

Frequently Asked Questions

Question

What is a Particulate Filter or DPFS and EOLYS Fluid?

Answer

A diesel particulate filter, sometimes called a DPF, is device designed to remove diesel particulate matter or soot from the exhaust gas of a diesel engine.

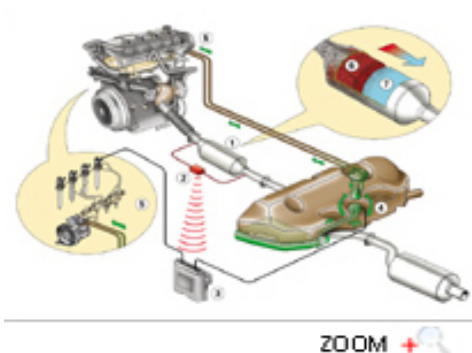
To check if your pre 2013 C4 HDi has the system check your car's Vin here: - [Click Here](#) -

Important Note: 2013+ 2.0 HDi engines fitted to the C4 Picasso range use 'Adblue' and not Eolys additive in the DPF system.

Wall Flow Diesel Particulate Filters usually remove 85% or more of the soot, and can at times (heavily loaded condition) attain soot removal efficiencies of close to 100%. **A diesel-powered vehicle equipped with functioning filter will emit no visible smoke from its exhaust pipe.**

In addition to collecting the particulate, a method must exist to clean the filter. Some filters are single use (disposable), while others are designed to burn off the accumulated particulate, either through the use of a catalyst (passive), or through an active technology, such as a fuel burner which heats the filter to soot combustion temperatures, through engine modifications (the engine is set to run a certain specific way when the filter load reaches a pre-determined level, either to heat the exhaust gases, or to produce high amounts of NO₂, which will oxidise the particulates at relatively low temperatures), or through other methods.

This is known as "filter regeneration." Fuel sulphur interferes with many "regeneration" strategies, so almost all jurisdictions that are interested in the reduction of particulate emissions, are also passing regulations governing fuel sulphur levels.



The Citroën Diesel Engine range includes a Particulate filter which traps and burns the particles produced by the engine. With the direct-injection common rail technology, the level of particle emissions



from the HDi engine was already particularly low. With the PF, it drops still further to a level that is barely measurable. In this way, the engine goes well beyond the future environmental standards of the European Union.

The PF traps the particles on a filter and burns them at regular intervals.

The particles burn naturally at around 550 °C, but the initial temperature of the exhaust gases The PF modifies these two parameters through:

- * a post-injection of fuel in the expansion phase, which generates post-combustion in the cylinder and raises the temperature of the gases by 200 °C to 250 °C, to around 350 °C to 400 °C.
- * additional post-combustion generated by an oxidation catalyser placed upstream of the filter, which treats the unburned hydrocarbons from the post-injection phase. The temperature may increase by a further 100 °C, up to 450 °C or 500 °C.
- * the fuel additive Eolys fuel additive. This additive lowers the natural particle combustion temperature to 450 °C.

FAP is the abbreviation for the French "Filtre à particules", i.e. particle filter, and FAP is registered as a proprietary name for PSA's DPFS.

HDi - High pressure Diesel Injection.

PSA wrote ...

On many PSA models fitted with the HDi (common rail) engine it is necessary to service the particulate filter (FAP) system every 40,000 to 50,000 miles. This will be indicated via the instrument cluster in the form of a Particulate system warning.

The following components make up the FAP system:

- " Control module (normally located in the cabin)
- " Particulate filter (part of the exhaust system)
- " Fluid reservoir (Integrated in the fuel tank)
- " Pump
- " Injector

The FAP system was introduced on PSA vehicles back in the year 2000 when it was developed to reduce diesel particulate levels in engine emissions through filtration.

The system operates by burning off particles caught in the filter which make up part of the exhaust system. To enable this burning off process the exhaust gas temperature must be raised to approximately 500 °C, this is achieved by changing the characteristics of the diesel before combustion by the means of an additive.



The additive is held in a separate fuel reservoir (approx 5 litres) which is connected via a pump to an injector fitted into the diesel fuel system (normally in the fuel tank).

A proportional amount of additive is injected under the control of the FAP ECU when the diesel tank is filled up, for this to be accurate the system needs to have information from the Fuel level sensor to determine what quantity to inject.

Early cars used 'Eolys' as the additive in a rigid container and later cars use different fluids as the additive in flexible pouches.

