

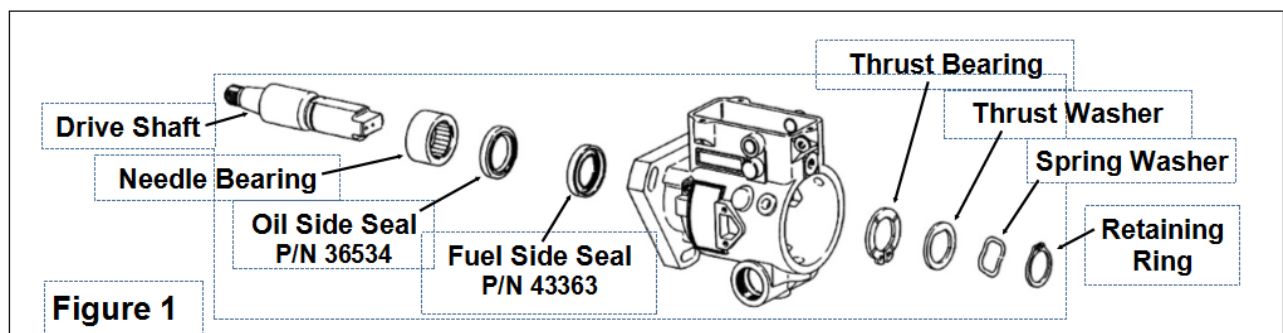
DATE: May 25, 2017

NO: SB 438R13

SUPERSEDES: S.B. 438R12 dated 9/3/2013
SUBJECT: DRIVE SHAFT & DRIVE SEAL SERVICE PROCEDURES
PUMP MODELS AFFECTED: DB4, DS, DE

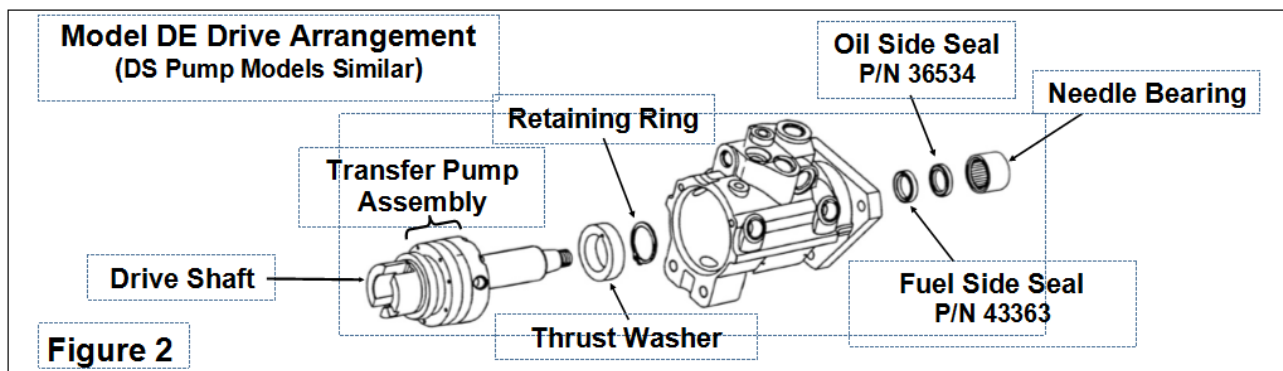
Drive Arrangement - DB4

The DB4 drive shaft is retained by an internal thrust arrangement consisting of a stationary thrust bearing, a rotating thrust washer, a spring washer, and a retaining ring as shown in Figure 1. Drive shaft sealing is accomplished by two lip type seals which are pressed into the front of the pump housing below the needle bearing. The needle bearing is engine oil lubricated and supports the drive shaft. A weep hole in the pump housing prevents fuel leakage from entering the engine and provides a means for visual leak detection.



