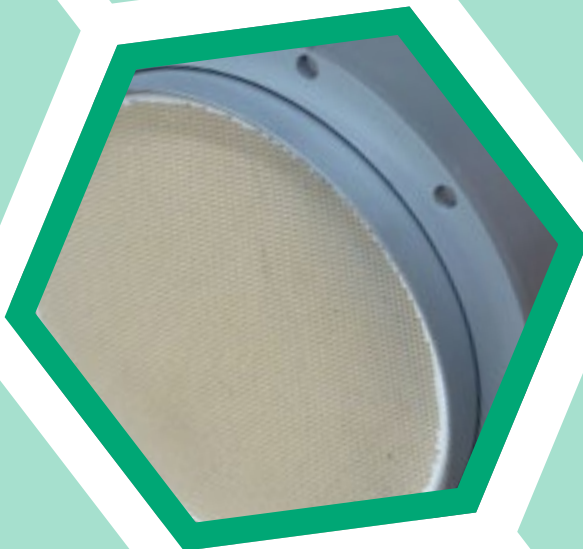




DPF TRAINING GUIDE: DO THE RIGHT THING

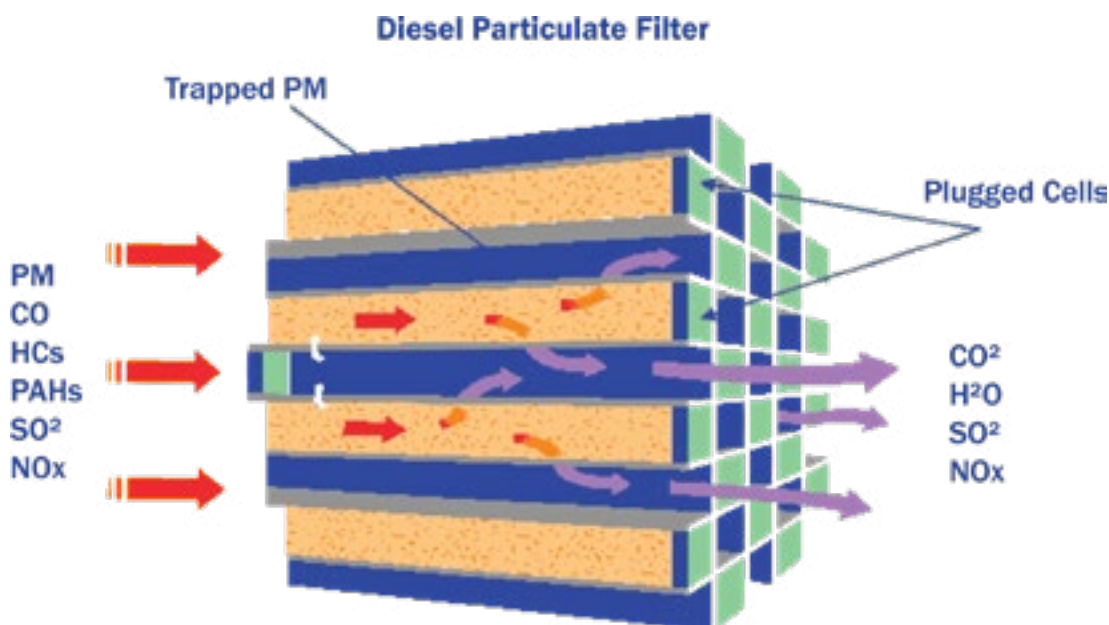


When it comes to DPF's, do the right thing.

The mystery surrounding Diesel Particulate Filters (DPF's) is understandable, whether you're an exhaust specialist, mechanical workshop or a dealer, uttering the words Diesel Particulate Filter can send exhaust technicians into a cold sweat.

So why the fear? After all a DPF is a serviceable item; a filter like any other. Or is it?

The fact is a DPF is a filter, but it's a filter with a few differences. Let's call it a "smart filter". The basic workings of a DPF are straight forward although different to a catalytic converter, the catalytic converter and the DPF work together to reduce emissions. A catalytic converter is a flow through device where exhaust gases pass over a substrate coated with precious metals to cause a chemical reaction which in turn changes the makeup of the exhaust gas released into the atmosphere, whereas a DPF is not a flow through device. Its substrate is blocked at the ends forcing exhaust gases through the substrate walls where soot particles are deposited producing a cleaner exit gas.



This is an internal diagram of a DPF. It clearly shows that its main function is to clean the exhaust gases by forcing them to pass through the walls of the filter. It is not a flow-through device. The soot build up is then burnt off at high temperatures during the 'Regeneration' process.

Once the soot level reaches a certain percentage blocked (measured by pressure sensors before and after the DPF), a value determined by the manufacturer, the DPF needs to be cleaned. This is a process that usually happens automatically and is controlled by the engine management system. The process is known as "regeneration" and will usually happen in one of two ways. "Passive Regeneration", which happens whenever the vehicle is at operating temperature, but with no other special engine conditions. And "Active Regeneration" which occurs when the vehicle is at operating temperature, running at a predetermined RPM and within a certain time frame, normally upwards of 15min. Once these requirements have been met the engine control module changes injection timing and pulse forcing unburnt fuel into the exhaust system which upon contact with the catalytic converter "fires" leading to a rise in temperature in the Diesel Particulate Filter causing the stored particulate matter to be burnt off. This is a very precise and controlled system, however if the vehicle is only used over short distances or there are other mechanical issues with the vehicle, this regeneration process is not possible. If this continues to occur the Diesel Particulate Filter may reach a saturation of above 80%. Anything above this percentage will require the unit to be replaced as neither active nor passive regeneration can be performed.

Australians are a resourceful bunch. We've built our reputation on work-arounds and clever fixes. So why would a DPF be any different? Why not clean a blocked filter with high pressure water or air? Why not superheat it with an oxy acetylene gun or furnace? Why not use a DPF delete pipe or better still why not just "cut the damn thing out" all together?

