



DTB

Date: June 4, 2008
 Order No.: S-B-09.20/29
 Supersedes:
 Group: 09

SUBJECT: Model 164.122/822
Model 211.022
Model Sprinter Van
Models Equipped with Engine OM642 BlueTec Diesel

If you receive customer reports in the above model vehicles of oil leakage at the air intake duct downstream of the air filter to the turbocharger, the cause may be a damaged or incorrectly installed seal. To resolve, perform the below procedure.

1. If the seal ring between turbocharger and air intake duct is leaking (Figure 1), is damaged or has been installed incorrectly (Figure 2), the seal must be replaced.



Figure 1 S-B-09.20/29
 External oil leakage



Figure 2 S-B-09.20/29
 Seal ring is crushed due to incorrect installation

This bulletin has been created and maintained in accordance with MBUSA-SLP S424HH001, Control of Quality Records.

This seal was not installed wrong. Every seal does this. The seals were installed at the factory. The seal is drenched with oil. The Turbo sucks in air so hard that it tries to suck in this seal. The volume of air being sucked in is also sucking oil out of the crankcase ventilation system. This can be stopped. This happens to every OM642 and OM651 BlueTec from 2007 to 2020.

It's hard to find the perfect starting point for explaining the problems with the BlueTec. This Service Bulletin from 2008 is a good starting point. Every BlueTec diesel has this same problem. Yes, a brand new 2020 Sprinter still has oil going into the Turbo. Depending on how long this has been ignored, the bigger the mess. Even though this is a fundamental design flaw, I don't want to get side tracked into the design issues. It is what it is. The goal is to stop this oil from entering the Turbo. The oil is NOT normal and it can be stopped. The more miles on the engine and the poorer the maintenance, the harder it will be to stop. A new Sprinter will be the easiest, so lets start with a new engine. Before we start, let me explain what causes this oil to be here and what harm is it doing. This oil is caused by excess crankcase oil pressure. It's caused by blow-by at the Piston Rings. The Rings are not sealing tight enough against the cylinder walls. Combustion gases and fuel dilution in the engine oil are pushing hot oil vapor past the Rings. The oil vapor finally goes out the Oil Separator / PCV valve and into the Turbo. From there it causes even more trouble which I'll get to in a minute.

- NEW ENGINE. When Mercedes builds the engine they put Gas engine oil in the engine. This oil is terrible for a new engine because the Piston Rings can't seat properly into the cylinder walls. The new cylinder walls quickly become glazed and the Rings will never have the chance to form a perfect seal. If you have a new BlueTec diesel, the first thing you should do is drain the factory oil and put Diesel Break-in oil in the engine. That perfect seal will reduce the Blow-by. After the Rings are properly seated, then use a proper diesel oil for your driving conditions. (Note: Everyone wants to know what the best oil is. Mechanics all have an opinion on the best oil and practically none of these opinions have any hard facts to support the opinion. There are several excellent oils depending on your situation. If your engine has even average milage, the engine has already built up a lot of sludge from the constant flow of hot oil vapor. No oil can clean up the mess in the EGR and intake system. There is special cleaning equipment with adapters for cleaning the OM642 and OM651 diesels. As for a good inexpensive diesel oil, Amazon "Basics" 5W/40 Synthetic diesel oil is way better than what Mercedes sells. There are better oils, but I need to explain in what circumstances they work best.)

- USED ENGINE As the engine ages the oil vapor you see in the Turbo begins to build up as sludge in the EGR, Intercooler, Swirl Flaps, EGR Cooler and the DPF. Once the sludge is there, the best oil in the world can't remove it. Fuel dilution is caused by the DPF regeneration. Diesel fuel mixed with the engine oil will wash past the Piston Rings and into the crankcase ventilation system. It finally ends up in the DPF which has to regenerate more often to burn it off. The more the DPF regenerates, the more fuel washes into the engine oil. It becomes a downward spiral. Every time the DPF regenerates, the hotter the oil becomes. The hotter the oil, the thinner it becomes and the easier it burns at the Rings. The burnt oil packs into the Piston Rings and causes them to stick. Stuck Rings can't press tightly against the Cylinder Walls. If you follow the factory recommended 20,000 mile oil changes, the engine gets into trouble very quick.

