



DPF WASHING



HVFS are pro-active in our approach to protecting the health and safety of our employees, our industry partners and the environment. Please see below our response to the recent safety bulletin (**SB17-05 September 2017**) from the Department of Planning & Environment NSW Resources Regulator (DPE). Many of the recommendations from the DPE are addressed in our Report on Cleaning of Diesel Exhaust Particulate Filters (DPFs). Below each of the DPE Supplier Recommendations have been reviewed and we have responded by stating how we are meeting and/or exceeding the minimum recommendations;

Recommendation 1

- ensuring cleaned removable exhaust filters perform within their original design specifications and in compliance with the ExDES design registration

The unique HVFS wet-wash method does not change the composition, or the integrity of diesel particulate filters. There are no increased risks or additional hazards resulting from the wet-wash cleaning process.

Please see attached Report on Cleaning of Diesel Exhaust Particulate Filters (carbon dioxide / monoxide testing p4-5, respiratory risks testing p8-11, auto ignition (spontaneous ignition) testing p12-17).

Fire and/or explosion risks were assessed during auto ignition (spontaneous ignition) testing conducted by the Mine Safety Technology Centre. Filter efficiency in diesel particulate capture was assessed during carbon dioxide/monoxide testing carried out by Coal Mine Technical Services.

Further, after each clean HVFS use an air restriction test to check resistance between the filter media which is measured against an acceptable range of a new filter.

Risks associated with worker health and safety were assessed by Advitech Pty Ltd using the gravimetric method.

Recommendation 2

- analysing the number of times a removable exhaust filter can be reused without affecting its performance

HVFS worked in consultation with our customers, Coal Mine Technical Services and NSW Department of Mineral Resources (approved Testing Authority) to determine the optimum number of cleans.

Various methods were used to test the DPFs performance; before use (ie new filter), after use (ie after one working shift) and after cleaning (using HVFS wet-wash method). The

report measured DPFs after one clean and after four cleans; variables were considered and an acceptable range was determined. HVFS recommend the optimum number of cleans to be three cleans.

Recommendation 3

- the system that will be used to identify and track how many times a removable exhaust filters has been cleaned and reused

HVFS can affix a permanent label to the DPF and mark the label at each clean. All users will be able to determine the number of cleans a filter has completed on visual inspection, when the filter reaches its maximum number of cleans the filter will be rejected. HVFS offer a reject replacement service as required.

HVFS do not recommend that filter cleaners use the punch method (filter end cap punched after each clean) as this causes damage to the protective cage, end cap and/or media of the filter. As part of our continuous improvement program HVFS are currently reviewing alternative tracking methods.

Recommendation 4

- carrying out relevant testing to MDG 43 on a sufficient number of cleaned and reused filters to statistical validate there is no increase in risk to health or safety from filter degradation following the cleaning process

HVFS have conducted extensive testing on cleaned diesel particulate filters to ensure the safety and integrity of engines, employees and the environment when reusing cleaned filters.

Please see attached Report on Cleaning of Diesel Exhaust Particulate Filters (carbon dioxide / monoxide testing p4-5, auto ignition (spontaneous ignition) testing p12-17). The report measures DPFs after one clean and after four cleans; HVFS recommend the optimum number of cleans is three.

Recommendation 5

- analysing the potential failure modes of the removable exhaust filters, and implementing systems to test and or examine filters for onset of failures

On site; OEM machines are fitted with vehicle safety monitoring systems where sensors alert operators when exhaust temperatures exceed acceptable limits. The engine goes into limp mode and a DPF change out must be performed.

During cleaning; Filters are inspected during the cleaning process; the external metal cage – minor dents are repaired; internal media – checked for holes; rubber seals – re-glued using OEM recommended glue; and end caps – checked to ensure they are secured. If at any point during inspection the filter fails QA, the filter will be rejected and not returned to the customer. We will not put engines, employees or the environment at risk.

Recommendation 6

- establish and implement relevant individual filter tests and batch tests

Quality control is an important part of the HVFS cleaning process. Checkpoints include; bubble test to check filter media integrity, visual integrity test of external casings, air restriction test to check resistance between the filter media (measured against an acceptable range of new filter). If a filter fails our strict testing procedure, the filter is rejected and will not be returned to the customer.

Recommendation 7

- carrying out the cleaning process in a quality system consistent with AS/NZS ISO 9001 *Quality management systems – Requirements*

HVFS policies, procedures and processes are consistent with AS/NZS ISO 9001 Quality management system requirements. HVFS Safety Management Plan is available on request.

Recommendation 8

- carrying out periodic testing of cleaned filters to the tests in MDG 43 to validate the ongoing performance of the cleaning process

HVFS work in consultation with our customers, manufacturers and regulators to ensure the cleaning processes used are best practice. These processes are reviewed periodically through our continuous improvement program to ensure compliance with relevant legislation.

Recommendation 9

- have the cleaning and checking process independently audited by a competent person

As part of our continuous improvement program HVFS are currently in the process of having our cleaning method independently audited. The results of the audit are not available at the time of printing however they will be made available on request.

Recommendation 10

- verifying the original supplier's label remains on the filter

OEM labels remain intact during the wet wash process.

Recommendation 11

- verifying the effectiveness of the removable exhaust filters' housing sealing arrangement

On site; Machine operators should conduct a visual inspection of the exhaust filters' housing during the change out process as per site JSAs.

During cleaning; Filters are inspected during the cleaning process; rubber seals are checked and re-glued using OEM recommended glue; and end caps are checked to ensure they are secured. If at any point during inspection the filter fails QA, the filter will be rejected and not returned to the customer.

Recommendation 12

- ensuring workers are trained and competent in the process and the risks associated with handling used reusable removable filters.

Safe Work Procedures (SWP 01, SWP 04, and SWP 07) are available on request.

Other Matters to Consider - 1

- the handling of hazardous by-products resulting that may produce risks to health and safety of workers when transporting, handling or cleaning filters

The potential for harm arises at the point of change out; that is when the machine engine is hot and the diesel particulate filter needs to be replaced. HVFS recommend adequate PPE is worn during the whole change out process (that is before removing the used DPF, while putting the replacement filter in and when disposing of the used filter).

DPFs are only of concern when hot; this is when carcinogenic gases are released into the air from the machine and filter. Once the filter is cool no gases are released into the air and the particulates collected in the filter become inert (chemically inactive). Adequate PPE must be worn during the change out process.

Other Matters to Consider - 2

- implementing handling systems consistent with the code of practice for handling hazardous materials

Safe Work Procedures (SWP 07) are available on request.

Other Matters to Consider - 3

- implement systems to minimise the risk to health of workers who work on used removable exhaust filters and who may be exposed to diesel exhaust particulate and conduct health monitoring.

HVFS engaged Advitech Pty Ltd to conduct a study on airborne contaminants at our DPF cleaning facility as part of assessing the health and safety of employees handling DPFs. The personal gravimetric method (as approved by the NSW Coal Industry) was used to establish that the risk to workers is low. This risk has been further mitigated by the use of adequate PPE which HVFS workers must wear during the cleaning process as detailed in SWP 01 and SWP 04.

Please see attached Report on Cleaning of Diesel Exhaust Particulate Filters (p8-11 analysis of gravimetric monitors); SWP 01 and SWP 04 are available on request.