Additional Information:

Please Note: the additives used vary depending on the cars RPO number and can NOT always be mixed.

More information: - [Click Here](#) -

The additive DPX42 must be used for vehicles with a rigid reservoir for the additive filter up to RPO 9491

Caution: from RPO number 9492 the additive used corresponds to the 'clickfit' union on the additive reservoir.

- » Green Clickfit: Eolys 176 (until stocks are exhausted)
- » Green Clickfit: Infineum F7995
- » Blue Clickfit: Rhodia Powerflex
- » White Clickfit: Rhodia DPX42

Later additives are in a 'flexible pouch' and it is simpler to change the pouch, as they aren't designed to be re filled.

To lower the regeneration limit for the DPFS, originally Eolys, a cerine based composite, is added to the fuel which lowers the particle combustion temperature from 550 °C to 450 °C .

Cerine is used in an organic solution stored in an additional tank, located near to the fuel tank

In order to inject an amount of additive proportional to the amount of fuel injected, an additive system has been developed .

The system is made up of the following components :

A suction device

An additive injection system in the fuel tank

A specific ECU controlling the additive function

The top up cycle for EOLYS is around 75,000 miles and DPFS Filter at 112,500 miles for a 1.6 HDi and 80,000 miles for EOLYS and 120,000 miles for the filter according to the Citroen Service Schedule

Phil wrote ...

This is confusing & but here goes!

The 2,0HDi is on 20,000 intervals, so the official replacement interval is 80,000 up to RP number 10380. (75,000 on the 1.6HDi)

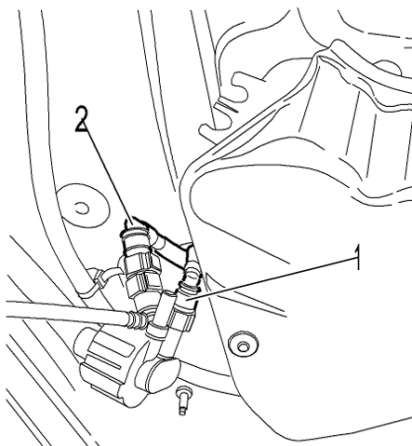
There's a bit of overlap between RP 10381 and 10388 when they were switching to 120,000 (112,500 on 1.6HDi) intervals and anything from 10389 is definitely 120,000 (112,500 on 1.6HDi) intervals for replacement of the filter, with just the fluid being topped up at 80,000. (75,000 for 1.6HDi)

Exchange filters are available, but they carry a huge surcharge (APPROX £500+VAT) so it may be best to have your old one off ready to give to the dealer when you pick the new one up... either that or find a friendly dealer that will trust you to bring the old unit back!

Now picking a filter at random to give you an idea of price (there are a fair few options depending on chassis number and engine size etc.) but an exchange FAP filter will be anything from around £200 inc VAT - a brand new one costing in the region of £600.

(It's the same for the **C4 Picasso and Grand Picasso**)

But care needs to be taken to ensure your buying the right model! - [Click Here](#) -





Please Note: If you refill the EOLYS fluid yourself, you will need to have the counter reset using Lexia or Proxia which may involve a payment to a Citroen Dealer.

Engine filter warning for city drivers.

6 February 2007

A WARNING has been sounded over potential problems with new-generation diesel engines.

Leasing company Lex says drivers in urban areas are at risk of the engines Exhaust Particulate Filters (EPF) clogging up. Some of the firm's drivers are having to visit a dealership every six weeks to have their filters unblocked. The problem occurs predominantly in traffic at low speed, it adds.

Lex says fleets can alleviate the potential problem by following manufacturer operating recommendations.

According to manufacturer guidelines, an EPF-equipped diesel engine is likely to clog up unless it is operated at 50mph for at least 20 minutes, or covers 50 miles at motorway speeds at least once every couple of weeks.

These driving conditions effectively burn off the soot particles that the EPF has been equipped to prevent from escaping into the atmosphere.

Drivers should look out for a warning light that notifies them that the EPF is blocked and that the car needs a run out at 50mph for a prolonged period.

Lex maintenance manager Jamie Wiseman said: If a driver knows their car is going to spend most of its time in urban areas at low speed, then it's worth avoiding a car with an EPF.

Tarza wrote ...

As the winter here in Finland went on and temperatures were staying continuously under -10 degrees. Mostly -15 Celsius. my little French car started notifying me with the engine light and a message of faulty exhaust or something.