These engines must be flushed and cleaned with special equipment designed for a specific engine. Once the engine is clean, you install a Catch Tank to capture the hot oil vapor before it gets into the Turbo and the rest of the intake system. If you install a Catch Tank on a new engine, it will stay clean forever. Catch Tanks are a little tricky because no one makes one specifically for a BlueTec. Plastic Catch Tanks will split open after a year or two. There is one Catch Tank that work perfectly.

(People have ask me to respond to comments on various Owners Forums. I've seen the guys who claim they never change the oil and the engine runs perfect. There are so many ridiculous claims that I don't know what motivates these people to post thousands of times. They argue about crap they know nothing about. They think I shouldn't charge \$200 for my 50 years of Mercedes experience. If it wasn't for my Grandson's college education, I would take down the article and enjoy the last years of my retirement. There are lots of people who want someone to explain all of these details. People who don't need help are certainly welcome to argue with each other on the internet.)

- ENGINES WITH HIGH OIL CONSUMPTION When the piston rings get so hot the oil vapor melts on the hot piston rings. This process virtually glues the piston rings into their ring grooves. The rings are so stuck they can't press against the cylinder walls. Blow-by or crankcase oil vapor is so bad the engine is burning a quart of oil every 200 miles. The Check Engine light is constantly on. The piston rings can be freed up, but it's hard work. To have any hope of getting the high oil consumption under control, the Oil Separator / PCV valve must be replaced. The engine must be flushed to remove all the oil sludge. The engine can be saved, but it's a lot of work. The engine's computer must have new software downloaded by the dealer. Updated software will greatly reduce the amount of diesel fuel used for regeneration of the DPF. The timing chain is often stretched and clatters on cold starts. The excessive crankcase pressure causes oil leaks from the usual suspects. The oil passages are so filled with sludge that it starves the Turbo for oil. Shortly after the Turbo fails the crankshaft freezes from oil starvation. If you have any warranty Mercedes will blame the frozen crankshaft on fuel contamination. That's not what really caused the engine to lock up, but Mercedes uses that as the excuse for not paying for the repair. Fuel quality is another problem, but it's doesn't cause the engine to lock-up.

Sprinters are very popular as RV's. They also weigh a lot. When it's 100F and you're going full throttle up a long steep grade in the big mountains, the Turbo is pulling so much air that it begins to suck the hot oil vapor out of the crankcase ventilation system. A Catch Tank is critical at this time. Instead of the oil vapor going straight into the Turbo and the air intake system, it's diverted to a holding tank with a filter to condense the oil vapor. Clean air is sent to the Turbo. The oil vapor that would have turned into sludge in the air intake system is held in the Catch Tank until it's drained off. The DPF no longer has to deal with the oil vapor from the crankcase ventilation system. The DPF doesn't have to regenerate as often. Every time the DPF regenerates the exhaust temperature goes to 1600F. The fewer times the system has to regenerate the less strain there is on all the systems in the engine.

In this Service Bulletin Mercedes shows us a red seal that's deformed. Mercedes says the seal was installed wrong. This seal was installed by the factory. They all deform like this because they're soaked in oil and the Turbo is sucking so much air at full throttle. To slow down the oil going into the Turbo, Mercedes has updated the Oil Separator (PCV valve) 14 times. In Europe, Mercedes redesigned the Crankcase vent system and installed a sophisticated version of the Catch Tank. Mercedes won't do that for the North American market because they would have to recall every BlueTec they've ever built. The goal is to stop the oil from leaving the crankcase. If you have a 2018 or older BlueTec, the Oil Separator is one of the first things that needs to be replaced. The older the engine, the more out dated the Oil Separator. Oil that's designed to withstand extreme temperatures, fuel dilution and soot, is the other part of the puzzle. This is also what I help owners to understand and choose an oil that's best for their situation.

If your engine already has a bunch of miles, it will have sludge built up in the intake system. Prior to this new cleaning equipment, mechanics had to disassemble half the engine to clean out the sludge. I send owners all the information about the equipment and how it works. If you have a new Sprinter, you can avoid all of these headaches with Break-in oil, the right diesel oil, and the proper Catch Tank.

