

Cummins Engine EGR Delete Review Worksheet

Engine Serial Number: {73744830}

Date: 05-05-2021

Program File: BDO/px-9.cal

Hardware Modifications ...

Coolant flow through the EGR cooler is still in place?

- ☐ - **YES.** (Correct action was taken for the egr-delete).
- ☐ - **NO, but an equivalent circuit/pipe replaces it.** (this is safe but can cause the engine to fail an emissions inspection).
- ☐ - **NO. EGR cooler circuit has been removed completely.** (this is unsafe and will lead to heat problems with cylinders 5 and 6 on most model ISX engines).
- ☒ - **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

EGR gas circuit has been mechanically blocked via a block-plate or by some other permanent means?

- ☐ - **YES.** (Correct action was taken for the egr-delete).
- ☐ - **YES, but the blocking device is inadequate.** (this is unsafe. If the blocking device fails, severe engine or turbo damage will likely result).
- ☐ - **YES, egr piping has been removed.** (this is safe but can cause the engine to fail an emissions inspection).
- ☐ - **NO.** (this is safe but is less than optimal. EGR gas will still enter the intake under high engine load conditions).
- ☒ - **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

DOC Exhaust element has been made hollow?

- ☐ - **YES, fully.** (Correct action was taken for the egr-delete).
- ☐ - **Removed or Bypassed.** (this is safe but can cause the engine to fail an emissions inspection).
- ☐ - **Partially.** (this is unsafe and can lead to collapse and/or blockage of the exhaust system. It is typically harmful to the turbocharger due to trapped and reflected heat).
- ☐ - **No.** (this is unsafe and will cause the engine, turbocharger, or other components to fail).
- ☒ - **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

DPF Exhaust element has been made hollow?

- ☐ - **YES, fully.** (Correct action was taken for the egr-delete).
- ☐ - **Removed or Bypassed.** (this is safe but can cause the engine to fail an emissions inspection).
- ☐ - **Partially.** (this is unsafe and can lead to collapse and/or blockage of the exhaust system. It is typically harmful to the turbocharger due to trapped and reflected heat).
- ☐ - **No.** (this is unsafe and will cause the engine, turbocharger, or other components to fail).
- ☒ - **UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

SCR Exhaust element has been made hollow?

- ☐ - **YES, fully.** (Correct action was taken for the egr-delete).
- ☐ - **Removed or Bypassed.** (this is safe but can cause the engine to fail an emissions inspection).
- ☐ - **Partially.** (this is unsafe and can lead to collapse and/or blockage of the exhaust system. It is typically harmful to the turbocharger due to trapped and reflected heat).
- ☐ - **No.** (this is unsafe and will cause the engine, turbocharger, or other components to fail).

[X] - UNKNOWN. (Unable to inspect at this time. It should be a high priority to inspect this very soon).

Software Modifications ...

Program in the ECM matches the Engine ser# requirements?

- [X] - YES.** (considered as a proper method and safe).
- [] - NO. However it is 100% compatible** (considered as a proper method and safe).
- [] - NO. Engine tier and hardware is NOT compatible** (Considered Unsafe. Fuel efficiency, power, and other losses will occur. Eventual engine or turbocharger damage may result.).
- [] - NO. The vehicle hardware is NOT compatible** (Considered less than optimal. Fuel efficiency, power, and/or other losses will occur. Eventual engine or turbocharger damage may result.).
- [] - NO. Only the emissions hardware is NOT compatible** (Considered less than optimal but still safe as long as these components have been removed and a delete has been performed.).
- [] - UNKNOWN.** (Unable to inspect at this time. It should be a high priority to inspect this very soon).

Editing of engine mode control logic tree was performed?

- [] - YES, engine locked into using non-egr operating modes only.** (considered as a proper method and safe).
- [] - Partially. Engine coaxed into using non-egr operating modes.** (this is considered significantly less safe, but is better than nothing).
- [] - Partially. Several modes are still active. Active modes have been correctly edited to accommodate this.** (this is considered safe, but not usually necessary after a delete).
- [X] - Partially. Several modes are still active. Active modes have NOT been correctly edited to accommodate this.** (this is unsafe and will cause the engine, turbocharger, or other components to suffer shortened lifespan).
- [] - None.** (this is extremely unsafe and will cause the engine to enter the wrong operating modes. The engine, turbocharger, and other components will suffer a significantly shortened lifespan. ECM programming becomes unstable).

De-reference of hardware sensors, egr components, and exhaust sensors that are not longer used was performed?

- [] - YES, fully. No need to blocking any fault codes.** (this is considered proper and safe after a delete).
- [X] - Partially. Some blocking of fault codes were necessary.** (this is considered less than optimal).
- [] - Poorly. Many blocking of fault codes were necessary.** (this is considered unsafe, is less than optimal, and can lead to ghost errors in the vehicle).
- [] - Very Poorly. Blocking of fault codes was relied on heavily.** (this is considered unsafe, is less than optimal, and can lead to ghost errors in the vehicle).

