AirDog® Champ II™

"SPIN-ON" For CAT Filters
High Pressure Fuel Air Separator

INSTALLATION MANUAL

For CATERPILLAR® 3406E, C10, C11, C12, C13, C15, & C16, C18 Engines

Using CAT 1R-0749 or 1R-0750 Fuel Filter







PLEASE READ
THESE INSTRUCTIONS
THOROUGHLY
BEFORE BEGINNING
INSTALLATION

Part No. A7SOCA701

Revised 11/17/2026



PROUDLY MADE IN THE USA

AirDog® HEAVY DUTY DIESEL FUEL SYSTEMS
PureFlow TECHNOLOGIES, INC.

www.airdogdiesel.com
1-573-635-0555 or
1-877-463-4373

Providing "Test Cell Performance" in "Real World Conditions" Since 1993!

PATENT
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HEAVY DUTY & INDUSTRIAL

Fuel Systems by PureFlow® TECHNOLOGIES, INC.

Amazingly Simple Installation

Spins on between filter head and the fuel filter. Air/Vapor return line connects to engine fuel return line.

Amazingly Simple Operation

Operates in conjunction with the fuel flow and pressure created by the engines transfer pump. Separates and removes entrained air plus vapor from fuel pump cavitation before the fuel enters the engine.



The AirDog® Champ II is proudly made in the USA.

With PureFlow Technologies AirDog® Champ II system installed, your diesel engine can perform as designed even under the most extreme conditions.

- Improves Fuel Mileage
- Lengthens Injector Life
- Smoother Idle
- Improves Throttle Response
- Maximizes Torque
- Reduces Emissions



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INSTALLATION GUIDELINES

The installation of your AirDog® Champ II can be made relatively easy by following the steps outlined in this manual, and:

1. Inventory the package components. Notify PureFlow® Technologies, immediately of any parts missing or damaged.

2. Read the installation manual completely. Understand how the system operates and the installation recommendations before beginning.

SAFETY GUIDELINES

CAUTION: Chock the vehicle's tires to prevent rolling.

CAUTION: Wear safety glasses when operating power tools such as drills and grinders or when using a punch or chisel.

CAUTION: Route the fuel lines and electrical harnesses keeping them away from hot exhaust components and/or moving parts. Properly secure the fuel lines and electrical harnesses to prevent chaffing.

If you are uncertain of any installation procedure, contact: PureFlow® Technologies, Inc. for technical assistance.

NOTE: The pictures used in this manual are for example only and may not depict the exact components as found on your truck.

Installation Parts List

QTY	Description	Part Number	Image
1	**Installation Manual**	207-7-0701	
1	**AirDog® Champ II High Pressure Air Separator**	A7SOCA701	
1	**#6 Hose w/end fittings 18" L Hose Assembly**	4C-1-06-06-18	

970-07-0701 Installation Fitting Kit

1 1 1	**#6M JIC x 3/8 M ORB 90º Elbow** **#6M JIC x 3/8 M ORB Straight Connector** **#6M JIC x #6F JICX 90° Swivel Nut Elbow** **Use Straight or 90°as needed for air/vapor return port.*	4A-2-01-06-06-S 4A-1-01-06-06-S 4A-2-04-06-06-S	
1	**#6M JIC x 3/8 M ORB Restrictor Fitting w/ Lock Nut** (w/ -906 o-ring installed)	001-4A-1-6400-06	
1	**#8M JIC x 3/8 M ORB Restrictor Fitting w/ Lock Nut** (w/ -906 o-ring installed)	001-4A-1-6400-08	
1	**1/4 NPT with Vibraseal Pipe Plug**	4A-3-01-A-S2	
1	**#6M JIC x 1/4 M NPTF Straight Connector**	4A-1-01-A-C-SZ	
1	**#10M JIC x 1/2 M ORB Straight Connector - Modified** ***(ACERT Pump Fitting)***	4A-1-02-10-08-S-.5M	
1	**#8M JIC x #8F JICX 90º Swivel Nut Elbow** *(Use if needed)*	4A-2-04-08-08-S	
1	**#10M JIC x #10F JICX 90º Swivel Nut Elbow** *(Use if needed)*	4A-2-04-10-10-S	
1	**CAT Fuel Pressure Shim Kit**	SHK-CAFP	
1	**#4M JIC x #4F JICX x #4M JIC Swivel Nut Run Tee** *(for #4 return line - if needed)*	4A-4-04-04-04-04-4-S	
1	**#4F JIC x #6M JIC Tube Reducer** *(for #4 return line - if needed)*	4A-1-21-9-04-06-S	

