye and hoist position pump casing (350. 12413 or 350. 20502) over impeller and stuffing box. Carefully push casing over stuffing box . Be careful not to damage stuffing box O-ring.

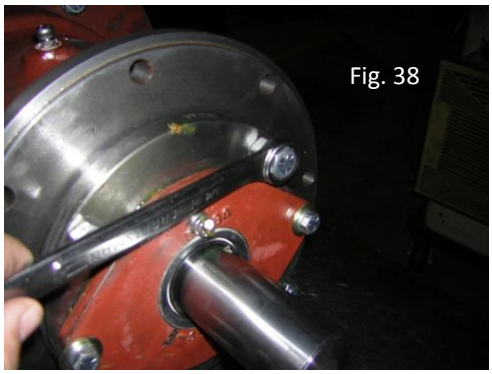


Fig. 38

34. Install 3/4-10NC x 3" cup point set screws (70.80613) through the unthreaded holes in the 12:00, 3:00, 6:00, 9:00 positions on the frame and into the pump casing. Set screws should extend 2.00 to 2.25 inches from back of pump casing. Coat threads with Never-Seize before installing. Install 3/4-10NC nut (70.32916) on each 3/4-10NC x 3" cap screw . Leave nut loose at this time (Fig. 39).


Fig. 39

35. Install 3/4-10NC x 2" cup point set screws (70.80614) through the threaded holes in the 1:00, 5:00, 7:00, 11:00 positions on the frame and into the pump casing. Coat threads with Never-Seize before installing. Do not screw past the frame flange at this time.

36. Install 3/4-10NC jam nut (70.32992) on each 3/4-10NC x 2" cap screw. Leave jam nut loose at this time (Fig. 40).

37. Install lifting strap (Fig. 41).

38. Using .016 inch feeler gauge, adjust casing in or out to get an average of .016" clearance between impeller and suction. Use 3/4-10NC x 2" (70.80614) set screws to push casing out and 3/4-10 nuts (70.32992) to pull casing back. Once an average of .016" is achieved, tighten jam nuts (70.32992) (Fig. 42).


Fig. 40


Fig. 41


Fig. 42

Installing Packing

1. Packing (350.12438) can be used as an alternative to the oil lubricated lips seals.
2. Packing can be cut in the field by firmly wrapping around the shaft sleeve as shown in (Fig. 1).
3. Rings can then be cut at a 90 deg. angle parallel with the shaft and sleeve (Fig. 2).
4. Individual rings are then installed in the same squence as the lip seals.
5. Be sure to install the lantern ring in the correct location
6. When installing the individual rings they should be staggered 90 deg from the previous ring so as to avoid creating a leak path (Fig. 3).
7. Install gland rings and gland plate finger tight. DO NOT OVER TIGHTEN.
8. When starting pump allow packing to leak freely. Slowly tighten the gland bolts until the leak has decreased to approximately 10 – 12 drops per minute.
9. Always allow some leakage from the packing. NEVER STOP LEAKAGE ENTIRELY or damage to the shaft sleeve will occur.
10. Packing should be lubricated with approved grease every 12 operating hours.

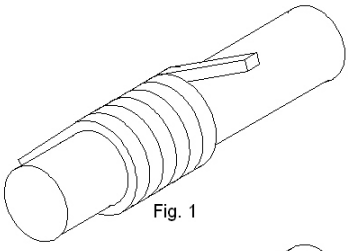


Fig. 1

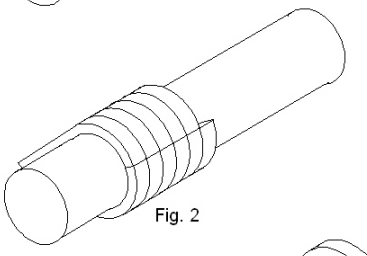


Fig. 2

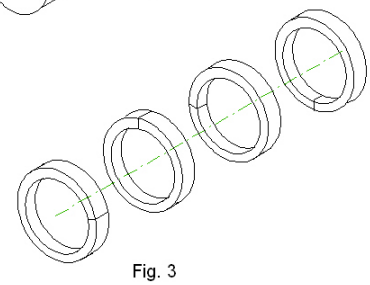


Fig. 3

Installing the Mechanical Seal

1. A mechanical seal is standard on the models 350.1241 and 350.1243. It is available as an option for all other models except the model 350.201.

2. The process fluid lubricates the mechanical seal, so no external lubrication is required.

3. Install 70.81033 roll pin thru the small hole at the bottom of the seal cavity. It should extend 3/32” into the seal cavity (Fig. 2, 3 & 4.)

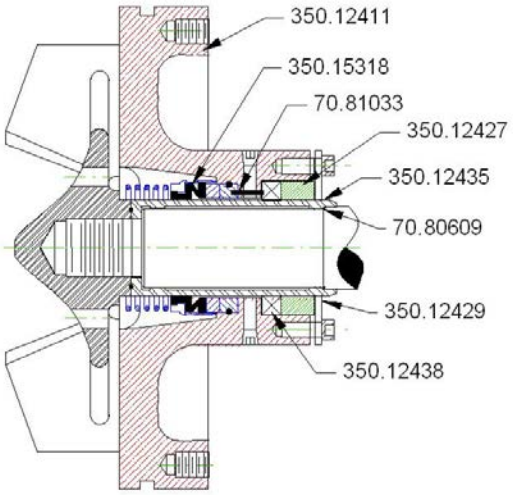


Fig. 1

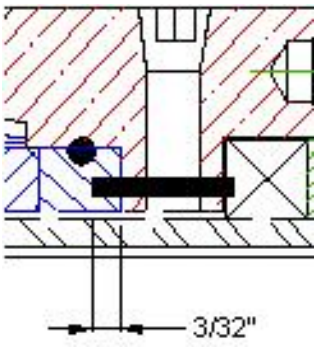


Fig. 2

Fig. 3

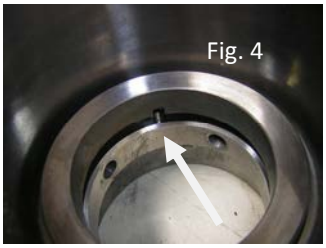


Fig. 4

4. Install the stationary side of the mechanical into the bore of the seal cavity. **CAUTION: make sure the notch in the back side of the stationary seal is aligned with the roll pin.** Use a soapy water or alcohol hand sanitizing solution to aid in installtion. Use the cardboard divider supplied with the new seal (to protect the seal face), press the stationary seal face into the bore until it bottoms out and the o-ring is seated.

5. Turn seal head over and install 1 each ring of packing (350.12438) in the bottom of stuffing box. (Fig. 5 & 6)

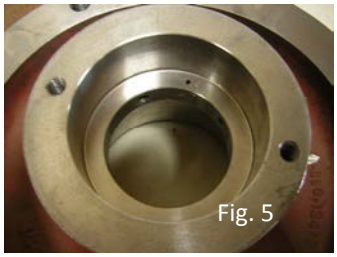


Fig. 5

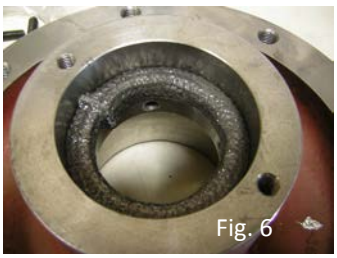


Fig. 6

6. Install split gland (350.12427) behind packing. (Fig. 7)

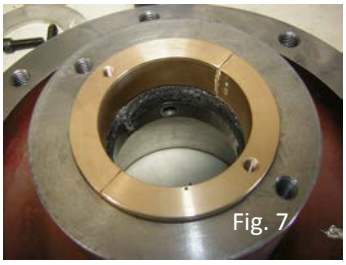


Fig. 7

7. Install gland plate (350.12429) and hand tighten the socket head cap screws (70.43374) If using torque wrench, tighten to between 100 – 120 in. oz. or 6.25 – 7.5 in. lbs. (DO NOT OVER TIGHTEN. (Fig. 8)

8. Install shaft sleeve (350.12435). (Fig. 9)

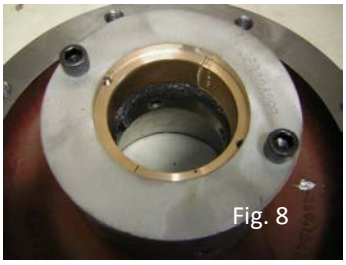


Fig. 8

9. Carefully install seal head (350.12411) assembly onto the power frame (350.2016). (Fig. 10)

10. Spray seal both faces with WD-40 or similar product to make sure they are free of contaminants.


Fig. 9


Fig. 10

11. Using a soapy water or alcohol hand sanitizing solution to aid in installtion, slide rotating half of the mechanical seal over the sleeve until the faces meet. Be careful not to “slap” the faces together or they could be damaged. Use caution so as not to cause the rubber bellows to “curl” while pressing the rotating half into position. **CAUTION – Do not use oil, grease or other lubicants to slide rotating half of seal on to the sleeve unless they are specifically designed for that purpose. Oil or grease may cause the rubber bellow to slip on the shaft during operation causing the seal to leak.** (Fig. 11)

12. Install the retaining spring . (Fig. 12)


Fig. 11


Fig. 12

13. Coat O-ring grove with Never-Seize or grease and install impeller O-ring (70.80608) in O-ring groove on back side of impeller (350.12414, 350.12431, 350.20501). Never-Seize or grease will hold o-ring in place during impeller installation (Fig. 13).


Fig. 13

14. Install impeller impeller and adjust per instruction on page 29. (Fig. 14)

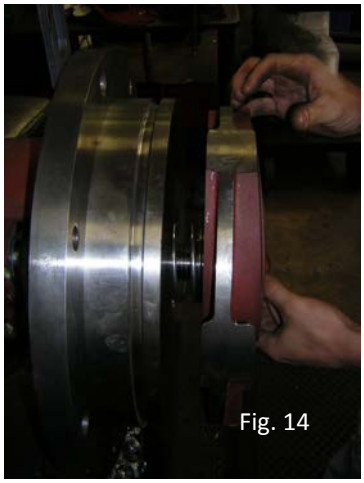


Fig. 14

15. Seal installation can be facilitated by the use of a seal installation tool. (Fig. 15) It can be fabricated per the drawing Fig. 16. The tool is usefull during installation and removal of both the stationary and rotating halves of the seal.

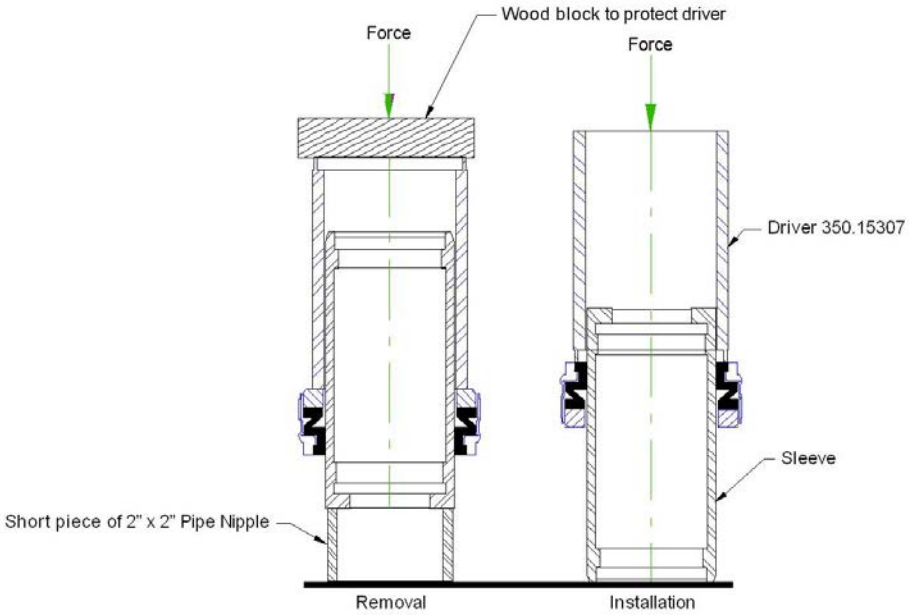


Fig. 15

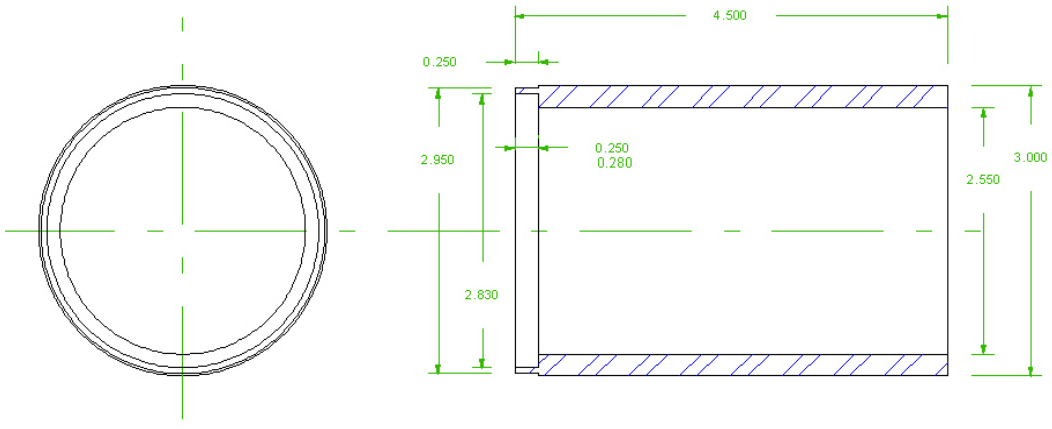


Fig. 16

Seal Lubricants and Suggested Service Rating

Service	Seal Type	Lubricant	Rating
Cementing	Lip Seal	Pressurized Oil (C-3 or Dexron)	A
		Grease	B
	Packing	Grease	B
	Mechanical Seal	None	Not Recommended
Fracturing Slurry	Lip Seal	Pressurized Oil (C-3 or Dexron)	A
	Packing	Grease	B
	Mechanical Seal	None	Not Recommended
Mud Circulation	Lip Seal	Pressurized Oil (C-3 or Dexron)	X
	Packing	Grease	A
	Mechanical Seal	Clean Flush Liquid	X
Water (Fresh)	Lip Seal	Pressurized Oil (C-3 or Dexron)	A
	Packing	Grease	B
	Mechanical Seal	None	A
Water (Sea)	Lip Seal	Pressurized Oil (C-3 or Dexron)	A
	Packing	Grease	B
	Mechanical Seal	None	X

Key		
A	Acceptable	Preferred
B	Acceptable	Secondary
X	Untested	Performance Unknown

Section 4

Troubleshooting Guide

***Warning**: Before trying to open or service the pump:*

- *Lockout or disconnect the power source to pump.*
- *Allow pump to completely cool if overheated.*
- *Failure to follow the operating instruction warnings of hazards or unsafe practices could result in injury or death.*

Trouble Shooting

	Symptom	Potential Causes	Corrective Action
1.	**No Liquid Delivered.**	a. Pump not primed.	Fill pump and pump suction line with water.
		b. Speed too slow.	Check pump shaft speed with tachometer. Increase speed as needed.
		c. Discharge head too high.	Make sure there are no obstruction in the discharge line, all valves are open, and that discharge hose is the correct length and diameter. Check with pressure gauge at pump discharge.
		d. Suction lift too high or restricted.	Remove any obstructions. Make sure liquid viscosity is not to high. Check with vacuum gauge at pump suction. Check suction valves to make sure they are open and unrestricted by debris.
		e. Impeller completely plugged.	Remove suction cover and clear obstruction.
		f. Wrong direction of rotation.	If pump is not locked up, check clearances and correct rotation.
		g. Viscosity too high (too thick).	Reduce liquid viscosity making fluid thinner.