Drive Arrangement - DE & DS

The DE and DS pump models share similar drive designs. Drive shaft sealing is accomplished by two lip type seals pressed into the front of the pump housing, as shown in Figure 2. The transfer pump assembly is driven by the drive shaft and is also the point where axial thrust is controlled. The drive shaft is supported by two bearings: an engine oil lubricated external needle bearing and also by a fuel oil lubricated internal needle bearing located within the transfer pump assembly.

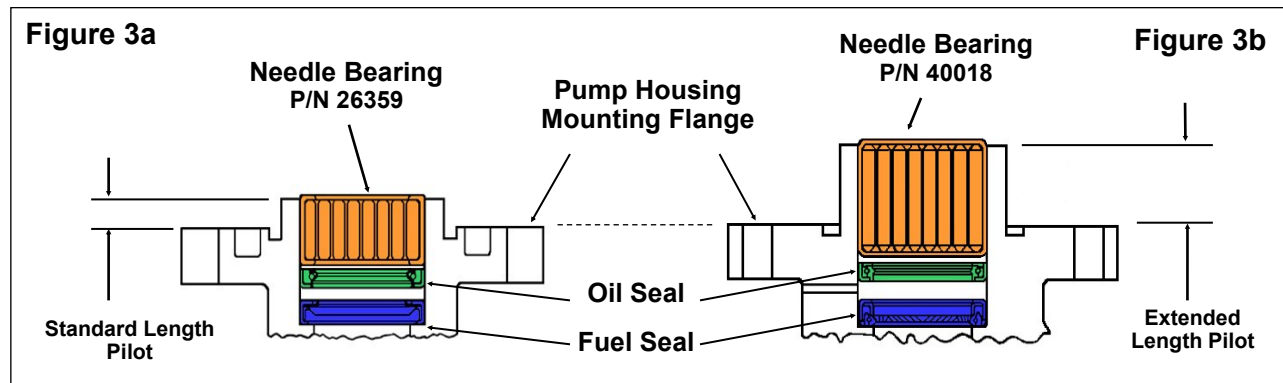


Drive Shaft Seals

The fuel side seal in DS, DE, and DB4 pump models is now P/N 43363, a lip type seal with a metal casing that incorporates a mold of rubber on the O.D. for the sealing surface. This seal replaces the 31375 seal that was used on DS models and the 30804 seal previously used on DB4 and DE models. All DB4, DE, and DS pump models now use the 36534 oil side seal.

Needle Bearings

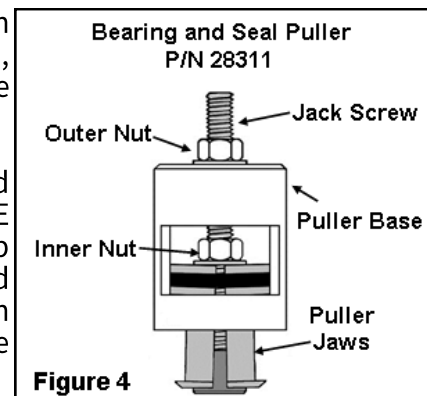
All DS, DE, and most DB4 pump models have a housing with a standard length mounting pilot as shown in Figure 3a and use needle bearing assembly P/N 26359. Some pump models use a housing with an extended length pilot and a longer needle bearing P/N 40018, as shown in Figure 3b. The service tools are the same for both needle bearings. However, the removal procedures differ as described herein.