There's another dozen secondary problems related to the oil vapor. Depending on your situation I deal with those in different Service Bulletins. Some owners will need to replace various parts that Mercedes has updated to correct known problems. This engine can be reliable with the proper maintenance. This is just a small glimpse into the BlueTec diesel's most basic problem with the crankcase ventilation system. Oil is certainly important, but it is not the savior many people seem to think it is. If you're not convinced, use the Amazon "Basics" 5W/40 Diesel oil. Change it often. If you have a 2019 or 2020 Sprinter, I promise the Check Engine light will come on before you get to 3,000 miles. You'll see a message that the DPF is full of soot. Why didn't the system regenerate and burn off the soot? Ask your dealer what's happening? When you realize they don't know, think about the lost opportunity to the engine off on the right foot.

2. Observe the installation sequence. The seal should be installed on the connection fitting (air intake) of the turbocharger and not in the intake pipe, before the pipe is installed on the turbo charger.
3. Inspect the clamp and replace if necessary. Tighten to 4 Nm.

i **Note:** Engine oil venting occurs on the right hand side of the engine air intake duct. For this reason there is always **some oil** in the engine air intake duct, see (Figure 3). This is no justification for replacing the turbocharger. Turbochargers replaced for this reason will not be covered by warranty.



Mercedes is telling their mechanics this oil in the Turbo is normal. It's not normal. It's also not the Turbo's fault. Replacing the Turbo won't stop the oil. Mercedes has never fixed this problem on the North American versions of this engine. It is still a problem in 2020. There is however a way to mitigate the damage being done by this oil. The leak and the red oil seal are not the problem. The problem is the incredible amount of sludge this oil causes inside the engine. It seems impossible, but sooner or later this oil will bring the engine to a grinding halt right in the middle of the road.

Figure 3 S-B-09.20/29

Normal oil accumulation at turbocharger

Parts Information

Qty.	Part Name	Part Number
1	Hose clamp (oval 60-80 mm)	A000 995 97 10
1	Seal ring (up to engine no. 642xxx 40 153203)	A017 997 40 45
1	Seal ring (as of engine no. 642xxx 40 153204)	A642 094 00 80

i **Note:** The following allowable labor operations should be used when submitting a warranty claim for this repair. This information has been generated on June 4, 2008. Please refer to Netstar → Star TekInfo → Star Time for the most current labor time allowance.

In Case of Warranty

Operation: Replace Seal Ring Between Turbocharger & Air Intake Duct (09-0000)

Damage Code	Operation Number	Time (hrs.)	Model Indicator (s)
09311 04	09 0000	0.4 hrs. *	BD, EB, TC, Z4

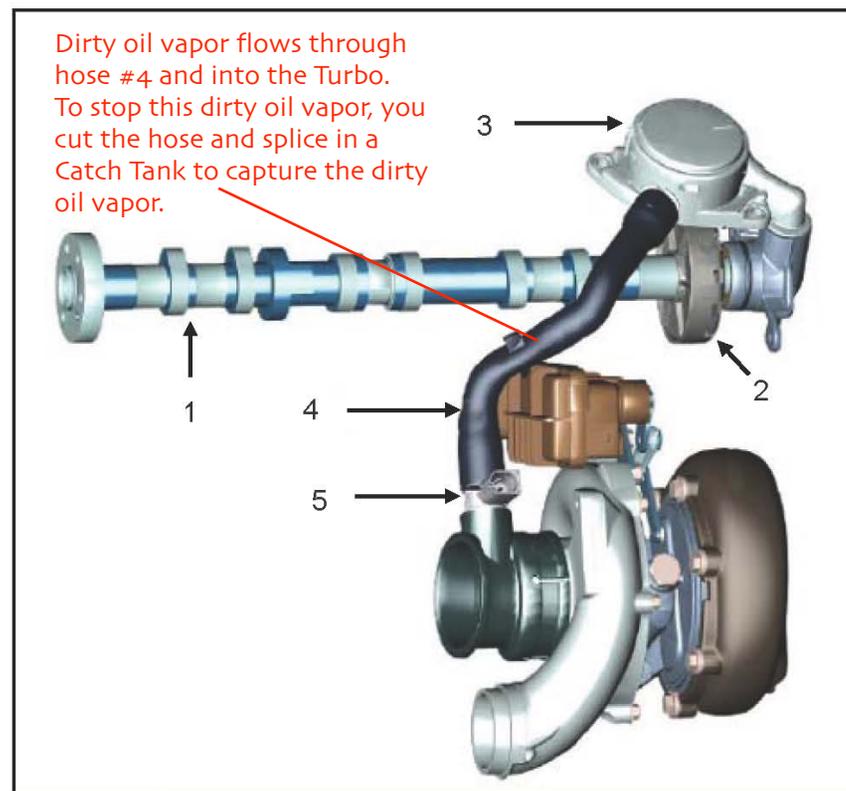
* Maximum time allowed with a separate time punch. Ensure that punches are labeled as NON time.