Well as said I got expert instructions from inside my family and I was told to run the car with relatively high speed with a low gear to begin the burn process. Apparently Finnish weather has done this to many cars. It worked for a while until it came up again. Did the same run but the light did not go away. I just let it be and was told that just wait for a while as the weather starts to warm.

It did warm up and the light went out. Has not appeared in a long time now. ... The plot thickens... I went to my local dealer to reset the computer just to get rid of all possible fault codes in the system.

It turned out that the reason why the light had come up in the first place was because of a faulty fuel cap



magnet surrounding the cork. Apparently there is a sensor detecting when you refuel and the system adds the Eolys additive to the fuel accordingly.

As the sensor is connected to the whole system it gave the same fault code as it would do in a case of normal FAP filter fault.

So there we are.

Problem solved.

BigJohnD wrote ...

I found this article from HonestJohn of "The Times" really informative.

The latest bain of a diesel driver's life is the Diesel Particulate Filter. The purpose is to absorb particulate emissions created during the start-up phase of an engine from cold. These absorbed particulates are then superheated and burned off during the regeneration cycle of the DPF.

There are two DPF cycles: passive and active.

On passive cycle the DPF will require the car to regularly be driven significant distances at 2,000rpm plus for the DPF to get hot enough to regenerate and burn off the particulates in it.

Some DPFs have an 'active' cycle where additional fuel is injected into the combustion chambers to create hotter than normal exhaust gases to burn off particulates in the DPF. However, this does not always work, particularly if the car has done a high proportion of short runs from cold starts and instead of burning off the particulate the extra fuel can instead find its way into the engine sump, contaminating the lube oil and sometimes leading to such a rise in sump oil level that the engine can start to run uncontrollably on its sump oil and will self-destruct.

The alternative 'active' cycle is an additional injector that injects either diesel fuel or an additive directly into a burner in the particulate filter.

Peugeot/Citroen/Ford diesel engines don't need to get quite as hot as diesels in other makes because they use an additive to help regenerate the DPF. This used to be added to a tank under the back seat, but is now contained in a bladder that needs to be replace around every 100,000 miles.

From a Vauxhall Owner's Forum, but generally very helpful advice that applies to most first generation self-regenerating diesel particulate filters ('closed loop' DPFs are more sophisticated):-

Question:

The glow plug symbol is flashing. Why? What should be done?

Answer:

The DPF regeneration has not been completed during normal driving and now DPF has reached its maximum saturation at which it can still be regenerated. The limit value depends on variant and Model Year, but is in the range of 105% - 125%.

Possible causes for this are:

- a.) Frequent short distance journeys, i.e. high soot loading while at the same time regeneration of the DPF does not take place because the conditions necessary were not fulfilled.
- b.) Frequent interrupted regenerations, i.e. the engine was switched off during regeneration. Applies to short journey drivers who have at least fulfilled the conditions for triggering regeneration. If the glow plug light flashes, the vehicle
 - a.) Engine running since start for longer than 2 minutes.
 - b.) Calculated saturation higher than 80%.
 - c.) Coolant temperature over 70 °C for at least 2 minutes.
 - d.) No DPF-relevant faults stored in system.
 - e.) A defined vehicle speed threshold must have been exceeded (e.g. for >80% loading, 100 km/h)

Question:

Under what conditions is regeneration interrupted/ended once it has started?

Answer:

Normally when regeneration has been successfully completed, or:

- a.) After a maximum regeneration time (20 - 25 min.).
- b.) If the engine is switched off or has stalled.
- c.) If the engine is left idling for a long time (5 - 10 min.).
- d.) If 1000 °C is detected by the exhaust temperature sensor.
- e.) If during regeneration, a fault is detected on the components relevant for combustion (injection/intake system). If a regeneration is interrupted once started but before it has been 50% completed, the glow plug lamp flashes on the next engine start (cold or hot) and regeneration begins again once the operating conditions (see 3) have been fulfilled.

Question:

How long does complete regeneration take? a.) In the most favourable case? b.) In the least favourable case?

Answer:

a.) Under constant conditions, i.e. the exhaust temperature necessary for regeneration always lies above the required value, for example during motorway/cross-country driving, the average regeneration time is 10 minutes.

b.) Vehicle conditions such as long down-hill descents, frequent driving in the low-load range (city driving, idling) allow the exhaust temperature to fall. If the conditions for triggering regeneration were fulfilled, the active regeneration time can be extended up to 25 minutes (depending on engine type). If complete regeneration is not possible within this period, the regeneration will be interrupted.

