

ISX15 CM2350 X101**Fault Code: 5655 | SPN: 4364 | FMI: 31****Aftertreatment 1 SCR Conversion Efficiency - Condition Exists**

- 1 Fault Code 5655 requires that ALL solutions be performed**
- 2 Check for primary fault codes**
- 3 Aftertreatment diesel exhaust fluid is contaminated**
- 4 Aftertreatment exhaust system leaks**
- 5 Charge air cooler or exhaust system leak**
- 6 Leaks in the aftertreatment diesel exhaust fluid dosing system**
- 7 Aftertreatment Diesel Exhaust Fluid Doser Pump Override test**
- 8 Aftertreatment SCR System Test**
 - 8.1 Aftertreatment diesel exhaust fluid dosing system test failed**
 - 8.2 Aftertreatment intake NOx sensor failed**
 - 8.3 Aftertreatment outlet NOx sensor - Inspection**
 - 8.4 Inspect both aftertreatment NOx sensors**
 - 8.5 Aftertreatment SCR Catalyst Test Failed**
- 9 ECM calibration revision history check**

1 Fault Code 5655 requires that ALL solutions be performed

Solution: S00007691

Verification

Conditions

- Turn keyswitch OFF.

Action

- This solution is information only.
- ALL solutions displayed for this fault code **must** be performed.
- Continue to perform the verifications of ALL solution steps listed for this fault code regardless if a given solution is within specification or out of specification.

Specification

- This solution is information only.

Linked Solutions

- None

Repair

- If a resolution is found in any solution for this fault code, continue performing ALL solutions listed for this fault code.

Validation

- None

2 Check for primary fault codes

Solution: S00000071

Verification

Conditions

- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.

Action

- Use the recommended Cummins® electronic service tool or equivalent to read the fault codes.

Specification

Before troubleshooting this fault code, troubleshoot any fault code that is active or has more than one inactive count within the last 25 engine operating hours from the following list:

- Aftertreatment NOx: 1885, 1887, 2771, 3228, 3232, 3545, 3583, 3649, 3681, 3682, 3717, 3718, 3725, 3748, 3749, 4452
- Aftertreatment outlet oxygen: 4749, 4751, 5656
- Aftertreatment intake oxygen: 4747, 4748
- Aftertreatment SCR: 3142, 3146, 3147, 3148, 3165, 4164, 4166, 4518, 4519, 4521, 4524, 4525, 6266, 6267, 6268, 8363
- Aftertreatment diesel exhaust fluid system: 1668, 1669, 1673, 1682, 3497, 3498, 3571, 3572, 3574, 3575, 4677, 4732, 4739, 5278
- Aftertreatment diesel exhaust fluid dosing unit: 3558, 3559
- Ambient air temperature: 249, 256, 2398

Linked Solutions

- None

Repair

- Perform a search on the appropriate fault codes.

Validation

- None

3 Aftertreatment diesel exhaust fluid is contaminated

Solution: S00000563

Verification

Conditions

- Turn keyswitch OFF.

Action

- Visually Inspect the diesel exhaust fluid in the tank for signs of debris or contamination. Refer to Procedure 011-056
- Use a diesel exhaust fluid refractometer to measure the concentration of the diesel exhaust fluid in the tank. Refer to Service Bulletin 4021566

Specification

- If there are signs of contaminants in the aftertreatment diesel exhaust fluid, then proceed to the Repair section.

Linked Solutions

- None

Repair

- Drain the diesel exhaust fluid tank, clean thoroughly and refill with pure diesel exhaust fluid. Refer to Procedure 011-056

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

4 Aftertreatment exhaust system leaks

Solution: S00001008

Verification

Conditions

- Engine running.

Action

- Visually inspect for leaks in the exhaust manifold to head. Refer to Procedure 010-024
- Visually inspect for leaks from the turbocharger to exhaust manifold. Refer to Procedure 010-024
- Visually inspect for leaks in the exhaust plumbing between the turbocharger outlet and the Aftertreatment DOC intake connection. Refer to Procedure 010-024
- Visually inspect the exhaust piping for leaks, cracks, and loose connections. Refer to Procedure 010-024
- Inspect for leaks at the aftertreatment DOC housing, sensor ports and connection points. Refer to Procedure 010-024
- Visually inspect the aftertreatment and SCR components for exhaust leaks. Refer to Procedure 010-024

Specification

- If there is any damage or leaks found in the exhaust system, then proceed to the Repair section.

