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Coding Information

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Title: 2010 I-6 Exhaust Manifold Soot Accumulation and Operating Characteristics

Applies To: 2010 + MaxxForce DT, 9, 10 (ESN 3,300,000 and later)

Overview: Exhaust Manifold Operating Characteristics

Below are examples of normal exhaust manifold operating conditions that **DO NOT** require manifold/gasket replacement.

- Exhaust manifold slip joint between ports 2 and 3 will intermittently leak upon initial cold start-up (aka slip joint blow by).
- The EGR Cooler to Exhaust manifold slip joint (Goose Neck) will also intermittently leak at initial cold start-up (normal).
- These brief "cold whiffs" of gas do not affect engine or after treatment performance, even though soot buildup may appear as if there is a significant leak.
- Cold start-up "whiffs" seal upon initial engine temperature rise via thermal expansion.
- Black soot tracking is often found on the underside of the heat-shield and cast surfaces that are in close proximity of the slip joints and goose neck fey rings. **NOTE: YOU WILL NOT SEE HEAVY SOOT BUILDUP ON THE MANIFOLD JOINTS THEMSELVES DUE TO THE HIGH MANIFOLD TEMPERATURES BURNING OFF ANY SOOT IT COMES IN CONTACT WITH.**
- Soot buildup in these areas are often mis-diagnosed as gasket leaks. The key thing to look for to pinpoint a leaking gasket (without removing the manifold) is to inspect for gasket damage specifically, not just soot buildup. Follow diagnostic procedure below for gasket condition. **IMPORTANT: It is NOT standard procedure anymore to remove the manifold to measure it for warping.** If the manifold is removed to replace a failed/blown out gasket, the manifold gets replaced and gets a cuff seal installed at the slip joint between ports 2 and 3. (note: in instances where the manifold is being removed/replaced, it is easier to install cuff on the manifold prior to mounting the manifold to the head). Currently, there is not a cuff solution in place for the EGR slip joint. Cuff seal p/n is listed at the end of the article.

Note that all pictures taken below were from engines with 40-80 hrs and 1000-2000 miles on them.

Figure 1

Soot trail from a slip joint upon visual inspection of the manifold: Note the close proximity of the soot trail in relation to the slip joint where the two manifolds come together. (Note the soot is not built up on the joint itself, just on the head surface)

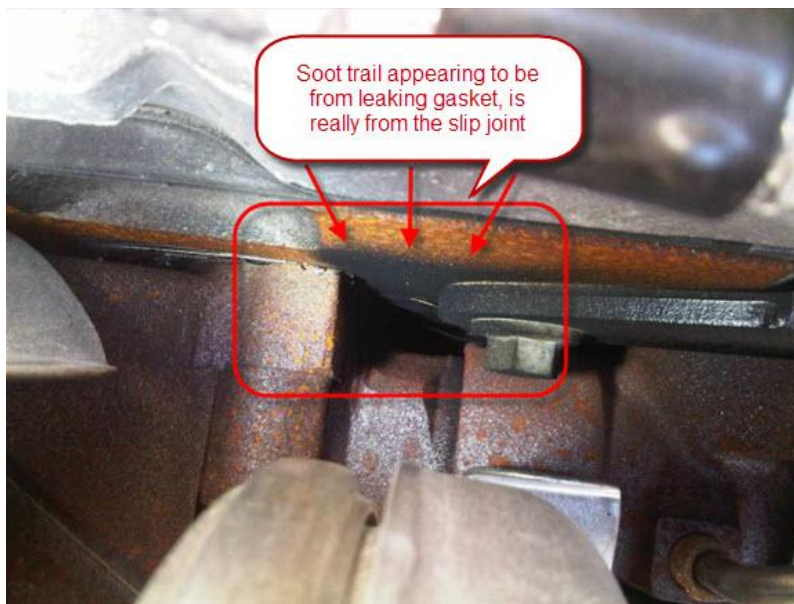


Figure 1

Figure 2

shows a slip joint with soot tracking on the manifold flange and cylinder head surface. This comes from the manifold slip joint, not from between the flange and cylinder head - often mistaken for a gasket leak. Once again, note that there is NO soot buildup on the joint itself.