Fault codes that have been blocked from showing up due to incorrect / missing delete programming logic ...

2375 - Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage Above Normal or Shorted to High Source
3136 - Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage Above Normal or Shorted to High Source
3137 - Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source
6688 - Aftertreatment 1 Particulate Sensor - Abnormal Update Rate

Removal of all shutdown and derate logic for hardware and sensors that were disabled/defeated?

- [] - YES, fully.** (this is considered proper and safe after a delete).
- [] - Partially, but the master derate/shutdown engine logic is disabled as a prevention.** (this is considered unsafe and less than optimal).
- [X] - Partially, and some master derate/shutdown engine logic is still in place.** (this is considered unsafe and can lead to ghost shutdowns or derates).
- [] - None, and the master derate/shutdown engine logic is still in place.** (this is considered unsafe and will lead to a shutdown).
- [] - None, but the master derate/shutdown engine logic is disabled as a prevention.** (this is considered unsafe, will lead to silent derates).

Removal of all higher level After-treatment management and tampering detection logic?

- ☐ - **Not Necessary. No after-treatment systems are used for this model engine** (this is considered proper and safe after a delete).
- ☐ - **YES, fully.** (this is considered proper and safe after a delete).
- ☒ - **Partially, master derate/shutdown engine logic is disabled.** (this is sometimes ok, but sometimes unsafe. It easily can lead to silent derates, the necessity to block additional after-treatment fault codes, and possible altering of the combustion cycle in negative ways, creating power/torque losses).
- ☐ - **None, and the master derate/shutdown engine logic is still in place.** (this is considered unsafe and will lead to a shutdowns and derates).
- ☐ - **None, but the master derate/shutdown engine logic is disabled as a prevention.** (this is considered unsafe, it will lead to silent derates, the necessity to add block fault codes, and altering of the combustion cycle in negative ways, creating power/torque losses).

Removal of EGR gas and emissions control request logic that alters the turbo positioning, egr valve, or other emissions related devices?

- ☐ - **YES, fully.** (this is considered proper and safe after a delete).
- ☐ - **partially. Was done in active engine operating modes.** (this is considered acceptable and safe after a delete).
- ☒ - **partially. Using fraction overrides.** (this is considered less than optimal but usually acceptable).
- ☐ - **partially. Is incomplete.** (this is considered unsafe, it can lead to possible engine fault codes or alteration of the combustion cycle, creating power/torque losses).
- ☐ - **None.** (this is considered unsafe, it can lead to possible engine fault codes or alteration of the combustion cycle, creating power/torque losses).

Removal of all fall-back and auxiliary emissions systems and engine exhaust limiting control logic that alters injection timing, fuel-air-mix, emissions related power/torque limiting, etc.?

- ☐ - **YES, fully.** (this is considered proper and safe after a delete).
- ☒ - **partially. Is incomplete.** (this is considered unsafe, it can lead to possible engine fault codes and harmful alteration of the combustion cycle. It can also create power/torque losses).
- ☐ - **None.** (this is considered unsafe, it can lead to possible engine fault codes and alteration of the combustion cycle, creating power/torque losses).

Performing corrections to the injection timing in all active engine operating mode(s) to prevent a harmful combustion process?

- ☐ - **YES, fully.** (this is considered proper and safe after a delete).
- ☐ - **Partially. Is within safe bounds.** (this is less than optimal but still considered safe after a delete).
- ☐ - **Partially. Not within safe bounds.** (this considered unsafe and will lead to a significantly shortened engine life).
- ☐ - **Edited Incorrectly. Not within safe bounds.** (this considered very unsafe and will lead to a significantly shortened engine life).
- ☒ - **None.** (this considered unsafe and will lead to a significantly shortened engine life).

Performing corrections to the fuel-air-mix and turbo positioning logic to prevent a harmful combustion process and/or over-boosting?

- ☐ - **YES, fully.** (this is considered proper and safe after a delete).
- ☐ - **Partially. Is within safe bounds.** (this is less than optimal but still considered safe after a delete).
- ☐ - **Partially. Not within safe bounds.** (this considered unsafe and will lead to a significantly shortened engine life).
- ☒ - **None.** (this considered unsafe. The engine will run too lean and have a significantly shortened engine life).

Method used to request boost/turbo positioning?

- ☐ - **Mass Flow Requests. Corrections were made.** (this is typically considered proper and safe after a delete as long as boost levels are not exceeded).
- ☐ - **Anti-Hysteresis Min/Max positioning request Tables. Within Safe Bounds** (this is typically considered proper and safe after a delete as long as boost levels are not exceeded).
- ☐ - **Anti-Hysteresis Min/Max positioning request Tables. Out of Bounds**(this is considered unsafe. Intake boost levels are likely to be exceeded).
- ☒ - **Mass Flow Requests. No corrections made.** this considered unsafe and will lead to improper fuel-air mix and a shortened engine or turbo lifespan).
- ☐ - **With Override, and fixed to one position.**(this is far less than optimal and can lead to over-boosting, subsequent engine damage, etc.).
- ☐ - **Disabled. A Fixed vane turbo was used.** (this considered far less than optimal, significantly lowers fuel efficiency, and can lead to shortened engine life if over-boosting occurs).