Linked Solutions

- None

Repair

Repair or replace **only** the components that were found to be out of specification.

- Replace the exhaust manifold. Refer to Procedure 011-007
- Repair or replace the exhaust plumbing. Refer to Procedure 011-007

Refer to OEM Service Manual

- Replace aftertreatment DOC. Refer to Procedure 011-049
- Replace the aftertreatment diesel particulate filter. Refer to Procedure 011-041
- Replace the aftertreatment SCR Catalyst. Refer to Procedure 011-036

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

5 Charge air cooler or exhaust system leak

Solution: S0000647

Verification

Conditions

- Engine running.

Action

- Run engine at high idle.
- Visually inspect for leaks in the exhaust manifold to head. Refer to Procedure 010-024
- Visually inspect for leaks from the turbocharger to exhaust manifold. Refer to Procedure 010-024
- Visually inspect for leaks from the EGR components. Refer to Procedure 010-024
- Visually inspect the exhaust piping for leaks, cracks, and loose connections. Refer to Procedure 010-024
- Visually inspect for leaks in the exhaust plumbing between the turbocharger outlet and the Aftertreatment DOC intake connection. Refer to Procedure 010-024
- Inspect for leaks at the aftertreatment DOC housing, sensor ports and connection points. Refer to Procedure 010-024
- Visually inspect the charge air cooler hoses for possible air leaks. Refer to Procedure 010-024
- Visually inspect the air compressor plumbing for possible air leaks. Refer to Procedure 010-024
- Pressure test the charge air cooler to check for leaks. Refer to Procedure 010-027

Specification

- If a leak is found, then proceed to the Repair section.

Linked Solutions

- None

Repair

- Repair or replace the leaking components.

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

6 Leaks in the aftertreatment diesel exhaust fluid dosing system

Solution: S00002840

Verification

Conditions

- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.

Action

- Perform the Aftertreatment Diesel Exhaust Fluid System Leak Test found under ECM Diagnostic Tests. Refer to Procedure 011-080
- While the test is running, inspect the diesel exhaust fluid tank connectors, diesel exhaust fluid dosing unit and dosing unit connectors, diesel exhaust fluid lines, and diesel exhaust fluid dosing valve for signs of external leaks.

Specification

- If a line, fitting, connection, or dosing unit is leaking, then a malfunction has been detected in the aftertreatment diesel exhaust fluid system or dosing unit.

Linked Solutions

- None

Repair

Repair or replace **only** the components that were found to be out of specification.

- Replace aftertreatment diesel exhaust fluid dosing unit. Refer to Procedure 011-058
- Replace the aftertreatment diesel exhaust fluid dosing valve. Refer to Procedure 011-059
- Repair or replace the leaking diesel exhaust fluid line, connector or fitting.

Refer to OEM Service Manual

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

7 Aftertreatment Diesel Exhaust Fluid Doser Pump Override test

Solution: S00001245

Verification

Conditions

- Reconnect all aftertreatment diesel exhaust fluid lines and electrical connectors to the dosing unit and aftertreatment diesel exhaust fluid tank if they have been previously disconnected during troubleshooting.

Action

- Remove the aftertreatment diesel exhaust fluid dosing valve from the decomposition tube. Refer to Procedure 011-059
- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.
- Use the recommended Cummins® electronic service tool or equivalent.
- Perform the Aftertreatment Diesel Exhaust Fluid Doser Pump Override Test. Refer to Procedure 011-063

Specification

- If the Aftertreatment Diesel Exhaust Fluid Doser Pump Override Test is **not** within specification, then proceed to the Repair section.

Linked Solutions

- None

Repair

Repair or replace **only** the components that were found to be out of specification.

- Replace the aftertreatment diesel exhaust fluid dosing valve. Refer to Procedure 011-059
- Replace aftertreatment diesel exhaust fluid dosing unit. Refer to Procedure 011-058

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

8 Aftertreatment SCR System Test

Solution: S00000541

Verification

Conditions

- Connect all components.

Action

- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.
- Use the recommended Cummins® electronic service tool or equivalent.
- Perform the Aftertreatment SCR System Test. Refer to Procedure 014-025

If the Aftertreatment SCR System Test is **not** available on the recommended Cummins® electronic service tool or equivalent, update to the latest ECM Calibration Revision and then perform the Aftertreatment SCR System Test.