Section 4: System Overview

PureFlow® Technologies, Inc. addresses diesel engine efficiency and peak performance on the fuel side from the fuel tank to the tip of the injector. Removing entrained air and fuel vapor from the fuel flow to the engine is not enough if the internal conditions of the fuel system components are such to allow vapor to form in the injector, itself.

Specifically, if the fuel pressure/flow to the injector, even with entrained air and vapor removed, is insufficient to totally fill the injector barrel on the up stroke of the plunger, a void or low pressure will form that allows vapor to re-form within the injector. The results of "injector lag", which is just another name for "delayed injection timing", is increased fuel consumption, lost power, and increased exhaust emissions.

To overcome these concerns, PureFlow® Technologies has an "Upgrade Kit" available for the CATERPILLAR 3406E, C10 - C13, C15, C16 and C18 engines. The "Upgrade Kit" is NOT included with the Champ II installation kit, although the complete and detailed instructions are included.

Contact PureFlow® Technologies at 1.573.635.0555 for additional information and ordering.

Section 5: Installing the AirDog® Champ II



Early Model 3406E CAT Secondary Fuel Filter Head

Figure 1



Later Model 3406E CAT Secondary Fuel Filter Head Also C13, C15, C16

Figure 2



Figure 3

5-1. Remove the CAT secondary fuel filter. (Figure 1 & 2)

5-2. Check the O-Ring seal to be sure that it is properly installed in the "Groove" in the top of the Champ II. (Figure 3)

5-3. Remove the red plastic plug from the Air/Vapor return port of the Champ II and spin the Champ II onto the CAT secondary fuel filter head, stopping with the Air/Vapor return port facing to the front. (Figure 4-4.1)



Figure 4



Figure 4.1

Section 5: AirDog® Champ II installation Continued

5-4. Install the Air/Vapor return fitting in the Air/Vapor return port in the side of the Champ II. You will need to determine if a straight fitting, or 90-degree fitting (both included for your convenience), will work best to most easily connect the Air/Vapor return line. In the example pictured, the return line will be installed most easily by looping down from the Champ II, and back up to the engine fuel return at the filter head. (Figure 5-5.2)

