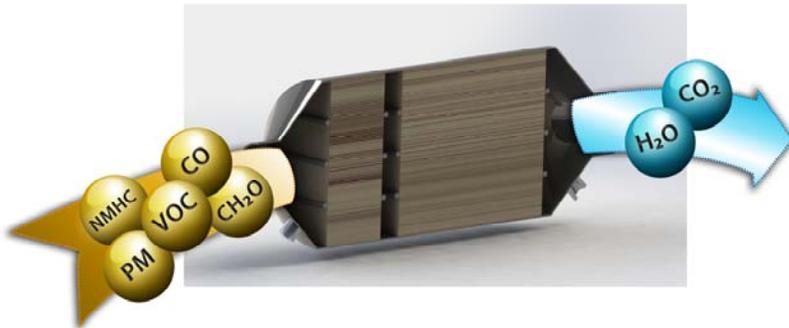




Clean Emissions Products Inc.

“Every Engine Deserves Clean Emissions”

CRT Summary of Technology & Operating Recommendations



Summary of How the System Works:

The system is composed of two important elements:

DOC (diesel oxidation catalyst) located upstream of particulate filter it will not only convert CO and HC molecules to CO₂ and H₂O at percentages of 90-99% but allows for the conversion of NO into NO₂. It is this NO₂ molecule that combusts the trapped soot particles allowing for regeneration (self cleaning of unit). Additional back pressure < 3” wc.

Coated Aluminum Cordierite Filter is located downstream of DOC and uses alternating blocked cells to trap PM molecules at an efficiency rating of 95-99%. Additional back pressure < 8-11” wc.

Engine Exhaust Temperature Required for Successful Regeneration

- Diesel engine must be maintaining exhaust temperatures between 250° C and 400° C for at least 40% of time to allow CRT system to properly regenerate.

Emission Reductions

- Reduces CO (carbon monoxide) by up to 90-99%
- Reduced HC (hydrocarbons) by up to 80-90%
- Reduces PM (particulate matter) by up to 95-99%



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Important Operating Notes for Successful Life of Filter

It is important to note that in any CRT system the ceramic based wall flow filter (DPF) is the most fragile component yet does the most work in the removal of PM molecules. If the DPF section is properly monitored and maintained you will get the best PM reduction and lifespan possible. Filters that aren't regularly inspected and continually monitored could be prone to clogging and eventual failure.

Important Steps to Ensuring Filter Performance/Lifespan

- Every CRT must be installed with a backpressure monitoring device (w/ warning alarm) that must be monitored by machine operator. This pressure reading device is the most important part of the monitoring of the CRT for successful performance and ensuring filter doesn't risk unreversible clogging damage.
- In addition to a pressure monitoring device we highly recommend regular visual inspection of filter section to ensure no damage has been sustained by filter at any time.

Recommended Operating Procedure

- Before CRT system is installed we recommend you review duty cycle of engine to ensure that the exhaust temperature cycle will be appropriate for a CRT application.
- While installing CRT system the operator must install a backpressure monitoring device (with warning alarm) to ensure that no complications will arise with respect to filter operation.
- When running CRT system we recommend a periodic visual inspection of filter to ensure no cracks or structural damage which could result in poor performance of filter
- Clean Emissions Products Inc. highly recommends that in addition to the above safeguards all CRT assemblies be purchased with a replacement filter section. This is imperative as the DPF filter section could be required to be removed at some stage and cleaned “baked” should the engine be running at a heavier soot load and as a result the DOC may not be able to keep up with the NO₂ molecule production needed for Filter to regenerate automatically (i.e. self-clean). Should this issue arise where filter is getting exposed to excessive soot buildup then it is recommended that the filter be removed and sent out for cleaning and the spare filter cartridge can be installed with little to no downtime interruption of engine.



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Warranty Coverage of Filter Sections

- Clean Emissions Products Inc. will warranty the workmanship and initial performance of filter cartridges provided the above mentioned safeguards have been initiated.
- Should a filter become damaged beyond repair due to excessive soot buildup or any foreign matter coming through exhaust stream then the customer is required to replace filter at their cost. This will not be covered by Clean Emissions Products Inc.
- Clean Emissions Products Inc. will not warranty applications. We will only warranty product performance in an appropriate application environment. Should a CRT system be placed on an engine application that isn't suitable for a CRT product then Clean Emissions Products Inc. will not warranty any of the CRT product or associated costs of customer for said application.

Low Sulphur Count Diesel Fuels

- While the CRT's primary responsibility is to greatly reduce the amount of PM from an exhaust stream the effectiveness of this process can be influenced by the quality of diesel fuel. ULSD (Ultra Low Sulphur Diesel) and LSD (Low Sulfur Diesel) fuels are best for use with the CRT product. In areas where high sulfur count diesel fuel is still being used (500 ppm) then the CRT filter could be much more prone to clogging issues and subsequently have a reduced lifespan. In these applications the need for proper monitoring/visual inspections and spare filter parts is imperative.

A Word about NO_x Reduction in A CRT Environment

- Because in the cleaning stage of the wall flow filter we are utilizing the oxygen molecules found in NO and NO₂ (to form NO_x) to combust with the trapped particulate molecules and break them apart and consume them we generally see a reduction in the total NO_x output. General NO_x molecule reductions (broken back down to N) can be anywhere from 25-50%. As this NO_x reduction is an uncontrolled reaction dependant on the oxygen content of treated exhaust and its ability to react with trapped PM molecules the total NO_x reduction percentage will vary from application to application.