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Version 20

Title

Mack Aftertreatment Hydrocarbon Injector (AHI) Troubleshooting Guide - US10+OBD13 And Newer Emissions

Abstract

Troubleshooting guide to be used for Diagnostic Trouble Codes (DTCs) related to the Aftertreatment Hydrocarbon Injector (AHI).

Content

Published 07 January 2025
Valid for all vehicle model year 2014 to present

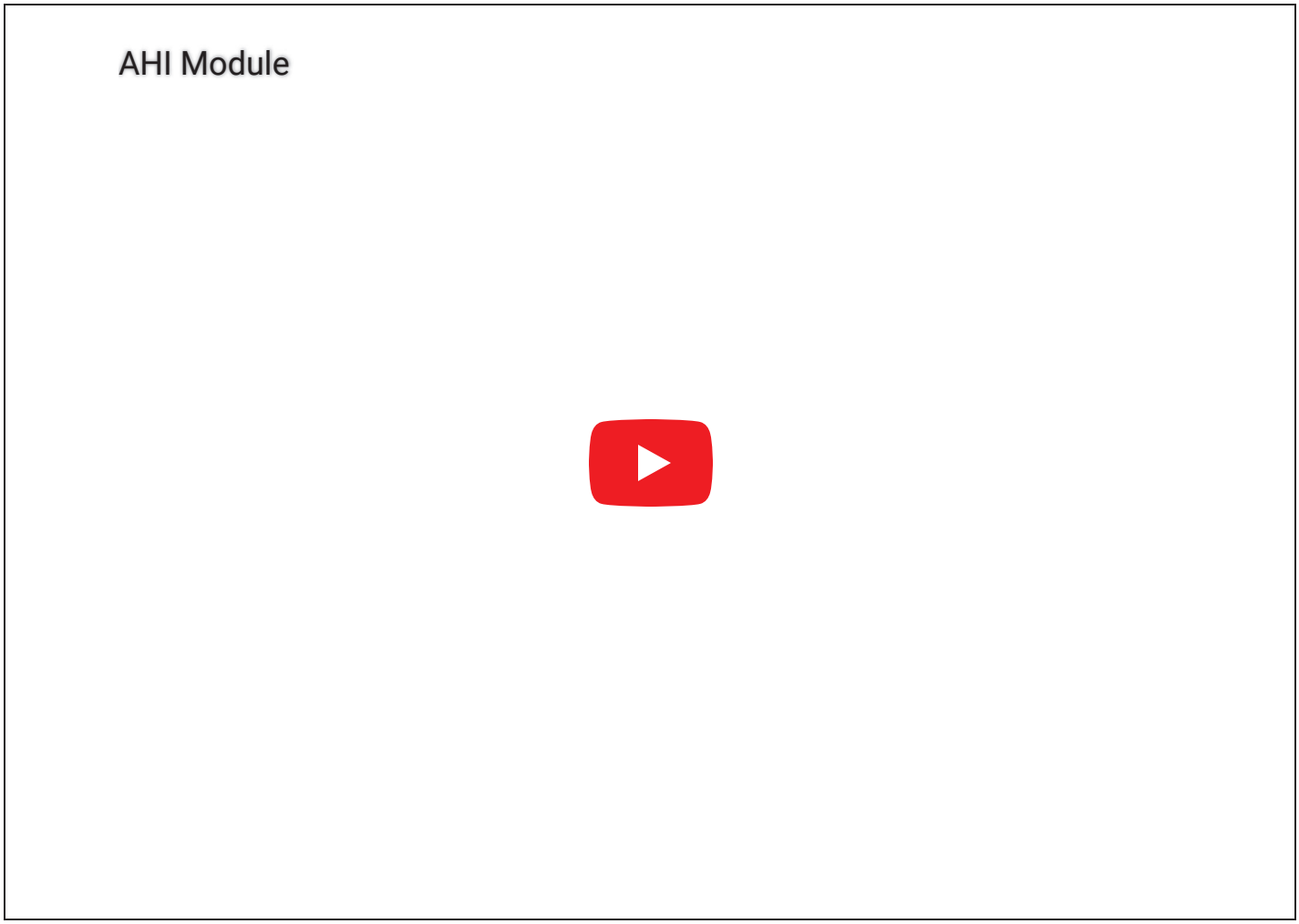
System Overview

The Aftertreatment Hydrocarbon Injector (AHI) System is a component of the Emissions Aftertreatment System (EATS) that monitors and controls fuel injection into the Diesel Oxidation Catalyst (DOC) to regenerate the Diesel Particulate Filter (DPF). The system is made up of 3 primary components: The AHI Module, Fuel and Air Lines, and the AHI Nozzle (7^{th} Injector).

