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PROCEDURE INSTRUCTION LETTER NO. I10-V-03

*Charles Thomas for*

FROM: KEVIN G. STRICKLIN  
Administrator for  
Coal Mine Safety and Health

SUBJECT: Evaluation of Non-Permissible, Heavy-Duty, Diesel-Powered  
Equipment, Compressors and Generators for Use of an  
Adequate Diesel Particulate Matter (DPM) Aftertreatment  
Device

#### Scope

This Procedure Instruction Letter (PIL) applies to all Coal Mine Safety and Health (CMS&H) enforcement personnel.

#### Purpose

This PIL provides instruction to Mine Safety and Health Administration (MSHA) personnel for determining the adequacy of DPM aftertreatment devices on non-permissible, heavy-duty, diesel-powered equipment, compressors and generators operated in underground areas of underground coal mines. 30 C.F.R. Section 72.501(c) establishes DPM emissions limits for these types of diesel-powered equipment.

#### Procedure Instruction

CMS&H enforcement personnel will perform two specific evaluations to determine if an adequate DPM aftertreatment device is being utilized. First, the operator's diesel inventory will be reviewed. This review will determine if the listed DPM aftertreatment control for each piece of diesel equipment will provide sufficient collection efficiency to reduce the DPM emissions to the level of 2.5 grams per hour. If the diesel inventory indicates the use of an inadequate DPM aftertreatment device, the affected machine must be inspected to confirm the use of the stated device prior to taking enforcement action for violation of 30 C.F.R. 72.501(c).

Second, CMS&H enforcement personnel will measure the exhaust gas temperature of select diesel-powered machines equipped with a non-ceramic particulate filter. This evaluation is to verify that the DPM aftertreatment device is maintained in accordance

with the manufacturer's specifications as required by 30 C.F.R. 72.503(d). These specifications include conditions of use that are necessary to maintain the established collection efficiencies and are required to gain MSHA acceptance as a DPM aftertreatment device.

Currently accepted high-temperature disposable particulate filters (HTDPFs) must be operated in a diesel exhaust stream that is 650 degrees Fahrenheit (°F) or less to provide the established collection efficiency (80 or 83 percent depending on the model of the DPM aftertreatment device). Specification sheets are attached for the two currently accepted HTDPFs. Paper/Synthetic diesel particulate filters are accepted with a collection efficiency of 95 percent at a maximum exhaust gas temperature of 302°F. Specifications for accepted non-ceramic filters may be found on MSHA's web page as additional information with the acceptance list of filters.

After January 1, 2006, MSHA will determine the exhaust gas temperature of diesel-powered equipment using the following test procedure:

- 1) Conduct the test when the engine is producing the maximum exhaust gas temperature. This test condition should be the same as that established by the mine operator to conduct the undiluted exhaust emissions weekly test required under 30 C.F.R. 75.1914(g). This test condition is normally produced using torque converter stall or hydrostatic transmission load.
- 2) Ensure that you are not exposed to undiluted exhaust gases or hot surfaces and that all persons participating in the test are aware of your location.
- 3) Measure the peak exhaust gas temperature in the undiluted exhaust using an electronic hand-held thermocouple instrument with a maximum 6 inch, J type thermocouple attached.
- 4) Place the thermocouple into the undiluted exhaust stream using an exhaust port near the inlet of the DPM exhaust filter and after any exhaust cooling device. The exhaust port must be located to permit measurement of the exhaust gas temperature before entering the DPM aftertreatment device but after any exhaust cooling device. This may be the same port that the mine operator uses to determine the exhaust gas emissions concentrations for 30 C.F.R. 75.1914(g). (Note: the thermocouple must not touch the wall of the exhaust pipe and should be as close as possible to the center of the exhaust pipe.)
- 5) Run the test for a minimum of 60 seconds to a maximum of 120 seconds or until the exhaust gas temperature is reasonably stable, whichever is less.
- 6) Record the identification of the machine being tested, the engine's serial number and the peak exhaust gas temperature measured.

The Exhaust Temperature Action Table summarizes the actions an inspector must take in response to peak temperature determinations and when additional testing is necessary.

