



## Selective Catalytic Reduction (SCR) Parts Supersession; New Part Numbers For SCR Muffler/Canister - All One Box And Two Box Configurations EXCEPT Turbo Compound - US17+OBD16 And US17+OBD18 Emissions, Model Years 2018 And 2019



> Internal Content

**THIS SOLUTION SHOULD ONLY BE UTILIZED AFTER RECEIVING AUTHORIZATION FROM DEALER TECHNICAL SUPPORT AS OUTLINED IN SOLUTION K65527708.**

**Note: SCR part numbers do not change for Turbo Compound (TC) applications.**

**Volvo** Part Number **21970118** – This P/N has been replaced for all applications except for Turbo Compound applications, replacement P/N is **23189992**.

**Mack** Part Number **21970120** – This P/N has been replaced for all applications except for Turbo Compound applications, replacement P/N is **23189994**.

Copper (Old) Part Numbers			
P/N	Description	Brand	Notes
22058301	SCR, VBOC Bottom Inlet	Volvo	
21970125	SCR, VBOC Side Inlet	Bus	
22058302	SCR, VBOC Bottom Inlet	Mack	
22058306	SCR, VBOC Side Inlet	Mack	
21970118	1-Box DPF + SCR	Volvo	<b>Part number does not change for Turbo Compound vehicles!</b>
21970120	1-Box DPF + SCR	Mack	<b>Part number does not change for Turbo Compound vehicles!</b>



Hybrid Part Numbers		
P/N	Description	Brand
23190004	SCR, VBOC Bottom Inlet	Volvo
23190006	SCR, VBOC Side Inlet	Bus
23190005	SCR, VBOC Bottom Inlet	Mack
23190007	SCR, VBOC Side Inlet	Mack
23189992	1-Box DPF + SCR <u>except TC</u>	Volvo
23189994	1-Box DPF + SCR <u>except TC</u>	Mack



Tags [k05618059](#)

## Related links and attachments

No links or attachments available



## Feedback

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

Title Diagnostic Trouble Codes (DTC) P20EE And P103C, Diagnostic Procedure; **REPLACES GUIDED DIAGNOSTICS IN PREMIUM TECH TOOL ( PTT ) - US17+OBD16 Through US17+OBD2018 Emissions, Model Years 2018 And 2019**

**Mack Models**

**Mack Model** LR , MRU - TerraPro , TE - TerraPro , AN - Anthem , CHU - Pinnacle, Axle back , CXU - Pinnacle, Axle front , GR - Granite , GU - Granite , PI - Pinnacle

**Volvo Models**

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

**Emission Standard**

Emission Standard US17+OBD16 , US17+OBD18

**Engine family**

Engine family 11L Engine , 13L Engine , MP7 , MP8

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

**Cause** Procedures and checks to follow for P20EE and P103C on US17+OBD2016 and US17+OBD2018 chassis.

**Solution**

**5 JANUARY 2020 UPDATE**

**There is no longer an eService case 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.**

**PRIOR TO PROCEEDING**

**Review open campaigns for the vehicle and ensure that it is NOT listed for Recalls EC0020a, EC0022a, EC0022b, or EC0022c.**

**IF THE CAMPAIGN APPLIES TO THE VEHICLE:**

- No diagnostics are necessary.
- No eService case is necessary.

**Follow the recall instructions if the vehicle is listed. This solution should only be utilized if the vehicle is not included in any of the recalls.**

**CASES AND DIAGNOSTIC TIME REQUESTS OPENED FOR CHASSIS AFFECTED BY ONE OF THE ABOVE RECALLS WILL BE REFUSED.**

**⚠ WARNING**

**If this solution is being reviewed for P225E-00, solution [K15560422](#) must be utilized FIRST, and this solution should only be followed if the NOx sensors are determined to be functioning properly. The tests performed in [K15560422](#) do not need to be duplicated for this solution.**

**The following checklist should be used for diagnosis of P20EE or P103C on GHG17 chassis instead of Guided Diagnostics.**

