

As most owners of a diesel MiTo will know, our newsletter rarely features any technical information or advice relevant to the owners of a 1.3 or 1.6 JTDM MiTo. This is in the most part due to your MiTo Registrar owning two petrol MiTos, so experimenting and fixing a diesel MiTo is a little tricky.

But I aim to change that in the coming months and want to include diesel features too, and a good place to start (albeit diving in at the deep end) is the diesel particulate filter, or DPF.

Just like the MultiAir issues on petrol MiTos, there is a lot of talk and assumption about failing diesel particulate filters and exhaust gas recirculation (EGR) valves on the diesel MiTos. Failures do happen, but largely as a direct result of not recognising how these elements work on a diesel car, and how to maintain them to prevent failure and ensure maximum life.

Let's start with the basics of what the DPF and the EGR valve do.

The DPF is a filter, or "soot trap", that captures and stores exhaust soot (which includes unburned hydrocarbons and oil) rather than allowing them to be expelled into the atmosphere through the exhaust. Filtration occurs within a canister with several internal channels. Gases are forced through the porous ceramic walls of the channels which trap the soot. If you imagine driving fast along a dual-carriageway, the gases flow freely through the channels and the soot is trapped. Because soot is combustible, the high temperatures generated at speed will naturally burn away the collected soot. This is called "passive regeneration": the DPF regenerates and is able to continue trapping the soot.

But the DPF has pressure sensors at the entrance and exit ports, so it knows if there is a build-up of soot that did not get burned off through passive

regeneration. This is particularly common if the MiTo is only used for short trips or city driving. When the DPF reaches a load of around 45%, "active regeneration" is required to burn off the trapped soot. In essence, the MiTo superheats the DPF by firing extra pulses of diesel during the exhaust stroke which pass through to the DPF. But for this to generate enough heat to burn off the excess soot, the car needs to be driven at speed to reach high enough operating temperatures, something that a lot of MiTos can't achieve living in a city or just doing short commutes.

Diesel MiTos which cannot actively regenerate the DPF suffer from many problems, including loss of power, poor fuel economy, poor throttle response, failure to start and even entering limp mode.

So what is the exhaust gas recirculation (EGR) valve, and what role does that play? The EGR valve has been used in diesel cars for the last few decades and

