

**\*\* SOLUTION \*\***

Title Diagnostic Trouble Codes ( DTC ) P20EE, P207F And P103C, Diagnostic Procedure - **R EPLACES GUIDED DIAGNOSTICS IN PREMIUM TECH TOOL ( PTT ) - US10+OBD2013 to US14+OBD2016 (Non-Common Rail) Emissions, Commonly Model Years 2014 To 2017**

**Mack Models**

**Mack Model** LEU , MRU - TerraPro , CHU - Pinnacle, Axle back , CXU - Pinnacle, Axle front , G U - Granite , TD - Titan

**Volvo Models**

**Volvo Model** VNL , VNM , VNR , VAH , VHD

**Emission Standard**

Emission Standard US10+OBD13 , US14+OBD13 , US14+OBD15 , US14+OBD16

**Engine family**

Engine family D12 , 11L Engine , 13L Engine , 16L Engine , MP7 , MP8 , MP10

**\*\* SOLUTION \*\***

Cause Procedures and checks to follow for P20EE, P207F or P103C on US13 to US16 chassis.

## Solution

**IMPORTANT**

An eService case **IS NOT** required for **ANY STEP** of the process below. A case should **ONLY BE OPENED** if further assistance is required to complete diagnosis.

If test results determine an SCR replacement is required, A **CASE IS NOT REQUIRED TO ORDER A REPLACEMENT.**

Cases submitted solely to request approval to replace an SCR **WILL BE REFUSED.**

**The following checklist should be used for diagnosis of P20EE, P207F or P103C on US10+OBD13 to US14+OBD16 chassis instead of Guided Diagnostics.**

**DO NOT REPLACE ANY PARTS UNTIL ALL ACTIVITIES LISTED IN THIS SOLUTION ARE COMPLETE.**

**NOTE:** The Malfunction Indicator Lamp ( MIL ) may still be lit even if P20EE shows inactive

on a DTC Readout.

## I. Vehicle History

- **The following information should be obtained and reviewed prior to beginning diagnosis.**

- Is this the chassis's first visit to the dealer for either of these codes?
- Have there been any previous failures or problems that may have caused problems with the Exhaust Aftertreatment System (EATS)?

Examples:

- Turbocharger failure
- EGR Cooler failure
- Coolant passage through the exhaust
- Excessive fuel through the exhaust (Injector failure, AHI failure)
- DPF failure
- Contaminated DEF

**NOTE: If this is the chassis's first visit for any of the three codes, a Crystal Sublimation should be performed and the chassis released after confirming the items below.**

## II. Check the DTC Readout

- **A complete DTC Readout from the time of the vehicle's arrival should be attached to the eService case if one must be opened as outlined in Step V.**

- **Are there any other NOx sensor DTCs present?**

- **P225E** and **P0422** are very similar to P20EE. The checks below should be followed for these codes as well.
- Any other NOx sensor codes may suggest intermittent NOx sensor failure.

- **Are there any codes present for other engine components that would indicate an issue contributing to or causing either P20EE, P207F or P103C?**

- Examples:

### **EGR System**

Fuel System ( Includes AHI)

Turbocharger/Boost

DPF

Exhaust temperature

## III. Check SCR Efficiency Evaluations

- **SCR Efficiency values can be found in Premium Tech Tool ( PTT ) Operation [2589-08-03-05 Aftertreatment Selective Catalytic Reduction \(SCR\) System.](#)**



- The last five efficiency evaluations are displayed as shown in the screenshot above.

**Note:** US10+OBD13 vehicles will only display one previous evaluation. A screenshot should still be provided if an eService case is opened.

If all five tests are below the fault limit, SCR conversion has been poor for an extended amount of time.

If only one or two are below the fault limit, conversion is only intermittently poor.

- Information on driving conditions when the poor conversion is occurring may provide insight into the cause of the codes.

