SI B18 02 17
Exhaust Systems

December 2017
Technical Service

DIAGNOSING SELECTIVE CATALYST REDUCTION (SCR) EFFICIENCY FAULTS

MODEL

E90 (335d)	E70 (X5 xDrive35d)

SITUATION

The Service Engine Soon light is on. The mileage countdown warning to a no start condition is displayed in the Control Display for incorrect exhaust fluid added. One or more of the following fault codes are stored in the DDE:

M57Y:

- **41F9** SCR system: System error and poor urea/water mixture quality detected
- **474C** SCR system, warning and deactivation scenario: Warning level 1
- **4748** SCR system, warning and deactivation scenario: Warning stage 2
- **4746** SCR system, warning and deactivation scenario: Warning stage 3 (maximum range reached)
- **4D08** SCR system, warning and deactivation scenario: Warning stage (maximum range reached, no engine start possible)
- **4D16** SCR system, efficiency (model years 2009 – 2012)
- **42FC** SCR exhaust emission system, efficiency (model year 2013 E70)
- **4D18** SCR system, efficiency (model year 2013 E70)

CAUSE

The SCR system is not efficiently converting NOx.

PROCEDURE

Follow the troubleshooting attachment for enhanced diagnosis of the SCR system.

WARRANTY INFORMATION

Not Applicable

ATTACHMENTS

View PDF attachment **B18 02 17 SCR Diagnosis**.

PRELIMINARY WORK

- Work through all other fault codes stored in the DDE (EGR, fuel/air, boost control, SCR tanks, etc.). Other faults stored in the DDE not related to SCR can affect the NOx levels in the exhaust.

- Check vehicle service history for previous repairs/ parts replacement. Do not repeatedly replace parts based off the SCR system diagnosis final report (Example: Test plan states to continually replace an NOx sensor that is known to be a good part).

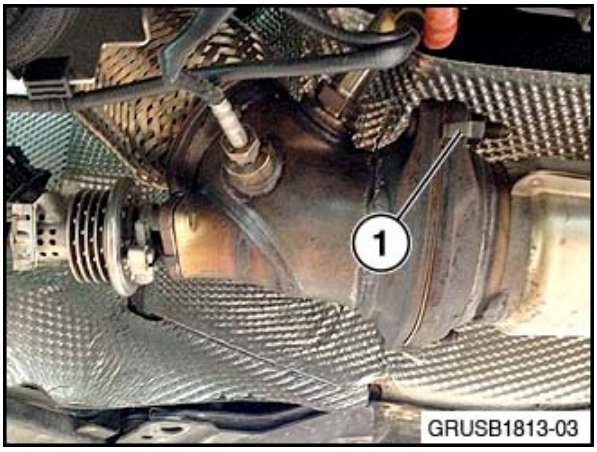
- Confirm the engine runs at operating temperature. An engine running cooler than specified (thermostat jammed open) will affect EGR and fuel injection rates which will affect NOx levels that the SCR system has to convert.
- The engine temperature can be monitored through the KOMBI test functions.
    - With KL15 on press and hold down the reset button in the instrument cluster for 10 seconds.
    - Press the reset button to scroll to test step 19 and unlock the instrument cluster (the unlock code is the sum of the last 5 digits of the VIN – example: VIN XY12345 (1+2+3+4+5 = 15).

    - Scroll through the test steps again to test step 7 (engine operating temp).

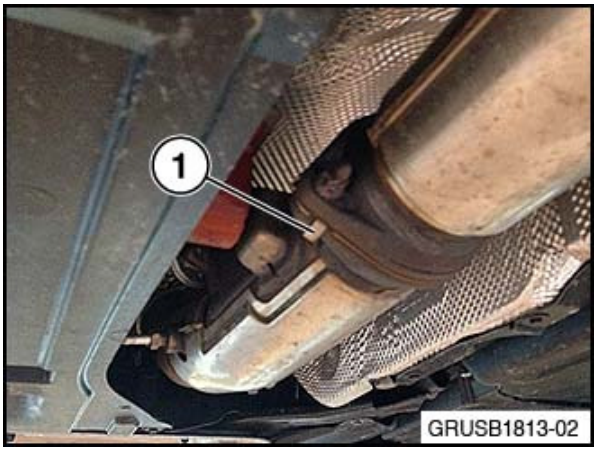
- Drive the vehicle and monitor the engine temperature. The coolant thermostat should open at 88°C (±2°C). **NOTE**: Do not leave the engine idling in the shop to monitor the engine coolant temperature. Only checking while driving (air passing through the radiator) will give an accurate reading of the engine operating temp.
- Replace the engine thermostat if necessary.