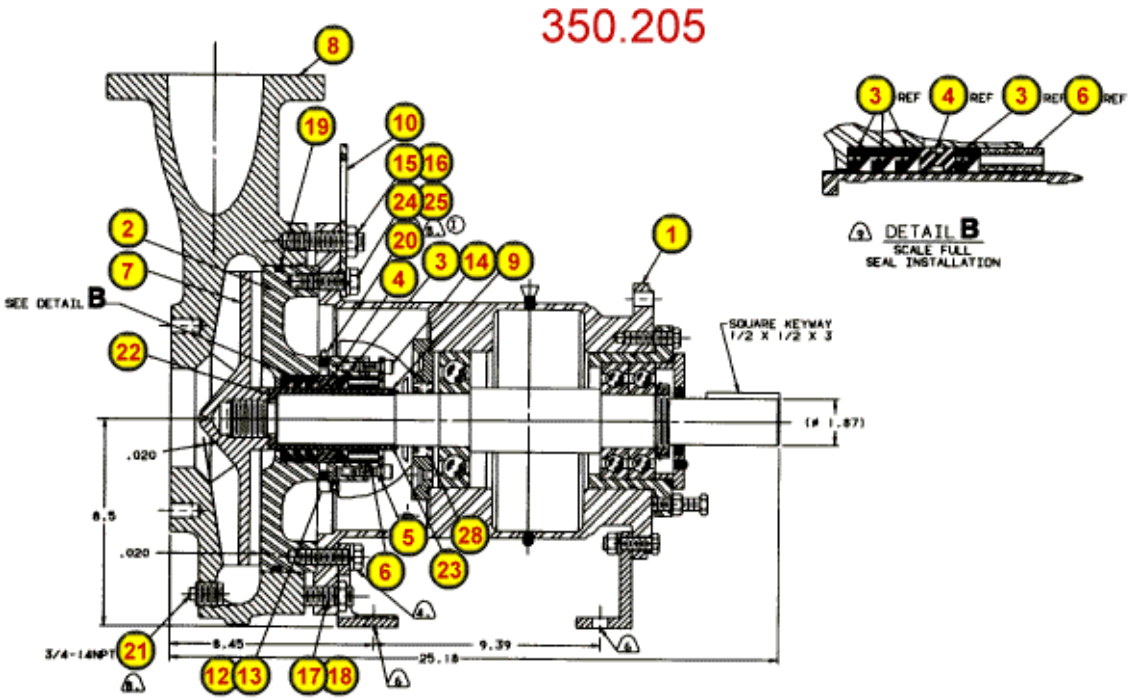
2.	**Not Enough Liquid Delivered.**	a. Air leak in suction pipe or stuffing box.	Adjust packing or repair mechanical seal. Check suction line and connects for leaks.
		b. Speed too low.	Check pump shaft speed with tachometer. Increase speed as needed.
		c. Discharge head higher than anticipated.	Make sure there are no obstruction in the discharge line, all valves are open, and that discharge hose is the correct length and diameter. Check with pressure gauge at pump discharge.
		d. Suction lift too high.	Remove any obstructions. Make sure liquid viscosity is not to high. Check with vacuum gauge at pump suction. Check suction valves to make sure they are open and unrestricted by debris.
		e. Impeller partially plugged	Remove suction cover and clear obstruction.
		f. Not enough suction head	Increase liquid level in supply tank.
		g. Mechanical defects.	Check for worn or damaged impeller or pump casing.
		h. Impeller clearances set too wide.	Check and adjust impeller clearances.
3.	**Not Enough Pressure**	a. Speed too slow.	Check pump shaft speed with tachometer. Increase speed as needed.
		b. Air in liquid.	Adjust packing or repair mechanical seal. Check suction line and connections for leaks. Increase liquid level in supply tank.
		c. Mechanical defects.	Check for worn or damaged impeller or pump casing.
		d. Impeller diameter too small.	Remove impeller and install correct diameter impeller.
		e. Impeller clearances set too wide.	Check and adjust impeller clearances.
4.	**Pump Works for a While and then Quits.**	a. Leak in suction line.	Adjust packing or repair mechanical seal. Check suction line and connects for leaks. Increase liquid level in supply tank.
		b. Suction plugged or restricted.	Remove any obstructions. Make sure liquid viscosity is not to high. Check with vacuum gauge at pump suction. Check suction valves to make sure they are open and unrestricted by debris.

		c. Suction lift too high.	Remove any obstructions. Make sure liquid viscosity is not to high. Check with vacuum gauge at pump suction. Check suction valves to make sure they are open and unrestricted by debris. Increase liquid level in supply tank.
5.	**Pump Takes Too Much Power.**	a. Speed too high.	Reduce pump speed.
		b. Discharge head lower than rating, pumps too much liquid.	Partially close discharge valve to produce more head pressure on pump discharge.
		c. Liquid viscosity is too high, liquid heavier than water or both.	Reduce liquid viscosity. Reduce flow rate for high fluid weights.
		d. V-belts too loose.	Adjust belt tension to manufactures specifications. Replace belts if glazed or damaged.
		e. Shaft bent.	Replace shaft.
		f. Impeller rubbing on casing.	Check and adjust impeller clearances.
		g. Stuffing box packing too tightly adjusted.	Do not over tighten packing. Allow liquid to drip thru packing for shaft lubrication. Regrease packing.
6.	**Bearings Overheating**	a. Bearing out of adjustment.	Check and adjust impeller clearances.
		b. V-belts too tight.	Adjust belt tension to manufactures specifications.
		c. Lack of lubrication.	Grease per manufacturer's recommendations.
		d. Excessive lubrication.	Remove excess grease. Grease per manufacturer's recommendations.
		d. Shaft bent.	Replace shaft.
		e. Bearings installed in face-to-face arrangement instead of back-to back arrangement.	Replace bearings. Install in back-to-back arrangement.
		f. Drive misaligned or excessive preload on shaft.	Check alignment. Remove preload from shaft.
7.	**Mechanical Seal Leaks.**	a. Mechanical seal has failed.	Replace seal.
		b. Lack of fluid has allowed seal to run dry.	Replace seal.
		c. Cavitation has caused seal to fail.	Replace seal.
8.	**Lip Seals Leak.**	a. Lips seals worn.	Replace lip seals.
		b. Shaft sleeve worn.	Replace shaft sleeve and lip seals.
		c. Seal oil supply tank pressure set too high.	Check level in oil supply tank.

9.	**Shaft breaks behind impeller.**	a. Pump speed too high.	Reduce pump speed.
		b. Obstruction in impeller.	Remove suction cover and remove obstruction.
10.	**Excessive Noise**	a. Cavitation in pump.	Remove any obstructions. Make sure liquid viscosity is not to high. Check with vacuum gauge at pump suction. Check suction valves to make sure they are open and unrestricted by debris.
		b. Pumping entrained air.	Check for leaks in suction line or evidence of vortexing at the pump suction.
		c. Pump not mounted securely.	Inspect and repair installation.
		d. Impeller clogged or damaged.	Remove any obstructions. Replace damaged part.
11.	**Shaft breaks at rear bearing.**	a. V-belts too tight.	Adjust belt tension to manufactures specifications.
		b. Lack of lubrication.	Replace bearings, readjust per manufacturer's instructions and re-grease bearings.

Section 5

Parts Breakdowns

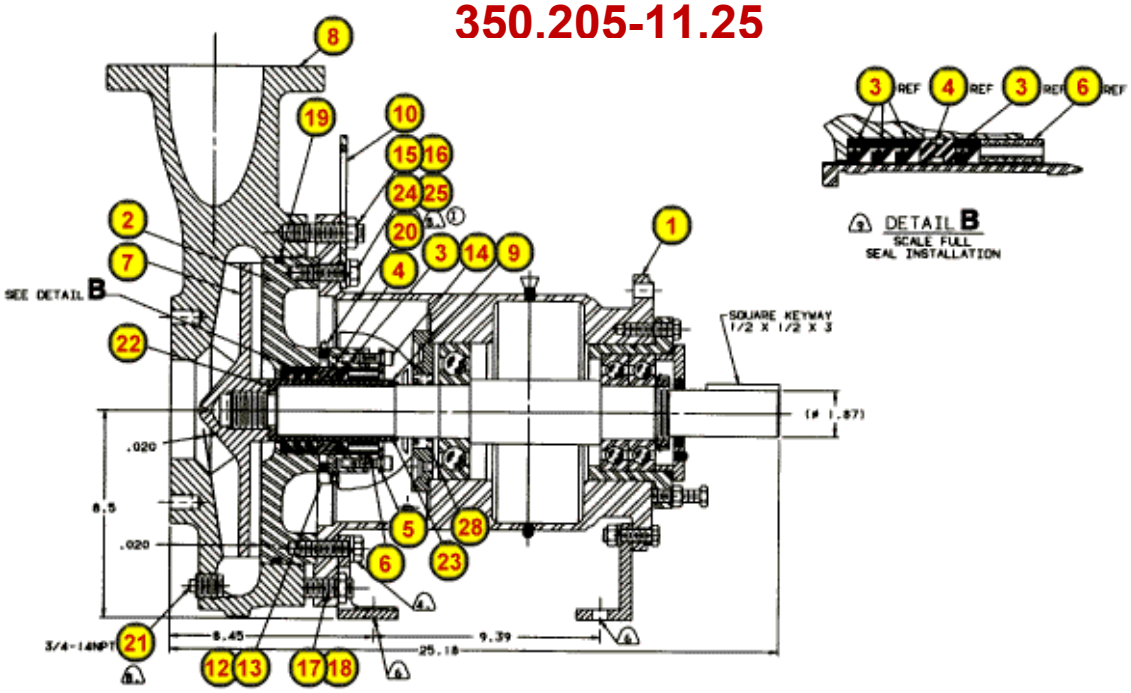


Halliburton 350.205 Size 4 X 4 X 12 - 12" Impeller Lip Seal Design
SAP 100011824

Item	SAP	Part Number	Description	Quan. Req.
1	100003125	350.2016	Power End Assembly 100 BHP	1
2	100003081	350.12412	Box - Stuffing - Lip Seal or Packing	1
3	100002398	70.80607	Seal- Oil	4
4	100003099	350.15293	Lantern Ring - 20623	1
5	100011791	350.12429	Plate - Gland	1
6	100059329	350.12420	Ring - Gland	1
7	100003127	350.20501	Impeller 12" Diameter	1
8	100003128	350.20502	Casing	1
9	100003087	350.12435	Sleeve - Shaft	1
10	100011794	350.12439	Strap - Lifting	1
11	100059337	350.12436	Plate - Identification	1
12	100034168	70.85981	Adapter - Hose-45 Deg Brass 1/4 Tube x 1/8-27MPT x 9/16-18 JIC	4
13	100032686	70.79319	Adapter - Hose -1/4 Tube x 9/16-18 JIC	4

14	100002169	70.43374	Screw - Hex SOC 3/8-16NC x 1-1/4	2
15	100012922	70.32916	Nut Hex 3/4-10NC	4
16	100013142	70.80613	Screw - Set - 3/4-10UNC-3A x 3 Cup Point	4
17	100013143	70.80614	Screw - Set - 3/4-10UNC-3A x 2 Cup Point	4
18	100012924	70.32992	Nut - Hex Jam - 3.4-10NC	4
19	100001993	70.34019	O-Ring - 70D 12-1/2 x 12 x 1/4	1
20	100016568	26.1	Pipe Plug 1/8 IN. - CI	2
21	100016593	26.5	Plug - Pipe - 3/4 IN CI	1
22	100002399	70.80608	O-Ring - 70D 2 x 1-7/8 x 1/16	1
23	100002400	70.80609	O-Ring - 70D 2-1/8 x 2 x 1/16	1
24	100029924	70.58962	Washer - Lock - 5/8 - STL	5
25	100028511	70.43897	Screw - Hex Cap 5/8-11NC x 1-3/4	5