Crankcase Ventilation

Crankcase gases are fed to the intake manifold through the:

- Hollow intake cam (1)
- Oil separator (2)
- Pressure regulator (3)
- Vent line (4)
- Crankcase ventilation heating element (5)

The vent line heater is controlled by the CDI control unit



Passenger car illustration, component shape may vary

How does dirty crankcase oil vapor get into the air intake system and the EGR? This is the early OM642 engine. The later OM642 and the OM651 is slightly different but operates the same way. Dirty hot oil vapor goes through hose #4 and into the Turbo. From there the oil vapor coats the EGR, Intercooler and Intake system. It gradually keeps building into a thick sludge. Once the sludge hits a tipping point, the Check Engine lights and Limp Home never stop. Your dealer starts fixing one problem after the other. They never tell you what caused it in the first place and what you need to do to finally put a stop to endless repair bills. A Catch Tank is spliced into hose #4 and the dirty oil vapor is diverted into the Catch Tank. Clean air is returned to the Turbo. The emission system stays clean and works like it should. You can use better oil, because oil vapor is not going to the DPF. The only reason Mercedes uses low SAPS oil is because nothing is stopping it from going into the DPF. Low SAPS oil (MB229.52) can't withstand the extreme heat. They had to remove the important oil additives because they contaminate the DPF. If you use better oils and a Catch Tank, the oil never gets to the DPF.

Ring shaped imprints

Visible in the upper and lower piston ring reversal area are not a cause for concern.

i Reuse crankcase.



P01.40-2248-11

Brown coloring of cylinder upper surface

Brown coloration (oil varnish) over large areas of the cylinder barrel indicates that the engine has been driven at a high temperature level. This is normal and not a cause for concern.

i Reuse crankcase.



P01.40-2247-11

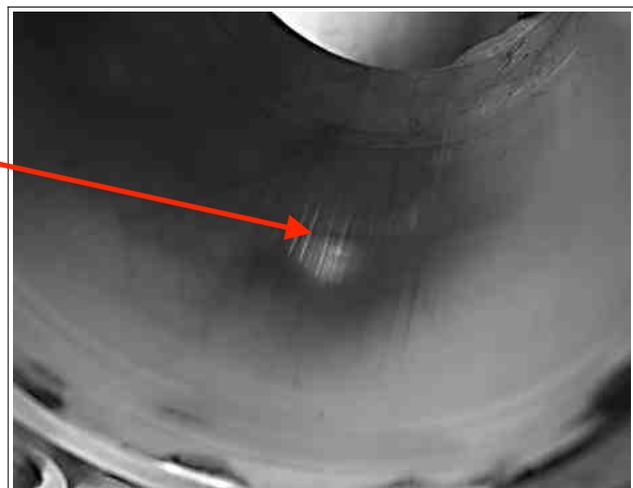
Glazing, smooth spots

Individual glazed spots, e.g. in cylinder center or in area of cylinder head bolts. Full circle impression at the upper and lower piston ring reversing points.