Removing Drive Shaft, Seals and Needle Bearing

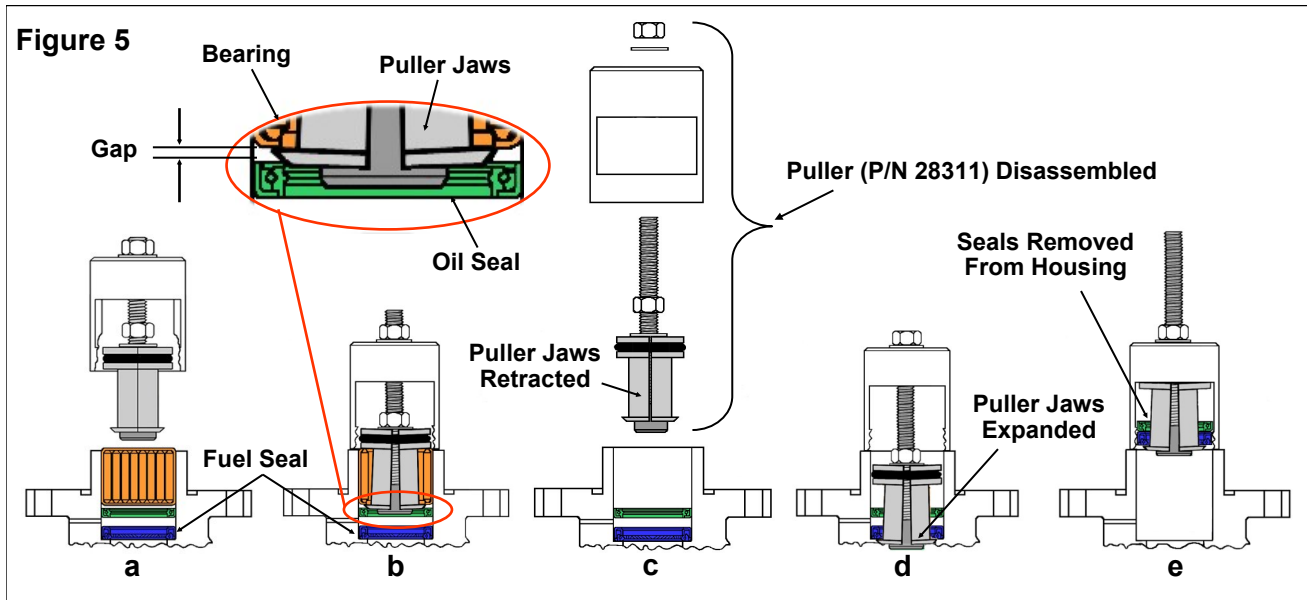
Drive shaft removal is required to service the seals and bearings in DB4, DE and DS pump models. Complete disassembly, inspection, and assembly procedures are provided in the applicable Operation and Instruction Pump Manual.

The bearing and seal puller (P/N 28311) shown in Figure 4 is used to remove both drive shaft seals and the needle bearing. For DE and DS pump models, as well as standard length pilot DB4 pump models, removal of the seals and bearing can be performed simultaneously in one operation. Those DB4 pump models with extended pilot housings require the bearing and seals to be removed in separate operations as follows:



1. Back the outer nut out to the end of the jack screw. Back the inner nut out until the jaws can be retracted. Insert tool jaws into the drive bore of the pump housing (Figure 5a), through the center of the bearing and align/center the puller base on the pilot boss of the pump housing.
2. Holding the inner nut stationary, turn the jack screw to expand the jaws. Position the puller jaws so that they are in the gap between the oil seal and the needle bearing so that the lip is in contact with the bottom of the bearing cage (Figure 5b). Do not over tighten. Remove the needle bearing by holding the jack screw stationary and tightening the outer nut.
3. Disassemble the P/N 28311 bearing and seal puller (Figure 5c). Retract the jaws, as in Step 1. Insert jaw assembly into the drive bore. Align the puller base with the pilot. Push jack screw thru the center hole and install washer and outer nut.