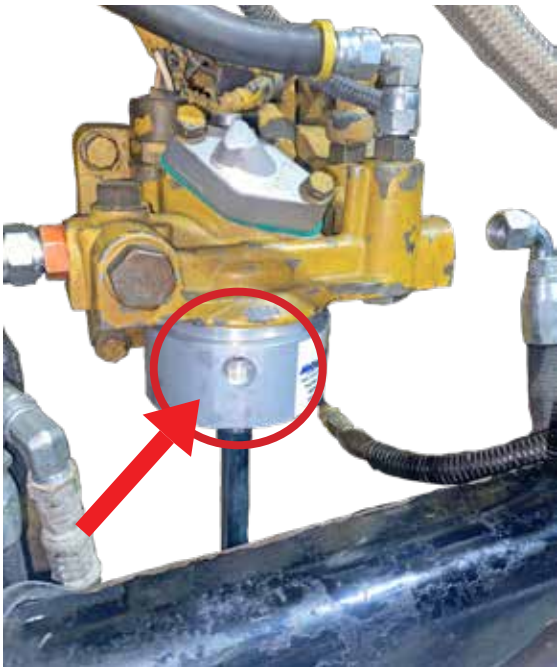


Figure 5

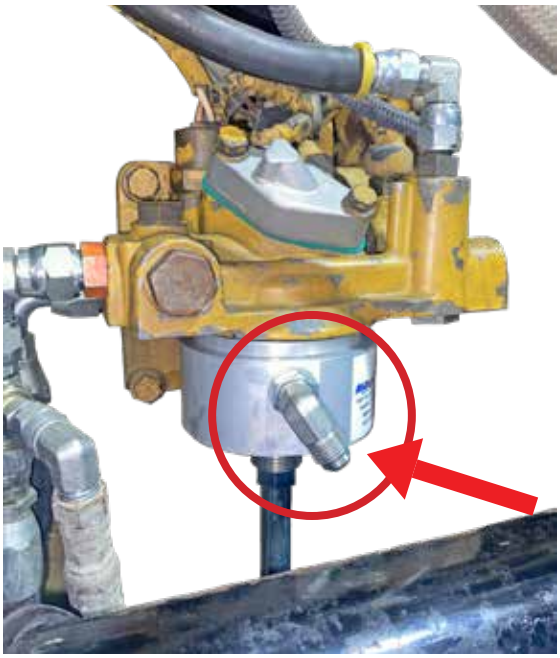


Figure 5.1



Figure 5.2

Section 5: AirDog® Champ II installation Continued

NOTE: The all-new Champ II is an indexable spin-on unit, which enables the installer to locate the Air/Vapor return port where it is the most easily accessible. Once the Air/Vapor return fitting is installed into the Champ II, simply rotate the Champ II counter-clockwise, so that the serial number is facing outward. Now, tighten up the installation by using a 9/16" wrench on the Air/Vapor return fitting to hold the unit in place, and use a ¾" wrench to tighten the Champ II pickup tube, which compresses the O-Ring seal against the fuel filter housing (Figure 6).
Tighten securely, but DO NOT OVERTIGHTEN, as doing so could damage the O-Ring seal.



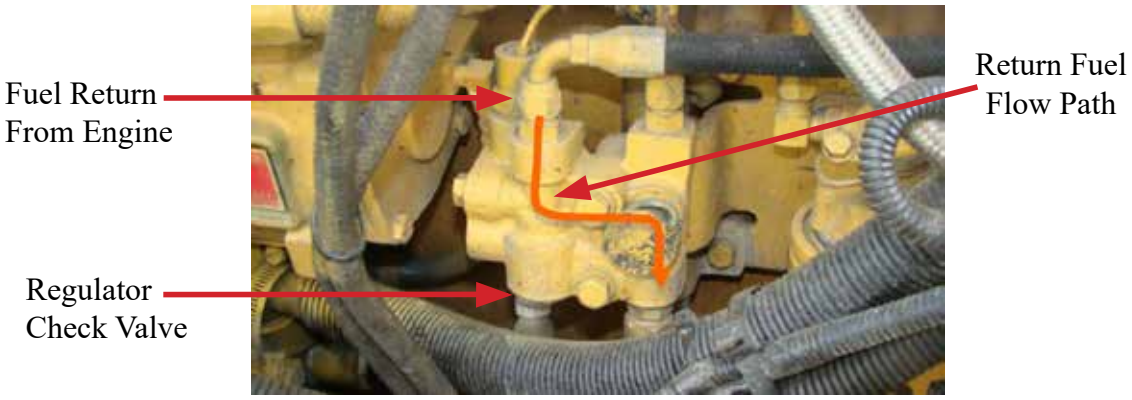


Figure 6

Section 6A: Installing the Air/Vapor Return Line

Early Model 3406E CAT Secondary Fuel Filter Head

The early model CAT 3406E engines have a fuel distribution casting mounted on the driver's side, upper front of the engine.



6A-1. Disconnect the fuel return line and remove the fuel return fitting from the fuel distribution casting. Note whether you have a -6 or -8 return line size. Install the special Champ™ O-Ring Boss restrictor fitting in the fuel return port of the casting (Figure 2).