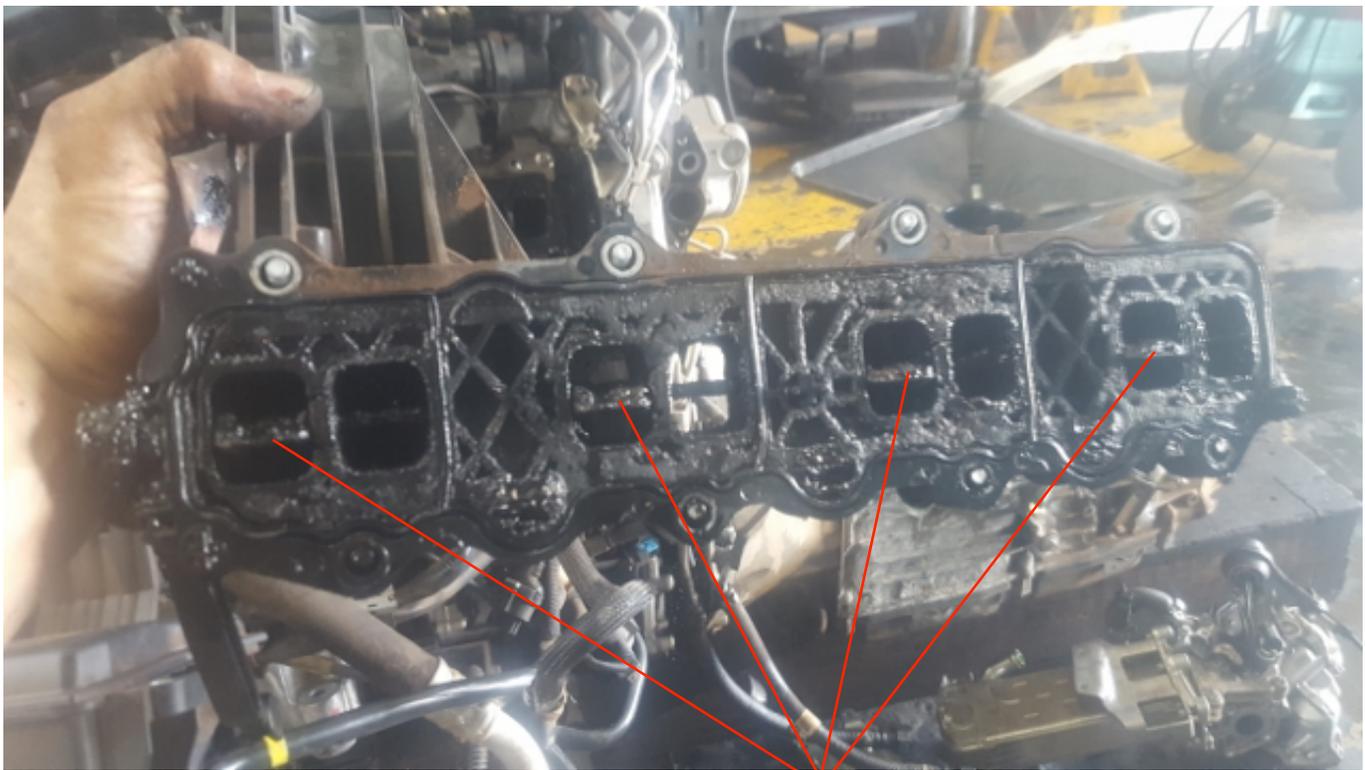
i Reuse crankcase but monitor oil Blow-by.

This is what bore polishing looks like in a BlueTec diesel. It was caused by the friction modifiers in Mobil One 5W/30 ESP. Blow-by and excessive crankcase pressure occurs where you see the glazing. In a gas engine, this is bad, but not the end of the world. However, when a BlueTec diesel regenerates the DPF, this glazing allows diesel fuel to enter the crankcase. Soot in the diesel fuel gets into the oil and causes the glazing to worsen. To remove this glazing, you need to use motor oil without the fuel efficiency friction modifiers. Motorcycle oil doesn't have the friction modifiers that cause the glazing. Over time, motorcycle oil will gradually clean off the glazing and return the cylinder walls to their normal look.

Motorcycle oil is very similar to diesel oil. Many motorcycle oils have a diesel rating.



Glazed cylinder walls are also caused by excessive idling or slow stop and go city driving. The piston rings are designed so higher RPM's creates more combustion gas that pushes the piston rings tight against the cylinder walls.