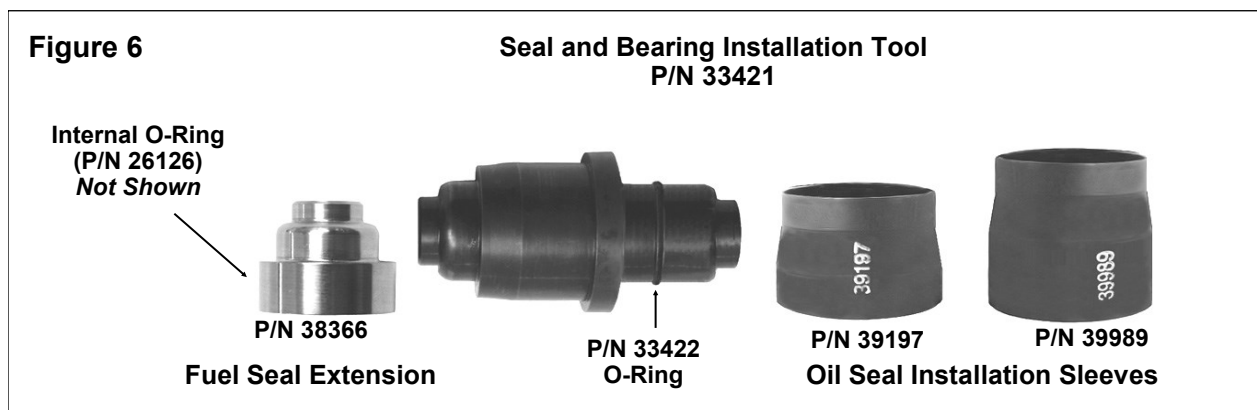
4. Expand the puller jaws under the seals (Figure 5d). Hold the jack screw stationary, tighten the outer nut to remove both seals (Figure 5e).



IMPORTANT! The seals and bearing are usually damaged during the removal process. Do not reuse seals or bearings once they are removed from the housing.

Seal and Bearing Installation Tool

The Seal and Bearing Installation Tool P/N 33421 in Figure 6 is used for all DB4, DS, and DE pump models to ensure correct seal positioning. Oil side seal installation sleeve P/N 39197 is used for all DS, DE and standard length pilot DB4 pump models. For the extended length pilot DB4 pump models, there is a separate extension adapter for the fuel side seal P/N 38366 and an extension sleeve for the oil side seal P/N 39989.



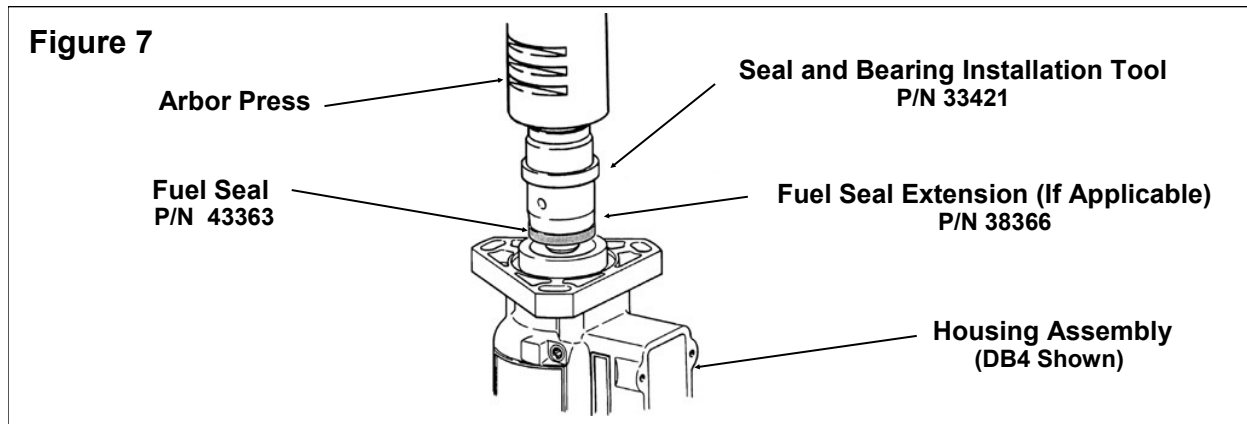
Seal and Bearing Installation

Both seals and the needle bearing are press fit into the pump housing. Place the pump housing on an arbor press with the housing flange facing upwards.