Question:

How does regeneration affect the oil life?

Answer:

On each regeneration or attempted regeneration, a certain diesel fuel amount is injected into the engine oil which reduces the oil life. If the "INSP" light in the instrument cluster comes on, the engine oil is exhausted and must be changed. Failure to do so could damage the engine.

MORE INFORMATION

Catalysed Diesel Particulate Filters

Traditional Diesel Particulate Filter systems consist of a filter material positioned in the exhaust designed to collect solid and liquid particulate matter emissions while allowing the exhaust gases to pass through the ceramic walls. Catalysed Diesel Particulate Filters (CDPF) are designed not only to achieve collection efficiencies of 90% or greater in terms of mass (over 95% when expressed as number of ultra fine particles), but also to burn off the collected particulate matter into carbon dioxide and water.

The incorporation of catalytic coating in CDPFs lowers the temperature at which particulate matter burns. To achieve this auto-ignite and the sustain combustion of collected particulate matter CDPFs must attain a minimum temperature of approximately 250C that can be helped by electrical heating if the engine-out exhaust temperature of a heavy-duty engine does not typically achieve this required temperature level.

Ceramic Diesel Particulate Filters

These types of particulate filters must be regenerated. Regeneration of a DPF is to remove accumulated soot/carbon. Two general approaches are continuous and intermittent regeneration. In continuous regeneration, a catalyst is provided upstream of the DPF to convert NO to NO₂.

NO₂ can oxidise carbon at typical diesel exhaust temperatures and thereby effectuate continuous regeneration. A disadvantage of this approach is that it requires a large amount of expensive catalyst. This technique is not commonly used on cars but is found on public transport vehicles / council vehicles.

Intermittent regeneration involves heating the DPF to a temperature at which carbon combustion is self-sustaining in a lean environment. Typically this is a temperature from about 400 to about 700 degrees C., depending in part on what type of catalyst coating has been applied to the DPF to lower the soot ignition temperature.

A typical way to achieve carbon combustion temperatures is to inject fuel into the exhaust upstream from the DPF, whereby the fuel combusts generating heat in the DPF or an upstream device. In most modern cars the catalyst is injected into the fuel tank and is effectuated through the fuel injection system.

Here is an extract from the press conference launching the Ford's cDPF system on the new Fiesta.

"Coated Diesel Particulate Filter (cDPF): Ford's optional cDPF system traps carbon deposits as they exit from the combustion system, preventing their release into the atmosphere. Under favourable conditions the system then cleans itself with a controlled 'burn-off' process, thus providing a self-contained clean air system without the need for service maintenance.

This system contains a ceramic filter body of around 4 litres volume mounted behind the exhaust manifold plus a special regeneration support unit on the engine's intake manifold. Together these components enable the filter system to regenerate in any possible drive condition automatically without requesting any input from the driver and without compromising drive ability noticeably during regeneration.

The advantages of the system are:

- * Additive systems have an additional additive tank that primes the fuel tank with the additive (a metallic catalyst) at every refuelling. On the Ford cDPF the additive is embedded in the filter wash coat, hence no additional complex priming system is required and no refilling of the tank.

- * Long life a normal additive DPF tank needs refilling after approx 60k km, whereas the new Ford cDPF has been developed to last at least 200.000km."

VAG DIESEL PARTICULATE FILTERS

Courtesy of David Bodily Volkswagen Technical Support Specialist

Diesel Particulate Filter (DPF)

Detailed below is important information outlining the function and features of the Diesel Particulate filter which all members of your team need to be aware of.

Diesel particulate filters are becoming more commonplace on diesel engines, particularly sizes 2.0L upwards. This is in order to reduce the exhaust emissions as required by European legislation.

The prime reason for a DPF is to reduce particulate matter entering the atmosphere. Particulate matter is found in the form of soot, which is produced during diesel combustion. The DPF traps most of the soot

which would normally travel down the exhaust and into the atmosphere.

The DPF can hold a certain amount of soot, but not a huge quantity and therefore it needs to go through a process called **regeneration** in order to clear the soot loading. When the soot goes through a **regeneration** process it will be converted to a much smaller amount of ash. The ash is non-removable. There are two types of **regeneration**, passive and active.