The fact is that the early DPF aftermarket has already seen many examples of well meaning mechanics and exhaust specialists taking the easy way out or just doing what the customer has asked them to do in order to make an easy sale. Cleaning a DPF with water can result in any residual water turning to steam and cracking the substrate or outer DPF housing. Flushing soot particles further down the DPF with water may block the pores downstream and cause the DPF to fail again shortly afterwards. This method may also cause contaminated water to flow into our waterways leading to environmental damage.



This image shows a DPF with holes punched into the substrate. The owner of the vehicle wanted to make it a flow-through device, as it was blocked. You can see by the colour of the filter, the engine is not running correctly.

Some manufacturers have the DPF substrate not only acting as a Filter but also as a catalyst which is coated with non-corroding precious metals rhodium, platinum and palladium. In these units high pressure air blasting may move or dislodge some of the precious metals resulting in reduced efficiency. This is due to the uncontrolled pressure and flow of the air being passed across the substrate.

Heating a DPF with an oxy acetylene or furnace system is unlikely to heat the unit evenly leading to hot spots or partial meltdown of the substrate, or possible damage or warping to the body of the unit or further blocking of the pores due to no back pressure to remove the burnt off soot particles.

Cutting the DPF out altogether or using a delete pipe carries the greatest risks. Putting to one side the fact that you might be bypassing the legitimate opportunity to supply a replacement DPF or maybe charge appropriately for a correct vehicle issue diagnosis (which may not actually be related to the DPF itself). You might be running the gauntlet with the Department of Transport and inviting your customer to come back to you for answers about EPA fines. You may also void the customer's insurance policy in the event of an accident and a police report which says the vehicle has been tampered with and is therefore deemed un-roadworthy. In vehicles with time or kilometre based

regenerations they will try to regenerate even though there is no DPF present causing large white clouds of unburnt or partially burnt diesel being released from the exhaust system. And in many vehicles the lack of a DPF can cause the vehicle to go into limp mode as well as causing engine light illumination. In fact in some late model cars removal of the DPF may invoke complete shut down of the ECU meaning a trip back to the dealer for reprogramming or in severe cases complete replacement of the ECU. **The message is clear. When it comes to DPF's do the right thing the first time.**



It is against the law to remove or modify the Diesel Particulate Filter on any vehicle in Australia. If you are thinking about doing this on any diesel vehicle fitted with a DPF, think again.

An estimated 15 % of diesel vehicles on Australian roads currently contain DPF's and on current projections that figure could rise to around 40% by 2020. The figures are somewhat subjective and depend greatly on dealer range decisions and other market factors but either way the significance of this to the aftermarket is enormous. Currently most replacement DPF's are done through the dealer network under warranty but some dealers are now looking to write DPF's out of their warranty conditions as a serviceable item. Added to this is that aftermarket DPF's can be as little as a third of the price of OE units which means that the market is now starting to see aftermarket DPF's as a viable option.

Nissan, Mazda, Ford, Volkswagen, Hyundai, BMW, Citroen, Fiat, Audi, Alpha Romeo, Volvo, Saab, Skoda, Peugeot, Kia, Opel, Renault and Jaguar already all have DPF's fitted to some portion of their passenger or light commercial ranges with many more manufacturers being forced to do the same with tightening emissions laws.

Australia's vehicle emission regulations closely follow European standards with Euro 5 already in place for new vehicles and full introduction to be completed by November 2016. From September this year Europe will be operating under Euro 6 regulations with Australia beginning its move to Euro 6 in July 2017. This means that new vehicles entering the Australian market will be subject to progressively tighter emissions controls and the current available technology to help meet these regulations includes the use of catalytic converters and DPF's. Make no mistake, DPF's are not going away in a hurry.

So why do people experience so many problems when fitting new DPF's? As with the introduction of any new technology the secret lies in training and awareness. Before fitting any new DPF a full vehicle history check should be done, checking for evidence of a reason for the DPF to stop functioning. Most DPF's have a combination of at least four temperature and pressure sensors which need to be checked and replaced if a new DPF is fitted. The engine management unit needs to be reset and a forced regeneration completed to let the vehicle know that a new DPF has been fitted and is operating correctly. Correct engine oil and a new fitment kit should always be used when fitting a new DPF and the use of bio diesel is likely to cause a DPF to reach saturation quicker.

Can you trust an aftermarket DPF to do the job? To some degree this may depend on your supplier and which overseas manufacturer they are using. You need to work with a supplier that has done their homework on the vehicle makes and models available in the Australian market. For example the Nissan Navara D40 has a Thai manufactured and a Spanish manufactured model available in the Australian market. Each model has a different configuration for its DPF heat shield and sensor positions. Without this knowledge you may be supplied with an incorrectly fitting unit. DPF's that form part of a DPF/Catalytic Converter combination unit must also come with a type approval certificate which ensures they comply to appropriate emission standards. Many of the more established European DPF manufacturers also produce for the aftermarket divisions of the OE manufacturers which means they are more likely to produce a high quality reliable unit. Another consideration is does your supplier have stock on the shelf? If they do not this may mean they are just flying the unit in as required and may not be certain of the unit's fitment suitability for the vehicle model specified.

There is some excellent diagnostic equipment becoming available to assist with DPF issue diagnosis. A five gas analyser will help identify engine timing issues, ignition problems or incorrect fuel mixture all of which can be leading causes of a blocked DPF. A relatively inexpensive DPF diagnostic tool will allow you to identify a DPF fault code or reset the vehicles ECU and run a forced regeneration on an existing or replacement DPF.



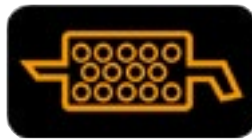
The Zetti Emissions DPF Diagnostic Tool can help check fault codes, diagnose DPF faults and perform 'Forced Regenerations'. When replacing a DPF, it can also help to reset the DPF by communicating with the Engine Management System.

This article is presented to you by **SWD AUST Pty Ltd**. SWD have the largest range of aftermarket DPF's available in Australia covering all the major manufacturers as well as a complete range of diagnostic equipment. SWD are emissions specialists and are happy to share their knowledge and answer any questions you may have regarding DPF's.