NOTE: Ensure the housing rests flat on the arbor plate and that the seal bore of the housing is clean and dry. Apply a light film of Lubriplate #630 grease (P/N 30465) to the housing bore where both the fuel side and oil side seals will be installed.

Fuel Side Seal

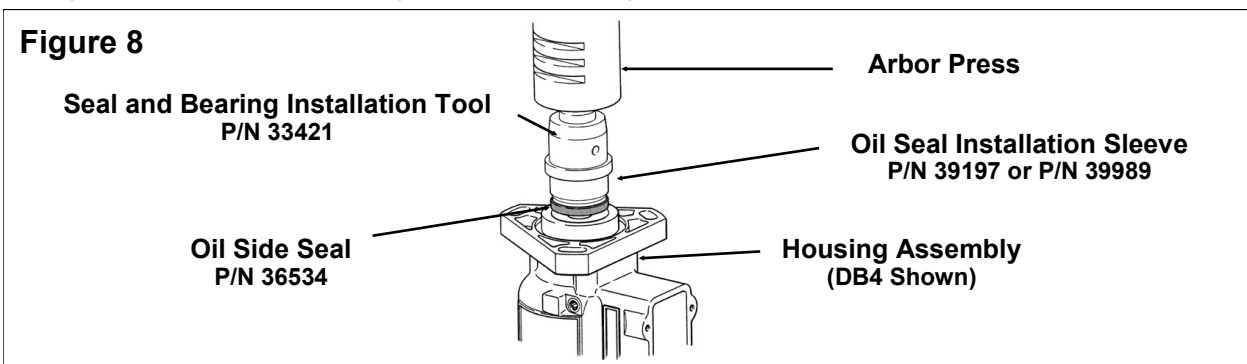
1. Place the P/N 43363 fuel side seal onto the end of the 33421 installation tool or the 38366 extension, as required. The seal case (solid end) faces the tool and the open side of the seal faces outward.
2. Position the tool and seal above the pump housing as shown in Figure 7. Guide the tool and seal into the housing bore and press the seal down until the tool flange bottoms against the pump housing.



NOTE: When installing the fuel side seal, ensure the 39197 oil seal installation sleeve is removed from the 33421 seal and bearing installation service tool to avoid damage to the thin lip of the sleeve.

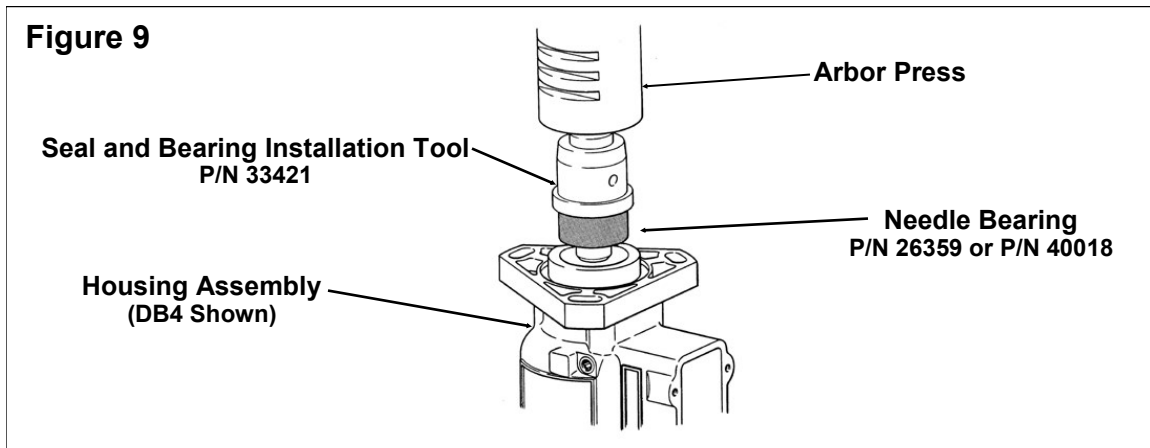
Oil Side Seal

1. Select the proper oil side seal installation sleeve and insert it onto the end of the 33421 seal and bearing installation tool. Place the 36534 seal onto the sleeve with the open end toward the sleeve and make sure that the seal sits squarely.
2. Guide the seal and tool into the pump housing as shown in Figure 8 and press the seal until the flange on the tool bottoms against the housing.