Engine brake has been modified?

☐ - **Yes. It is set to harmful levels.** (this is considered extremely unsafe and can lead to severe engine damage).

☒ - **No.** (this is considered safe/correct).

Fuel and engine performance limiters have been removed/Defeated/Edited?

☐ - **Yes, All.** (this is considered ok as long as proper power/torque settings are in place elsewhere).

☐ - **Partially. They do NOT interfere with Power levels.** (this is considered ok as long as proper power/torque settings are in place elsewhere).

☐ - **Incorrectly. They DO interfere with Power levels.** (this is considered incorrect and will lead to lower than expected power levels).

☐ - **Edited. Raised or lowered to match Power levels.** (this is considered ok as long as proper power/torque settings are in place elsewhere).

☒ - **No, but they match or exceed power levels.** (this is considered ok as long as proper power/torque settings are in place elsewhere).

☐ - **No, and they interfere with power levels.** (this is considered problematic, as engine power will be less than what is expected).

Has the ECM been coaxed into giving up more fuel than expected?

☒ - **No.** (this is considered proper and safe after a delete).

☐ - **Yes.** (this is considered very problematic. The engine will incorrectly show higher than normal fuel mileage readings in the dash. Power and torque will be raised to unknown levels. Fuel-air-mix levels may be set incorrectly. Cylinder balancing corrections will become disabled or ineffective).

Have Injection pressures been altered?

☒ - **No.** (this can be less than optimal depending on engine mode control and other settings.).

☐ - **Yes. Is within safe bounds, was done correctly.** (this is considered proper and safe after a delete).

☐ - **Yes. Out of bounds, was done incorrectly.** (this is considered Unsafe and can lead to fuel impingement problems, and shortened engine and/or fuel pump life).

☐ - **Not relevant to this engine model.**

Have the Power and torque level request settings been changed?

☒ - **No.** (this is considered proper and safe after a delete).

☐ - **Yes. Is within engine ratings.** (this is considered proper and safe after a delete as long as the Advertised and other J1939 broadcast power settings have also been edited properly to accompany this).

☐ - **Yes. Is above engine ratings.** (this is considered unsafe and will lead to a significantly shortened engine life).

Does the Advertised Power/Torque levels Match the actual Power/Torque settings?

☒ - **Yes.**

☐ - **No.** (this is considered deceptive and can lead to someone assuming the engine is a different power/torque than what it is actually set to).

Have all settings located in RAM memory that are necessary for a delete been properly adjusted?

☐ - **Yes.**

☐ - **No.** (this is problematic and leads to silent derates and power issues).

☐ - **Unknown. Likely NO, considering other alterations.** (this is problematic and leads to silent derates and power issues).

☐ - **Unknown. Likely Yes, considering other alterations.** (this is considered proper and safe after a delete).

☒ - **Not necessary for this model engine.**

Other Findings / Comments:

- * Engine restart limiters are still in place. This could potentially lead to a shutdown and prevention of engine re-starts without any warning. Considering there are also several codes blocked for the EGR system, this could lead someone towards incorrect diagnosis, and to believe the ecm has failed if it ever does this.
- * The program is showing an active silent Torque derate from the 'INDM' (regen inducement) manager due to a flagged incomplete regen cycle. This may or may not have a negative effect on engine power and torque, depending on other settings.
- * The program is showing a higher then normal detected CAC leak rate, however it is not enough to throw a fault as of yet. This may or may not have a negative effect on engine power and torque, depending on other settings.
- * The EGR temperature air-fuel-mix compensation option has been turned ON by someone, even though this option is OFF in the original factory file. This is not correct.
- * No proper removal of aux. Emissions has been done, leading to inconsistencies in engine operation and power levels. Amonia and Nox gas combustion clamping is still in place for all engine operating modes.

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- * Overall, the file seems to be somewhat incomplete. This leads to harm of the engine over time. Other issues include unpredictable engine mode control that can lead to ghost power/fuel efficiency/torque losses, hidden derates, excess internal friction, and usually shortened turbocharger lifespan as well.
 - * The injection timing has NOT been edited for the missing egr gas. It is in excess of 5+ degrees too far advanced in the active engine modes and will lead to high internal cylinder lateral friction, eventual liner fretting (on wet-liner engines such as the ISX, ISC), and eventual head gasket failure. It can also result in the engine suffering a sudden failure due to a cracked piston or failed wrist pin.
 - * The turbocharger has NOT been re-programmed for proper fuel-air mix with consideration to the missing egr gas. This will lead to the engine running too lean all the time and a shortened engine life will result.
- Overall, this program is moderately harmful to the engine and its turbocharger. This could lead to the engine unpredictably jumping engine modes and causing things like unstable conditions, power losses, silent ghost derates, possibly an over-spooling VGT turbocharger, inefficient combustion, excess exhaust heat produced and a severely shortened engine life due to excessive injection timing and improper fuel-air-mix.