AHI Module

Component Overview

Live UI



The AHI Module for model year 2017 and newer trucks is mounted to the fuel filter housing. In older vehicles, it was mounted to the side of the engine block. Despite the different configuration, the functionality is the same and the module's primary job is to control the amount of fuel and air to the nozzle.

There are 3 primary failure modes of the AHI Module (Dosing Block):

- Contaminated Air Supply
- Contaminated Fuel Supply
- Electrical Circuit Fault

Any AHI Module failure from air or fuel is primarily due to system contamination. The AHI module is susceptible to debris and oil from the upstream systems. It is imperative that when replacing the AHI Module that the fuel and air system are adequately evaluated.

Diagnosis and Repair

• Perform a DTC Readout using Premium Tech Tool. Use the below fault tables to aid in diagnosing AHI system and the **root cause** of the failure.

- **ONLY** Active codes or codes with DTC Status showing as "Confirmed" should be diagnosed.

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- If there are no Active or Status Confirmed DTCs and the vehicle will not successfully complete a regen, proceed to the AHI Nozzle Evaluation section.

Air And Fuel Supply Faults

DTC	Fault Description	System To Evaluate
P24F700	Exhaust Aftertreatment Fuel Air Purge Valve Stuck Closed	1. Air Supply 2. AHI Module 3. Fuel/Air Lines between AHI Module and Nozzle.
P24F600	Exhaust Aftertreatment Fuel Air Purge Valve Stuck Open	1. Air Supply 2. AHI Module 3. Replace the AHI Nozzle and clean Fuel/Air Line.
P20DC00	Exhaust Aftertreatment Fuel Supply Control Stuck Closed	1. Fuel Supply 2. If no problem with fuel supply, follow PTT Diagnostics
P20CF7A	Exhaust Aftertreatment Fuel Injector "A" Stuck Open	1. Fuel Supply 2. AHI Module
P20D000	Exhaust Aftertreatment Fuel Injector "A" Stuck Closed	1. AHI Module 2. Replace the AHI Nozzle and clean Fuel/Air Line.
P20DE00	Exhaust Aftertreatment Fuel Pressure Sensor Circuit Range/Performance	1. Follow PTT Diagnostics for this fault. Suspected Failure: - AHI Pressure Sensor - Air Supply - AHI Nozzle or Air/Fuel Lines

Air System Evaluation

1. Replace the following components:

- Air Regulator
- Air Dryer Cartridge/Filter (A proper oil coalescing filter/cartridge MUST be used)

2. Ensure the air tanks are properly drained

3. Clean the air supply line to the AHI module

Live UI

Fuel System Evaluation

1. Replace the fuel filters with OEM or OEM approved parts

2. Visually check the fuel condition and ensure there is no debris or contamination in the fuel tanks.

AHI Module Evaluation

1. Perform PTT Operation 2545-08-03-02 Exhaust aftertreatment diagnostics option D. Follow the results of the operation.

2. If the AHI Module or Nozzle is replaced it is imperative to follow guidance on use/reuse of the fuel/air supple line. See the Fuel & Air Line Section Below.

Electrical Faults

DTC	Fault Description	Action
P269A00	Exhaust Aftertreatment Fuel Injector "A" Circuit High	Check the AHI Module Electrical connection and wiring harness
P269900	Exhaust Aftertreatment Fuel Injector "A" Circuit Low	
P269713	Exhaust Aftertreatment Fuel Injector "A"	
P20D713	Exhaust Aftertreatment Fuel Supply Control	
P20DA00	Exhaust Aftertreatment Fuel Supply Control Circuit High	
P20D900	Exhaust Aftertreatment Fuel Supply Control Circuit Low	
P24F813	Exhaust Aftertreatment Fuel Air Purge Valve Control Circuit	
P24FA00	Exhaust Aftertreatment Fuel Air Purge Valve Control Circuit Low	
P24FB00	Exhaust Aftertreatment Fuel Air Purge Valve Control Circuit High	
P20DD00	Exhaust Aftertreatment Fuel Pressure Sensor	Check AHI Pressure Sensor Electrical Connector and wiring harness