Drive Shaft Needle Bearing

1. Remove the oil side seal sleeve P/N 39197 or P/N 39989 from the end of the 33421 seal and bearing installation tool. Slide the bearing onto the tool in place of the sleeve with the bearing part number facing toward the tool shoulder. Guide the bearing into the housing as shown in Figure 9 on the following page and press it in until the flange on the tool bottoms against the housing.

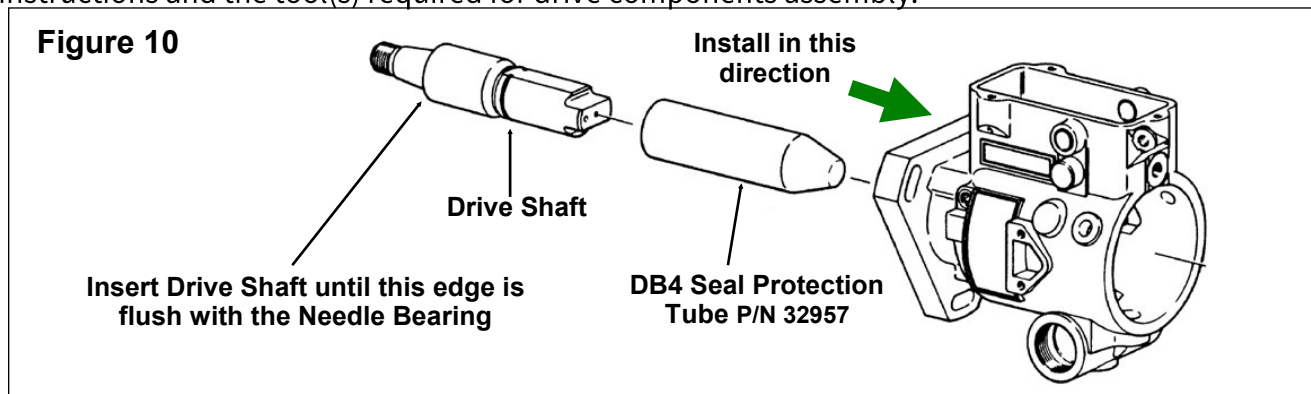


IMPORTANT: When the needle bearing is installed correctly, it will protrude approximately .045 inches (1.14 mm) from the end of the housing. This is a normal condition.

NOTE: Some DB4 pump models used on VM Motori pump applications are not equipped with a drive bearing. Reference Service Bulletin 478 for specific service and bench testing information regarding these pump models.