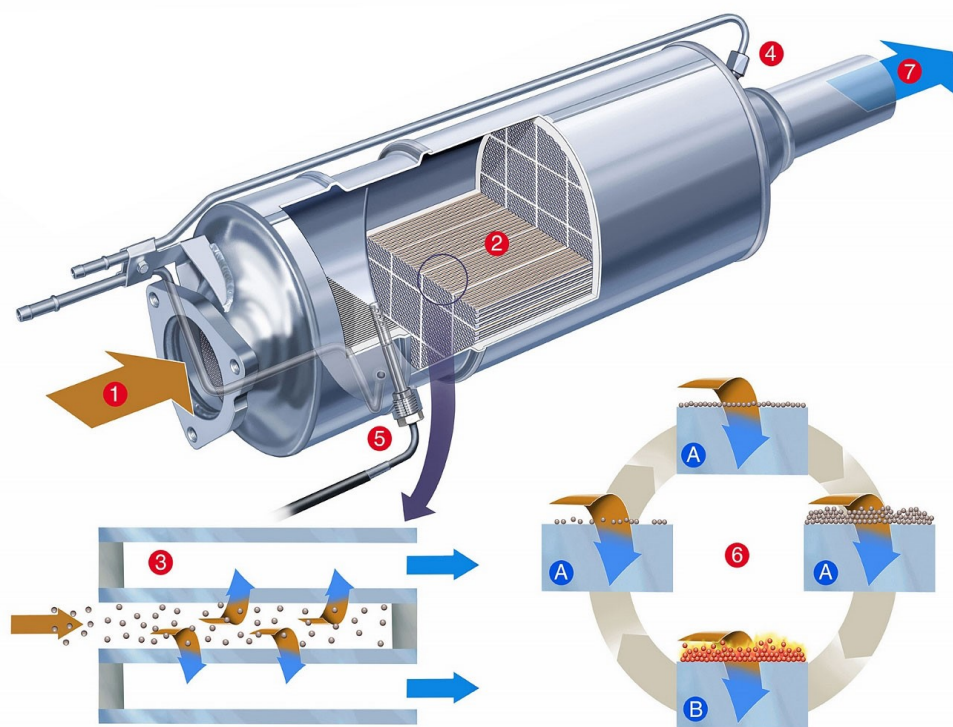


it exists to reduce the Nitrogen Oxide by passing some of the exhaust gases *back* into the engine from the exhaust manifold. Nitrogen Oxide gets produced as a consequence of burning the fuel/air mixture at a very high temperature. By re-routing some of the exhaust back into the combustion chamber of the engine, the result is a reduced temperature which in turns generates less Nitrogen Oxide.

Like the DPF, the EGR valve can become clogged or blocked with

carbon deposits, which results in poor running of the MiTo and, of course, pollution of the environment. A blocked EGR valve can result in poor miles per gallon, very rough idling, lack of power and excessive black exhaust smoke when accelerating.

So it is clear that two very important elements of the MiTo which contribute to our environment and your engine efficiency can also cause untold issues leading to catastrophic failure if they are not maintained.



1. Pre-treated exhaust emissions
2. Cross-section of filter-element
3. Function of filter-element

4. Pressure sensors
5. Temperature sensor

6. Filtration-cycle
 - A. Filtering phase
 - B. Regeneration phase
7. Filtered exhaust emissions

MiTo Diesel DPF/EGR Maintenance

Prevention

The MiTo diesel, like most modern diesel cars, does not sufficiently regenerate passively on short commutes or city driving. It needs high operating temperatures to effectively regenerate, normally achieved over longer, faster drives. Taking a blast up the motorway once every few months is simply not enough. If you have a diesel MiTo and only ever use it for short drives or only in the city, you should consider how you can pro-actively and regularly stimulate active regeneration, or potentially consider whether you have the right car given your circumstances.

Depending on the age and mileage of your MiTo, there are varying levels of maintenance you can do yourself to prevent issues. But to be clear, removing or tampering with either the DPF or EGR valve are not to be considered. It is illegal to modify a vehicle in a way that it can no longer meet the emissions standards set when it was new and you can be prosecuted for driving a MiTo on the public

highway with any parts of its anti-pollution systems disabled or removed, including the DPF, the EGR valve and the catalytic converter. Removal or tampering with the DPF will result in an MOT failure and vehicles registered from 1st January 2014 now have reduced emissions limits to pass the MOT, and the MOT regulations are set to become harder, not softer. So whilst there are options to remove the DPF as well as remove/blank the EGR valve, you should not consider these. In any event, none of us should want to poison the environment by increasing the harmful pollutants that our cars produce.

So whilst the first step with any diesel MiTo is to establish how and when you can trigger active regeneration, for lower mileage or newer diesel MiTos, a good place to start would be to consider the regular use of additives to assist in the prevention of carbon build-up. Additives typically contain solvents that can help to break down deposits and reduce the combustion temperature of soot so that the soot



particles burn faster and at a lower temperature. Products from Wynn's, Cataclean, STP and Redex are all proven to have a significant impact on soot contaminants in the DPF, though all need to be added when you fill up with fuel and all must be combined with longer drives to be fully effective.

There is also a considerable weight of evidence now that premium fuels, containing additives to help burn off harmful particles, can play a significant role

not only in the efficiency of your engine but also its longevity. I am not suggested you stop caring about fuel pump prices, but it is certainly worth twenty minutes of your time researching the latest technology now being used in some premium fuels, such as Shell's Dynaflex technology in their V-Power fuel which not only prevents build-up of carbon but has active ingredients to remove deposits already formed.

Along with targeted DPF cleaning additives, the addition of more general diesel engine cleaning agents (such as Wynn's Diesel Extreme Cleaner) also assist in cleaning the diesel fuel injectors, EGR valve and associated fuelling and combustion of the engine.

These types of fuel additives primarily clean the "wet" part of the engine (though assist with carbon deposits in the catalyst and DPF), but the EGR valve is a component of what could be termed the "dry" part of the engine – where the air and exhaust gases flow.