P20E000	Exhaust Aftertreatment Fuel Pressure Sensor Circuit High	
P20DD13	Exhaust Aftertreatment Fuel Pressure Sensor	Check AHI Pressure Sensor Electrical Connector and wiring harness. If no fault is found during inspection of wiring harness and electrical connector, replace the AHI Fuel Pressure Sensor.
P20E013	Exhaust Aftertreatment Fuel Pressure Sensor Circuit High	

Rules for Replacement

In order for a repair to be eligible for warranty coverage, one of the diagnostic trouble codes (DTCs) listed in the yellow section above must be active or confirmed. However, in rare cases where there is a potential failure but no DTCs are detected, please provide supporting evidence of the failure. This can be in the form of a photo or video, along with an explanation for the need of replacement. This evidence will be used to determine if the repair qualifies for warranty coverage. For any additional support with diagnostics, open an e-Service case.

In addition, if the AHI module is being replaced. Maintenance records may be required showing the fuel filters and air dryer/filter have been properly maintained and are not the root cause of the failure.

The Air dryer / filters and Fuel Filters are all consumables. These components may be denied on a warranty claim unless they have been properly maintained. Refer to Service At a Glance (SAG) found in the Trucks Dealer Portal under the Information tab - Service - Service literature for replacement guides.

Standard Diagnostic Time for AHI Module is 1.5 hours.

AHI Nozzle

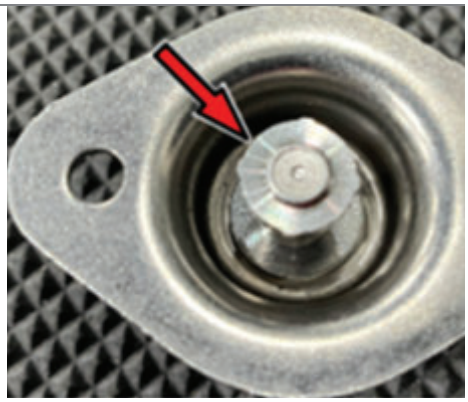
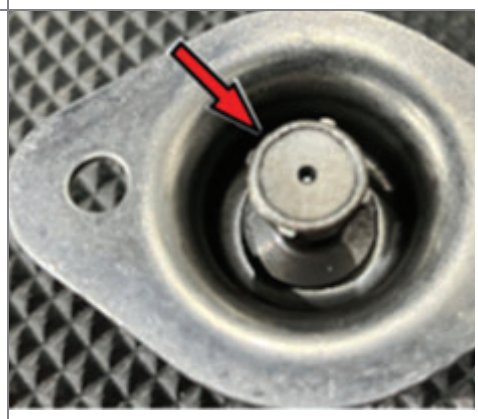
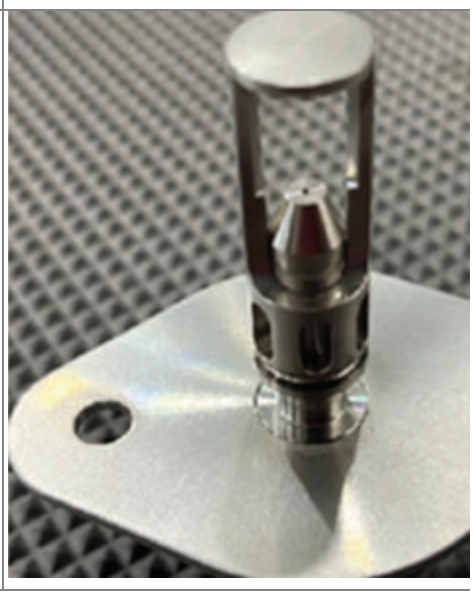
Component Overview

Live UI

The AHI Nozzle (also called the 7th injector) is mounted on the diffuser located directly on the outlet of the turbocharger turbine housing. The 7th injector atomizes fuel going into the exhaust stream. Some versions of the nozzle also regulate the amount of fuel being injected.

The primary failure mode of the AHI Nozzle is a clogged/plugged nozzle tip. A complaint of failed regens or constant request of regen is a common associated complaint. If the AHI Nozzle is clogged, it will either not inject a sufficient amount of fuel into the exhaust, or it will not properly atomize the fuel to distribute it evenly throughout the DOC. Both of these conditions will not produce the required temperatures for a successful regen.

There have been a few different Types of AHI Nozzle over the past several years. Use the table below as a guide along with Impact parts information to ensure the proper Nozzle is installed on the vehicle.

