



Technical Service Bulletin

Technical Service Bulletin: TSB101120	Released Date: 06-Nov-2019
Engine Surge - Usually With High Counts of Fault Codes 1861, 2776, and/or Fault Code 3847	

Engine Surge - Usually With High Counts of Fault Codes 1861, 2776, and/or Fault Code 3847

Core Issue

Customer complaints of engine surge, especially at idle or low RPM, usually accompanied by high counts of Fault Code 1861, 2776, and/or 3847 will prompt troubleshooting. The cause is found to be contamination of the air/fuel mixer and partial or complete blockage of the mixer's fuel ports with a gray/white, crusty substance. Further inspection may reveal similar contamination of other components in the air stream. The source of the contamination can often be traced directly back to the charge-air cooler by following a visible trail of white or grey streaks on the intake piping.

Product Affected

- ISB5.9 G CM2180. Refer to ISB5.9 G CM2180 Service Manual, Bulletin 2883369 (</qs3/pubsys2/xml/en/bulletin/2883369.html>).
- ISL G CM2180. Refer to ISL G CM2180 Service Manual, Bulletin 4021649 (</qs3/pubsys2/xml/en/bulletin/4021649.html>).
- ISX12 G CM2180 EJ. Refer to ISX12 G CM2180 EJ Service Manual, Bulletin 4310682 (</qs3/pubsys2/xml/en/bulletin/4310682.html>).

Confirmation

Note : Flux contamination is only one possible cause for engine surge with Fault Codes 1861, 2776, and/or 3847. It is the responsibility of the repair facility to follow normal troubleshooting procedures and determine root cause. The primary failure mode addressed by this document is contamination of the air/fuel mixer, which can only be determined by direct observation of the mixer.

The source of the contamination is potassium fluoroaluminate flux used in the manufacture of certain charge-air coolers found in a variety of OEM installations. Flux in these coolers is carried through the intake system and deposited on the downstream components. The contaminant appears as a white, gray, or black deposit and can be mistaken for corrosion. Visual inspection of the intake piping often reveals a trail of deposited material on the downstream intake piping and

other components. Visual inspection of the mixer, while still installed in the fuel module, is normally sufficient to confirm the contamination. Complete a visual inspection of the air/fuel mixer as follows:

- Remove the throttle body from the fuel control housing. See Procedure 005-052 in Section 5 of the corresponding Service Manual.
- Check the air/fuel mixer for contamination. Potassium fluoroaluminate flux deposits are white, but the contaminants on the mixer are often colored by exhaust gas recirculation (EGR) gases and can be white, gray, black, or a combination of all three. These deposits will often have a crusty appearance. Careful inspection with good lighting and a mirror will allow observation of the fuel inlet ports. Any blockage of these ports indicates mixer contamination. See the illustrations below.
- If the above step is not possible, the mixer **must** be removed from the fuel control housing for inspection. See Procedure 005-003 in Section 5 of the corresponding Service Manual.

Note : The components shown are examples and may differ between engine types.