SWD can be contacted on 1300 4 ZETTI (93884) or visit the Zetti Emissions information website at www.zettiemissions.com.



WHAT TO DO WHEN YOUR CUSTOMER SHOWS UP WITH ONE OF THESE:



DIAGNOSE THE FAULTS:

What caused the issue your customer is currently having? Diesel particulate filters are a very precise emissions control that can be affected by even the slightest variation. When a customer arrives at your workshop with the DPF or check engine light on, here are the basic steps that should be followed.

1. DIAGNOSE THE FAULTS:

a) Vehicle History:

- Where and how has the vehicle been serviced?
- Have there been any similar faults diagnosed previously?
- Has low ash or genuine oil been used?
- What recent repairs have been made? E.g. Head gasket replacement, injectors, ECU reprograms.

b) Look at the stored codes, live data and check the following:

- Has Bio diesel been used?
- Over accumulation code?
- Temperature sensor codes?
- Pressure sensor codes?
 - > Check pressure differential sensor and lines connecting to the DPF for fractures or blockages.
- Air fuel ratio sensor codes?
- EOLYS injection codes?
- Low fuel pressure?
 - > This can be checked by the manufacturer or well equipped diesel shops.
- Diesel injector codes?
 - > Leakage can be a common cause of DPF failure and can be tested by diesel specialists.
- Variable vane turbo charger codes?
 - > Common part for wear and seizure due to high heat and soot.
- Examine live data e.g. temperature sensor readings, pressure differential sensor readings?
- Check EGR, including connection pipes and data transfer lines.

c) Ask some basic questions of the customer:

- Do you get out on the motorway or mainly city driving?
- Has the check engine / DPF light been on long?
- Have you seen the light before?
- What were you doing when the light came on?

d) Look at the stored soot and ash percentages in the ECU:

- These will give a clear indicator of the severity of blockage and determine if the 80% rule applies.

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e) Other contributing factors that may cause or be affected by DPF failure:

- Catalytic converter efficiency: The catalytic converter plays a large part in the way regeneration occurs. It is what creates the heat required to burn off the soot loading stored by the DPF. A physical check to determine that the catalytic converter is in working order and not melted or fractured is strongly recommended.
 - > Note: Catalytic converters can be separate to the DPF, part of the main DPF body and also incorporated into the DPF monolith itself.

2. ATTEMPT A REGENERATION EITHER STATICALLY (FORCED) OR ACTIVELY (WHILE DRIVING AT A SET SPEED AND RPM):

- a) This process should only be attempted if the stored ash and soot levels are below 80%. Completion of this process will indicate that the vehicle has not been driven in such a way as to promote scheduled regeneration (these requirements can often be found in the Owners Handbook). It may also indicate issue's like stored fault codes or programing faults that are present in the ECU.

RECTIFY THE FAULTS (IF REGENERATION FAILS):

- a) Refer your customer to a dealer / mechanical workshop to rectify or repair issues causing DPF fault.
- b) Check for any outstanding campaigns or ECU updates that have become available.

3. REPLACE THE FILTER:

a) The following process **MUST** be observed and adhered to when replacing a Diesel Particular Filter:

- The engine oil and filter must be renewed with OE parts and liquids.
 - Note: To do this the vehicle should be run up to operating temp and then the oil and filter replaced to the correct fill level.
- The new Zetti Emissions Diesel Particular Filter can

now be fitted. **The engine can not be started or run**

for any reason from this point until completion of

the following steps. This new unit needs to be fitted

using either the supplied gaskets kit or parts sourced OE. (Used clamps, gaskets, and hanger can not be used on a new unit.) No silicone sealant or exhaust putty can be used pre or post the catalytic converter or diesel particular filter.