During long motorway journeys, passive regeneration will occur. This needs no intervention from the engine control unit. Due to the raised exhaust temperatures on a long journey (temperatures between 350 and 500 °C), the procedure occurs slowly and continuously across the catalytic-coated (with platinum) DPF. The catalytic-coated DPF is situated close to the Engine, therefore the exhaust gas temperature is high enough (500 °C) to ignite the soot particles. Due to this soot is burned-off and is converted into a smaller amount of ash.

Active **regeneration** is when the ECU intervenes when the soot loading in the DPF is calculated to be 45%. The procedure lasts for about 5 – 10 minutes. Specific measures are taken by the ECU to raise the engine exhaust temperature to above 600 °C, these include switching off the exhaust gas recirculation and increasing the fuel injection period to include a small injection after the main injection. The soot particles are oxidised at this temperature.

The ECU will trigger a regeneration process, if for some reason this is aborted, i.e. customer slows down, stops etc, the process will be resumed when regeneration conditions are once again met, above 60km/h (38mph). This will continue for 15 minutes.

If after 2 attempts of 15 minutes, a successful regeneration has not been possible, the loading will increase. At 50% soot loading, the ECU will continue to maintain maximum exhaust temperatures of 600 °C to 650 °C to cause a regeneration process. The system will try to run a regeneration process for 15 minutes. If unsuccessful, the system will repeat this process for a further 15 minutes, if still unsuccessful, the DPF light on the driver display panel will then be lit.

The owners handbook states, the DPF symbol lights up to indicate that the diesel particulate filter has become obstructed with soot due to frequent short trips. When the warning lamp comes on, the driver should drive at a constant speed of at least 60 km/h for about 10 minutes. As a result of the increase in temperature the soot in the filter will be burned off. If the DPF symbol does not go out, the driver should contact an authorised Volkswagen repairer and have the fault rectified.

At 55% soot loading the DPF light is lit on driver display panel. At this point the customer should follow the advice in the handbook. If they ignore this information and continue driving the vehicle until the soot loading reaches 75% without successful regeneration, additional warning lamps will light up. At this point the customer will also be complaining of lack of power, etc.

At 75%, regeneration is still possible with the use of the VAS tester. Only when the loading is above 95%, is it necessary to replace the DPF unit.



Operating Status System Response

45% DPF Load Level 1

- Normal Regeneration

50% DPF Load Level 2

- Regeneration at maximum exhaust temperatures

55% DPF Load DPF lamp

Regeneration from 60 km/h onwards

("See operating manual")

75% DPF Load DPF, SYS and MI lamp

Torque limitation, EGR deactivation,

Regeneration via VAG tester only

95% DPF Load Replace the DPF Unit

The Warranty department has confirmed that if there is no fault on the vehicle and DPF regeneration has been unsuccessful due to the customers driving style and the customers failure to comply with the instructions in the handbook, DPF replacement will not be paid for by warranty.

Common causes for complaint:

" Frequent short journeys Regeneration conditions are not met. Not recommended for sale in the Channel Islands and inner city driving.

" Customers who continue to drive the vehicle with DPF light on Continued driving with the DPF light on and without successful regeneration results in excessive soot loading of the DPF, to a point where it is above 95% loaded. At this point regeneration is not an option and replacement of the DPF is necessary.

" Fault 18434 particle filter bank 1 malfunction Common fault code. This does not only relate to the DPF itself, but the entire exhaust gas handling system. This can be caused by defective temperature sensors, pressure sensors, additive system components (if applicable), poor connections, wiring issues, etc.

Important Information

" Before diagnosing a problem vehicle or attempting to perform an emergency regeneration, it is important to obtain a full diagnostic log and read out relevant measured value blocks. These MVB s contain important information on the condition of the DPF system and are essential in diagnosing the fault. When the DPF light is illuminated, it does not necessarily mean that the DPF requires regeneration. For further advice, please contact Technical Support with the information from the diagnostic log and MVB data.

" If a problem vehicle arrives with the DPF light, the engine management light and the emissions light on. If during your diagnosis and reading of relevant MVB s, you find that the soot loading exceeds 75% (but is still below 95%), an emergency regeneration procedure must be performed with the VAS tester.



Further to this, the customer needs to be educated. They need to understand why the lights have appeared on the dash panel. Their attention needs to be brought to the owners handbook instructions, so that they are aware of what the DPF light means and what to do when it appears. This should prevent unnecessary repeat visits for regeneration purposes.

David Bodily

Volkswagen Technical Support Specialist

Given all the above, have a look here at PSA great description of DPFS

Details

Info 06 May 2009 by Web Admin Only