Figure 1, Air intake piping with flux deposits

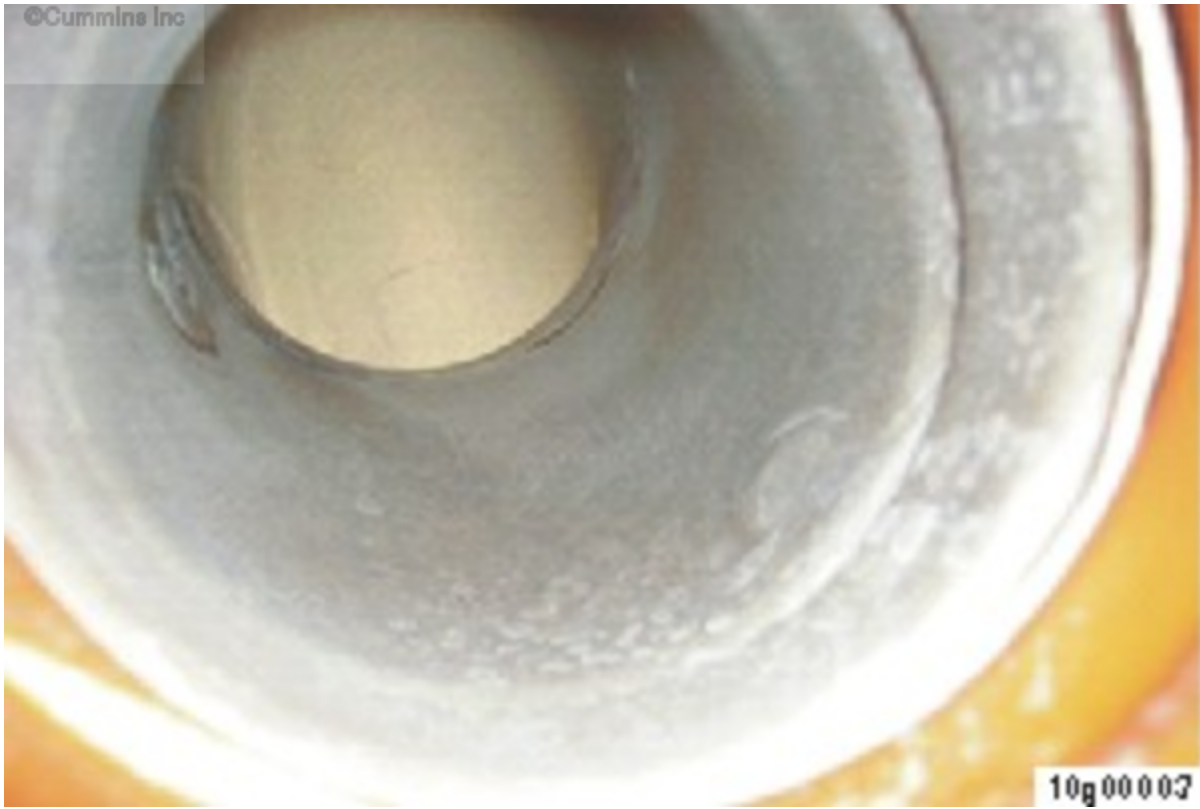


Figure 2, Air intake piping with flux deposits

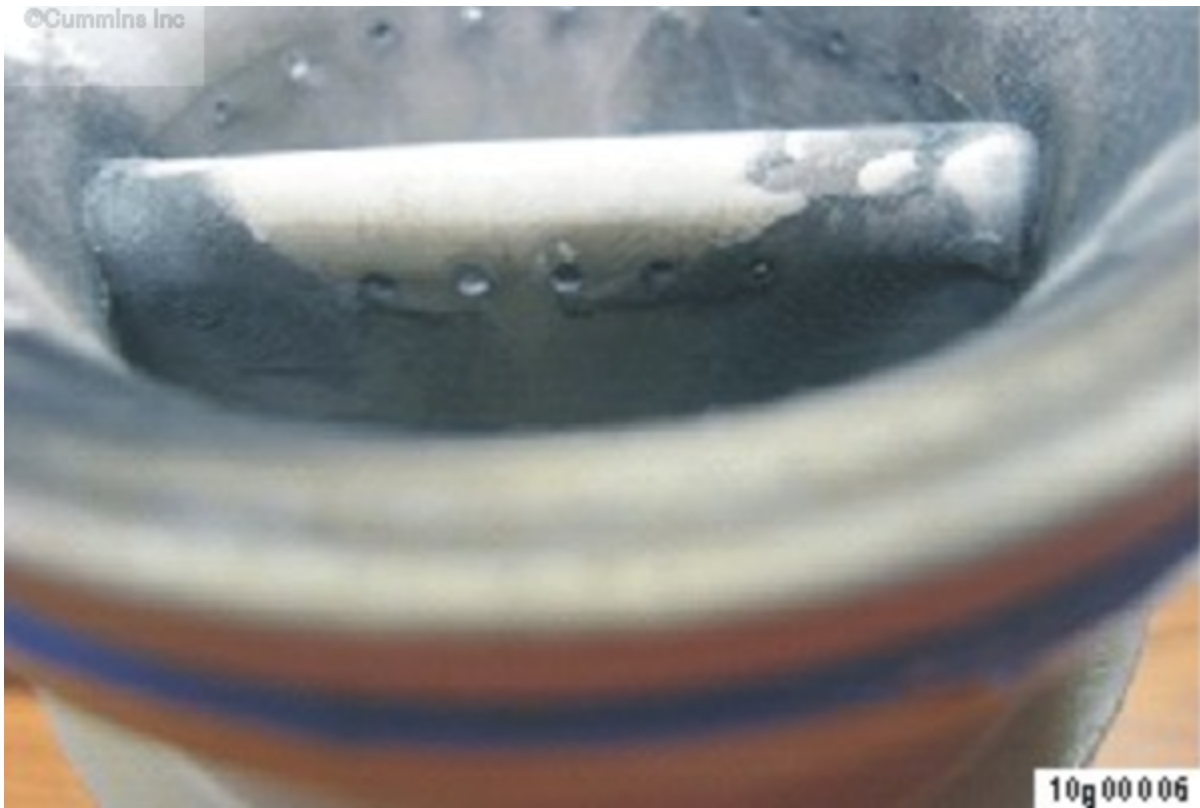


Figure 3, Air/fuel mixer with flux deposits

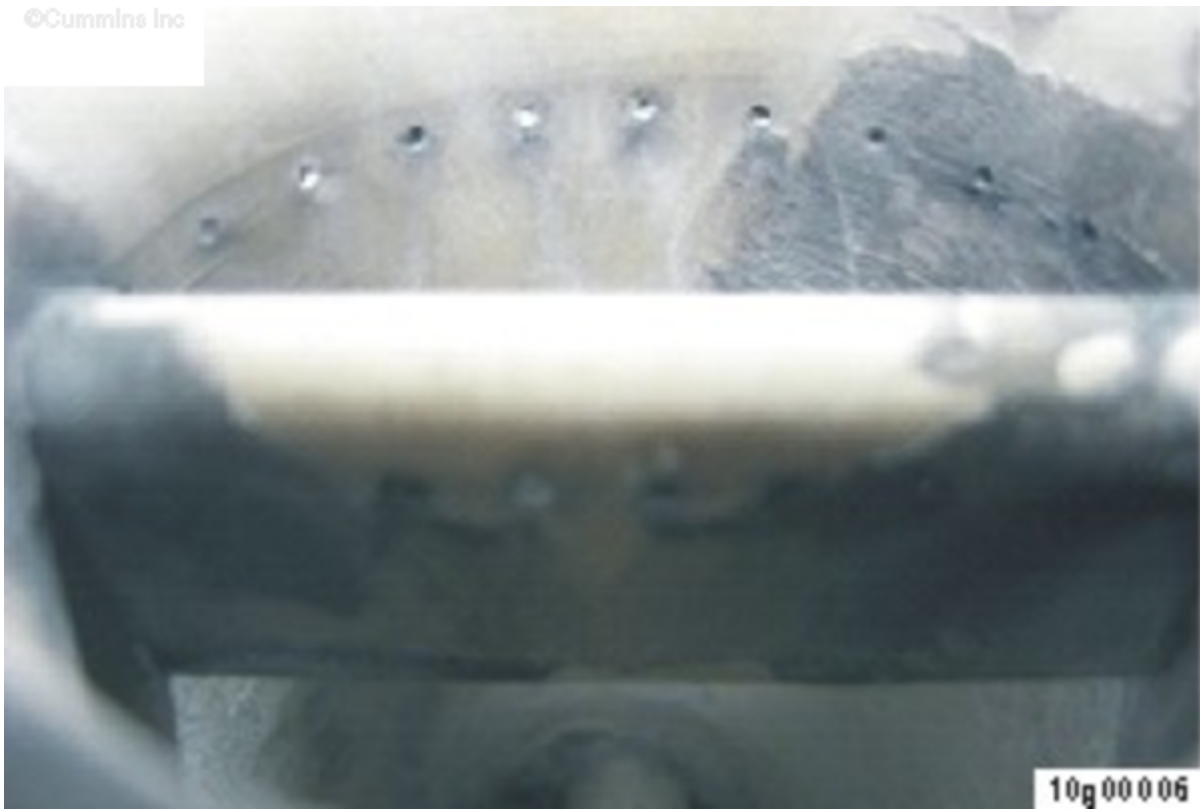


Figure 4, Air/fuel mixer with flux deposits



Figure 5, ISL G CM2180 Mass air flow sensor with flux deposits



Figure 6, External deposits seeping from ISL G CM2180 fuel module near the wastegate control valve



Figure 7, Throttle plate with flux deposits



Figure 8, Throttle plate with flux deposits

Visual inspection of the sensors, throttle plate, and other intake tract components is sufficient to determine if those components are affected. A coincident failure of the components listed below, especially sensors, can be considered contamination-related, even if the amount of contamination is small.

Resolution

Inspect for signs of flux contamination on the following components as applicable to suspect engine:

- Mass air flow sensor
- Turbocharger wastegate control valve
- Throttle assembly
- Air/fuel mixer
- Intake manifold pressure/temperature sensor
- Low pressure regulator

Once contamination is confirmed, clean or replace the necessary components. Read below for more information.

⚠ WARNING ⚠

To reduce the possibility of personal injury, wear goggles and protective clothing.