Figure 2

001-4A-1-6400-06 (Silver) for a -6 return line
– or –
001-4A-1-6400-08 (Black) for a -8 return line



6A-2. There are two ¼" NPT female ports in the special return fitting installed in step 6A-1. Install one ¼" NPT x -6 JIC male fitting into the port which best aligns with a direct line from the Champ™ fuel pump (Figure 3). (Use the included 90° elbow, if necessary.)



Figure 3

Early Model 3406E CAT Secondary Fuel Filter Head Continued

6A-3. Install one ¼" NPT with Vibraseal Pipe Plug into the opposite port of the restrictor fitting installed in step 6A-1.

Note: that you may need to loosen the restrictor fitting, to index it so the open port faces outward, so you can reach the port to install the plug into. Tighten back securely after installing the plug.



6A-4. Securely tighten the jam nut on the special restrictor fitting, locking the fitting into position and seating the o-ring.

6A-5. Reconnect the engine fuel return line at the newly-installed restrictor fitting.



6A-6. Install the Champ II #6 hose assembly between the Champ II air/vapor return port and the restrictor fitting in the engine fuel return.

Section 6B: Installing the Air/Vapor Return Line

Later Model CAT Secondary Fuel Filter Head

The Champ returns entrained air & vapor to the fuel tank. The air/vapor return line may be connected directly to the engine fuel return line "Low Pressure" side after the regulator.

Connecting the Air/Vapor Return to the Engine Fuel Return Line

6B-1. Disconnect the fuel return line connected to the fuel return fitting on the secondary filter housing and remove the #6 fitting. Note whether you have a -6 or -8 return line size. Install the special Champ™ O-Ring Boss restrictor fitting in the "To Tank" port in the secondary filter head. You will use:

001-4A-1-6400-06 (Silver) for a -6 return line
– or –
001-4A-1-6400-08 (Black) for a -8 return line



-8 -6

6B-2. There are two ¼" NPT female ports in the special restrictor fitting installed in step 6B-1. Install one ¼" NPT x -6 JIC male fitting into the port which best aligns with a direct line from the Champ™ fuel pump.



6B-3. Install one ¼" NPT with Vibraseal Pipe Plug into the opposite port of the restrictor fitting installed in step 6B-1.



6B-4. Securely tighten the jam nut on the special restrictor fitting, locking the fitting into position and seating the o-ring.



6B-5. Connect the return line to the Champ™ "TANK" air/vapor return port.



Later Model 3406E CAT Secondary Fuel Filter Head Continued

6B-6. Route and connect the other end of the air/vapor return line to the newly installed restrictor fitting at the secondary fuel filter housing. Use the included 90° elbow, if required.





6B-7. Connect the factory return fuel line to the end of the Champ™ special restrictor fitting installed in step 6B-1. Use the included 90° elbow, if required.

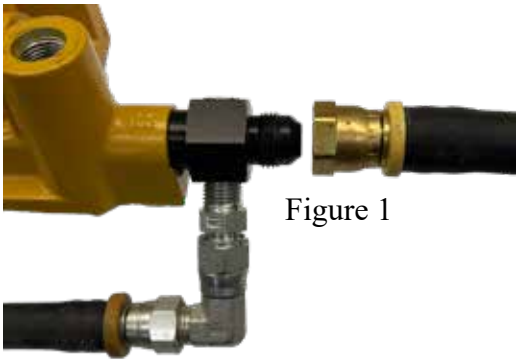


Figure 1



6B-8. Reattach the original engine fuel return line. (Figure 1)

Note: Use the 90° #8 F JIC Swivel x #8 M JIC elbow, as needed.

6B-9. Install the Champ II Air/Vapor return line. The return line is included in the installation kit. (Figure 2)

6B-10. Pre-fill the fuel filter with clean fuel and install the filter on the Champ II.