#### IV. SCR System Checks

- Check DEF quality with a refractometer

- Physically check for any contamination in the DEF tank

- Examples
  - Dirt or Debris
  - Coolant
  - Water
  - Fuel
  - Oil

- Physically inspect the DEF Dosing Valve, Diffuser Pipe, and SCR Inlet for crystallized DEF

- Ensure there is no significant/excessive crystal buildup in any component.
  - NOTE:** A small amount of crystal accumulation is normal.
- If significant accumulation is noted clean it as first step and then ensure that the DEF dosing valve is correctly installed with all gaskets and clamps positioned properly.

- Perform DEF Dosing Test 2 (confirms correct operation of the DEF dosing valve)

- Located in Operation [2589-08-03-05 Aftertreatment Selective Catalytic Reduction \(SCR\) System](#).

Test B from the first screen of the operation

- Test two is the **Small Dosing Test**

The test should be run twice and results noted to an accuracy of 2 milliliters

Nominal Volume is **55 mL**

Acceptable range is 55 mL ± 3 mL

- **Run a NOx Conversion, Operation 2549-08-03-03.**

- **Note:** This test checks the function of both NOx sensors. It does not evaluate SCR efficiency.
  - While running the routine if you get new NOx sensor fault code (Egs: P220E-93 , P220F-93), then troubleshoot that fault code. Typically P220E-93 fault code suggests replacement of NOx1 sensor.
  - Inlet and Outlet NOx Sensor values should be close to each other at high engine speed (last portion of the test) as shown below.
- If during the test difference between NOx sensors are greater than 10%, we recommend replacing sensor reading higher value and re-do the test.

The likelihood that both sensors require replacement at once is low. Replacement of both sensors at once should not be considered immediately unless affected by an upstream failure.



**V. If no fault is found and an eService is required for further assistance, the following items MUST BE included when the case is opened:**

- **A thorough description of vehicle history**

- Summary of previous visits to service locations
- Previous repairs and part replacements and findings that led to the repair or replacement

- **A complete list of all diagnostic steps performed including actual numerical values observed in the steps above.**

- "Performed GD", "Completed worksheet", "Completed solution" etc. do not provide any

information on work that has already been done.

- "Good", "OK", "in spec", are not acceptable values. Numerical values are required.
- CBR solution numbers should be included.

- A complete DTC Readout from the time of the vehicle's arrival.

- A screenshot of SCR efficiency evaluations as shown in Section III.

- A screenshot of the NOx Conversion test as shown in Section IV.

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Internal comments (BO)

For US13 to US16 cases with P20EE (and /or P103C) evaluate following 6 items:

1. SCR efficiency looks bad (all 5 evaluations hovering around or lower than 80%)
2. NOx conversion just before shutdown looks good (Both NOx sensors are within 10% of each other and values between 200-500ppm). When in doubt replace sensor reading higher value (higher by atleast 10%). Also make sure there were no new NOx sensor codes created while running the NOx conversion test (Egs: P220E-93).
3. DEF quality inspection is good
4. Dosing flow test is good (52-58cc)
5. No other relevant fault codes (EGR system, fuel system)
6. Prior visit got Crystal sublimation completed and truck is back within 2 weeks for same issue.

If all 6 of the above items are OK, we would recommend replacing SCR. Please make sure to collect all the data as per checklist prior to recommending SCR replacement.

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Solution visibility

Dealer distribution

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### Function(s)/component(s) affected

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Function affected

Diagnostic tool , SCR , EGR , DPf

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### Function Group

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Function Group

254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment

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### Customer effect

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Main customer effect

regeneration , diagnostics/methodology , efficiency/abnormal behavior , fault code /display

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Fluid implicated

Diesel Exhaust Fluid (DEF)

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### Fault Codes And Error Codes

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OBdII Diagnostic Trouble Codes (P, U, B Format)

P0422-00 , P103C-00 , P207F-00 , P20EE-00 , P225E-00

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### Conditions

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Vehicle operating mode

when driving , when stationary

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Frequency of occurrence of problem

random

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### Administration

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Author	RU4469V
Dealer ID	RU4469V
Last modified by	RU4469V
Creation date	17-01-2018 16:01
Date of last update	20-01-2020 17:01
Review date	08-01-2019 00:01
Status	Published
Average score	2.5333333015441895
Number of scores	15
NA_Reviewer	ut0031h
NA_Author_Group	GTT

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