CHECKING THE DEF MIXER (E90 and E70 with the M57Y)

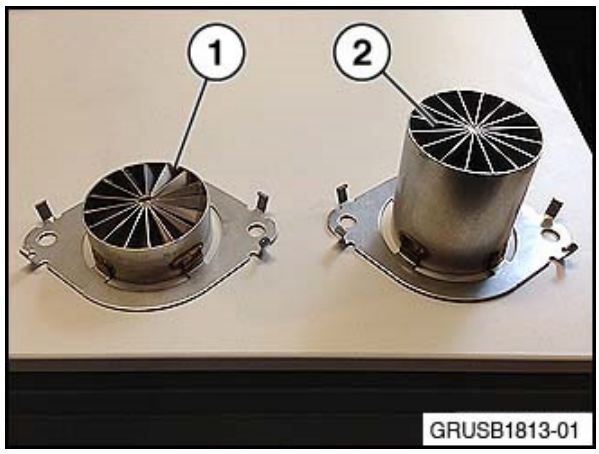
Ensure the mixers are pointing correctly in the exhaust stream for proper dispersion of ammonia into the SCR cat.



- The retaining tabs (1) for the E90 mixer point towards the tailpipe.

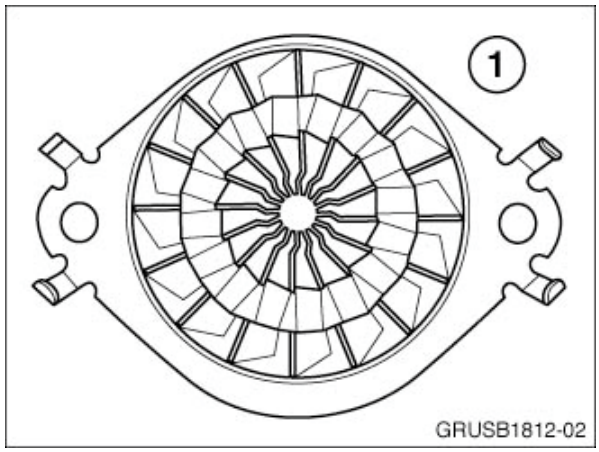


- The retaining tabs (1) for the E70 mixer point towards the engine.



- The E90 mixer (1) is shorter than the mixer for the E70 (2).

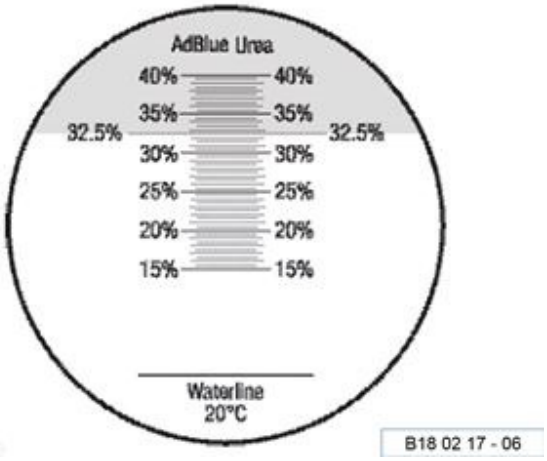
The mixers are model specific and designed to disperse the ammonia into the exhaust path correctly. If necessary, remove the mixer for inspection and proper fitment. The E90 mixer **can** fit into the E70 exhaust system. Ensure the correct mixer is installed and is facing in the correct direction.



- Inspect the fins on the mixer. If the fins are split (1) the mixer needs to be replaced.
- Replace the mixer with P/N 18 30 8 513 445 (E70) or P/N 18 30 8 512 438 (E90).

- Check for contamination, damage to the fins or DEF build-up on the mixer (1). DEF build-up can washed away with water.

CHECKING DEF CONCETRATION and THE METERING VALVE

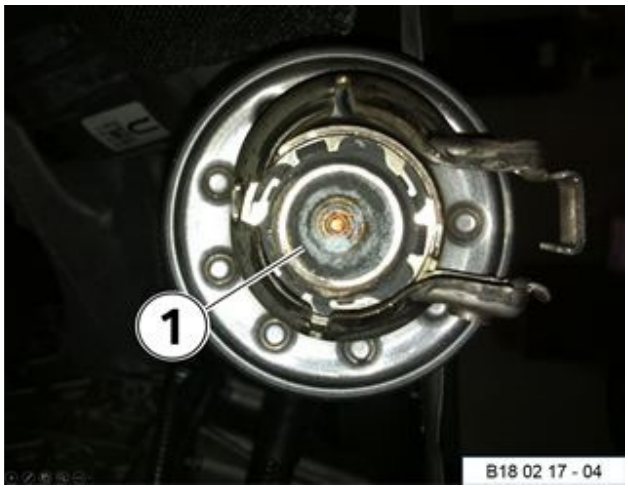


- Check the DEF with a calibrated refractomer (SI B04 19 11). The concentration of urea must be within 31.8 - 33.3%.