Engine	Emission Level	OBD Level	Description	Part Number	Picture
11L & 13L	US14	2013-2016	w Nozzle	21407621	
11L	US17	2017-2018	High Flow Type 1	21407772 (This pn now supersedes to 23937771)	
11L & 13L	US17 OR US21	2017 to current	High Flow Type 2	23937771	

NOTE: For high flow type 2 nozzles (23937771) an E-Service case is currently required for replacement.

Diagnosis and Repair

• Check the Adaptive Factor for the AHI system by using operation 2545-08-03-02 Exhaust Aftertreatment Diagnostics, Options C in Premium Tech Tool.

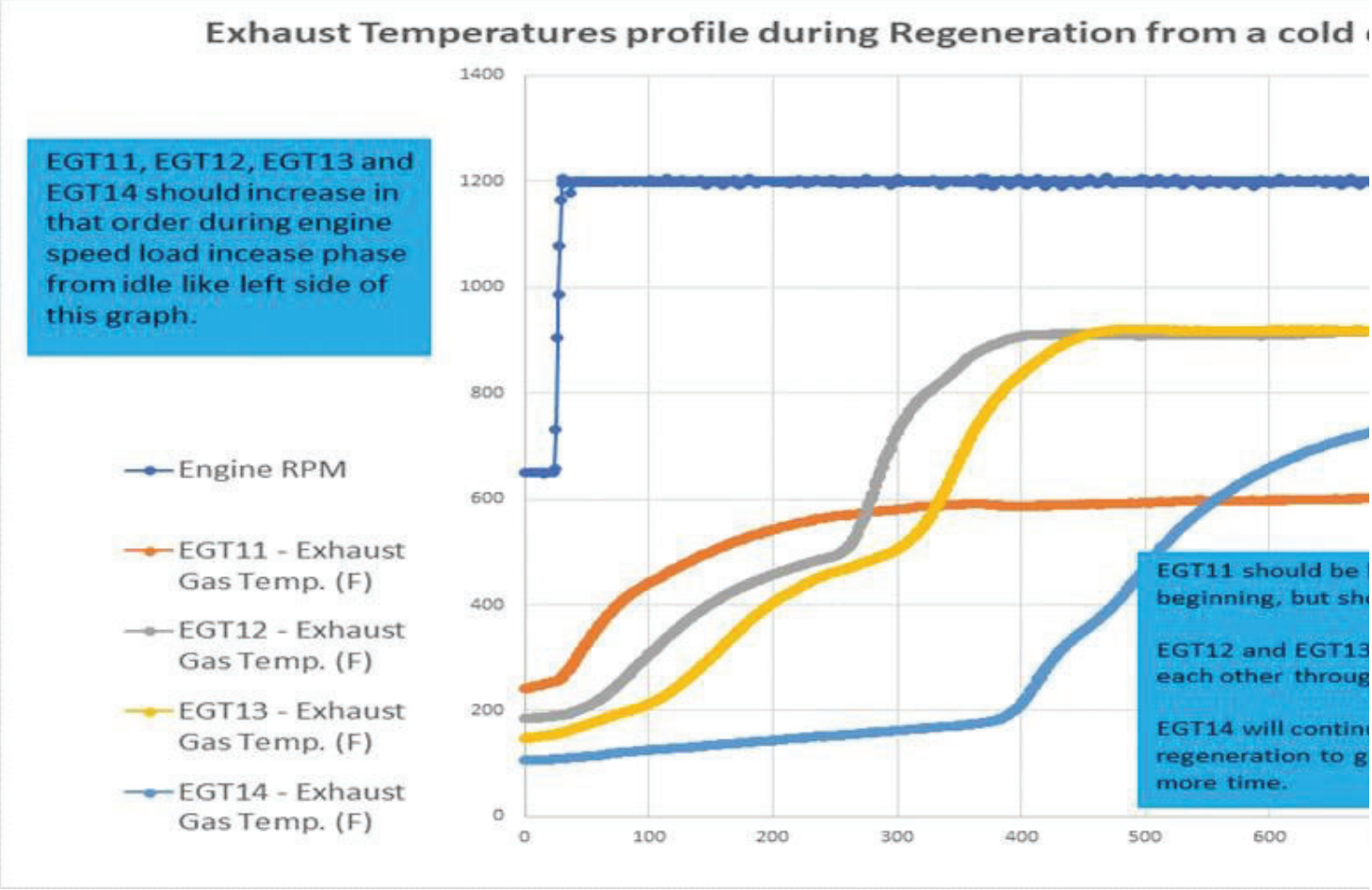
- **If the Adaptive Factor is higher than 1.2:**

Live UI

- Replace the AHI Nozzle
- Reset the Adaptive Factor using the option in PTT
- Run a Service Regeneration. Ensure that the temperature graph looks similar to the one in the image below.