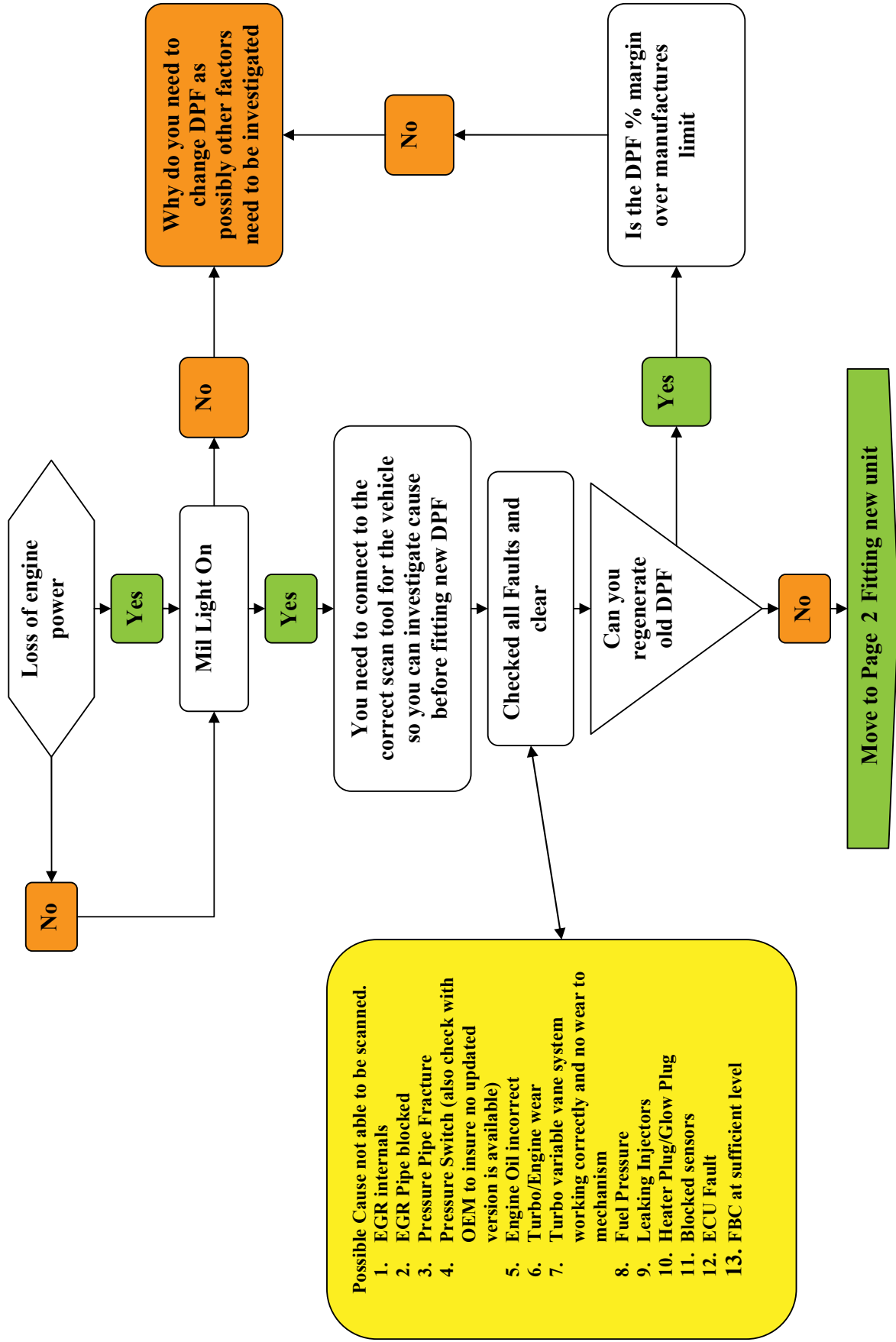
- Reset the ash and soot levels stored in the ECU. All ECU updates and faults need to have been rectified before this process can be carried out. If you are unable to do this with current workshop equipment the vehicle must be towed to a dealer to have this process completed. **The engine cannot be started until this has been completed.**
- The engine can now be started, bring the car up to operating temperature and perform a regeneration immediately either static (forced) or actively (while driving at a set speed and rpm). If this process is not fully completed, i.e. it gets halfway through and ends or the DPF light is displayed after attempting this process, **STOP** immediately and recheck faults as there is still an issue with the vehicle.
- If the regeneration completes 100% then the vehicle should be test driven by the workshop for 50-100km before returning to the customer to ensure no further issues are found.

WARNING! THIS IS ONLY A GUIDE AS TO THE CORRECT WAY TO IDENTIFY AND RECTIFY ISSUES FOUND WITH THE DIESEL PARTICULAR FILTER. EACH MANUFACTURER & VEHICLE MAY DEVIATE FROM THIS PROCESS.

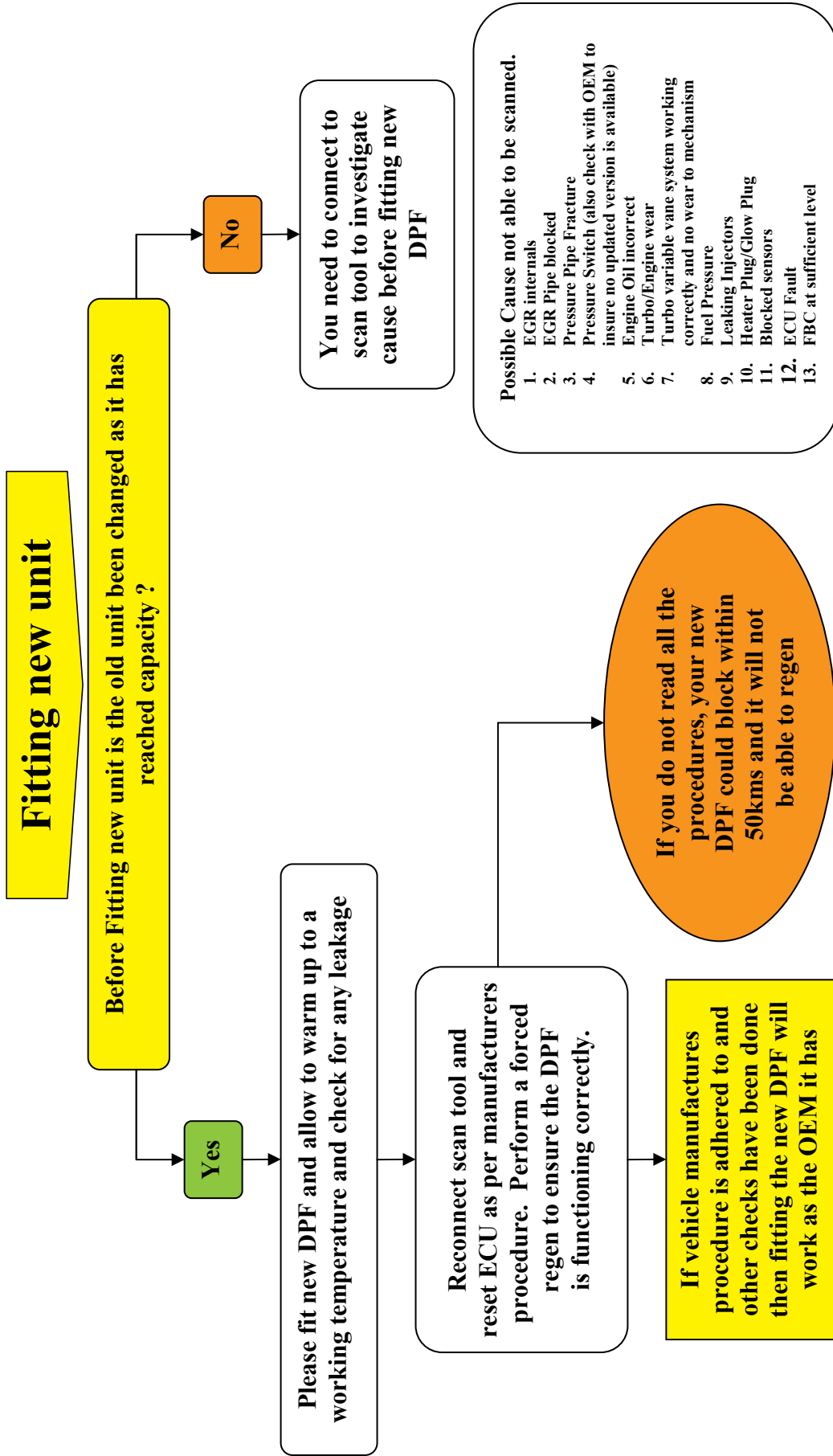
FAILURE TO FOLLOW THE ABOVE DIRECTIONS WILL RESULT IN THE ZETTI EMISSIONS DIESEL PARTICULAR FILTER WARRANTY BECOMING VOID.