Clean the following components as needed:

Note : Do **not** use sandpaper or other materials that could leave particulate contamination in the intake system.

Air intake piping between the charge-air cooler and throttle assembly

- Remove the affected piping. Use a mild abrasive pad and water to scrub the flux from the piping, then thoroughly flush with clean water until the piping is clean.

Throttle plate and surrounding structure

- Use a mild abrasive pad and water to gently scrub the flux from the throttle plate and throttle body. Wipe the cleaned components down to make sure that all cleaning materials and flux have been removed before reassembly.

Air/fuel mixer

- Remove the air/fuel mixer from the fuel control module. See Procedure 005-003 in Section 5 of the corresponding Service Manual.
- Use a mild abrasive pad and water to gently scrub the flux from the surface of the mixer. Use a length of wire to carefully dislodge flux deposits from the fuel ports around the perimeter and in the venturi of the mixer.

Suitable wire sizes are as follows:

- Mixer barrel - 17 gauge
- Mixer venturi - 14 gauge

Note : Do **not** force the wire into the fuel ports. Do **not** elongate, enlarge, or otherwise affect the shape of the fuel ports. If the flux can **not** be removed from the fuel ports, or the ports are damaged during cleaning, the mixer **must** be replaced.

- After cleaning, flush the air/fuel mixer thoroughly with clean water to remove any cleaning debris prior to assembly.

Replace the following components as needed:

- Replace the mass air flow sensor. See Procedure 019-460 in Section 19 of the corresponding Service Manual.
- Replace the turbocharger wastegate control valve. See Procedure 019-103 in Section 19 of the corresponding Service Manual.
- Replace the intake manifold pressure/temperature sensor. See Procedure 019-099 in Section 19 of the corresponding Service Manual.
- Replace the low pressure regulator. See Procedure 005-047 in Section 5 of the corresponding Service Manual.

Warranty Statement

The information in this document has no effect on present warranty coverage or repair practices, nor does it authorize TRP or Campaign actions.

Information Only - OEM Related Matter Not Covered By Cummins® - Contact Appropriate OEM Dealer or OEM Representative For Additional Information

Document History

Date	Details
2010-12-13	Module Created
2011-9-26	Response from the field warrants clarification of the procedure through these notes.
2014-11-14	Updated to expand product affected.
2019-11-1	Made edits to add fault code 3847 as part of this TSB.

Last Modified: 06-Nov-2019