- **If the Adaptive Factor is lower that 1.2:**

  - The AHI nozzle is NOT the likely cause of the failed regeneration. Symptom Based Diagnostics in PTT should be followed from this point.



Rules for Replacement

In order for a repair to be eligible for warranty coverage, one of the diagnostic trouble codes (DTCs) listed above must be present. However, in rare cases where there is a potential failure but no DTCs are detected, please provide supporting evidence of the failure. This can be in the form of a photo or video, along with an explanation for the need of replacement. This evidence will be used to determine if the repair qualifies for warranty coverage. For any additional support with diagnostics, open an e-Service case

Standard Diagnostic Time for the AHI Nozzle is 1.4 hours

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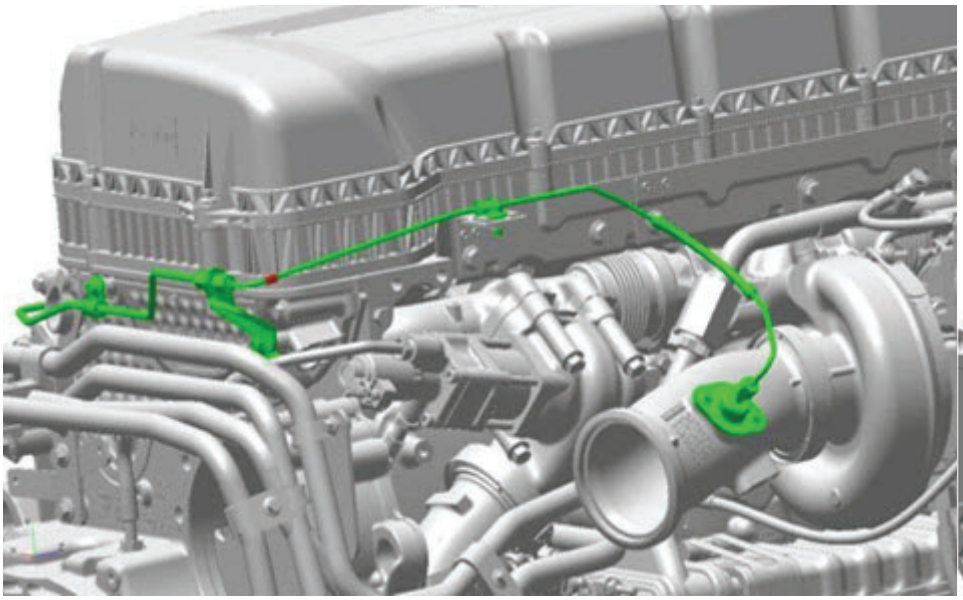
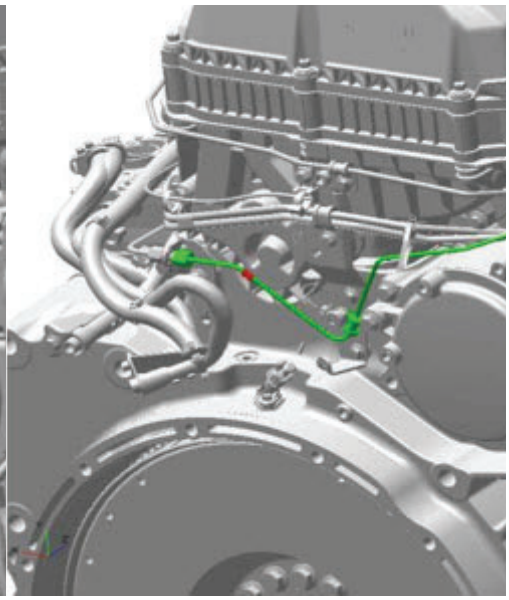
ıd Air Lines

Component Overview

These lines run from the AHI Module to the Nozzle and are two-piece metal lines. With start of production 2017 these lines have a limited serviceability (3 times only) that are marked with plastic clips.
The primary failure mode of these lines is leaking (fuel/air) at the points of connection. Because of the atomized fuel and air this leaking may not be easily noticeable.