Specification

- If the Aftertreatment SCR System Test does **not** pass, then proceed to the Linked Solutions section.
- If the Aftertreatment SCR System Test passes, then use the recommended Cummins® electronic service tool or equivalent to reset the Aftertreatment SCR Maintenance under Advanced ECM Data.

If the Aftertreatment SCR System Test does **not** activate, then reset the Search to Aftertreatment SCR System Test does **not** activate.

If the Aftertreatment SCR System Test does **not** complete, then reset the Search to Aftertreatment SCR System Test does **not** complete.

If the Aftertreatment SCR System Test displays "Deposit Burn Failed", the test should keep running and no repair action is required unless a Aftertreatment Intake or Outlet NOx sensor failure is detected.

Linked Solutions

- Aftertreatment diesel exhaust fluid dosing system test failed (8.1 [S00000552])
- Aftertreatment intake NOx sensor failed (8.2 [S00000867])
- Aftertreatment outlet NOx sensor - Inspection (8.3 [S00000567])
- Inspect both aftertreatment NOx sensors (8.4 [S00000566])
- Aftertreatment SCR catalyst test failed (8.5 [S00000565])

Repair

- No additional action is required for this solution.

Validation

- None

8.1 Aftertreatment diesel exhaust fluid dosing system test failed

Solution: S00000552

Verification

Conditions

- Turn keyswitch OFF.

Action

- Visually Inspect the diesel exhaust fluid in the tank for signs of debris or contamination. Refer to Procedure 011-058
- Perform the Aftertreatment Diesel Exhaust Fluid Doser Pump Override Test. Refer to Procedure 011-063

Specification

- If there are signs of contaminants in the diesel exhaust fluid, then proceed to the Repair section.
- If the Aftertreatment Diesel Exhaust Fluid Doser Pump override test displays FAILED, then proceed to the Repair section.

Linked Solutions

- None

Repair

Repair or replace **only** the components that were found to be out of specification.

- Drain the diesel exhaust fluid tank, clean thoroughly and refill with pure diesel exhaust fluid.

Refer to OEM Service Manual

- For a Aftertreatment Diesel Exhaust Fluid Doser Pump override test displaying FAILED, then follow the repair instructions in the procedure. Refer to Procedure 011-063

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

8.2 Aftertreatment intake NOx sensor failed

Solution: S00000867

Verification

Conditions

- None

Action

- Verify that the aftertreatment intake NOx sensor is displayed as FAILED.

Specification

- If the SCR System test displays that the intake NOx sensor has FAILED, then proceed to the Repair section.

Linked Solutions

- None

Repair

- Replace the aftertreatment intake NOx sensor. Refer to Procedure 019-463

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

8.3 Aftertreatment outlet NOx sensor - Inspection

Solution: S00000567

Verification

Conditions

- Turn keyswitch OFF.

Action

- Visually inspect the decomposition tube for deposits. Refer to Procedure 011-062
- Visually inspect the aftertreatment diesel exhaust fluid tank connections for cracks or pitting.

Refer to OEM Service Manual

- Connect all aftertreatment diesel exhaust fluid lines and electrical connectors to the dosing unit and aftertreatment diesel exhaust fluid tank.
- Remove the aftertreatment diesel exhaust fluid dosing valve from the decomposition tube.
- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.
- Perform the Aftertreatment Diesel Exhaust Fluid System Leak Test found under ECM Diagnostic Tests. Refer to Procedure 011-080
- While the test is running, inspect the diesel exhaust fluid tank connectors, diesel exhaust fluid dosing unit and dosing unit connectors, diesel exhaust fluid lines, and diesel exhaust fluid dosing valve for signs of external leaks.

Specification

- If the aftertreatment diesel exhaust fluid dosing valve is **not** leaking and there are no deposits in the decomposition tube, then a malfunctioning aftertreatment outlet NOx sensor has been detected.

Linked Solutions

- None

Repair

Repair or replace **only** the components that were found to be out of specification.

- Replace the aftertreatment outlet NOx sensor. Refer to Procedure 019-451
- Replace the aftertreatment diesel exhaust fluid dosing valve. Refer to Procedure 011-059
- Clean and install the decomposition tube. Refer to Procedure 011-062

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

8.4 Inspect both aftertreatment NOx sensors

Solution: S00000566

Verification

Conditions

- Turn keyswitch OFF.