Drive Shaft and Thrust Component Assembly

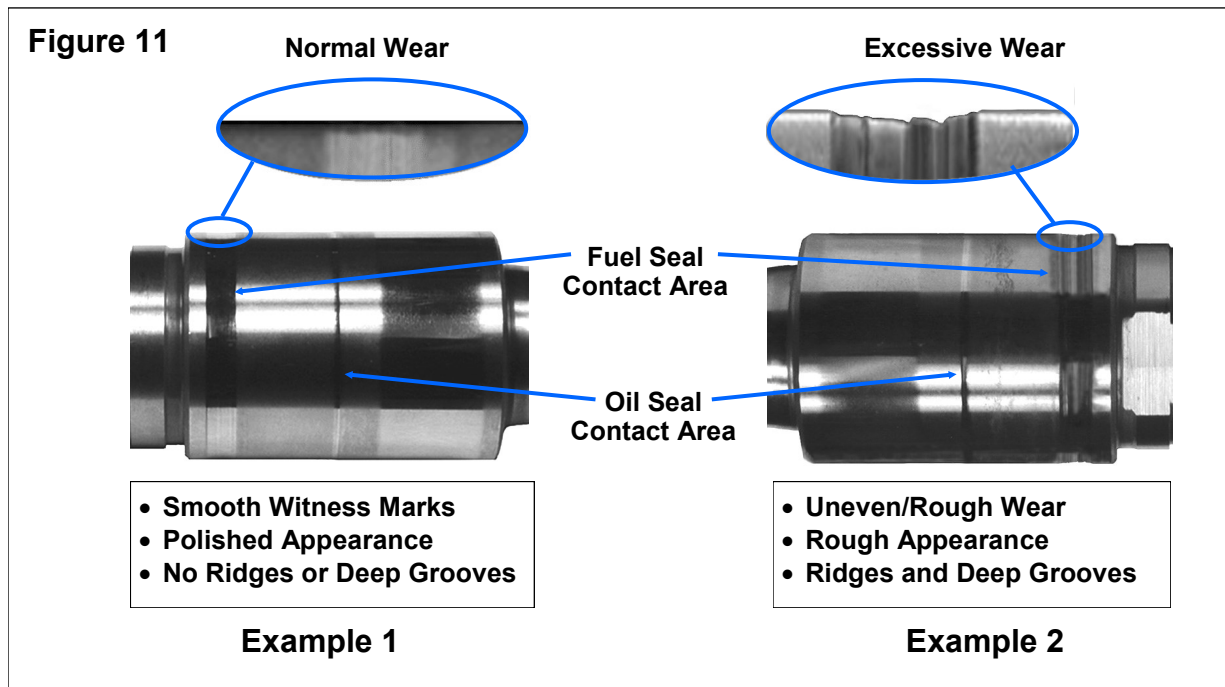
There is a specific drive shaft seal protection tube used for each pump type. Figure 10 shows a typical DB4 drive shaft installation. As an assembly aid, moisten the seal protection tube with Lubriplate #630 prior to installation. Reference the specific Operation and Instruction Manual for instructions and the tool(s) required for drive components assembly.



IMPORTANT: Do not tilt the housing rearward (head bore down) without the head and rotor assembly installed and secured. The drive shaft and thrust components could fall out of the housing through the head bore.

Re-use of Drive Shafts

During normal pump operation, seal lip contact creates witness marks on the drive shaft as shown in Figure 11. Re-using a drive shaft with new seals is an acceptable service practice if the shaft exhibits normal wear patterns as shown in Example 1 of Figure 11. Uneven ridges and/or deep wear grooves shown in Example 2 of Figure 11 would be a legitimate reason to replace the drive shaft.



Warranty

If a DB4, DS, or DE pump is received for service with a customer complaint of weep hole leakage (fuel or engine oil), and it is within the Stanadyne warranty period, the pump does not have to be tested to verify the complaint (Operation Code 01A). A warranty claim may be submitted for the labor operations outlined below.

NOTE: Reference Section 4.5 of the Stanadyne Service Policies and Procedures for time allowances.

Labor Operations for DB4, DE, or DS Drive Shaft Seal Replacement (When customer complaint is weep hole leakage)

Labor Operation	Description
06	Replace drive shaft seals
51, 51A, or 51B (Dependent on Model Type)	Install pump on test bench, calibrate and leak test.
00	Administrative time

The Stanadyne on-line warranty program will automatically calculate time allowances.

**Global Aftermarket Team
Product Support Department**

Revision	Date	Changes
11	4/10	Introduced oil seal installation extension sleeve P/N 39989. Removed Loctite procedure and oil seal change history
12	09/13	Introduce 43363 Fuel Side Seal as replacement for 31375 and 30804 seals, the use of Lubriplate #630 to install seals, and remove outdated literature.
13	05/17	Updated to current format and reference to Section 4.5 of the SP&P for time allowances.