Movable Flaps

These are dirty Swirl Flaps from a OM642 V6 diesel. There are two sets of these flaps. They're also the Intake Manifolds. This is about average for 60,000 miles. The metal butterfly flaps in the manifold are always moving. They are attached to plastic linkage and an actuator motor (M55). As the sludge builds up, the flaps begin to bind-up and the plastic linkage breaks. Heaven help you if a flap breaks off and is sucked into the engine.

When the Plastic linkage breaks the engine goes into the Limp Home mode (A loss of power. Fault Code: P126A00). Then you're forced to remove the flaps and replace the plastic linkage with an updated metal linkage kit. It cost about \$3000 to fix just this mess. The rest of the intake system is also coated with this same oil sludge. The EGR Valve and the EGR Cooler are also filled with the same sludge.

There is now a new cleaning machine with adapters specifically for the OM642 and OM651 diesel. Any shop that has the equipment can clean all of this sludge without taking half the engine apart. You can preemptively clean this mess up, or wait until the repair bills force you to clean it up. If you clean out the Swirl Flaps before the sludge breaks the plastic linkage, you'll save yourself a major repair bill. The plastic linkage would last the life of the engine if it didn't have to fight this sludge. The problem is, most dealers and repair shops don't have the equipment. They make more money taking everything apart. Not only does cleaning this mess save you the cost of the Swirl Flaps, but the EGR and EGR Cooler will cost \$3000 or \$4000 to repair. When the EGR Cooler becomes clogged with sludge (Fault Code: 170400, P2428 or P2429), it causes the exhaust temperature to exceed the limits for the SCR system. The SCR Catalytic Converter and NOx sensors fail because the clogged EGR Cooler can't cool the exhaust properly. These cost \$4000 to \$5000. Owners also notice exhaust fumes in the vehicle. The exhaust system gets so hot the welds crack. The excessive exhaust temperatures also cause the engine oil to "coke" at the Piston Rings. The Piston Rings get so full of burnt oil the engine uses oil. That causes the DPF to clog with oil sludge. The SCR Catalytic Converter gets so hot that it self destructs (Fault Code: P126A00). The Turbocharger is "exhaust driven", and it will also get so hot the bearings fail and the Impeller blades start to wobble and hit the Turbo housing. In 2015, Garrett and Mercedes upgraded the Turbocharger to a "Sever Duty", which has a thicker housing to withstand the extreme heat. This same sludge has filled the Intercooler and it can no longer cool the air going into the combustion chamber. This causes the exhaust temperatures to climb even higher. Eventually the exhaust temperatures climb so high the engine oil breaks down and the Crankshaft Bearings fail. The engine locks up while driving. It will gradually loose power until it stops running.

Whenever you see any of these failures, they are a sign the exhaust temperatures are to hot and the engine is full of sludge. Once the engine is cleaned up, installing a Catch Tank will prevent the Swirl Flaps and the rest of the engine from getting like this again.

The Cleaning Equipment cost about \$1000. That may sound expensive, but it's a bargain compared to the repair cost. It is inevitable the engine will sooner or later sludge-up. Only a new engine with the proper Break-in oil, Catch Tank and the proper diesel oil can avoid this.

There is no question that a better oil will reduce the rate at which sludge is building up inside the engine. Any BlueTec diesel with over 50,000 miles will need to have the sludge physically cleaned out. You can preemptively clean this mess with the new cleaning equipment. Pay a mechanic to remove all of these components and clean them. Or wait until the sludge causes any of the above mentioned problems. The system will actually warn you of a pending disaster. An experienced mechanic will recognize various failures as a warning sign. Abnormal exhaust temperatures are a sure sign that a major failure is close.

Once the internal engine is clean, a Catch Tank and the other updates published by Mercedes will prevent the sludge from returning.