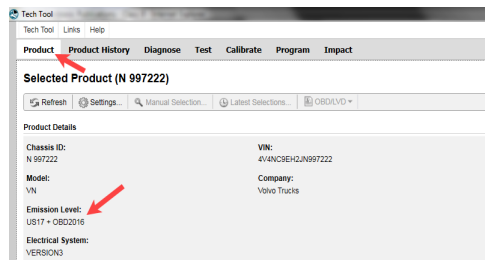
**DO NOT REPLACE ANY PARTS UNTIL ALL ACTIVITIES LISTED IN THIS CBR ARE COMPLETE.**

**NOTE:** The Malfunction Indicator Lamp ( MIL ) may still be lit even if P20EE shows inactive on a DTC Readout.

## I. Vehicle Emissions Level

### Review the vehicle emissions level

- Details can be found in the Product Details box on the Product tab in PTT as seen below:



- **If the vehicle is US17+OBD16 or US17+OBD18:**

- Perform Sections II and III below.

## II. Vehicle History

- **The following information should be obtained 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

## III. Check the DTC Readout

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

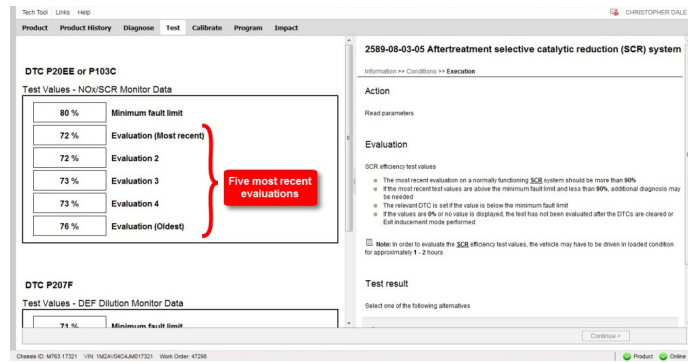
- **P225E** and **P0422** are very similar to P20EE and should be checked with the same steps below.
- Any other NOx sensor codes may suggest intermittent NOx sensor failure.

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

- Examples:
  - EGR System
  - Fuel System ( Includes AHI)
  - Turbocharger/Boost
  - DPF
  - Exhaust temperature

## IV. 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.
  - 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.

## V. SCR System Checks

**All steps below should be performed to verify proper function of each component.**

### 1. Check DEF quality with a refractometer

### 2. Physically check for any contamination in the DEF tank

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

### 3. 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.

### 4. Perform DEF Dosing Test 2 to confirm proper function

- 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

### 5. Check the Main Software part number for the Engine Control Module (EMS).

- **If vehicle has Turbo-compound system, then do not update EECU SW. Only EECU MSW 23470187 and older have capability to run NOx conversion test on Turbo-compound vehicles.**
- **If vehicle has VGT system, then update EECU MSW to 23766686 or newer.**

### 6. If vehicle has a Turbo-compound System run NOx Conversion, Operation [2549-08-03-03](#). (only possible if vehicle still has 23470187 and older EECU MSW).

### 7. If vehicle has a VGT System run Exhaust After-treatment System Analysis, Operation [2589-08-03-18](#). Make sure to evaluate only NOx sensors and SCR using this test (See Picture Below).

# 2589-08-03-18 Exhaust Aftertreatment System Analysis


## Simulation


Information >> Conditions >> **Execution** >> Result

▼ Information

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▲ Action

 It is highly recommended to run all the subtests at the same time in order to do a system evaluation. However, each subtest can be selected individually on recommendation, diagnostic/service information or Technical Support.

 **Note:** All subtests are enabled by default

Deselect which subtests not to run

- Aftertreatment hydrocarbon injection (AHI) system
- NOx sensors
- DEF dosing system
- SCR efficiency

If NOx sensors have been recently evaluated to be good or replaced, Just selecting SCR efficiency is preferred.

### Interpreting NOx Sensor Test Results:

When NOx Sensors portion of the test is completed look for results on right hand side as shown in picture below.