<b>Exhaust Temperature Action Table</b>			
<b>Test No.</b>	<b>Peak Temperature Determination</b>		<b>Action To Be Taken</b>
	<b>HTDPF Type (°F)</b>	<b>Paper/Synthetic Type (°F)</b>	
1	$\leq 650$	$\leq 302$	DPM Control is Adequate
	$\geq 700$	$\geq 325$	DPM Control is Not Adequate, Citation under 72.503(d)
	$> 650 \leq 699$	$> 302 \leq 324$	Re-test according to items 1) – 6)
2	$\geq 700$	$\geq 325$	Control is Not Adequate, Citation under 72.503(d) using Test 2 Peak Temp as basis
	$> 650 \leq 699$	$> 302 \leq 324$	Average Test 1 + Test 2 Peak Temp, use as basis of Citation under 72.503(d)
	$\leq 650$	$\leq 302$	Re-test according to items 1) – 6)
3	$\geq 700$	$\geq 325$	Control is Not Adequate, Citation under 70.503(d) using Test 3 Peak Temp as basis
	$> 650 \leq 699$	$> 302 \leq 324$	Average Test 1 + Test 3 Peak Temp, use as basis of Citation under 72.503(d)
	$\leq 650$	$\leq 302$	Average Test 2 + Test 3 Peak Temp, use as basis to determine control is adequate

The following paragraphs detail the enforcement actions and additional testing summarized in the Exhaust Temperature Action Table above:

#### Scenario 1

The DPM control is adequate if the exhaust gas temperature measured is less than or equal to 650°F for a HTDPF or less than or equal to 302°F for a Paper/Synthetic filter.

A citation shall be issued for violation of 72.503(d) if the exhaust gas temperature measured is greater than or equal to 700°F for a HTDPF or greater than or equal to 325°F for a Paper/Synthetic filter. The violation of 72.503(d) should state that

the DPM control being relied upon to remove DPM from the diesel emissions was not maintained in accordance with the manufacturer's specifications in that the filter was being operated at an exhaust gas temperature of XXX°F.

#### Scenario 2

If the exhaust gas temperature measured is 651°F to 699°F for a HTDPF or 303°F to 324°F for a Paper/Synthetic filter, the inspector will re-test the machine in accordance with exhaust gas temperature test procedures 1) - 6) above.

If the second temperature determination is greater than or equal to 700°F for HTDPF or greater than or equal to 325°F for a Paper/Synthetic filter, then this single determination shall be used as the basis of a citation for a violation of 72.503(d) as stated above.

If the second temperature determination is 651°F to 699°F for HTDPF or 303°F to 324°F for a Paper/Synthetic filter, the inspector shall average the two peak temperature determinations and use this average as the basis of a citation for a violation of 72.503(d) as stated above.

If the second temperature determination is less than or equal to 650°F for HTDPF or less than or equal to 302°F for a Paper/Synthetic filter, then the inspector shall conduct a third test of the machine in accordance with exhaust gas temperature test procedures 1) - 6) above.

#### Scenario 3

If the third temperature determination is greater than or equal to 700°F for HTDPF or greater than or equal to 325°F for a Paper/Synthetic filter, then this single determination shall be used as the basis of a citation for a violation of 72.503(d) as stated above.

If the third temperature determination is 651°F to 699°F for HTDPF or 303°F to 324°F for a Paper/Synthetic filter, the inspector shall average the two peak temperature determinations in this temperature range and use this average as the basis of a citation for a violation of 72.503(d) as stated above.

If the third temperature determination is less than or equal to 650°F for HTDPF or less than or equal to 302°F for a Paper/Synthetic filter, the inspector shall average the two peak temperature determinations in this temperature range and use this average as the basis for determining that the DPM control is adequate.

### Background

In order to reduce the diesel particulate matter level to the diesel emission limits contained in 30 C.F.R. Part 72, DPM aftertreatment devices have an established collection efficiency that is equipment-, temperature- and use-dependent. The aftertreatment devices must be used on the appropriate diesel engines and operated in accordance with the manufacturers' requirements to obtain the stated collection efficiency. MSHA is aware that some DPM controls are not being used in a manner that will provide the degree of DPM reduction necessary for compliance with the levels required by 30 C.F.R. Part 72.

30 C.F.R. Section 75.1914(g) requires mine operators to develop standard operating procedures for conducting weekly tests on the undiluted exhaust emissions of diesel engines in diesel-powered equipment approved under Part 36 and heavy-duty non-permissible diesel powered equipment as defined in Section 75.1908(a). These procedures specify the method of achieving a repeatable loaded engine operating condition. Use of these test procedures should provide reasonably stable and repeatable exhaust gas temperature data.