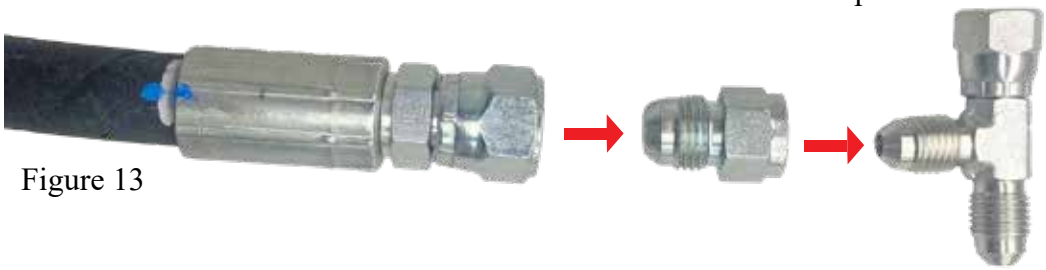


Figure 13

NOTE: On some 'B' or 'C' model CAT engines, there may be a #4 return line. In this instance, use the included #4 Tee and DO NOT install the restrictor fittings. You will also need to install the #4 - #6 JIC tube reducer to the #4 Tee, to connect the Champ II fuel return line.

Section 7: Adjusting the Fuel Rail Pressure



For the CAT 3406E, C10 - C13, C15, C16 and C18 (with filter 1R-0749 or 1R-0750) engine to perform at peak efficiency, the fuel rail pressure must be adequate to completely fill the fuel injectors during the "up" stroke of the plunger. A minimum of 115 PSI to an absolute maximum of no more than 120 PSI at "high idle" is required.

There are three models of the CATERPILLAR® fuel transfer pump. The early model 1st generation with a small diameter spring hex head plug and the 2nd generation and 3rd generation with a larger diameter spring and socket head plug.

Temporarily install a 150 PSI Fuel Pressure Gauge.

It is important to know the original fuel pressure before you start.

NOTE: The first step to resetting the "Fuel Rail Pressure" has already been performed when the "Restrictor Fitting" was installed in Step 6A-1 or 6B-1. If your transfer pump is in good condition and not worn out, with the engine running the fuel rail pressure should be at approximately 118 PSI at high idle (1,900 to 2,100 RPM). If the fuel rail pressure is still low, follow the steps below.

To adjust the rail pressure after the AirDog® Restrictor Fitting has been installed, reset the spring tension on the high pressure bypass regulator.





Connect the Pressure Gauge Here

Note: The shim kit includes shims for each of the three generation pumps.

1st Generation Pump Shims + pin



2nd Generation Pump Shim Caps



3rd Generation Pump Shims



Adjusting the Rail Pressure for the 1st Generation CAT® Fuel Transfer Pump

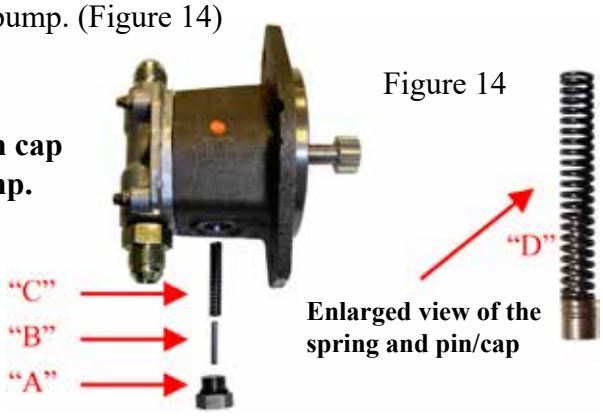
7-1. Remove hex plug "A" on the side of the transfer pump. (Figure 14)

7-2. Take out spring "C" and the Stiffener Pin "B".

NOTE: The shim kit includes new stiffener pin with cap and three shims for the 1st generation transfer pump.

7-3. Put the new stiffener pin w/cap "D" into the spring and re-install in transfer pump.

Figure 14



7-4. Start the engine. Run the RPM up slowly until high idle is reached. High idle is 1,900 to 2,100 RPM. Read the fuel rail pressure. If the rail pressure does not reach 118 PSI, add a shim and repeat until at least 118 PSI, but not more than 120 PSI, is reached. All three shims may be required to reach 118 PSI.