8 OF 24 FOR FURTHER TECHNICAL HELP PLEASE CONSULT THE ORIGINAL PLACE OF PURCHASE.

DPF Guide to Fitting for the Professional



DPF Guide to Fitting for the Professional



Please note this is only a guide and each vehicle present their own different faults and procedures , you must be competent and have the correct technical back up or you must take to a professional installer for this product.

Failure to follow the directions above will result in the DPF warranty becoming void!

For further technical help, consult the original place of purchase.



BEFORE YOU FIT A NEW DPF...

HAVE YOU CONSIDERED THE FOLLOWING?

- Have you compared a picture of the faulty DPF with a picture of the replacement DPF?
- Check the vehicle history for any existing issues.
- Have a copy of the *DPF Fitment Guide for the Professional*
– available from your local DPF supplier.
- Confirmed the reason for the apparent DPF failure, e.g. engine issues, injector timing, DPF pressure or flow, air leak, EGR, heater or glow plug, turbo engine wear.
- Inspect intercooler & associated plumbing for leaks or wear.
- Replaced the engine oil and filter, use low ash factory oil only.
- Check the used oil for any sign of contamination (thinning due to over fuelling/large clumps of carbon).
- Check the fuel for any signs of contamination e.g. water, bio-fuel or solids. Ensure low sulphur fuel only is being used.
- Ensure NO BIO-FUEL has been used.
- Check catalytic converter efficiency, are there any signs of damage, heat discolouration or pitting of the substrate.
- Check all pressure and temperature sensors on the DPF.
- Purchase a new DPF fitment kit including gaskets, bolts and mountings.
- Ensured that no exhaust paste or silicone sealant is being used upstream of the DPF or Catalytic Converter.
- Re initialise Engine Control Units, reset ash level & adaptations and where necessary complete Engine Control Module restore.
- Check for vehicle Engine Control Module programming updates.
- Check Adblue or Eolys (if applicable) at sufficient level.
- Completed a successful **Forced Regeneration** before driving the vehicle.

STOP!

BEFORE INSTALLING THIS CATALYTIC CONVERTER/DPF

- **A complete evaluation of the exhaust system for damage and/or contamination must be done before replacing the Catalytic Converter/DPF.**
- **Ensure the original engine fault has been rectified before replacing the Catalytic Converter/DPF.**

CATALYTIC CONVERTER FITMENT

- Replace all gaskets, bolts and mountings.
- It is strongly recommended to replace all oxygen sensors on the Catalytic Converter.
- Do not use exhaust paste or silicone sealant upstream of the Catalytic Converter.
- After fitment run the vehicle at 2500rpm until the electric fan kicks in. Run the vehicle for another 1 minute until the Catalytic Converter temperature reaches 350°C.

DPF FITMENT

- Change the engine oil when replacing a DPF. Only use the manufacturers specification oil.
- Replace all gaskets, bolts and mountings.
- It is strongly recommended to replace all sensors on the DPF.
- Do not use exhaust paste or silicone sealant upstream of the DPF.
- Do not run the vehicle on biodiesel
- **YOU MUST** update the engine management software to tell the vehicle it has a new DPF fitted.
- **YOU MUST** run a forced Regen on the new DPF **BEFORE DRIVING THE VEHICLE**

FAILURE TO FOLLOW THE ABOVE WILL VOID THE WARRANTY
All Catalytic Converters & DPF's are sold subject to warranty conditions found at www.zetti.com or Phone 1300 4 ZETTI (1300 4 93884). © 2016 SWD AUST.

ZETTI DPF TOOL

The Zetti diagnostic tool can perform static regenerations as well as diagnose DPF faults. This hand held DPF Tool simply plugs into the vehicles diagnostic connector and can be used to diagnose codes, carry out the all important forced regeneration and even zero the DPF after replacement.

Covering these manufacturers:



and more are being added every month!

DPF TOOL FEATURES:

- Push button operation
- Regenerates Diesel Particulate Filters
- Resets ECU when fitting new DPF
- Covers most DPFs in the SWD range
- DPF fault code identification
- Resets EOLYS additive lights
- Handheld
- Supports vehicles from 2000 on
- No need to send cars away to the dealer
- Updates available for all new SWD DPFs
- Download the latest vehicle updates straight to the device



Modern diesel vehicles are fitted with complex anti-pollution systems. These systems require servicing and resetting which can only be completed via diagnostics.

The Zetti DPF tool allows you to carry out numerous functions on the Diesel Particulate Filter system without having to send the car to a main dealer.

The tool will reset the DPF light after the filter has been replaced, reset the additive level after it has been topped up, and burn off collected particles when a maximum fill level is reached by performing a static regeneration.

It is only necessary to replace the DPF when this process breaks down and the filter becomes irreversibly clogged or damaged.

The Zetti DPF reset tool covers the majority of our range of Diesel Particulate Filters.

**It is only necessary to replace the DPF when the filter becomes irreversibly blocked or damaged.*

CONTACT US:

SWD AUST | 1300 4 ZETTI (1300 4 93884) | with branches in Brisbane - Sydney - Melbourne



CATALYTIC CONVERTER DO'S & DON'TS:

Things to consider once your Catalytic Converter has been replaced with a new Zetti Emissions component.