This was sent to me by an owner. This is a Factory rebuilt OM642 BlueTec diesel with 6,000 miles. The original engine locked up at 84,000 miles. All of the maintenance service was done by the same dealer. The dealer replaced the engine but did not clean the Intercooler. The dirty Intercooler is driving up the combustion temperatures so high that the oil is vaporizing and going into the Turbo. This is also the factory Mobil One 5W/30 ESP oil. The owner suspected something was wrong because he got a message the oil level was too high. No one had added oil since the new engine was installed. The dealer also did not update the ECU software or send the ECU to Germany for the factory rebuild program. The ECU dumps too much fuel during regeneration of the DPF. The dealer also failed to update the DPF "Differential Pressure Sensor". This owner drives long trips of over 300 miles per day. No stop and go driving. He also drives in a mild climate. If you don't understand this engine and know what maintenance your dealer should actually be doing, you'll pay dearly for trusting someone else.

Note: Mercedes has stopped the factory ECU rebuild program. They've gone back to letting the dealers download new software into the ECU. However, dealers are reluctant to perform the software updates. All of the model year 2014 and older ECU's will need to be replaced with new parts or try to talk your dealer into a software update.

After 1700 miles on a new engine, this is the crud one owner drained out of his Catch Tank. He has a 2019 Sprinter and this was with the best oil. There is a lot of condensation mixed with the oil vapor. Imagine what the Intercooler, EGR, Swirl Flaps, EGR Cooler and the DPF would look like if the engine had Mobil One ESP? Now imagine what this would look like with 20,000 miles on the oil. This is what causes the sludge that coats the inside of the engine. Instead of this crud building up inside his engine, this owner has drained it off and thrown it away. The Intake and DPF stay clean. This is one of the ways you get around the design problems with this engine.

1/23/20 - I was watching one of the financial news programs this morning and Daimler (Mercedes-Benz) announced guidance for lower profits. The reason was the financial losses expected from the Diesel Fraud cases working their ways through the Courts around the world. Mercedes knows what the design problems are with the OM642 and OM651 diesels. Mercedes is trying to do everything possible to minimize their liability. If you read the diesel owner's forums you'll see people who aggressively defend the Mercedes recommended oil and maintenance. They've posted thousands of times. Their full time job is defending Mercedes and bad mouthing any other opinion. Once you understand how the crankcase ventilation system actually works, the solution is obvious. When you see confusing explanations for ordinary maintenance, it's all designed to limit Mercedes exposure in their legal problems. Mercedes knows if they can drag this out for as long as possible, the repair cost will send these vehicles to the Junk Yard.