Action

- Visually inspect the decomposition tube for deposits. Refer to Procedure 011-062
- Visually inspect the aftertreatment diesel exhaust fluid tank connections for cracks or pitting.

Refer to OEM Service Manual

- Connect all aftertreatment diesel exhaust fluid lines and electrical connectors to the dosing unit and aftertreatment diesel exhaust fluid tank.
- Remove the aftertreatment diesel exhaust fluid dosing valve from the decomposition tube.
- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.
- Perform the Aftertreatment Diesel Exhaust Fluid System Leak Test found under ECM Diagnostic Tests. Refer to Procedure 011-080
- Verify proper sealing at all connection points, including diesel exhaust fluid tank, dosing unit, and dosing valve.

Specification

- If the aftertreatment diesel exhaust fluid dosing valve is **not** leaking and there are no deposits in the decomposition tube, then a malfunctioning aftertreatment intake NOx sensor and a malfunctioning aftertreatment outlet NOx sensor has been detected.

Linked Solutions

- None

Repair

Repair or replace **only** the components that were found to be out of specification.

- Replace the aftertreatment intake NOx sensor. Refer to Procedure 019-463
- Replace the aftertreatment outlet NOx sensor. Refer to Procedure 019-451
- Replace the aftertreatment diesel exhaust fluid dosing valve. Refer to Procedure 011-059
- Clean and install the decomposition tube. Refer to Procedure 011-062

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

8.5 Aftertreatment SCR Catalyst Test Failed

Solution: S00000565

Verification

Conditions

- Reconnect all aftertreatment diesel exhaust fluid lines and electrical connectors to the dosing unit and aftertreatment diesel exhaust fluid tank if they have been previously disconnected during troubleshooting.

Action

The aftertreatment diesel exhaust fluid dosing valve **must** be removed and placed in a measuring container greater than 1.5 liter [50 oz] capacity to perform the Aftertreatment Diesel Exhaust Fluid Doser Pump Override test. The Aftertreatment Diesel Exhaust Fluid Doser Pump Override test can **only** be ran twice before a key cycle needs to be performed.

- Remove the aftertreatment diesel exhaust fluid dosing valve from the decomposition tube.
- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.
- Perform the Aftertreatment Diesel Exhaust Fluid Doser Pump Override Test. Refer to Procedure 011-063

Specification

- If the Aftertreatment Diesel Exhaust Fluid Doser Pump Override Test is **not** within specification, then proceed to the Repair section.
- If the Aftertreatment Diesel Exhaust Fluid Doser Pump Override Test is within specification, then a malfunctioning aftertreatment SCR Catalyst has been detected.

Linked Solutions

- None

Repair

Repair or replace **only** the components that were found to be out of specification.

- Replace the aftertreatment diesel exhaust fluid dosing valve. Refer to Procedure 011-059
- Replace the aftertreatment SCR Catalyst. Refer to Procedure 011-036

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

9 ECM calibration revision history check

Solution: S00000443

Verification

Conditions

- Connect all components.
- Turn keyswitch ON.
- Connect the recommended Cummins® electronic service tool or equivalent.

Action

- Use the recommended Cummins® electronic service tool or equivalent to read the fault codes.
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revision listed in the ECM calibration revision history for applicable changes.

Specification

- If a calibration update for this fault code is available, the ECM calibration revision **must** be that revision or higher.

Linked Solutions

- None

Repair

- Prior to downloading the ECM calibration, check to see that all job images and all other troubleshooting has been documented as downloading an ECM calibration will remove the fault codes on the ECM.
- Download the updated ECM calibration code. Refer to Procedure 019-032

Validation

- Connect all components
- Connect the recommended Cummins® electronic service tool or equivalent.
- Disable the fault code.
- Operate the engine within the "Conditions for Clearing the Fault Code" found in the Overview section of the troubleshooting procedure.
- Verify that the fault code is no longer active.
- Check ECM Calibration Revision History
- Use the recommended Cummins® electronic service tool or equivalent to find the current ECM code and revision number in the ECM.
- Compare the ECM code and revision number in the ECM to the calibration revisions listed in the ECM Calibration Revision History Database for applicable changes related to this fault code.
- Refer to ECM Calibration Revision History Database.

If all steps have been completed and no root cause has been identified, then follow the technical escalation process.