- If the DEF concentration is below or above the specified range the DEF needs to be fully drained and refilled with fresh DEF.
- Vehicles that are constantly having top offs of the active tank will may end up with degraded DEF in the passive tank. Once there is a transfer of DEF from passive to active the degraded fluid will contaminate the active tank (vehicle may return for a repeat visit where the system was operating as designed at last repair). Check the DEF concentration at the passive tank and drain/replace if necessary)

- If the concentration is within specification: Check that the DEF tanks are not empty (at least ¼ full). Top off if necessary

- The metering valve needs to be removed when checking the dosing amount during the first test step of the SCR System Test (ABL-DIT-AT1361_SCR_SYS_M57_2-SCR exhaust emission system test – V.2).



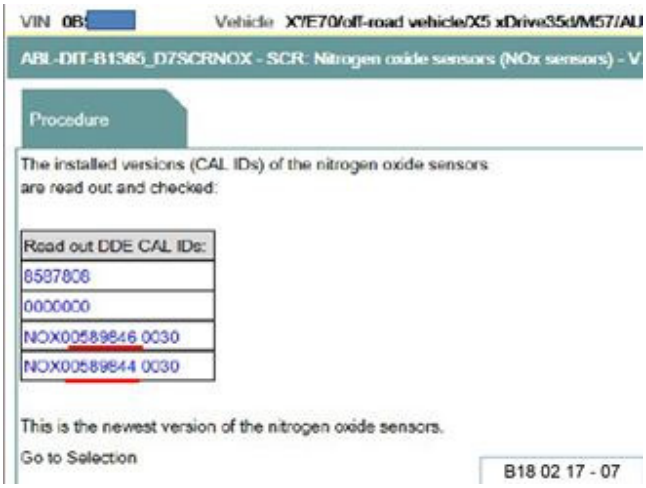
- Check the metering valve for any DEF build-up (1) during this test. Clean off build-up with water.

- Check the spray pattern of the metering valve when performing the quantity measurement.
- Check the port for the metering valve in the exhaust for any crystalized DEF build-up.

- Any blockage in the exhaust (1) will compromise the spray of DEF and will also absorb DEF which will decrease the amount of ammonia entering the SCR cat.

CHECKING THE NOx SENSORS

- Remove the NOx sensors from the exhaust and check the tips for contamination (excessive urea/oil). Reinstall if the ends are clean.
- Follow Test Plan **ABL-DIT-B1365_D7SCRNOX-SCR: Nitrogen oxide sensors (NOx sensors)-V.13 to check for updated NOx sensors.**



- ISTA will recognize the newest NOx sensor part number available. Replace the NOx sensor/s if the test plan indicates an old part number.

- Latest Part Numbers for NOx sensors:
  E70 and E90 pre:13 62 8 589 846
  E90 post :13 62 8 589 845
  E70 post :13 62 8 589 844

SCR CATALYST

Do not perform an SCR catalyst reset with Test Plan **ABL-DIT-B1365_D7USANAB-SCR system: Adjustment – V.20** (replacement of the SCR cat) unless the SCR cat has been replaced.

To reset SRC catalyst aging factor back to the current vehicle mileage do the following:

- Run Test Plan **ABL-DIT-B1365_D7USANAB-SCR system: Adjustment – V.20**
- System: SCR catalytic converter Selection:
- Select 2 Carry out SCR adjustments.
- Select 4 Engine control unit
- Select 2 A new control unit was already fitted. Date from the old control unit is not to be rescued.
- The current mileage gets transferred automatically into the DDE.

PERFORMING THE CONDITIONING RUN

A conditioning run has to be performed if one or more of the following fault codes are stored:

- **41F9** SCR system: System error and poor urea/water mixture quality detected
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These faults cannot be cleared until the DDE has monitored a successful SCR conditioning run (Correct DEF and SCR efficiency)

DO NOT CLEAR FAULTS

• Check the DEF filling level and top up. Turn on the ignition and wait 3 minutes. The Check Control message will disappear if the cause was missing DEF in the active tank.

• Check if the active tank is frozen; if so, let it thaw.

• Check whether other fault codes relating to the SCR system are stored and rectify them.

• Check the quality of the DEF and drain/replace if necessary.

In case of further stored SCR faults, perform the following steps:

• Rectify SCR faults.

• Reset the SCR adaptations (long-term adaptation factor only).

• Request a forced diesel particulate filter regeneration. Follow Test Plan **ABL-DIT-B1363_D7CSFREG.** Select Request regeneration (first selection).

• Drive the vehicle until the Check Control message for the switch-off scenario in the KOMBI goes out. The minimum duration for the drive is 20 minutes at approximately 60 - 90 km/h (45 - 60 mph) but could take up to one hour.

NOTE: The vehicle may also be driven when the mileage countdown range is insufficient for the test drive (mileage range has reached 0). Only the engine start will be prevented. Do not turn off the engine!

There is a one-time reset available through ISTA to reset the count-down to 50 miles. Follow test steps in Test Plan **ABL-WAR-B1365_D7SCRRST – SCR reset – V.3**