### Authority

30 C.F.R. Part 72 and 30 C.F.R. Part 75

### Issuing Office and Contact Persons

Coal Mine Safety and Health, Division of Health

Robert Thaxton, (202) 693-9515

E-mail: [thaxton.robert@dol.gov](mailto:thaxton.robert@dol.gov)

### Internet Availability

This instruction letter may be viewed on the Internet by accessing MSHA's home page at <http://www.msha.gov> and under "Compliance Assistance" choose "Compliance Info" and then "Procedure Instruction Letters."

### Distribution

Coal and All Volume Program Policy Manual Holders

Attachments



## High Temperature Exhaust Filter For Diesel-Powered Equipment

**When you need a durable,  
high efficiency exhaust  
filter that captures diesel  
particulate matter, call  
Donaldson.**

Accepted  
for use by  
MSHA\*

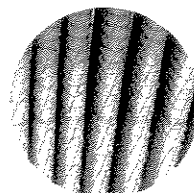


Part No. P604516

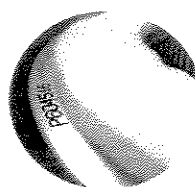
This proprietary design requires installation of a retrofit filter housing. An engineering drawing of the filter is available upon request.

### Features

- Reinforced filter media with wire backing maximizes performance and durability
- Water-resistant filter media can eliminate the need for de-misters when used with water-bath exhaust conditioners
- All materials are engineered to withstand high temperature operations and are non-combustible
- High temperature gasket material insures proper sealing
- Open-ended filter design allows for multiple filter operation (stacked end-to-end or side-by-side)
- Filter size maximizes performance and minimizes operating costs



Close-up of reinforced  
filter media



Close-up of filter gasket

*Please read the CAUTION statement on reverse side  
before purchasing.*

\* Meets U.S. Department of Labor, Mine Safety & Health Administration (MSHA) application criteria for permissible (MSHA Table 1) engines that limit exhaust gas temperature to 302°F or less AND non-permissible (MSHA Table 2) engines that limit exhaust gas temperature to 650°F or less.  
Ref: [www.msha.gov/01-995/Coal/DPM-FilterEfflist.pdf](http://www.msha.gov/01-995/Coal/DPM-FilterEfflist.pdf)

Donaldson

**CAUTION!**

Diesel emissions (such as carbon, unburned fuels, etc.) can ignite at temperatures below the rated filter limits. Ensure proper safeguards are in place to protect against damages resulting from ignition and/or uncontrolled regeneration.

## Exhaust Filter Service Life

Engine emission rates and exhaust temperatures affect overall filter life. Emission rates vary with many factors, including; engine age, level of maintenance, fuel quality, exhaust flow and duty cycles. Engines should be well maintained and calibrated regularly to maximize service life.

Exhaust temperatures within MSHA's permissible application range have little or no impact on filter material life. Higher exhaust temperatures will degrade filter materials over time.

## Specifications

### Product Attributes

Part No.: P604516

### Dimensions

Outer diameter: 12.74" (324mm)

Inner diameter: 8.38" (213mm)

Length: 26.00" (660mm)

Weight: 16.5 lbs. (7.5 kg)

### Exhaust Flow

Maximum exhaust flow:  
400 acfm per filter

Multiple filters must be used to accommodate higher airflows. Contaminant collects on the inner liner of the filter (reverse flow filtration).

### Maximum Pressure Drop

40" H<sub>2</sub>O maximum pressure drop across the filter. Do not exceed total system backpressure limits as defined by the engine manufacturer.

### Installation Guidelines

- Do not use this filter in applications that produce exhaust gas temperatures at the filter inlet in excess of 650°F.
- Position the filter housing and exhaust outlet to maintain a minimum distance of 12 inches from un-shielded flammable material.
- Avoid localized areas of high exhaust flow through the filter element via a filter housing of an "end outlet" or multiple "side outlet" design. The minimum total area of the side outlet(s) must be two times greater than the inlet section area.
- Install an in-line temperature sensing device ahead of the filter housing to alert the operator should exhaust temperatures exceed 650°F.

**Note:** The filter media contains trace amounts of vegetable oils that may produce light smoking during initial heat-up. Individual components of the off-gassing have been analyzed and are non-toxic.



# Donaldson

Donaldson Company, Inc.  
Minneapolis, MN  
55440-1299

[www.donaldson.com](http://www.donaldson.com)

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suitable for applications  
up to 650° F

Rebuildable  
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significant cost saving