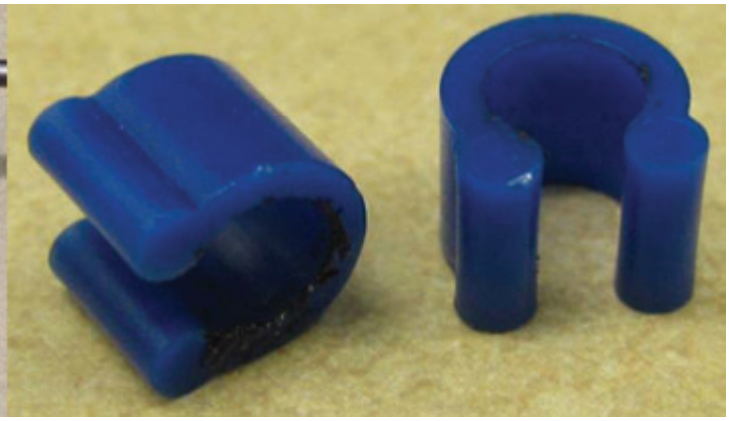
2017 VGT Engine



2017 TC Engine

Diagnosis and Repair

These lines are only to be tightened 3 times before they require replacement. This applies to both connection points of the lines (AHI Module and AHI Nozzle). When new, two plastic C-clips are installed on each of the lines. Each time a line is removed and re-tightened, one of the plastic clips is to be removed. When there are no clips left on the line it should be replaced with a new one.



Lines are to be torqued in accordance with the table below.

NOTE: It is extremely important to follow proper torque to reduce premature line failure.

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Torque Specifications

US17 and newer	
Air/Fuel Line Fittings	25 ± 6 Nm (221 ± 53 in-lb)
Connection Joint	15 ± 2 Nm (135 ± 18 in-lb)
US13 through US16	
Air/Fuel Line Fittings	22 ± 2 Nm (195 ± 18 in-lb)
Connection Joint	22 ± 2 Nm (195 ± 18 in-lb)

Tags

mack p24f700 p20dc00 p20de00 p20e000 p20d713
p24fb00 p24f600 p20cf7a p20d000 p269a00 p269900
p269713 p20dd00 p20da00 p20d900 p24f813 p24fa00
ahi module ahi nozzle unlocking uptime 7th injector

Categories *

Make and Model > Mack Americas > CXU/CHU/PI - Pinnacle

Make and Model > Mack Americas > LEU - TerraPro Low Entry

Make and Model > Mack Americas > LR

Make and Model > Mack Americas > TD - Titan

Make and Model > Mack Americas > MRU/TE - TerraPro

Vehicle System > Emissions

Make and Model > Mack Americas > AN - Anthem

Make and Model > Mack Americas > GU/GR - Granite

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Tech Tool

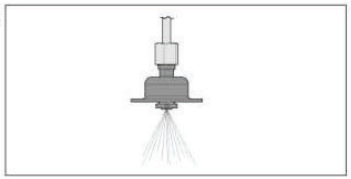
Tech Tool | Links | Help

BRADLEY PICKENS

Product | **Product History** | **Diagnose** | **Test** | **Calibrate** | **Program**

A

B



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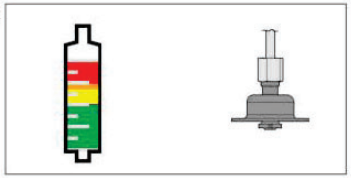
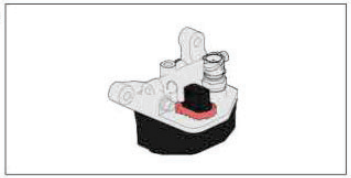


D



2545-08-03-02 Exhaust Aftertreatment Diagnostics

Simulation

Information >> Conditions >> Execution

Purpose

Check the function of the exhaust aftertreatment system (DPF)

Ash and soot level reset

Description

This operation allows monitoring of system conditions, activation of components and reset of system values

Selections

Select the illustration corresponding to the method or test to be performed

A

Sensor Values, Monitoring

B

Aftertreatment hydrocarbon doser air flow test

C

DPF System Reset

- AHD Adaptive Factor
- Soot Level

D

Active Diagnostics Test

- The "Active Diagnostics Test" is self-test of the dosing control system
- Aftertreatment Hydrocarbon Dosing Module

Continue > | Cancel

Chassis ID: M763 16441 VIN: 1M2AV02C2HM016441 Work Order: 7777

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