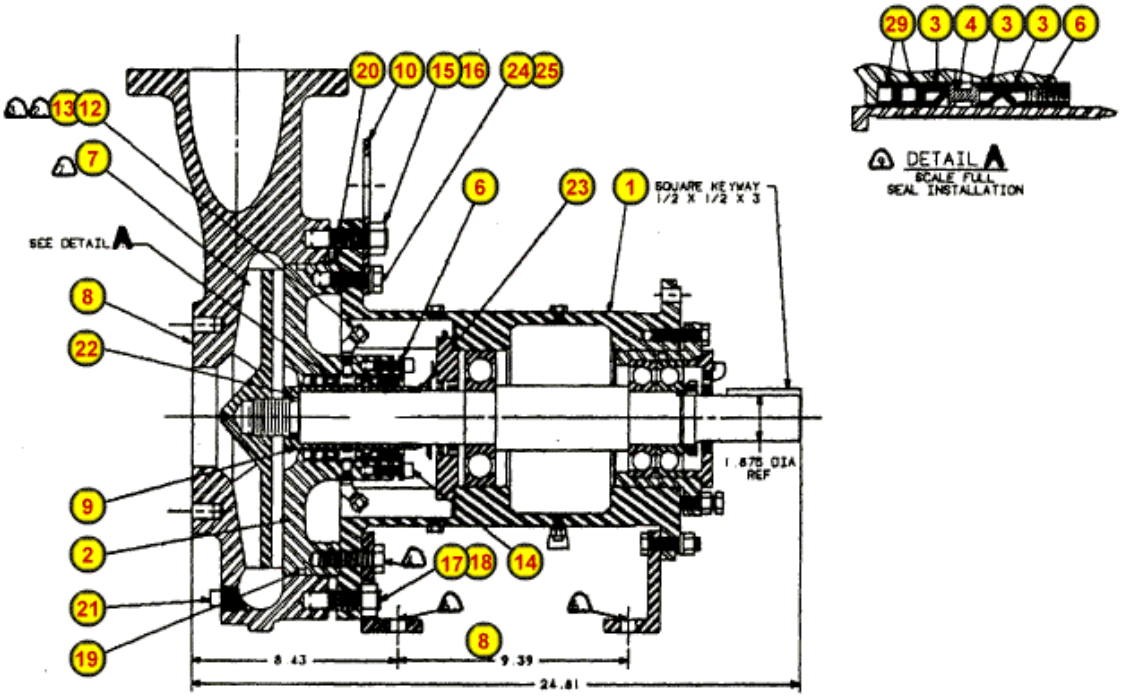
350.205-11.25



Halliburton 350.205-11.25 Size 4 X 4 X 12 – 11.25" Impeller Lip Seal Design SAP 101646801				
Item #	**SAP**	**Part Number**	**Description**	**Quan. Req.**
1	100003125	350.2016	Power End Assembly 100 BHP	1
2	100003081	350.12412	Box - Stuffing - Lip Seal or Packing	1
3	100002398	70.80607	Seal- Oil	4
4		350.15293	Lantern Ring - 20623	1
5		350.12429	Plate - Gland	1
6		350.12420	Ring - Gland	1
7		350.20501A	Impeller 11.25" Diameter	1
8		350.20502	Casing	1
9		350.12435	Sleeve - Shaft	1
10		350.12439	Strap - Lifting	1
11		350.12436	Plate - Identification	1
12		70.77872	Adapter Hose Cap 9/16-18 JIC Size 6	2
13		70.796714	Adapter Hose 45 Deg 9/16-18 JIC X 1/8-27 NPT	2
14		70.43374	Screw - Hex SOC 3/8-16NC x 1-1/4	2
15		70.32916	Nut Hex 3/4-10NC	4
16		70.80613	Screw - Set - 3/4-10UNC-3A x 3 Cup Point	4
17		70.80614	Screw - Set - 3/4-10UNC-3A x 2 Cup Point	4
18		70.32992	Nut - Hex Jam - 3.4-10NC	4
19		70.34019	O-Ring - 70D 12-1/2 x 12 x 1/4	1
20		26.1	Pipe Plug 1/8 IN. - CI	2

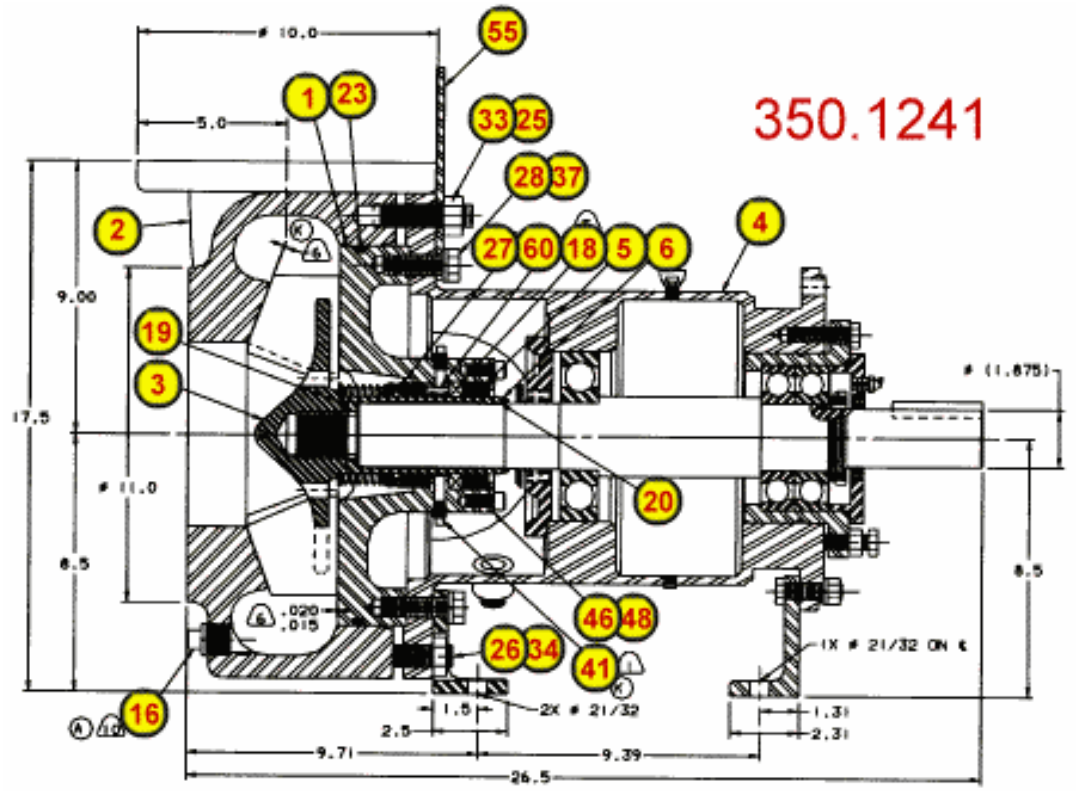
21		26.5	Plug - Pipe - 3/4 IN CI	1
22		70.80608	O-Ring - 70D 2 x 1-7/8 x 1/16	1
23		70.80609	O-Ring - 70D 2-1/8 x 2 x 1/16	1
24		70.58962	Washer - Lock - 5/8 - STL	5
25		70.43897	Screw - Hex Cap 5/8-11NC x 1-3/4	5

350.2056



Halliburton 350.205-11.25 Size 4 X 4 X 12 – 12.00" Impeller Teflon Lip Seal Design, HALAR coated Impeller SAP				
Item #	**SAP**	**Part Number**	**Description**	**Quan. Req.**
1		350.2016	Power End Assembly 100 BHP	1
2		350.12412	Box - Stuffing - Lip Seal or Packing	1
3		70.80607	Seal - Oil -2.500 B X 3.500 OD X .437 W	3
4		350.15293	Lantern Ring - 20623	1
5		350.12429	Plate - Gland	1
6		350.12427	Ring - Gland	1
7		350.20510	Impeller 12" Diameter Coated	1
8		350.20502	Casing	1
9		350.12435	Sleeve - Shaft	1
10		350.12439	Strap - Lifting	1
11		350.12436	Plate - Identification	1
12		70.77872	Adapter Hose Cap 9/16-18 JIC Size 6	2
13		70.796714	Adapter Hose 45 Deg 9/16-18 JIC X 1/8-27 NPT	2
14		70.43374	Screw - Hex SOC 3/8-16NC x 1-1/4	2
15		70.32916	Nut Hex 3/4-10NC	4
16		70.80613	Screw - Set - 3/4-10UNC-3A x 3 Cup Point	4
17		70.80614	Screw - Set - 3/4-10UNC-3A x 2 Cup Point	4
18		70.32992	Nut - Hex Jam - 3.4-10NC	4
19		70.34019	O-Ring - 70D 12-1/2 x 12 x 1/4	1
20		70.80954	O-Ring - 70D 12-1/4 x 12 x 1/8	3
21		26.5	Plug - Pipe - 3/4 IN CI	1

22			Not Shown	
23		7.33684	O-Ring - 70D 2 x 1-7/8 x 1/16 Fluorocarbon	1
23		70.80609	O-Ring - 70D 2-1/8 x 2 x 1/16	1
24		70.58962	Washer - Lock - 5/8 - STL	5
25		70.43897	Screw - Hex Cap 5/8-11NC x 1-3/4	5
27			Not Shown	
29		350.20560	Teflon PTFE Lip Seal	2

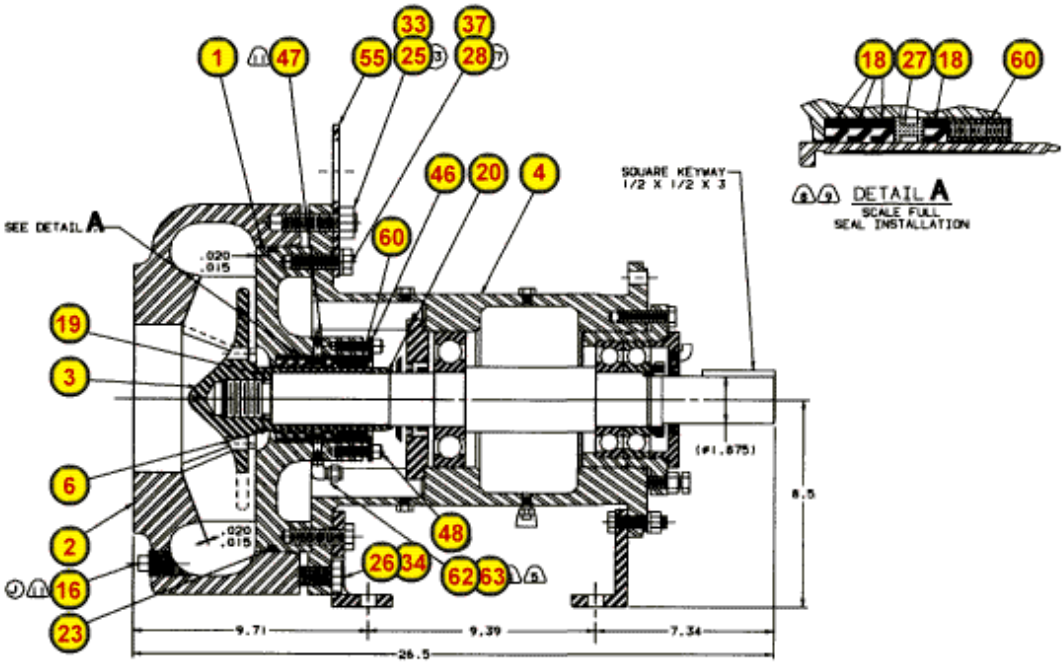


Halliburton 350.1241 Size 6 X 5 X 11 - 10" Impeller - Mechanical Seal Design
SAP 100059322

Item #	SAP	Part #	Description	Quan. Req.
1		350.12411	Box - Stuffing - Mechanical Seal	1
2		350.12413	Casing - Pump Cent - 6X5X10	1
3		350.12414	Impeller - 10" Dia. Pump Cent.	1
4		350.2016	Power End Assembly 100 BHP	1
5		350.12427	Ring - Gland	1
6		350.12435	Sleeve - Shaft	1
7			Not Shown	
16		26.5	Plug - Pipe 3/4" CI	2
18		350.12438	Packing Ring 3.5 X 2.5 graphite	1
19		70.80608	O-Ring - 70D-2 X 1-7/8" X 1/16" 568-032	1
20		70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033	1
23		70.34019	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453	1
25		70.80613	Screw - Set 3/4"-10UNC-3A X 3 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
26		70.80614	Screw - Set 3/4"-10UNC-3A X 2 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
27		350.15318	Mechanical seal TC/TC	1
28		70.43897	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated	5
33		70.32916	Nut Hex 3/4-10NC	4

34		70.32992	Nut - Hex Jam - 3.4-10NC	4
37		70.58962	Washer - Lock 5/8" -Steel - Plated	5
41		26.1	Plug - Pipe 1/8 - CI	4
46		350.12429	Plate - Gland	1
47		70.80954	O-Ring - 70D - 12-1/4 X 12 X 1/8 568-278	3
48		70.43371	Screw - Hex Socket - 3/8-16NC X 3/4	2
53			Not Shown	1
55		350.12439	Strap - Lifting	1
60		70.81033	Roll Pin SS 1/8 x 3/4	1
61		350.12436	Plate - Identification	1

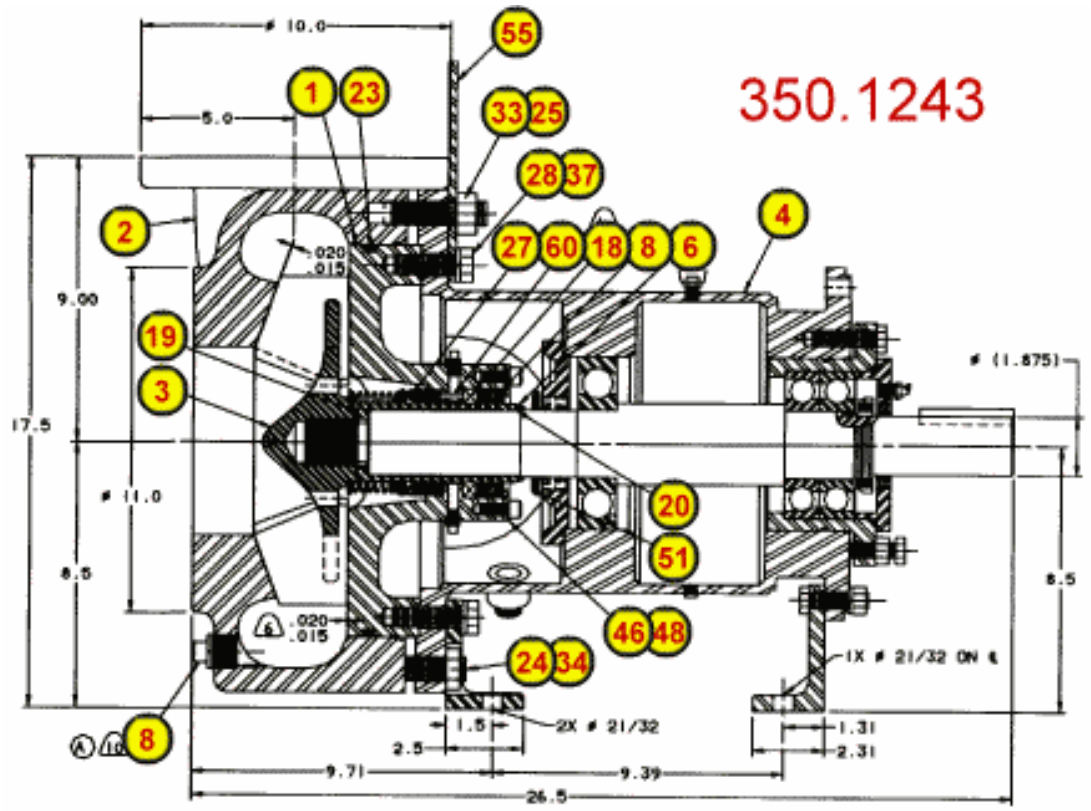
350.1242



Halliburton 350.1242 Size 6 X 5 X 11 - 10" Impeller - Lip Seal Design
SAP 100011789