- It is highly recommended that you use high octane fuel, for example 95 or 98 Octane and avoid Ethanol blended fuels. Ethanol blended fuels severely decrease Catalytic Converter efficiency & life span.
- If your vehicles Catalytic Converter was replaced due to an Check Engine Light issue, (usually the P0420 fault code) it is highly recommended that you also have further checks completed by your chosen mechanical workshop to ensure your vehicle does not have additional non-Catalytic Converter related faults.
- If you experience any further issues with the Check Engine Light illumination after replacement of a Catalytic Converter, please make your exhaust specialist aware IMMEDIATELY as continued driving of the vehicle may lead to further Catalytic Converter or other mechanical issues.
- Continuing to keep your vehicle properly maintained, for example replacing air and fuel filters and choosing the correct oil for your vehicle is also critical to Catalytic Converter efficiency and in turn life span.



Thank you for choosing a Zetti Emissions replacement part on your vehicle. If you have any further questions, please contact your exhaust specialist today.



ZETTI EMISSIONS

DPF CASE STUDY



SPARECO CASE STUDY REPORT: 17-6-14

The following report aims to establish the facts in relation to warranty claims on an aftermarket Diesel Particulate Filters (DPF), Part No. DPF003SC, supplied by ██████████ to Mazda in ██████████ in April 2014, the vehicle and specified issues are outlined separately with their issues and suspected causes outlined in black text and the recommended course of action Spareco believes should have been performed at the time outlined in red text.

MAZDA 3 (██████████ DEALER)

Car Details as given by ██████████ Mazda / ██████████: Mazda 3 2.0L Turbo Diesel

This vehicle was bought by ██████████ Mazda as a used car and was found to have a failed Diesel Particulate Filter. After attempting to clean the unit with degreaser and a pressure hose several times and refitting it to the car to obtain a forced regen, it was found that the *“front of the DPF had melted”*. ██████████ Mazda had not seen this vehicle before and had no service history on the vehicle.

Process recommendation:

- The history on this vehicle should have been checked for evidence of a reason for initial failure.
- The pressure/temperature sensors should have been checked before replacement of DPF.
- When it was discovered that the original unit had melted down this should have raised flags for the dealer alerting them to an underlining issue.
- Further diagnosis and pre checks as outlined in *DPF Fitment Guide for the Professional* (see attached) should have been completed before the DPF unit was replaced.

At this point a new silicone carbide unit was sourced by the Sales Department at ██████████ Mazda; it was purchased through the Parts Department and supplied to the Service Department for fitment. *There where no fitting instructions attached to the unit just a part number and the contact details for ██████████ was the only things attached. We spoke to ██████████ about fitting and there was no mention about special circumstances around the DPF or things we should check”* The unit was fitted by Service, the oil and filter where changed, Engine Management Unit values where reset and there was a forced regen completed on the new Diesel Particulate filter without issue as per the Mazda replacement schedule. Both Sales and the Service Department test drove the vehicle with a combined distance of approximately 100km before the vehicle was put on a truck and taken to ██████████ Mazda for sale.

Process recommendation:

- There should have been attached to this unit the Warranty label as well as a copy of the *DPF Fitment Guide for the Professional*.
- When ██████████ Mazda spoke to ██████████ more info was required about correct fitting process including pre-checks and fitting guide should have been supplied.

MAZDA 3 (██████████ DEALER)

Car Details as given by ██████████ Mazda / ██████████: Mazda 3 2.0L Turbo Diesel

While on test drive with a possible customer the vehicle was reported to lack power and during the test drive entered the Limp Mode bringing on the engine light. It was given to ██████████ Mazda Service Department for diagnosis and after some investigation it was found that the DPF was causing

a restriction in power as well as having a higher than recommended pressure differential. A forced regen was performed however on road test the same issues were felt with restricted power and eventually the Limp Mode occurred again. The unit was removed as well as the injectors and inlet manifold for check and further diagnosis.

The injectors were checked by a local independent [REDACTED] Diesel Services and the following results were found.

1. Injector 1 was found to pass all tests (both return and delivery) with notes stating only a slightly higher than average specification fuel return.
2. Injector 2 was found to be the same as Injector 1
3. Injector 3 was found to have excessive return. Over a 1 minute return test with a maximum return of 30cc allowable an amount of 500cc approximately (the test was withdrawn at 30 seconds due to results) was found. A delivery test was not completed due to overwhelming return issue.
4. Injector 4 was found to have an acceptable return however its delivery was found to be only 59mm³ where a specification of 70mm³ is needed.
5. These tests were completed by a trained technician on a Bosch EPS200 series test bench using a Redat equipment update. (Denso Injectors).

All 4 injectors have since been replaced and the Engine Management System has been recoded to work with these calibrated injectors. Both the intake manifold and EGR were also removed however there were no reported issues with either. It should be noted that inlet manifold blockage is a common occurrence in these vehicles and that it can be extremely detrimental to the service life of a Diesel Particulate Filter.

The DPF was replaced with one borrowed from another used car and has since had no further issues with approximately 150km travelled.

Process recommendation:

- The history on this vehicle should have been checked for evidence of a reason for initial failure.
- These issues should have been picked up by the [REDACTED] Mazda Dealer as part of their pre-replacement process as outlined in the *DPF Fitment Guide for the Professional*

IN SUMMARY:

It is the opinion of Spareco that this vehicle was not diagnosed correctly in accordance with best practice DPF diagnosis and replacement. The following points summarise our thinking

1. The car's history was not sufficiently checked.
2. All recommended vehicle technical checks were not carried out.
3. Recommended DPF replacement process was not followed.

Other important notes:

- A new fitting kit should have been used.
- Engine sealant should not have been used to seal either end of the replacement DPF unit. (There was evidence of silicone sealant upstream of the particulate filter.)
- There are no recorded pressure differential readings from either Mazda Dealer even after failing 2 separate Diesel Particulate Filter's. (OE and Zetti Emissions product)

REPORT PROVIDED BY INDEPENDENT TEST FACILITY:

Overview of Objectives:

A sample of ash has been supplied to an independent test facility for analysis to further understand the cause of failure in the supplied Diesel Particulate Filter DPF003SC, supplied by [REDACTED] to Mazda in [REDACTED] in April 2014. See Picture 1 & 2 below.