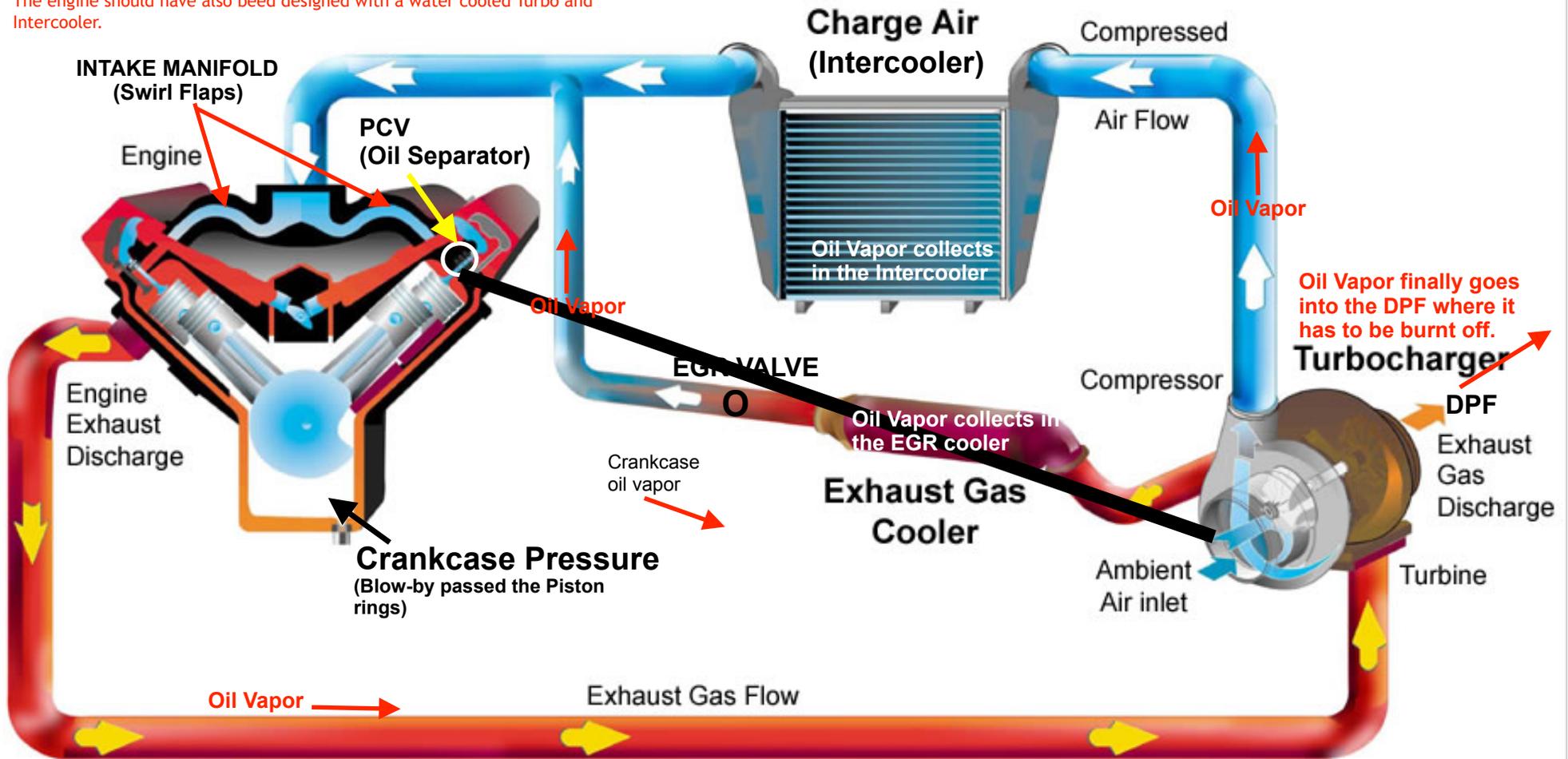
Do a Google search for Mercedes Diesel Fraud in Europe and North America. It is ugly. Europe has criminal charges against Mercedes management for diesel fraud. Every State Attorney General in America has filed diesel fraud charges against Mercedes. Canada has BlueTec recalls that America doesn't. Why, the engines are the same? You're looking at the heart of the problem right here. You can wait for years and see how all the legal cases turn out; or you can fix the problem now.

Mercedes actually started to address the problem in the Summer of 2019. They started a program that sent the diesel engine control modules to Germany for repair. Mercedes charged the customer \$1600. That was actually a bargain. But someone must have noticed that program was admitting the computer software was not right. This would cause problems for Mercedes in the fraud cases. Mercedes stopped the program.



The engine should have been designed with two Oil Separators. One on each cylinder head to balance the crankcase pressure.
The engine should have also been designed with a water cooled Turbo and Intercooler.

As oil vapor collects in the Intercooler and EGR cooler it causes the combustion temperatures to increase. That causes the engine to burn even more oil and damage the NOx sensors.



Crankcase oil vapor cannot be vented into the atmosphere. Crankcase oil vapor must flow from the PCV valve into the Turbocharger, where the engine tries to burn the oil vapor in the combustion process. As the oil vapor goes through the Turbo it goes into the Intercooler. From there the oil vapor flows through the Intake Manifold and EGR valve. Then the oil vapor goes into the EGR cooler and out the DPF. As the oil vapor flows through the system, it deposits oil sludge onto everything it touches. As the sludge builds over time, it restricts the air intake cooling. Combustion temperatures get so hot the Piston Rings become packed with burnt oil and finally can't move. The engine starts burning more oil and the cycle becomes even worse. The engine finally locks-up because the oil is so hot it blocks the flow to the crankshaft. When the DPF is contaminated with so much sludge it's a early warning that the engine is close to failing.

Poor quality oil breaks down at the hot piston rings. This causes the Blow-by to increase.

Installing a Catch Tank diverts the oil vapor going into the Turbo and sends it to the Catch Tank. Only clean air is sent to the Turbo. No more oil vapor can build up inside the EGR and Intake system. The DPF stays clean and the emission system works as it was designed.