WARNING: Do Not exceed 120 PSI fuel rail pressure. High rail pressure, 130 PSI and above will void your factory engine warranty and may cause engine damage!

Adjusting Rail Pressure for the 2nd & 3rd Generation CAT® Fuel Transfer Pump

7-5. Remove hex plug "A" on the side of the transfer pump. (Figure 15 & 16)

NOTE: The Shim Kit includes:

- **Two shim caps, one 0.25" thick and one 0.125" thick, for the 2nd generation pump.**
- **Two shims, one 0.25" thick and one 0.125" thick, for the 3rd generation pump.**



7-6. Hold the 0.125" shim cap "C" (2nd Generation) or 0.125" shim "D" (3rd Generation) on the end of the plug "A" and re-install the spring, shim cap or shim, and plug into the transfer pump.

Figure 15

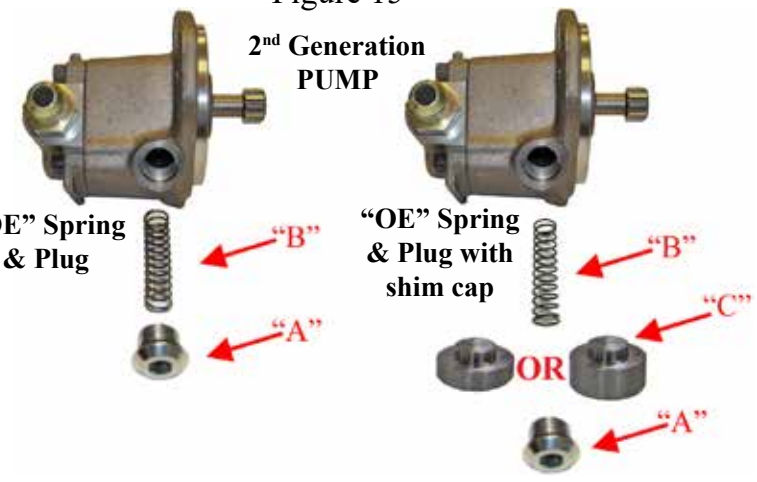
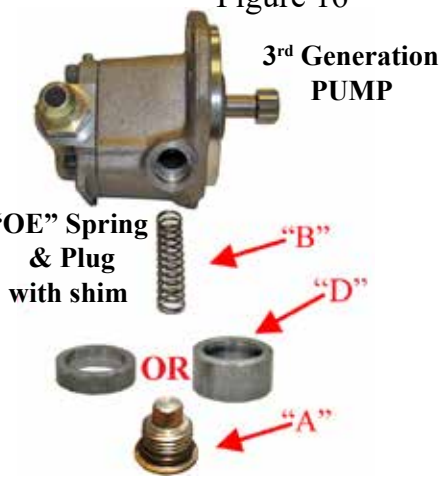


Figure 16



7-7. Start the engine. Run the RPM up slowly until high idle is reached. High idle is 1,900 to 2,100 RPM. Read the fuel rail pressure. If the rail pressure does not reach 118 PSI, remove the .125 shim and replace with the .250 shim and repeat until at least 118 PSI is achieved, but not more than 120 PSI.

7-8. When you have completed adjusting the fuel rail pressure, remove the pressure gauge from the secondary fuel filter head and replace the plug.