Picture 1



Picture 2



Ash Test Results:

Understanding of the Test Graph (Refer Picture 3)

To understand the graph shown, the X line is Time, the Y-1 line is Weight and the Y-2 line is Temperature.

The test we perform consists of 77 minutes of increasing the temperature (Y-2 Blue) from room temperature to 400 degree's. We then maintain a 400 degree temperature for 30 minute's during this time any raw diesel / oil contamination within the soot will burn off. Looking at the Green Y-1 line it starts from 100%, this will always start from 100% as the soot loaded equals this figure. This value can only decrease as the test continues as the soot, raw diesel / oil is burning and decreasing the overall weight. The point stated on the green line is the final per-cent after the 30 minutes of 400 degree burn time, the per-cent shown at this point is the per-cent of soot left after the 400 degree burn time of 30 minutes. As stated previously any oil or raw diesel contamination within the soot will have burn off during this time. For example – the point shown on the graph states : 92.00 %, this means at a temperature of 400 degrees after 30 minutes the soot content now is 91.66 % from 100 % from the beginning of the test, so $100\% - 91.66\% = 8.34\%$, this 8.34% is burnt oil or raw diesel, so in a simple term the soot sample taken contains 8.34% oil or raw diesel contamination, the limit is 7.00 % , so the soot sample has failed our test as its over the 7% limit. In this term as we are over the 7% limit there is a problem with the car, whether it be over fuelling or leaking oil into the combustion chamber. As suggested in the attached case study several of this vehicles diesel fuel injectors did not pass OEM specification testes. 1 in particular was over 100% the required spec.

The next process in testing the soot sample is decreasing the temperature to 100 degrees, this is so we can cool the soot to a steady temperature, if we increase the temperature from 400 degree's right after the previous 30 minutes there will be a chance we could burn the remaining soot too fast, once the temperature reaches 100 degree we hold the temperature their for 5 minutes forming our test base line.

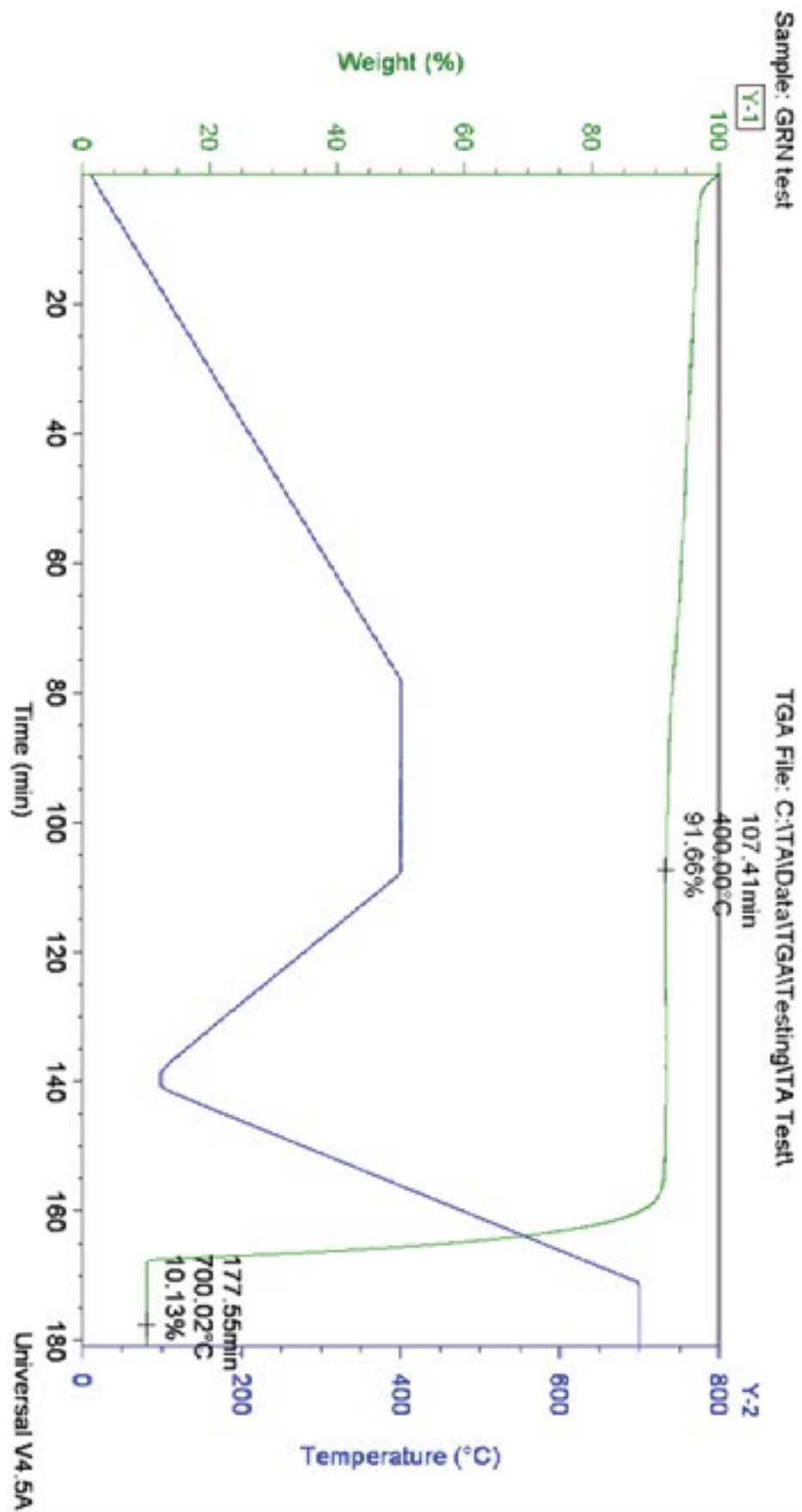
We then increase the temperature to 700 degree's and maintain this for duration of 9 minutes. The reason for doing this is to burn the remaining soot steadily leaving only a sample weight of other non burnable contamination. You will notice there is a point at the end of this graph on the Green Y-1 line this is what's left after the remaining soot is burnt. For example : the graph states 10.00%, this means 10.13% of foreign contaminate is left after the remaining soot has burnt, this will be due to engine component breaking up, for example piston rings slowly deteriorating or the burning of injector tips. The limit for this point on the graph is 2.00%, so again this has failed the test as it is over the 2.00 % limit by 8.13%.