Item #	SAP	Part #	Description	Quan. Req.
1		350.12412	Box - Stuffing - Lip Seal or Packing	1
2		350.12413	Casing - Pump Cent - 6X5X10	1
3		350.12414	Impeller - 10" Dia. Pump Cent.	1
4		350.2016	Power End Assembly 100 BHP	1
5			Not Shown	
6		350.12435	Sleeve - Shaft	1
16		26.5	Plug - Pipe 3/4" CI	2
18		70.80607	Seal - Oil -2.500 B X 3.500 OD X .437 W	4
19		70.80608	O-Ring - 70D-2 X 1-7/8" X 1/16" 568-032	1
20		70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033	1
23		70.34019	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453	1
25		70.80613	Screw - Set 3/4"-10UNC-3A X 3 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
26		70.80614	Screw - Set 3/4"-10UNC-3A X 2 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
27		350.15293	Lantern Ring	1
28		70.43897	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated	1
33		70.32916	Nut Hex 3/4-10NC	4
34		70.32992	Nut - Hex Jam - 3.4-10NC	4
37		70.58962	Washer - Lock 5/8" -Steel - Plated	5

46		350.12429	Plate - Gland	1
47		26.1	Pipe Plug 1/8 IN. - CI	2
48		70.43374	Screw - Hex Socket - 3/8-16NC X 1-1/4	2
53			Not Shown	
55		350.12439	Strap - Lifting	1
60		350.12427	Ring - Gland	1
60		350.12420	Ring - Gland	1
61		350.12436	Plate - Identification	1
62		70.77872	Adapter Hose Cap 9/16-18 JIC Size 6	2
63		70.796714	Adapter Hose 45 Deg 9/16-18 JIC X 1/8-27 NPT	2

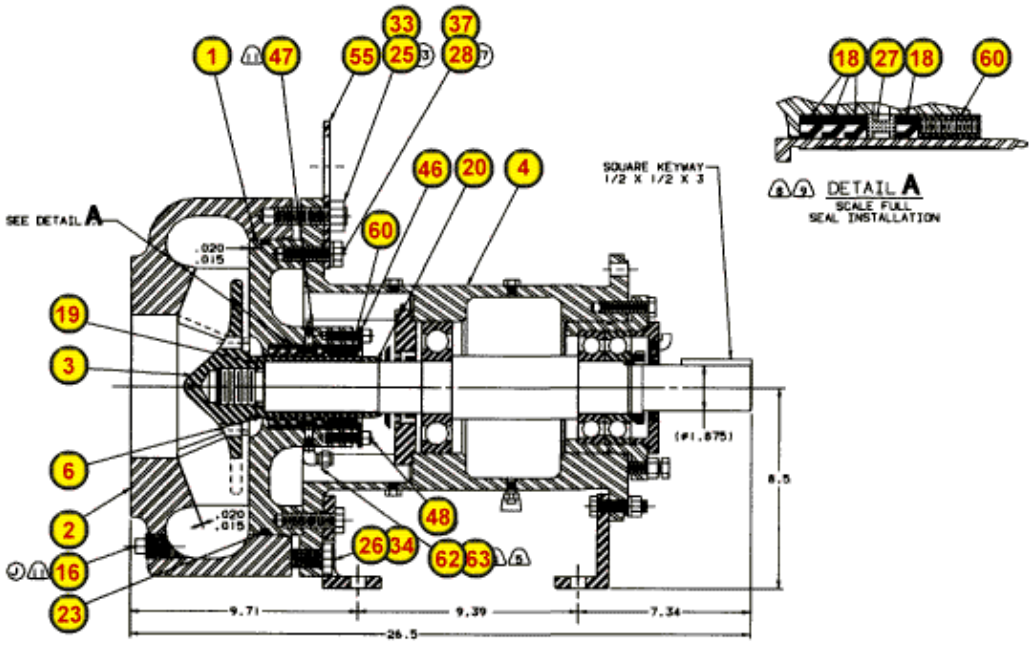


	Halliburton 350.1243 Size 6 X 5 X 11 - 11" Impeller - Mechanical Seal Design SAP 120021877		

Item #	SAP	Part #	Description	Quan. Req.
1		350.12411	Box - Stuffing - Mechanical Seal	1
2		350.12413	Casing - Pump Cent - 6X5X10	1
3		350.12431	Impeller - 11" Dia. Pump Cent.	1
4		350.2016	Power End Assembly 100 BHP	1
5			Not Shown	
6		350.12435	Sleeve - Shaft	1
7			Not Shown	
8		350.12427	Ring - Gland	1
16		26.5	Plug - Pipe 3/4" CI	2
18		350.12438	Packing Ring 3.5 X 2.5 graphite	1
19		70.80608	O-Ring - 70D-2 X 1-7/8" X 1/16" 568-032	1
20		70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033	1
23		70.34019	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453	1
25		70.80613	Screw - Set 3/4"-10UNC-3A X 3 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
26		70.80614	Screw - Set 3/4"-10UNC-3A X 2 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
27		350.15318	Mechanical seal TC/TC John Crane	1
28		70.43897	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated	5
33		70.32916	Nut Hex 3/4-10NC	4
34		70.32992	Nut - Hex Jam - 3.4-10NC	4

37		70.58962	Washer - Lock 5/8" -Steel - Plated	5
41		26.1	Plug - Pipe 1/8 - CI	4
46		350.12429	Plate - Gland	1
47		70.80954	O-Ring - 70D - 12-1/4 X 12 X 1/8 568-278	3
48		70.43371	Screw - Hex Socket - 3/8-16NC X 3/4	2
55		350.12439	Strap - Lifting	1
60		70.81033	Roll Pin SS 1/8 x 3/4	1
61		350.12436	Plate - Identification	1

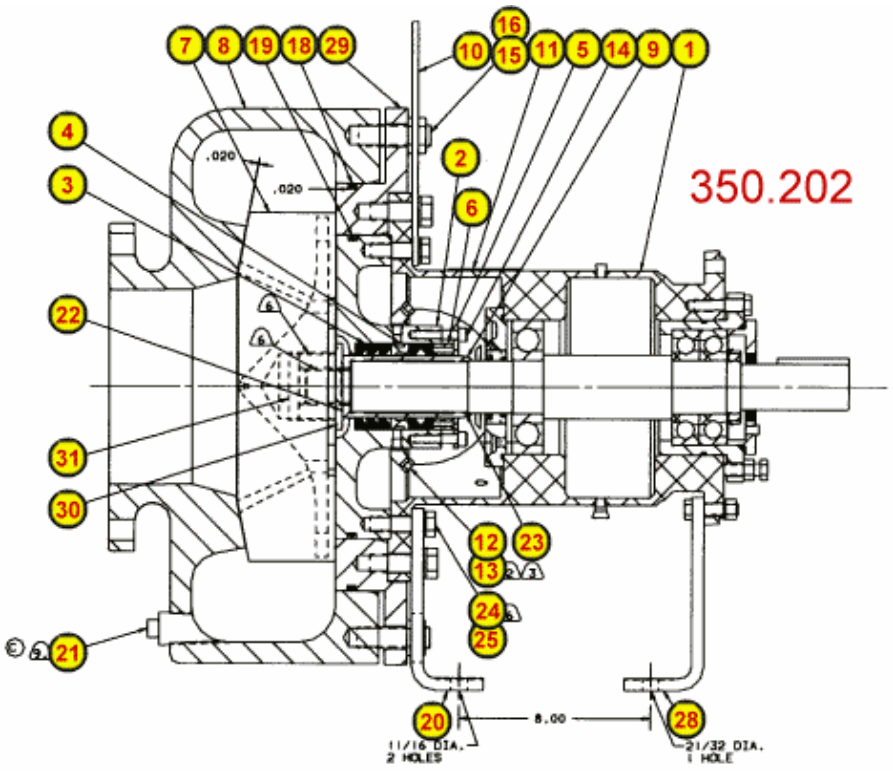
350.1244



Halliburton 350.1244 Size 6 X 5 X 11 - 11" Impeller - Lip Seal Design
SAP 100011795

Item #	SAP	Part #	Description	Quan. Req.
1		350.12412	Box - Stuffing - Lip Seal or Packing	1
2		350.12413	Casing - Pump Cent - 6X5X11	1
3		350.12431	Impeller - 11" Dia. Pump Cent.	1
4		350.2016	Power End Assembly 100 BHP	1
5			Not Shown	
6		350.12435	Sleeve - Shaft	1
7			Not Shown	
16		26.5	Plug - Pipe 3/4" CI	2
18		70.80607	Seal - Oil -2.500 B X 3.500 OD X .437 W	4
19		70.80608	O-Ring - 70D-2 X 1-7/8" X 1/16" 568-032	1
20		70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033	1
23		70.34019	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453	1
25		70.80613	Screw - Set 3/4"-10UNC-3A X 3 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
26		70.80614	Screw - Set 3/4"-10UNC-3A X 2 Cup Point HT Alloy Steel - Zinc Plated 40 RC	4
27		350.15293	Lantern Ring	1
28		70.43897	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated	1
33		70.32916	Nut - Hex -3/4-10NC	4
34		70.32992	Nut - Hex Jam -3/4-10NC	4
37		70.58962	Washer - Lock 5/8" -Steel - Plated	5
46		350.12429	Plate - Gland	1

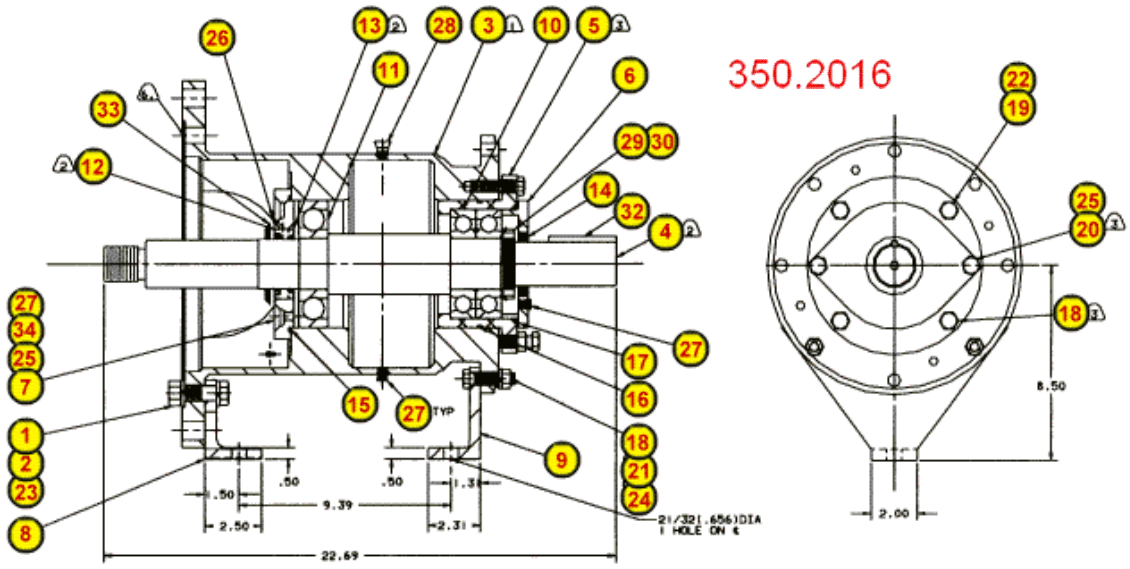
47		26.1	Plug - Pipe 1/8 NPT CI	2
48		70.43374	Screw - Hex Socket - 3/8-16NC X 1-1/4	2
55		350.12439	Strap - Lifting	1
60		350.12420	Ring - Gland	1
61		350.12436	Plate - Identification	1
62		70.77872	Adapter Hose Cap 9/16-18 JIC Size 6	2
63		70.796714	Adapter Hose 45 Deg 9/16-18 JIC X 1/8-27 NPT	2



Halliburton 350.202 Size 8 X 6 X 14 - 14" Impeller - Lip Seal Design - 100 BHP Frame
SAP 101308220

Item #	SAP	Part Number	Description	Quan. Req.
1		350.2016	Power End Assembly 100 BHP	1
2		350.12412	Box - Stuffing - Lip Seal or Packing	1
3		70.80607	Seal - Oil -2.500 B X 3.500 OD X .437 W	5
4		350.15293	Lantern Ring	1
5		350.12429	Plate - Gland	1
6		350.12427	Ring - Gland	1
7		350.20201	Impeller - 14" Dia. Pump Cent.	1
8		350.20102	Casing - Pump Cent - 8X6X14	1
9		350.12435	Sleeve - Shaft	1
10		350.20205	Strap - Lifting - 8 x 6 x 14 Pump	1
11		350.12436	Plate - Identification	1
12		70.77872	Adapter Hose Cap 9/16-18 JIC Size 6	2
13		70.796714	Adapter Hose 45 Deg 9/16-18 JIC X 1/8-27 NPT	2
14		70.43374	Screw - Hex Socket - 3/8-16NC X 1-1/4	2
15		70.83335	Screw - Set - 7/8-9UNC - 3AX3.0 Cup Point HT Alloy Steel - Zinc Plated 40 RC	8
16		70.32994	Nut - Hex Jam - 7/8-9UNC - PL	4
17		70.32917	Nut Hex 7/8-9NC- PL	4
18		70.83333	O-Ring -70D - 16.5 X 116.0 X1/4 568-461	1
19		70.34019	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453	1
20		350.20206	Mount - Front - 8 X 6 X 14 100BHP	1