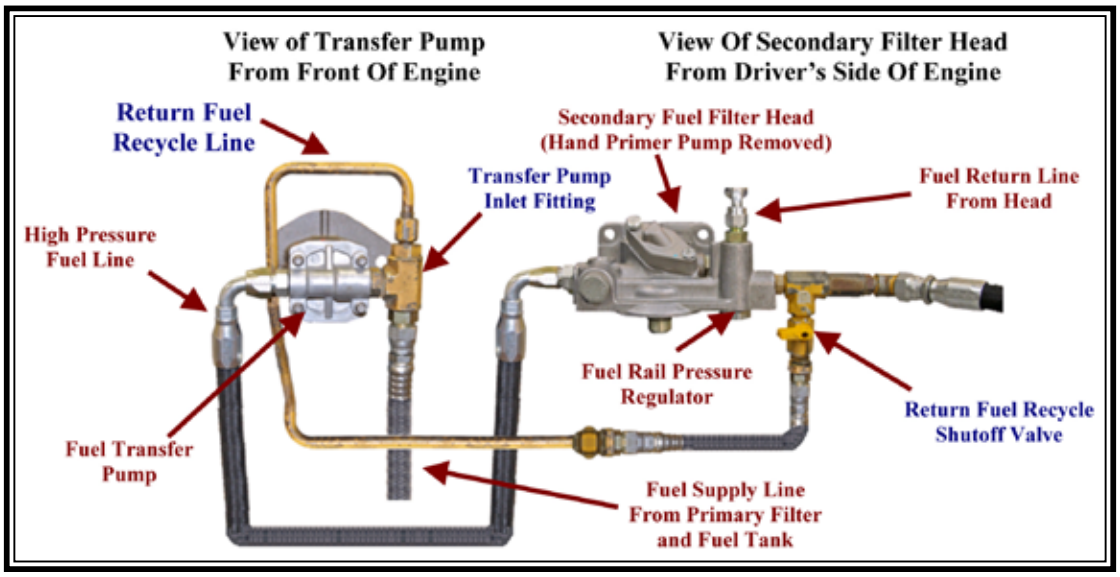
VERY IMPORTANT: After the adjustments have been performed and the rail pressure does not reach 118 PSI ±3, it would be wise to have the fuel pump checked for excessive wear. Your fuel pump may be worn out and need replacing!

Section 8: CATERPILLAR® ACERT Fuel Recycle Line (CAT ACERT Engines)

For Non ACERT engines, see Section 9C

CATERPILLAR® ACERT Engines have a "Return Fuel Recycle Line". This fuel line recycles "HOT" fuel, coming directly from the engine head, back to the fuel inlet port of the transfer pump.

For BEST FUEL ECONOMY and MAXIMUM ENGINE EFFICIENCY the "Return Fuel Recycle Line" must be removed.



8-1. Disconnect the "Return Fuel Recycle Line" from the top of the inlet fitting at the transfer pump.

8-2. Disconnect the "Return Fuel Recycle Line" from the bottom of the Return Line shutoff valve.

8-3. There is a bracket on the "Return Fuel Recycle Line" that secures the line to the block. Remove the bolt holding the bracket. Remove the "Return Fuel Recycle Line" from the engine.

8-4. Disconnect the fuel supply line from the bottom of the inlet fitting at the transfer pump.

85. Remove the Transfer Pump inlet fitting.



8-6. Install the #10 M JIC x 1/2 M ORB fitting in the Transfer Pump Inlet Port.



8-7. Reconnect and tighten the fuel supply line removed earlier.