Conclusion Supplied by Independent Test Facility:

"After reading through the attached case study and completed a range of tests and examining the results we agree with the above mentioned study.. Our opinion after reading through this report is, the ██████████ Mazda Dealer purchased the vehicle with no evidence of any faults, once the faults where brought to there attention they only replaced the reported fault and no attention was made to any auxiliary components that could or indeed have caused the reported fault. The ██████████ Mazda Dealer took more attention to detail with their diagnostics and fault finding, but at this stage the DPF was already damaged, the correct procedures where taken to repair the vehicle however there has been no mention in the above document about the condition of the catalytic converter forward of the DPF unit (contained in the engine pipe) this is something that requires attention before replacement of the DPF unit."

Statement given by Independent Test Facility used to test DPF003SC.

Picture 3



ZETTI EMISSIONS PRODUCT WARRANTY CERTIFICATE

STOP!!

BEFORE INSTALLING THIS CATALYTIC CONVERTER / DPF

- A COMPLETE EVALUATION OF THE EXHAUST SYSTEM FOR DAMAGE AND / OR CONTAMINATION MUST BE DONE BEFORE REPLACING THE CATALYTIC CONVERTER / DPF.
- ENSURE THE ORIGINAL ENGINE FAULT HAS BEEN RECTIFIED BEFORE REPLACING THE CATALYTIC CONVERTER / DPF.
- THE "DPF TRAINING GUIDE" MUST BE READ & UNDERSTOOD BEFORE REPLACING ANY DPF.

CATALYTIC CONVERTER FITMENT

- Replace all gaskets, bolts and mountings.
- It is strongly recommended to replace all oxygen sensors on the Catalytic Converter.
- Do not use exhaust paste or silicone sealant upstream of the Catalytic Converter.
- After fitment run the vehicle at 2500rpm until the electric fan kicks in. Run the vehicle for another 1 minute until the Catalytic Converter temperature reaches 350°C.

DPF FITMENT

- Change the engine oil when replacing a DPF. Only use the manufacturers specification oil.
- Replace all gaskets, bolts and mountings.
- It is strongly recommended to replace all sensors on the DPF.
- Do not use exhaust paste or silicone sealant upstream of the DPF.
- Do not run the vehicle on biodiesel
- **YOU MUST** update the engine management software to tell the vehicle it has a new DPF fitted.
- **YOU MUST** run a forced Regen on the new DPF **BEFORE DRIVING THE VEHICLE**



FAILURE TO FOLLOW THE ABOVE WILL VOID THE WARRANTY
 All Catalytic Converters & DPF's are sold subject to warranty conditions found at www.zetti.com or Phone 1300 4 ZETTI (1300 4 93884). © 2017 SWD AUST.

ZETTI EMISSIONS PRODUCT WARRANTY CERTIFICATE

Warranty No. _____

IMPORTANT: THIS MUST BE FILLED IN & RETURNED NOW!

WHOLESALER NAME: _____ KEY CONTACT NAME: _____ ADDRESS: _____ CITY: _____ STATE: _____ POSTCODE: _____ PHONE: _____ SWD INVOICE #: _____ INSTALLER BUSINESS NAME: _____ ADDRESS: _____ CITY: _____ STATE: _____ POSTCODE: _____ PHONE: _____ Installer Name (print name): _____ Signature: _____ Date: ____/____/____	VEHICLE MAKE: _____ MODEL: _____ YEAR: _____ ODOMETER: _____ ENGINE SIZE: ____ L FUEL TYPE: _____ REGO #: _____ <small>(91, 95, 98, ETHANOL, DIESEL, BIO DIESEL)</small> OIL BRAND: _____ OIL VISCOSITY: _____ LAST SERVICE DATE: ____/____/____ KM AT LAST SERVICE: _____ PRODUCT SERIAL #: _____ PRODUCT PART #: _____ <small>(STAMPED ON THE PART)</small> NEW GASKETS FITTED (e.g. CKIT, OEM)? <input type="checkbox"/> Y <input type="checkbox"/> N <small>(PLEASE TICK ONE)</small> REPLACED ALL SENSORS (O ² , Pressure, etc)? <input type="checkbox"/> Y <input type="checkbox"/> N <small>(PLEASE TICK ONE)</small> WERE YOU GIVEN & DID YOU READ THE "DPF TRAINING GUIDE" BEFORE REPLACING THE DPF? <input type="checkbox"/> Y <input type="checkbox"/> N <small>(PLEASE TICK ONE)</small> DATE PART FITTED: ____/____/____ PLEASE INCLUDE ALL INFORMATION ABOUT WHAT HAPPENED TO THE DPF / CAT & BACKGROUND INFORMATION ON THE VEHICLE. _____ _____ _____ _____ _____
*This Warranty Certificate must be sent back to SWD AUST prior to any warranty claim and for this product to be eligible for warranty in the future. **All details must be filled out in full to make this a valid warranty certificate. Please return to: SWD AUST 122-124 Compton Road, Woodridge 4114 QLD For all warranty enquiries please call: 1300 4 ZETTI (93884)	



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- Universal Mufflers
- Hotdogs & Cannons



- Tube
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- 5 Gas Analysers
- DPF Diagnostic Tool



- Accessories (Gasket, Rubber, Bolts, Etc)



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