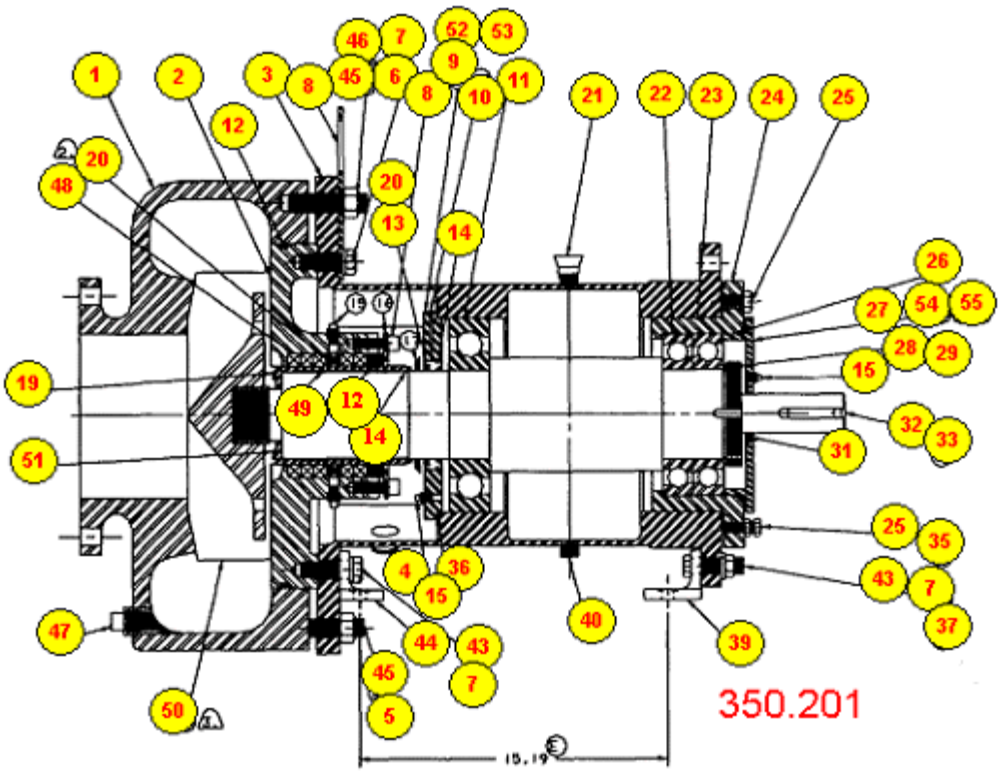
21		26.6	Plug - Pipe 1" STL - SQ HD	3
22		70.80608	O-Ring - 70D-2 X 1-7/8" X 1/16" 568-032	1
23		70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033	1
24		70.58962	Washer - Lock 5/8" -Steel - Plated	8
25		70.43897	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated	8
26			Not Shown	
27			Not Shown	
28		350.20204	Mount - Rear - 8X6X14 - 100BHP	1
29		350.20202	Adapter - Stuffing Box - 8X6X14 Pump to 100BHP Power end	1
30		70.43924	Screw - Hex Cap - 3/4-10NC X 2 - PL	4
31			Not Shown	
32		70.58964	Washer - Lock 3/4 - STL - PL	4



350.2016 Power End Assembly - 100 BHP - Centrifugal Pump
SAP 100003125

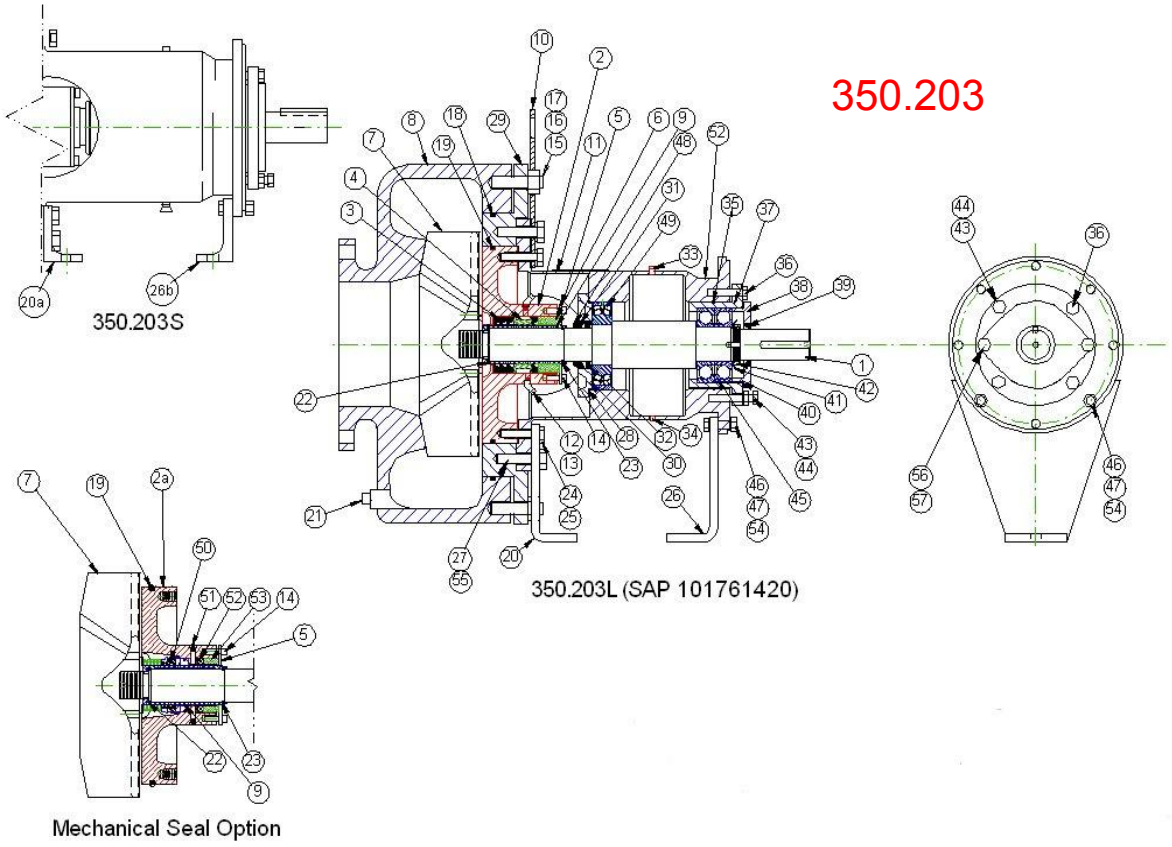
Item #		Part Number	Description	Quan. Req.
1		70.43903	Screw- Hex cap -5/8-11NC x 2-1/4	3
2		70.32915	Nut - Hex 5/8-11NC	3
3		350.12432	Frame - Cast Ductile Iron	1
4		350.12416	Shaft	1
5		350.12418	Housing - Bearing - Rear	1
6		350.12419	Cap - Bearing - Rear	1
7		350.12421	Cap - Bearing - Front	1
8		350.12422	Mount - Front - STD	1
9		350.12423	Mount - Rear - STD - Single Hole	1
10		70.04136	Bearing - Ball - 7311 Duplex	2
11		70.80602	Bearing - Ball - 6411 Simplex	1
12		70.80603	Seal - Oil - 21159	1
13		70.80604	Seal - Oil - 21163	1
14		70.80606	Seal - Oil - 9189 LPD	1
15		8.34051	O-Ring - 90D - 5-3/4 x 5-1/2 x 1/8	1
16		70.80612	O-Ring - 70D - 5-1/2 x 5-1/4 x 1/8	1
17		8.33988	O-Ring - 90D - 4-3/4 x 4-3/8 x 3/16	1
18		70.43872	Screw- Hex cap -1/2-13NC x 2	4
19		70.43868	Screw - Hex cap - 1/2-13NC x 1-1/2	2
20		70.43814	Screw - Hex cap - 3/8-16NC x 1	2
21		70.32914	Nut - Hex 1/2-13NC	2
22		70.32989	Nut - Hex Jam 1/2-13NC	2
23		70.58962	Washer - Lock 5/8	3
24		70.58959	Washer - Lock 1/2	2
25		70.58806	Washer - Flat 3/8	4
26		70.22933	Fitting - Grease 1/8 straight	1
27		26.10102	Plug - Pipe 1/8 SS Hex socket Head	3

28		106.54711	Vent - Air - 301370 -1/8 NPT	1
29		70.09091	Nut - Lock - N11	1
30		70.09111	Washer - Lock - W11	1
31		26.2	Plug - Pipe 1/4 CI	1
32		350.12433	Key - Square - 1/2 x 1/2 x 3	1
33		350.12434	Slinger - Shaft	1
34		70.43816	Screw - Hex Cap 3/8-16NC x 1-1/4	2
35		70.22931	Fitting - Grease - 1/8 45 Deg	2
36		70.58955	Washer - Lock 3/8	4



	350.201 8 X 6 x 14 HD Centrifugal Pump - Packing Design SAP 101573750		
Item #	**Part Number**	**Description**	**Quan. Req.**
1	350.20102	Casing - Pump Centrifugal 8x6x14	1
2	350.20103	Box - Stuffing - Packing - Pump Centrifugal - 8x6x14	1
3	350.20122	Frame - Pump Centrifugal 8x6x14	1
5	70.32917	Nut - Hex - 7/8-9NC - Plated	4
6	70.43924	Screw - Hex Cap - 3/4-10NC x 2 - Plated Spec70.43917	8
7	70.58964	Washer - Lock - 3/4 - Plated Spec. 70.59034	14
8	70.43381	Screw - Hex Cap - 1/2-13NC x 1-1/4 - Plated Spec70.43270	2
9	350.20124	Cap - Bearing - Front - Pump - Centrifugal 8x6x14	1
10	70.22933	Fitting - Grease - 1/8 - Straight - Drive	1
11	70.83282	Bearing - Ball - 322S -4.331 B x 9.448 OD x 1.969 W - Single Row - Radial - MRC Only	1
12	70.83333	O-Ring - 70D - 16.5 - x 16.0 x 1/4 - 568-461 - Spec 70.33000 Spec 70.72000	1
13	70.83357	Seal - Oil - Chicago Rawhide - 42470- 4.250 B x 5.256 OD x .250 W	1
14	70.83283	Seal - Oil - Chicago Rawhide - 42422- 4.250 B x 5.256 OD x .375 W	1
15	26.1	Plug - Pipe - 1/8 Inch - CI	2
16	350.20107	Plate - Gland - Pump Centrifugal 8x6x14	1
17	70.32728	Slinger - Pump Centrifugal 8x6x14	1
18	350.20106	Ring - Gland - Pump Centrifugal 8x6x14	1

19		70.83334	O-Ring - 70D - 4-1/8 x 4.0 x 1/16 - 568-045 - Spec 70.33000 Spec 70.72000	2
20		350.20105	Lantern Ring - 6 Inch OD x 4.75 Inch ID Pump Centrifugal 8x6x14	1
21		106.54711	Vent - Air - 301370 - 1/8" NPT - Alemite	1
22		70.83284	Bearing - Ball - 4.3307 B x 7.8740 OD x 1.4960 W - Single Row - Angular Contact - 40 Deg Contact Angle - 1/2 Pair	1
23		8.34066	O-Ring - 90D -9-1/4x9x1/8 - 568-270 - Spec 8.33001 Spec 70.72000	1
24		350.20126	Housing - Bearing - Rear - Pump Centrifugal 8x6x14	1
25		70.43898	Screw - Hex Cap - 5/6-11NC x 2 - Plated Spec70.43917	4
26		70.34016	O-Ring - 90D -8-1/4x7-3/4x1/4 - 568-444 - Spec 599.33 Spec 70.72000	1
27		350.20125	Cap - Bearing - Rear - Pump - Centrifugal 8x6x14	1
28		70.33254	Nut - Lock - AN-22	1
29		70.59086	Washer - Lock - W-22	1
30		70.36972	Plug - Pipe - 1/4 Inch - Square Head - Steel	4
31		70.80606	Seal - Oil - 9189 LPD - 1.875 B x 2.750 OD x .375 W - Johns Mansville Only	1
32		350.12433	Key - Square - 1/2 x 1/2 x 3	1
33		350.20123	Shaft - Pump Centrifugal 8x6x14	1
35		70.32996	Nut - Hex - Jam - 5/8-11NC - Plated Spec 70.32869	2
36		70.34068	O-Ring - 90D 9-3/4 x 9-1/2 x 1/8 568-272 Spec 599.33001 Spec 70.72000	1
37		70.32916	Nut - Hex - 3/4-10NC - Spec 70.32869	3
38		350.12436	Plate - Identification - Pump Centrifugal	1
39		350.20127	Mount - Rear - Pump - Centrifugal 8x6x14	1
40		26.10102	Plug - Pipe - 1/8 Inch - Stainless Steel Hex Socket Head	3
41		68.00102	Paint Spec - Coating 68.00102	1
42		70.36981	Plug - Pipe - 1/2 Inch Socket Head	1
43		70.43926	Screw - Hex Cap - 3/4-10NC x 2-1/4 - Plated Spec70.43917	6
44		350.20128	Mount - Front - Pump - Centrifugal 8x6x14	1
45		70.83335	Screw - Set 7/8-9UNC - 3Ax3.0 - Cup point - Hex Socket - HT Alloy Steel - Zinc Plated - RC 40 Maximum - Hollowkrome Only - Spec	8
46		70.32994	Nut - Hex Jam - 7/8-9NC - Plated Spec 70.32869	4
47		26.6	Plug - Pipe - 1 Inch - Cast Iron	2
48		350.20108	Packing Set - 6 x 4-3/4 - 4 Rings - Carbon Yarn - Graphite Impregnated - Spec	1
49		350.20104	Sleeve - Shaft Pump - Centrifugal Lip seal 8x6x14	1
50		350.20101	Impeller - Pump - Centrifugal 8x6x14-14	1
51		70.83337	O-Ring - 70D -3-5/8 x 3-1/2 x 1/16 -568-043 Spec 70.33000 Spec 70.72000	1
52		70.43816	Screw - Hex Cap - 3/8-16NC x 1-1/4 - Plated Spec 70.43917	2
53		70.58955	Washer - Lock - 3/8 - Steel - Plated Spec 70.59304	2
54		70.43895	Screw - Hex Cap - 5/8-11NC x 1-1/4 - Plated Spec 70.43917	2
55		70.58962	Washer - Lock - 5/5 - Steel - Plated Spec 70.59034	2
56		350.20149	Spec - Pump Test - Pump - Centrifugal 8x6x14	1
57		350.20110	Strap - Lifting - Pump - Centrifugal 8x6x14 - 300 BHP Power End	1