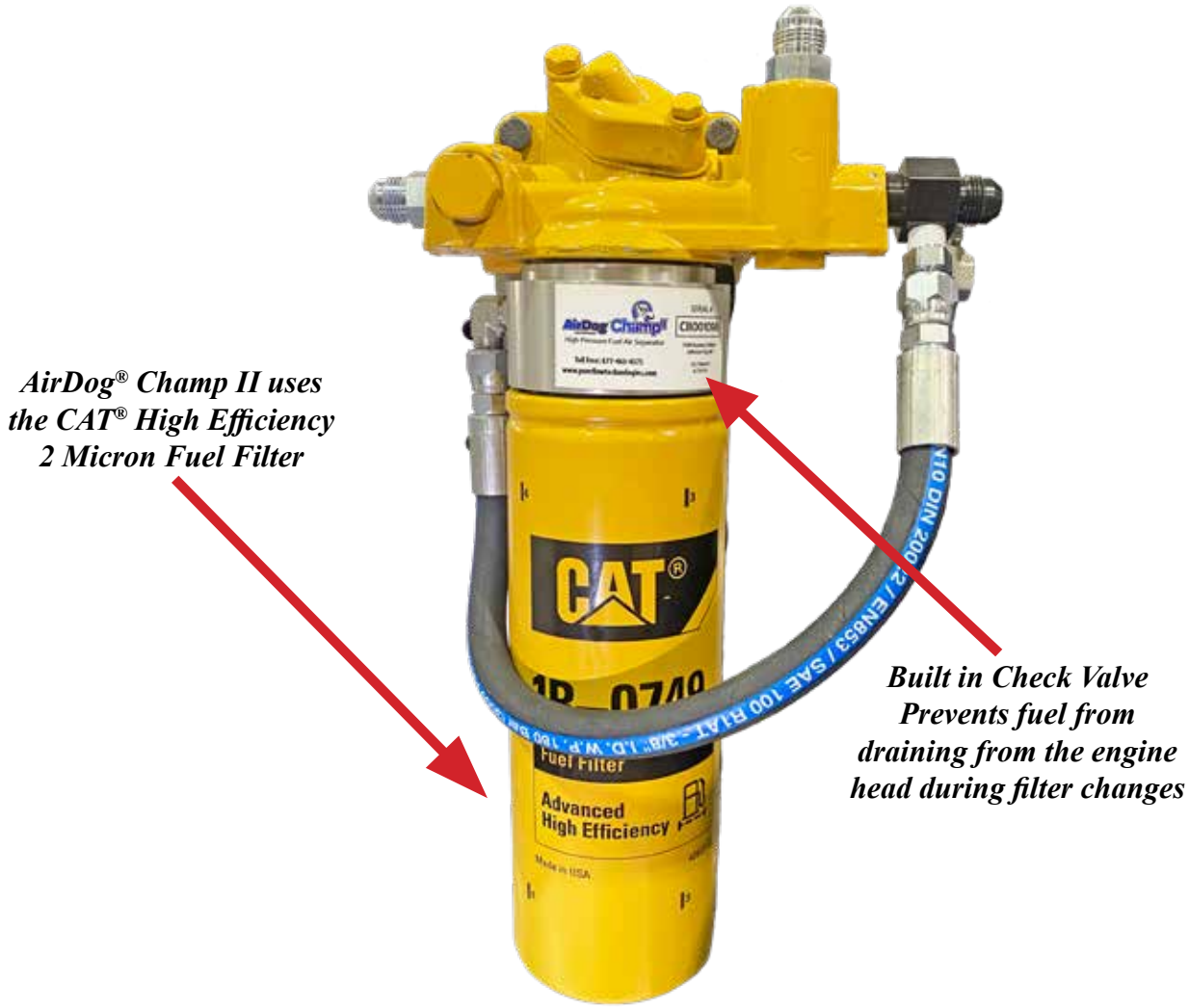
Note: Use the 90° #10 F JIC Swivel x #10 M JIC elbow, as needed.



Section 9: Servicing the AirDog® Champ II Fuel Filter

Replace the fuel filter as recommended by CATERPILLAR.

When replacing the fuel filter, be sure to clean the under side of the AirDog® Champ II base. Follow the instructions on the filter for proper tightening procedures



NOTE: Due to the fact that fuel filters are often OVER TIGHTENED and difficult to remove, it is suggested to carry a second filter wrench to use as a backup wrench when changing the fuel filter.

Dispose of waste fuel and used filters properly to protect our environment.

READY TO FULLY OPTIMIZE YOUR CAT™ ENGINE?



AirDog®

The most complete and effective fuel system solution for heavy duty diesel engines. Install to run in tandem with the Champ™ II system and maximize your engine's potential!

UPS-CAFS

Our Secondary Fuel System Upgrade Kit is the perfect complement to the Champ™ II and AirDog® - maximize fuel flow for supreme efficiency and performance!



SCAN FOR INFO

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www.airdogdiesel.com
1-877-463-4273

NOTES

NOTES



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