So for higher mileage MiTos or as part the regular servicing regime, the use of aerosol EGR cleaning spray can be used to reduce the build-up of carbon. Products such as Wynn's Diesel EGR Cleaner, STP Diesel EGR Cleaner, LiquiMoly Proline Intake System Cleaner and JLM Diesel Air Intake and EGR Cleaner are all



MiTo Diesel DPF/EGR Maintenance



aerosol based cleaners that clean the intake system, airflow sensors, inlet valves and the EGR valve but are a little more complex to apply. Unlike the wet engine treatments which are added to the fuel tank, these cleaners need to be sprayed into the air intake or turbo system whilst the engine is ticking over. Each has slightly different instructions, but they typically involve removing the flexible host between the turbo and the air intake manifold and spraying the cleaner in short intervals into the air system or turbo. It can be a little unnerving as each spray makes the revs drop and it may cause temporary diesel "knocking" due to the additional fluid in the air/fuel ratio, but these cleaners have a proven history of being good at removing deposits on the EGR valve.

Fixing Problems

Of course, for completely untreated high mileage diesel MiTos (or even average mileage cars which have only been used for short journeys or city driving) it may be necessary to take more drastic action to clean or even renew the DPF and/or the EGR valve.

Both the EGR valve and the DPF can be replaced of course, but prices are expensive. Anything up to around £250 for the EGR valve and two or three times that for the DPF, plus of course any labour charges for swapping them (though after-market versions are available at

considerably less cost).

Companies including TerraClean and UK Carbon Cleaning offer an on-site/mobile diesel engine cleaning service for approximately £150 which can remove the build-up of carbon and soot deposits. TerraClean do this by using their own patented technology and unique fuel which is passed through both pre and post-combustion including the EGR system and the DPF. UK Carbon Cleaning do a similar process but pump and pulse hydrogen through the air intake system, burning away the carbon deposits. Both services are aimed at being a "spring clean" and part of your annual maintenance procedure, so they are good if your MiTo is showing no symptoms of EGR or DPF blockage. These services typically take around 45 minutes.

However, both TerraClean and UK Carbon Cleaning (and other national and local alternatives) can also provide one-off targeted cleaning of the EGR and the DPF specifically, aimed at diesels that are showing signs of issues such as loss of power, poor fuel economy, poor throttle response or even failure to consistently start. They are different processes and typically take around 90 minutes, but they do achieve excellent results and if caught in time can return both the EGR and DPF to as close to optimal performance possible.

In extreme cases, where active regeneration has not occurred for many months or a lot of miles, it may be necessary to



directly clean the EGR and DPF. Companies such as Tunap now have agents all around the UK (typically within an established vehicle repair premises rather than a mobile service, as the work requires access to the DPF with the car up on a ramp) who can use their own TÜV approved technology directly applied to parts like the EGR and DPF. These services typically cost in the region of £300-400 but still represent a saving against replacement or, worse still, catastrophic engine failure caused by carbon build-up in your MiTo.

Typically, if a DPF is over 80% full then it is recommended that it be replaced. But an alternative might be the DPF Centre who use their FH2 Cleaning Machine to restore any DPF back to 98% original. Their machine pumps high pressure water mixed with hydro carbon fluid at a rate of 160 litres per minute from a dedicated pump, assisted with blasts of air at 4bar to dislodge virtually all traces of soot and ash. However, the machine is very large so you need to send your DPF to them for this service. But they do offer a free collection and delivery service and the full cost is in the region of £240, so even with the labour charges to remove the DPF

this could still make economic sense to save your DPF rather than replace.

Summary

As with all things, prevention is better than cure. Both the 1.3 and 1.6 diesel MiTo needs preventative maintenance which must include regular passive and active regeneration. And that needs some long and spirited driving. If you use your MiTo for long journeys and regular commutes on A-roads, dual-carriageways and motorways you likely have nothing to worry about.

But if you live in a city, rarely travel far in your MiTo or do lots of short journeys, you may want to consider a maintenance plan to care for your MiTo which includes some nice spirited driving out of town. Combined with some well-chosen cleaning additives, premium diesel fuel and a servicing and maintenance schedule that includes carbon cleaning your MiTo, you should be able to have worry-free motoring in your MiTo diesel.

www.terraclean.co.uk
www.carbon-cleaning.co.uk
www.tunap.co.uk
www.dpfcentre.com