	Halliburton 350.203 Size 8 X 6 X 14 - 14" Impeller - Lip Seal Design - 300 BHP Small Frame SAP 101761420		
Item #	**Part Number**	**Description**	**Quan. Req.**
1	350.20316	Shaft - 300 HP - Small Frame	1
2	350.12412	Box - Stuffing - Lip Seal or Packing	1
3	70.80607	Seal - Oil -2.500 B X 3.500 OD X .437 W	4
4	350.15293	Lantern Ring	1
5	350.12429	Plate - Gland	1
6	350.12420	Ring - Gland	1
7	350.20201	Impeller - 14.375" Dia. Pump Cent.	1
8	350.20102	Casing - Pump Cent - 8X6X14	1
9	350.20335	Sleeve - Shaft	1
10	350.20205	Strap - Lifting - 8 x 6 x 14 Pump	1
11	350.12436	Plate - Identification	1
12	70.77872	Adapter Hose Cap 9/16-18 JIC Size 6	2
13	70.796714	Adapter Hose 45 Deg 9/16-18 JIC X 1/8-27 NPT	2
14	70.43374	Screw - Hex Socket - 3/8-16NC X 1-1/4	2
15	70.83335	Screw - Set - 7/8-9UNC - 3AX3.0 Cup Point HT Alloy Steel - Zinc Plated 40 RC	8
16	70.32994	Nut - Hex Jam - 7/8-9UNC - PL	4
17	70.32917	Nut Hex 7/8-9NC- PL	4

18		70.83333	O-Ring -70D - 16.5 X 116.0 X1/4 568-461	1
19		70.34019	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453	1
20		350.20206	Mount - Front - for 12.5 Shaft C/L (350.203L)	1
21		26.6	Plug - Pipe 1" STL - SQ HD	3
22		70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033	1
23		70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033	1
24		70.43897	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated	8
25		70.58962	Washer - Lock 5/8" -Steel - Plated	8
26		350.20204	Mount - Rear for 12.5 Shaft C/L (350.203L)	1
27		70.43924	Screw - Hex Cap - 3/4-10NC X 2 - PL	4
28		8.34051	O-Ring - 90D - 5-3/4 x 5-1/2 x 1/8	1
29		350.20202	Adapter - Stuffing Box - 8X6X14 Pump to 100BHP Power End	1
30		350.12421	Cap - Bearing - Front	1
31		70.80603	Seal - Oil - 21159	1
32		70.80604	Seal - Oil - 21163	1
33		106.54711	Vent - Air - 301370 -1/8 NPT	1
34		26.10102	Plug - Pipe 1/8 SS Hex socket Head	3
35		70.80612	O-Ring - 70D - 5-1/2 x 5-1/4 x 1/8	1
36		70.43868	Screw - Hex cap - 1/2-13NC x 1-1/2	2
37		350.12418	Housing - Bearing - Rear	1
38		350.12419	Cap - Bearing - Rear	1
39		9120	Seal - Oil - NBR LUP 2.000 2.750 .438 - 9120 H1L5	1
40		8.33988	O-Ring - 90D - 4-3/4 x 4-3/8 x 3/16	1
41		70.09111	Washer - Lock - W11	1
42		70.09091	Nut - Lock - N11	1
43		70.43872	Screw- Hex cap -1/2-13NC x 2	2
44		70.32989	Nut - Hex Jam 1/2-13NC	2
45		70.04136	Bearing - Ball - 7311 Duplex	2
46		70.43872	Screw - Hex cap - 1/2-13NC x 2	2
47		70.32914	Nut - Hex 1/2-13NC	2
48		350.12434	Slinger - Shaft	1
49		SKF 21313E	Bearing - Ball - 21313E - Spherical Roller Bearing	1
52		350.12432	Frame - Cast Ductile Iron	1
54		70.58959	Washer - Lock 1/2	2
55		70.58964	Washer, Lock - 3/4 - Steel	4
56		70.43814	Screw - Hex cap - 3/8-16NC x 1	2
57		70.58806	Washer - Flat 3/8	4
20a		350.12422	Mount - Front - for 8.5 Shaft C/L (350.203S)	1
26a		350.12423	Mount - Rear for 8.5 Shaft C/L (350.203S)	1
		70.22931	Fitting - Grease - 1/8 45 Deg - Bearing Cap (Not Shown)	2
		70.22933	Fitting - Grease 1/8 straight - Frt Bearing Cap (Not Shown)	1
		350.12433	Key - Square - 1/2 x 1/2 x 3 - Input Shaft (Not Shown)	1
			Optional Mechanical Seal	
50		350.15318	Mechanical seal TC/TC John Crane	1
51		26.10102	Plug - Pipe 1/8 SS Hex socket Head	4
2a		350.12411	Box - Stuffing - Mechanical Seal	1
53		350.12427	Ring - Gland	1
52		350.12438	Packing Ring 3.5 X 2.5 Graphite	1

Legacy to SAP Part Crossover

Legacy Part #	Halliburton SAP Part #	Description
7.33684	100015357	O-Ring - 70D 2 x 1-7/8 x 1/16 Fluorocarbon
8.33988	100013720	O-Ring - 90D - 4-3/4 x 4-3/8 x 3/16
8.34051	100000979	O-Ring - 90D - 5-3/4 x 5-1/2 x 1/8
8.34066	100015436	O-ring - 90D - 9-1/4 X 9 X 1/8 -568-270
26.1	100016568	Pipe Plug 1/8 IN. - CI
26.10102	100016570	Plug - Pipe 1/8 Stainless Steel Hex Socket Head
26.2	100016573	Plug - Pipe 1/4 CI
26.5	100016593	Plug - Pipe - 3/4 IN CI
26.6	100016601	Plug - Pipe - 1 IN STL - SQ HD
68.00102	100020311	Coating per spec.
70.09091	100001510	Nut - Lock - N11
70.09111	100001511	Washer - Lock - W11
70.22931	100024706	Fitting - Grease - 1/8 45 Deg
70.22933	100024708	Fitting - Grease 1/8 straight
70.32728	100026448	Shaft Slinger
70.32914	100026525	Nut - Hex 1/2-13NC
70.32915	100026526	Nut - Hex 5/8-11NC
70.32916	100012922	Nut Hex 3/4-10NC
70.32917	100026527	Nut Hex 7/8-9NC -PL
70.32989	100026551	Nut - Hex Jam 1/2-13NC
70.32992	100012924	Nut - Hex Jam - 3.4-10NC
70.32994	100026553	Nut - Hex Jam - 7/8-9UNC - PL
70.32996	100001872	Hex Jam Nut - 5/8-11NC - PL
70.33254	100026632	Lock Nut - AN-22
70.34016	100026847	O-ring - 90D - 8-1/4 X 7-3/4 X 1/4 - 568-444
70.34019	100001993	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453
70.34068	100026855	O-ring - 90D - 9-3/4 X 9-1/2 X 1/8 - 568-272
70.36972	100027498	Pipe Plug - 1/4 NPT - Sq. Hd. Steel
70.36981	100027505	Pipe Plug - 1/2 NPT - Sq. Hd. Steel
70.43374	100002169	Screw - Hex Socket - 3/8-16NC X 1-1/4
70.43381	100028247	Hex Socket Screw - 1/2-13NC X 1-1/4
70.43814	100013017	Screw - Hex cap - 3/8-16NC x 1
70.43816	100028455	Screw - Hex Cap 3/8-16NC x 1-1/4
70.43868	100028505	Screw - Hex cap - 1/2-13NC x 1-1/2
70.43872	100028492	Screw- Hex cap -1/2-13NC x 2
70.43895	100028509	Screw-Hex Cap - 5/8-11NC X 1-1/4 -PL
70.43897	100028511	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated
70.43898	100028512	Screw - Hex Cap - 3/4-10NC X 2-1/4 - PL
70.43903	100028515	Screw- Hex cap -5/8-11NC x 2-1/4
70.43924	100028525	Screw - Hex Cap - 3/4-10NC X 2 - PL
70.43926	100028527	Screw - Hex Cap - 3/4-10NC X 2-1/4 - PL
70.58806	100029874	Washer - Flat 3/8
70.58955	100013059	Washer - Lock 3/8
70.58959	100002256	Washer - Lock 1/2
70.58962	100029924	Washer - Lock 5/8" -Steel - Plated
70.58964	100029925	Washer - Lock 3/4 - STL - PL
70.59086	100029956	Lock Washer - W-22
70.77872	100032333	Adapter Hose Cap 9/16-18 JIC Size 6

Legacy Part #	Halliburton SAP Part #	Description
70.79319	100032686	Adapter - 210292-4S - Brass- 1/4 OD Tube - x 7/16-20 JIC
70.80603	100013140	Seal - Oil - 21159
70.80604	100002396	Seal - Oil - 21163
70.80606	100002397	Seal - Oil - 9189 LPD
70.80607	100002398	Seal - Oil -2.500 B X 3.500 OD X .437 W
70.80608	100002399	O-Ring - 70D-2 X 1-7/8" X 1/16" 568-032
70.80609	100002400	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033
70.80612	100013141	O-Ring - 70D - 5-1/2 x 5-1/4 x 1/8
70.80613	100013142	Screw - Set 3/4"-10UNC-3A X 3 Cup Point HT Alloy Steel - Zinc Plated 40 RC
70.80614	100013143	Screw - Set 3/4"-10UNC-3A X 2 Cup Point HT Alloy Steel - Zinc Plated 40 RC
70.80954	100002403	O-Ring - 70D - 12-1/4 X 12 X 1/8 568-278
70.81033	100033017	Roll Pin SS 1/8 x 3/4
70.83282	100033517	Ball Bearing 322S MRC
70.83283	100033518	Seal - Oil - CR 42422 - 4.250B X 5.256OD X.375W
70.83284	100033519	Bearing - Ball - 4.3307 B x 7.8740 OD x 1.4960 W - Single Row - Angular Contact - 40 Deg Contact Angle - 1/2 Pair -SKF 7222BAG
70.83333	100002431	O-Ring -70D - 16.5 X 116.0 X1/4 568-461
70.83334	100033535	O-Ring -70D - 4 1/8 X 4.0 X1/16 568-045
70.83335	100033536	Screw - Set - 7/8-9UNC - 3AX3.0 Cup Point HT Alloy Steel - Zinc Plated 40 RC
70.83337	100033537	O-ring - 70D - 3-5/8 X 3-1/2 X 1/16 -568-043
70.83357	100033545	Oil Seal - 42470 - 4.25BX5.26ODX.250W
70.85981	100034168	Adapter - Hose 45 Deg - Brass- 1/4 OD Tube - 1/8 - 27 MPT x 7/16-20 JIC
70.96714	100035941	Adapter Hose 45 Deg 9/16-18 JIC 1/8-27 NPT
106.54711	100011066	Vent - Air - 301370 -1/8 NPT
350.12411	100003080	Stuffing Box - Mechanical Seal
350.12412	100003081	Box - Stuffing - Lip Seal or Packing
350.12413	100003082	Casing - Pump Cent - 6X5X10
350.12414	100003083	Impeller - 10" Dia. Pump Cent.
350.12416	100009363	Shaft
350.12418	100059325	Housing - Bearing - Rear
350.12419	100059327	Cap - Bearing - Rear
350.12420	100059329	Ring - Gland
350.12421	100059330	Cap - Bearing - Front
350.12422	100011790	Mount - Front - STD
350.12423	100059333	Mount - Rear - STD - Single Hole
350.12427	100003084	Ring - Gland Obsolete use 350.12420
350.12429	100011791	Plate - Gland
350.12431	100003085	Impeller - 11" Dia. Pump Cent.
350.12432	100011792	Frame - Cast Ductile Iron
350.12433	100011793	Key - Square - 1/2 x 1/2 x 3
350.12434	100003086	Slinger - Shaft
350.12435	100003087	Sleeve - Shaft
350.12436	100059337	Plate - Identification
350.12438	100003088	Packing - Carbon 1/2"
350.12439	100011794	Strap - Lifting
350.15293	100003099	Lantern Ring - 20623
350.15318	100059405	Mechanical Seal
350.20101	100059458	Impeller - Pump - Centrifugal - 14.375
350.20102	101201829	Casing - Pump Centrifugal - 8X6X14
350.20103	101005573	Box - Stuffing - Packing - Pump Centrifugal

Legacy Part #	Halliburton SAP Part #	Description
350.20104	100059460	Sleeve - Shaft Pump - Centrifugal Lip seal 8x6x14
350.20105	100059461	Lantern Ring - 6 Inch OD x 4.75 Inch ID Pump Centrifugal 8x6x14
350.20106	100014384	Ring - Gland - Pump Centrifugal 8x6x14
350.20107	101014710	Plate Gland
350.20108	100059462	Packing Set - 6 x 4-3/4 - 4 Rings - Carbon Yarn - Graphite Impregnated - Spec
350.20110	100059463	Strap - Lifting - Pump - Centrifugal 8x6x14 - 300 BHP Power End
350.20122	101573751	Frame - Pump Centrifugal 8x6x14 - 300 HP
350.20123	100059464	Shaft - Pump Centrifugal 8x6x14
350.20124	101573752	Cap - Bearing - Front - Pump - Centrifugal 8x6x14
350.20125	101573753	Cap - Bearing - Rear - Pump - Centrifugal 8x6x14
350.20126	100059465	Housing - Bearing - Rear - Pump Centrifugal 8x6x14
350.20127	100059466	Mount - Rear - Pump - Centrifugal 8x6x14
350.20128	100059467	Mount - Front - Pump - Centrifugal 8x6x14
350.2015	100003124	Service Manual
350.2016	100003125	Power End Assembly 100 BHP
350.20201	100003126	Impeller - 14" Dia. Pump Cent. 100 BHP
350.20202	120133378	Adapter - Stuffing Box - 8X6X14 Pump to 100BHP Power end
350.20204	100059469	Mount - Rear - 8X6X14 - 100BHP
350.20205	100059470	Strap - Lifting - 8 x 6 x 14 Pump
350.20206	100059471	Mount - Front - 8 X 6 X 14 100BHP
350.20301	No SAP	Impeller - 14" Dia. Pump Cent.
350.20335	No SAP	Sleeve - Shaft
350.20335	No SAP	Sleeve - Shaft
350.20501	100003127	Impeller 12" Diameter 4 X 4
350.20502	100003128	Casing 4 X 4 X 12
350.20510	100059474	Impeller 12" Diameter Coated
350.20560	100059476	Teflon PTFE Lip Seal
350.20501A	101646568	Impeller 4x4 11.25" Diameter
70.04136 SKF	100001442	Bearing - Ball - 7311 Duplex
70.80602 SKF	100002395	Bearing - Ball - 6411 Simplex
350.2016HD	No SAP	Power End Assembly 300 BHP