## 2589-08-03-18 Exhaust Aftertreatment System Analysis

Information >> Conditions >> Execution >> Result

### Result

Recommended actions

Detailed information



AHI system values

NOx sensor values

Primary	Low level	High level
Average difference	8 ppm	6 ppm
Secondary		
MAX difference	50 ppm	100 ppm
Average inlet	231 ppm	804 ppm
Average outlet	223 ppm	798 ppm

Average difference Low more than 75 ppm suggests one sensor not acceptable (Currently we may fail at difference >50ppm). If results for low level (circled above) is between 50-75 ppm, sensors are OK. Re do the 2589-08-03-18, while selecting only SCR efficiency.  
 If results for low level is greater than 75 ppm, look and see if there are any other NOx sensor fault codes suggesting a sensor to be damaged. If no other codes, we would recommend replacing the sensor reading higher values in the test (Egs: In the example above NOx Inlet sensor would be suspected to be failed, as Average Inlet is higher than Average Outlet).

### Interpreting SCR Efficiency Results:

Expected Efficiency by Step 2 is more than 83% for Good SCR. If Step 1 gets more than 85% efficiency Step 2 is skipped (Fast Pass).

Maximum Efficiency out of Step1 and Step 2 below 77% is considered degraded SCR and SCR can be replaced.

Maximum efficiency out of Step 1 and Step 2 above 83% is considered Good SCR and should not be replaced.

Maximum Efficiency out of Step 1 and Step 2 between (77-83)% is considered marginal SCR, replacement can be done based on other considerations (Repeat visit, any derates etc).

SCR efficiency test values

Primary	Step 1	Step 2
Conversion Efficiency	97 %	0 %
MIN Conversion efficiency threshold	65 %	77 %

### VI. eService Case

If further assistance is required to complete diagnosis and an eService case is opened, the case **MUST INCLUDE**:

1. The vehicle history as described in Section I.
2. A complete DTC Readout from the time of the vehicle's arrival.
3. Screenshots of:

- SCR Efficiency values as shown in Section III
- The NOx Conversion Test as shown in the picture in Section IV.

**NOTE: Refer to CBR Solution [K52225504](#) - Methods For Taking A Screenshot**

4. A description of findings for each item checked in Section IV, **including numerical values for the dosing tests** ("Good", "Okay", "In spec", etc. are not acceptable values).

Internal comments (BO)	<b><u>For OBD2019 and Newer vehicles (Truck MY2020+), there is a new CBR.</u></b>  GHG2017 and OBD2018 vehicles have Exhaust Aftertreatment System Analysis Test (2589-08-03-18), which helps evaluate NOx sensors, DEF dosing valve and SCR in one ~30 minute test with wk1945+ EECU MSW (P/N 2376686 or newer) releases. We do not have capability to run either NOx conversion or EATS Diagnostics Test (2589-08-03-18) on Turbocompound Vehicles.
Solution visibility	Dealer distribution
<b>Function(s)/component(s) affected</b>	
Function affected	Diagnostic tool , DEF Dosing , SCR
<b>Function Group</b>	
Function Group	254 catalytic converter; exhaust emission control equipment , 258 emissions after-treatment
<b>Customer effect</b>	
Main customer effect	regeneration , diagnostics/methodology , efficiency/abnormal behavior , fault code/display
Fluid implicated	Diesel Exhaust Fluid (DEF)
<b>Fault Codes And Error Codes</b>	
OBDII Diagnostic Trouble Codes (P, U, B Format)	P0422-00 , P103C-00 , P20EE-00 , P225E-00
<b>Conditions</b>	
Vehicle operating mode	when driving , when stationary
Frequency of occurrence of problem	random
<b>Administration</b>	
Author	UT0031H
Dealer ID	UT0031H
Last modified by	A241298
Creation date	05-06-2018 17:06
Date of last update	14-05-2020 19:05
Review date	01-10-2018 00:10
Status	Published
Average score	4
Number of scores	5
NA_Reviewer	ut0031h
NA_Author_Group	GTT

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