SAP to Legacy Part Crossover

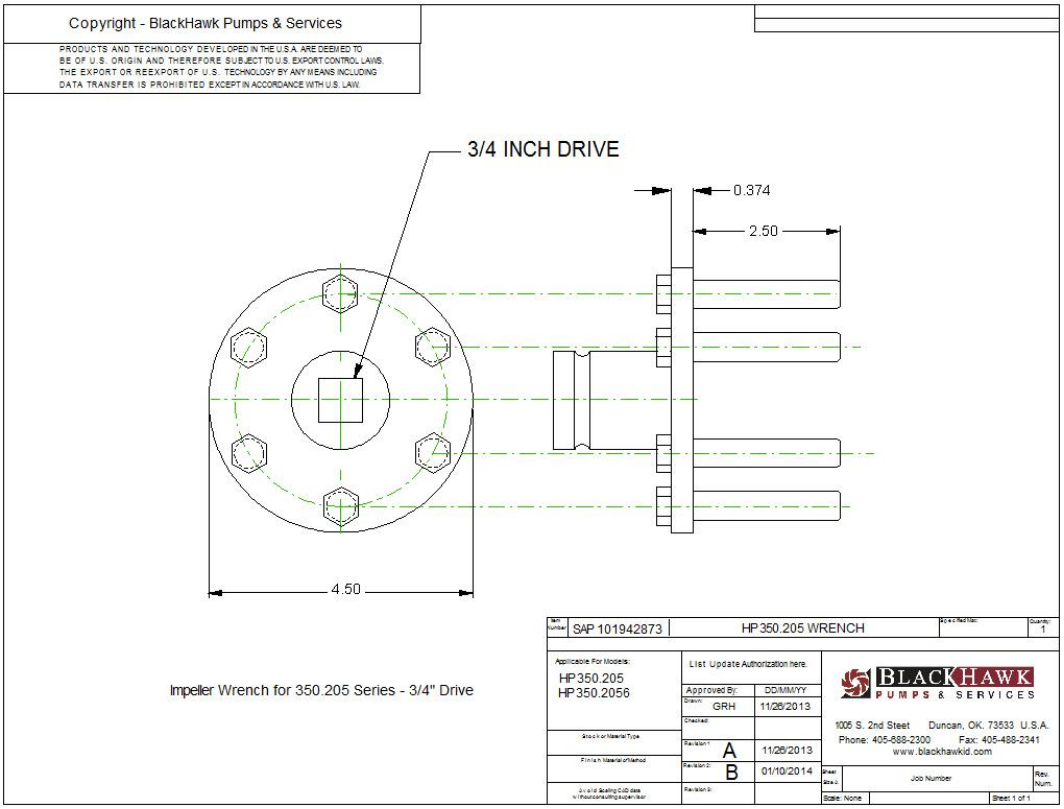
Halliburton SAP Part #	Legacy Part #	Description
100000979	8.34051	O-Ring - 90D - 5-3/4 x 5-1/2 x 1/8
100001442	70.04136 SKF	Bearing - Ball - 7311 Duplex
100001510	70.09091	Nut - Lock - N11
100001511	70.09111	Washer - Lock - W11
100001872	70.32996	Hex Jam Nut - 5/8-11NC - PL
100001993	70.34019	O-Ring - 70D - 12-1/2 X 12 X 1/4 568-453
100002169	70.43374	Screw - Hex Socket - 3/8-16NC X 1-1/4
100002256	70.58959	Washer - Lock 1/2
100002395	70.80602 SKF	Bearing - Ball - 6411 Simplex
100002396	70.80604	Seal - Oil - 21163
100002397	70.80606	Seal - Oil - 9189 LPD
100002398	70.80607	Seal - Oil -2.500 B X 3.500 OD X .437 W
100002399	70.80608	O-Ring - 70D-2 X 1-7/8" X 1/16" 568-032
100002400	70.80609	O-Ring - 70D 2-1/8 X 2 X 1/16 568-033
100002403	70.80954	O-Ring - 70D - 12-1/4 X 12 X 1/8 568-278
100002431	70.83333	O-Ring -70D - 16.5 X 116.0 X1/4 568-461
100003080	350.12411	Stuffing Box - Mechanical Seal
100003081	350.12412	Box - Stuffing - Lip Seal or Packing
100003082	350.12413	Casing - Pump Cent - 6X5X10
100003083	350.12414	Impeller - 10" Dia. Pump Cent.
100003084	350.12427	Ring - Gland Obsolete use 350.12420
100003085	350.12431	Impeller - 11" Dia. Pump Cent.
100003086	350.12434	Slinger - Shaft
100003087	350.12435	Sleeve - Shaft
100003088	350.12438	Packing - Carbon 1/2"
100003099	350.15293	Lantern Ring - 20623
100003124	350.2015	Service Manual
100003125	350.2016	Power End Assembly 100 BHP
100003126	350.20201	Impeller - 14" Dia. Pump Cent. 100 BHP
100003127	350.20501	Impeller 12" Diameter 4 X 4
100003128	350.20502	Casing 4 X 4 X 12
100009363	350.12416	Shaft
100011066	106.54711	Vent - Air - 301370 -1/8 NPT
100011790	350.12422	Mount - Front - STD
100011791	350.12429	Plate - Gland
100011792	350.12432	Frame - Cast Ductile Iron
100011793	350.12433	Key - Square - 1/2 x 1/2 x 3
100011794	350.12439	Strap - Lifting
100012922	70.32916	Nut Hex 3/4-10NC
100012924	70.32992	Nut - Hex Jam - 3.4-10NC
100013017	70.43814	Screw - Hex cap - 3/8-16NC x 1
100013059	70.58955	Washer - Lock 3/8
100013140	70.80603	Seal - Oil - 21159
100013141	70.80612	O-Ring - 70D - 5-1/2 x 5-1/4 x 1/8
100013142	70.80613	Screw - Set 3/4"-10UNC-3A X 3 Cup Point HT Alloy Steel - 40 RC
100013143	70.80614	Screw - Set 3/4"-10UNC-3A X 2 Cup Point HT Alloy Steel - 40 RC
100013720	8.33988	O-Ring - 90D - 4-3/4 x 4-3/8 x 3/16
100014384	350.20106	Ring - Gland - Pump Centrifugal 8x6x14

Halliburton SAP Part #	Legacy Part #	Description
100015357	7.33684	O-Ring - 70D 2 x 1-7/8 x 1/16 Fluorocarbon
100015436	8.34066	O-ring - 90D - 9-1/4 X 9 X 1/8 -568-270
100016568	26.1	Pipe Plug 1/8 IN. - CI
100016570	26.10102	Plug - Pipe 1/8 Stainless Steel Hex Socket Head
100016573	26.2	Plug - Pipe 1/4 CI
100016593	26.5	Plug - Pipe - 3/4 IN CI
100016601	26.6	Plug - Pipe - 1 IN STL - SQ HD
100020311	68.00102	Coating per spec.
100024706	70.22931	Fitting - Grease - 1/8 45 Deg
100024708	70.22933	Fitting - Grease 1/8 straight
100026448	70.32728	Shaft Slinger
100026525	70.32914	Nut - Hex 1/2-13NC
100026526	70.32915	Nut - Hex 5/8-11NC
100026527	70.32917	Nut Hex 7/8-9NC -PL
100026551	70.32989	Nut - Hex Jam 1/2-13NC
100026553	70.32994	Nut - Hex Jam - 7/8-9UNC - PL
100026632	70.33254	Lock Nut - AN-22
100026847	70.34016	O-ring - 90D - 8-1/4 X 7-3/4 X 1/4 - 568-444
100026855	70.34068	O-ring - 90D - 9-3/4 X 9-1/2 X 1/8 - 568-272
100027498	70.36972	Pipe Plug - 1/4 NPT - Sq. Hd. Steel
100027505	70.36981	Pipe Plug - 1/2 NPT - Sq. Hd. Steel
100028247	70.43381	Hex Socket Screw - 1/2-13NC X 1-1/4
100028455	70.43816	Screw - Hex Cap 3/8-16NC x 1-1/4
100028492	70.43872	Screw- Hex cap -1/2-13NC x 2
100028505	70.43868	Screw - Hex cap - 1/2-13NC x 1-1/2
100028509	70.43895	Screw-Hex Cap - 5/8-11NC X 1-1/4 -PL
100028511	70.43897	Screw - Hex Cap - 5/8-1NC X 1-3/4- Plated
100028512	70.43898	Screw - Hex Cap - 3/4-10NC X 2-1/4 - PL
100028515	70.43903	Screw- Hex cap -5/8-11NC x 2-1/4
100028525	70.43924	Screw - Hex Cap - 3/4-10NC X 2 - PL
100028527	70.43926	Screw - Hex Cap - 3/4-10NC X 2-1/4 - PL
100029874	70.58806	Washer - Flat 3/8
100029924	70.58962	Washer - Lock 5/8" -Steel - Plated
100029925	70.58964	Washer - Lock 3/4 - STL - PL
100029956	70.59086	Lock Washer - W-22
100032333	70.77872	Adapter Hose Cap 9/16-18 JIC Size 6
100032686	70.79319	Adapter - 210292-4S - Brass- 1/4 OD Tube - x 7/16-20 JIC
100033017	70.81033	Roll Pin SS 1/8 x 3/4
100033517	70.83282	Ball Bearing 322S MRC
100033518	70.83283	Seal - Oil - CR 42422 - 4.250B X 5.256OD X.375W
100033519	70.83284	Bearing - Ball - 4.3307 B x 7.8740 OD x 1.4960 W - Single Row - Angular Contact - 40 Deg Contact Angle - 1/2 PairSKF 7222BAG (7222BECBM per SKF)
100033535	70.83334	O-Ring -70D - 4 1/8 X 4.0 X1/16 568-045
100033536	70.83335	Screw - Set - 7/8-9UNC - 3AX3.0 Cup Point HT Alloy Steel - 40 RC
100033537	70.83337	O-ring - 70D - 3-5/8 X 3-1/2 X 1/16 -568-043
100033545	70.83357	Oil Seal - 42470 - 4.25BX5.26ODX.250W
100034168	70.85981	Adapter - Hose 45 Deg - Brass- 1/4 OD Tube - 1/8 - 27 MPT x 7/16-20 JIC
100035941	70.96714	Adapter Hose 45 Deg 9/16-18 JIC 1/8-27 NPT
100059325	350.12418	Housing - Bearing - Rear
100059327	350.12419	Cap - Bearing - Rear

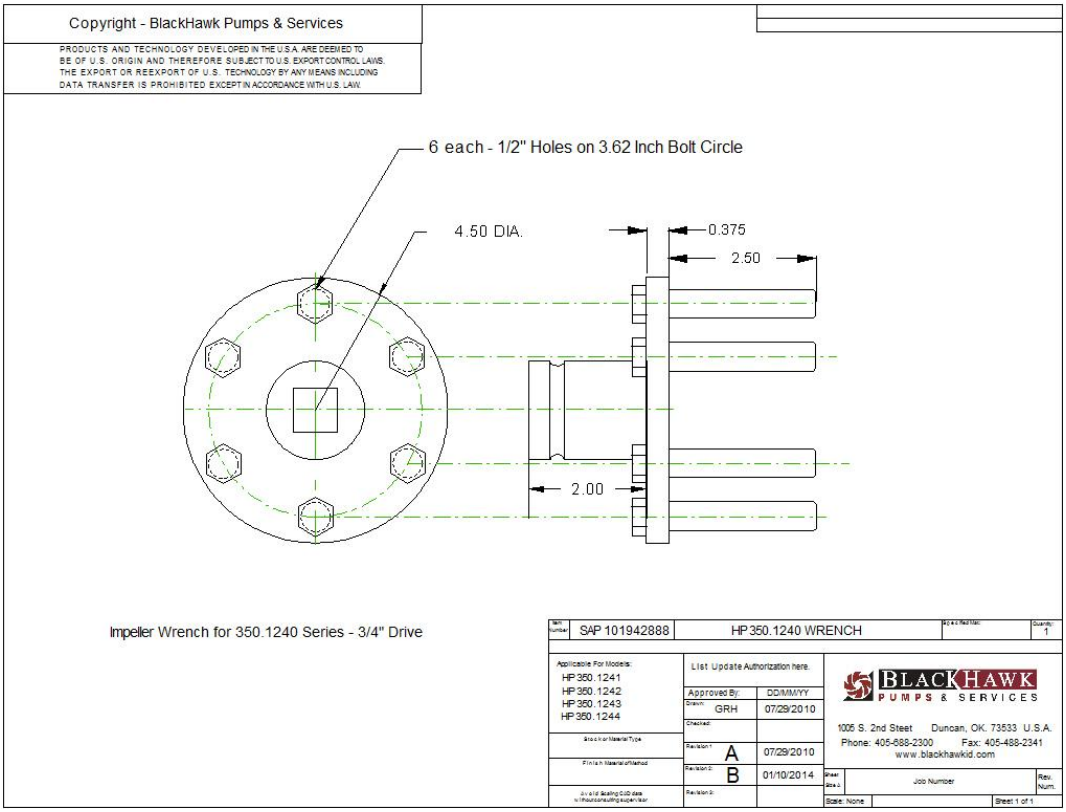
Halliburton SAP Part #	Legacy Part #	Description
100059329	350.1242	Ring - Gland
100059330	350.12421	Cap - Bearing - Front
100059333	350.12423	Mount - Rear - STD - Single Hole
100059337	350.12436	Plate - Identification
100059405	350.15318	Mechanical Seal
100059458	350.20101	Impeller - Pump - Centrifugal - 14.375
100059460	350.20104	Sleeve - Shaft Pump - Centrifugal Lip seal 8x6x14
100059461	350.20105	Lantern Ring - 6 Inch OD x 4.75 Inch ID Pump Centrifugal 8x6x14
100059462	350.20108	Packing Set - 6 x 4-3/4 - 4 Rings - Carbon Yarn - Graphite Impregnated - Spec
100059463	350.20110	Strap - Lifting - Pump - Centrifugal 8x6x14 - 300 BHP Power End
100059464	350.20123	Shaft - Pump Centrifugal 8x6x14
100059465	350.20126	Housing - Bearing - Rear - Pump Centrifugal 8x6x14
100059466	350.20127	Mount - Rear - Pump - Centrifugal 8x6x14
100059467	350.20128	Mount - Front - Pump - Centrifugal 8x6x14
100059469	350.20204	Mount - Rear - 8X6X14 - 100BHP
100059470	350.20205	Strap - Lifting - 8 x 6 x 14 Pump
100059471	350.20206	Mount - Front - 8 X 6 X 14 100BHP
100059474	350.20510	Impeller 12" Diameter Coated
100059476	350.20560	Teflon PTFE Lip Seal
101005573	350.20103	Box - Stuffing - Packing - Pump Centrifugal
101014710	350.20107	Plate Gland
101201829	350.20102	Casing - Pump Centrifugal - 8X6X14
101573751	350.20122	Frame - Pump Centrifugal 8x6x14 - 300 HP
101573752	350.20124	Cap - Bearing - Front - Pump - Centrifugal 8x6x14
101573753	350.20125	Cap - Bearing - Rear - Pump - Centrifugal 8x6x14
101646568	350.20501A	Impeller 4x4 11.25" Diameter
120133378	350.20202	Adapter - Stuffing Box - 8X6X14 Pump to 100BHP Power end
No SAP	350.20301	Impeller - 14" Dia. Pump Cent.
No SAP	350.20335	Sleeve - Shaft
No SAP	350.20335	Sleeve - Shaft
No SAP	350.2016HD	Power End Assembly 300 BHP

Section 6

Special Tools



Impeller Wrench for 350.205 Series - 3/4" Drive



Impeller Wrench for 350.1240 Series - 3/4" Drive

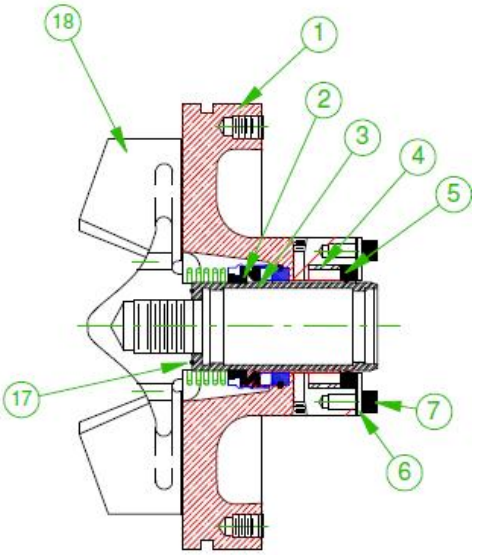
Section 7
Addendums

Oil Lube Mechanical Seal Addendum

1. A mechanical seal is standard on the models 350.1241 and 350.1243. It is available as an option for all other models except the model 350.201.

2. The process fluid lubricates the mechanical seal, so no external lubrication is required.

3. Install 70.81033 roll pin thru the small hole at the bottom of the seal cavity. It should extend 3/32” into the seal cavity (Fig. 2, 3 & 4.)



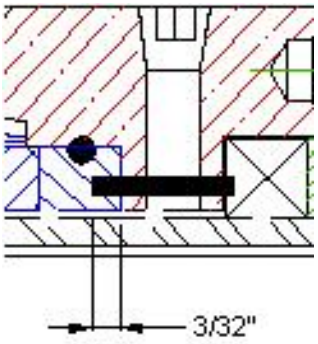
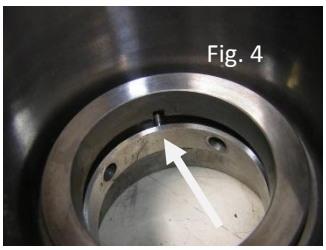


Fig. 2



4. Install the stationary side of the mechanical into the bore of the seal cavity. **CAUTION: make sure the notch in the back side of the stationary seal is aligned with the roll pin.** Use a soapy water or alcohol hand sanitizing solution to aid in installtion. Use the cardboard divider supplied with the new seal (to protect the seal face), press the stationary seal face into the bore until it bottoms out and the o-ring is seated.

5. Turn the seal head over and install spacer (BHPS 700141) instead of the standard packing ring. (Fig. 5)

6. Install seal (70.80607) with the spring facing the spacer using the appropriate seal driver. (Fig. 6)


Fig. 6

7. Make sure seal is seated against the spacer and the back of the seal flush with the stuffing box. (Fig. 7)


Fig. 7

8. Install gland plate (350.12429) and hand tighten the socket head cap screws (70.43374) If using torque wrench, tighten to between 100 – 120 in. oz. or 6.25 – 7.5 in. lbs. (DO NOT OVER TIGHTEN. (Fig. 8 & 9)

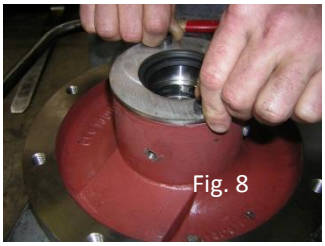


Fig. 8

9. Oil is supplied to the seal by a sealed tank system or a small oil bottle (Fig. 10)


Fig. 9

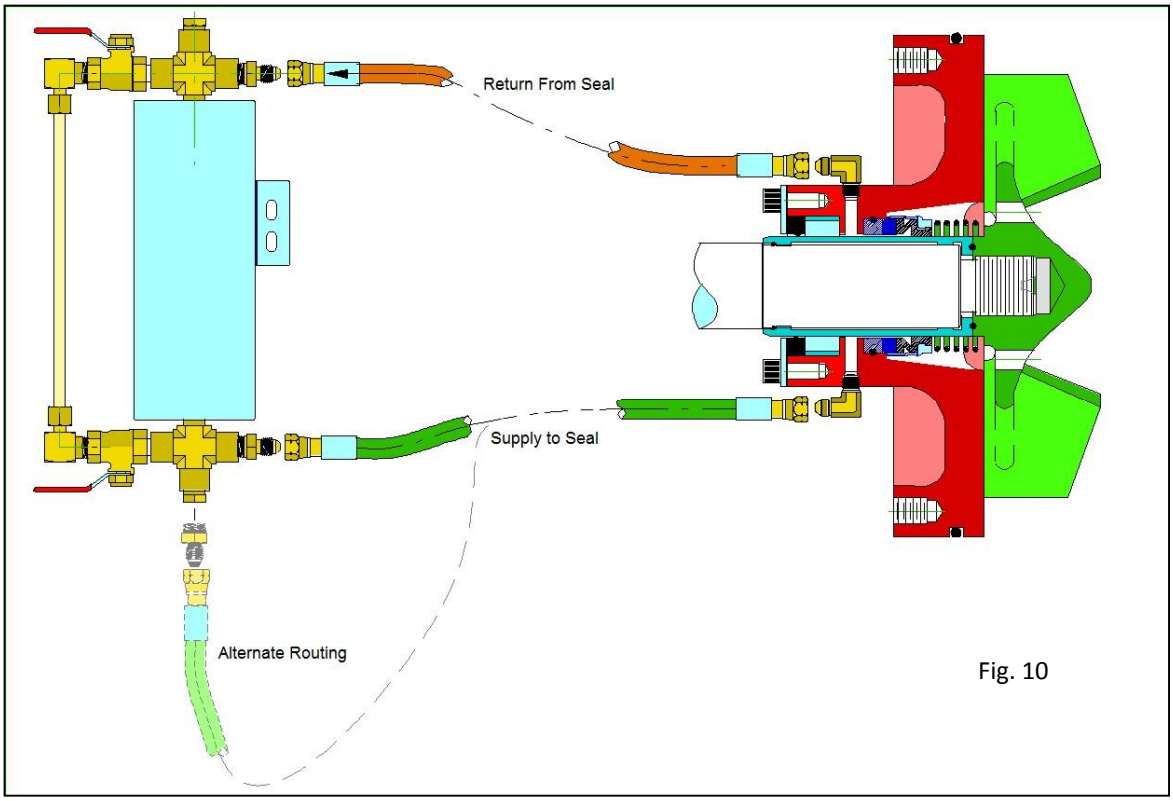


Fig. 10

10. Install shaft sleeve (350.12435). (Fig. 12)

Fig. 12

11. Carefully install seal head (350.12411) assembly onto the power frame (350.2016). (Fig. 13)

12. Spray seal both faces with WD-40 or similar product to make sure they are free of contaminants.

Fig. 11 Fig. 13

13. Using a soapy water or alcohol hand sanitizing solution to aid in installtion, slide rotating half of the mechanical seal over the sleeve until the faces meet. Be careful not to “slap” the faces together or they could be damaged. Use caution so as not to cause the rubber bellows to “curl” while pressing the rotating half into position. **CAUTION – Do not use oil, grease or other lubicants to slide rotating half of seal on to the sleeve unless they are specifically designed for that purpose. Oil or grease may cause the rubber bellow to slip on the shaft during operation causing the seal to leak.** (Fig. 14)

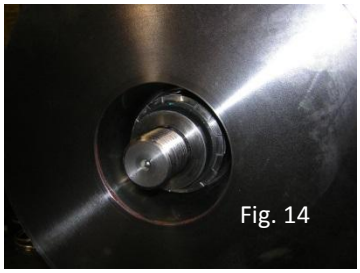


Fig. 14

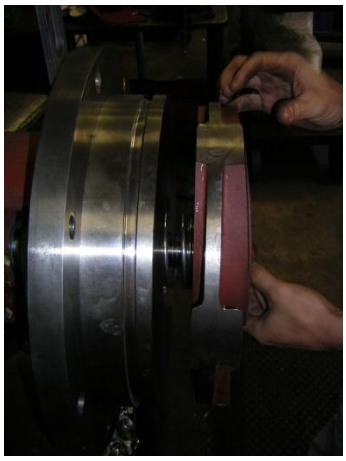
14. Install the retaining spring. (Fig. 15)


Fig. 15

15. Coat O-ring grove with Never-Seize or grease and install impeller O-ring (70.80608) in O-ring groove on back side of impeller (350.12414, 350.12431, 350.20501). Never-Seize or grease will hold o-ring in place during impeller installation (Fig. 16).


Fig. 16

16. Install impeller impeller and adjust per instruction on page 29. (Fig. 17)



17. Seal installation can be facilitated by the use of a seal installation tool. (Fig. 18) It can be fabricated per the drawing Fig. 19. The tool is usefull during installation and removal of both the stationary and rotating halves of the seal.

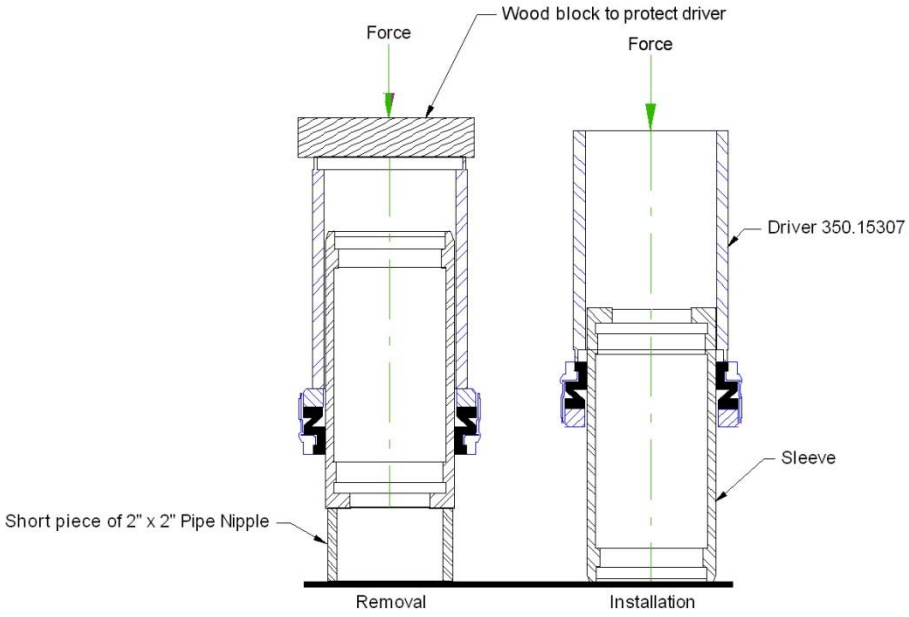
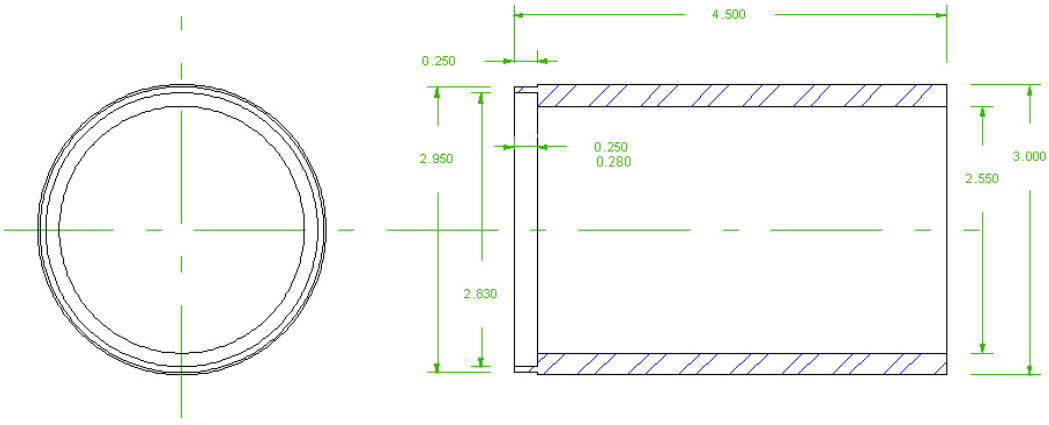


Fig. 18

Fig. 19



Section 8

Notes

Available Options:

- Graphite Packing
- Mechanical Seal
- Oil Lubricated Teflon Lip Seals
- Halar Coated Impeller
- Hydraulic Motor Adapter
- Electric Driven Units
- Engine Driven Units

Potential Applications:

Oilfield Service Applications

- **Blending**
- **Cementing**
- **Fracturing**
- **Charge Pumps**
- **Drilling Mud**

General Industrial

- **Waste Water Treatment**

Sludge Slurry Applications

- **Drilling Mud**
- **Sewage Sludge**
- **Lime**
- **Industrial Waste**
- **Hydromulch**
- **Sand & Silt Laden Water**

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