Figure 2

Figure 3

shows the soot did not leak from the gasket mating surfaces of the exhaust manifold to the cylinder head. Notice there is no soot from the inner seal ring of the gasket port to the outer edge of the gasket, just an outline of soot from the manifold flange. This soot buildup came from an exterior source. (i.e. fcy ring/slip joint leakage as shown above)



Figure 3

Figure 4

This is a heat shield (EGR 'gooseneck') connection at manifold. The source of soot at this specific location would be from the fey ring joint (slip joint), which seals up with thermal expansion. If the fey rings themselves are seized in place or damaged then replace them but please note that replacing the fey rings or the manifold may NOT eliminate soot buildup at this joint or under the heat shield. **NOTE: THIS WILL NOT CAUSE A REGEN OR PERFORMANCE ISSUE.**



Figure 4

Figure 5

A "buckled" exhaust manifold gasket is not a defective part, the manifold and gaskets expand and contract (slide) with each thermal expansion cycle.

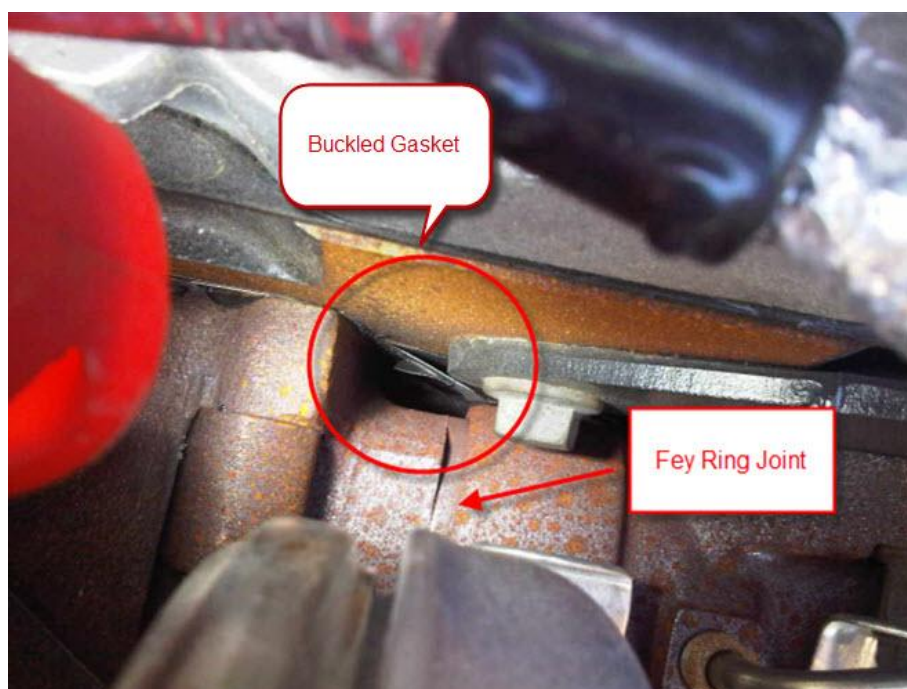


Figure 5

Note: All of the preceding conditions shown do not require manifold/gasket replacement. Soot trails at these areas **WILL NOT** cause frequent regen's or performance issues.

If soot trails are found at the manifold slip joint between ports 2 and 3 and/or at the EGR connection of the manifold, DO NOT replace the manifold/gasket based solely on these findings. Please see the diagnostic procedure below to determine if the manifold & gasket need to be replaced or if a cuff seal only will suffice. There is currently no cuff seal correction for the EGR connection. **NOTE: the p/n for the cuff may come up as a Big Bore part - this will ALSO fit on 2010 Maxxforce DT, 9 and 10.**

Manifold/Gasket Diagnostic Steps Below (option: interactive diag. link or written out, step-by-step procedure. Same procedures, two different formats):

Automated Diagnostic link:

[Click here for Soot buildup/Exhaust manifold gasket automated diagnostic procedure](#)

Step Base Diag. Table:

Step	Action	Decision
1	Visually inspect entire manifold/gasket area for soot. Is there any soot accumulation?	Yes: Proceed to <u>step 2.</u>
		No: DO NOT remove the manifold. Install cuff seal p/n: 7092423C91 at the slip joint between ports 2 and 3. END OF REPAIR.
2	Inspect for soot between ports 2/3. Is there any soot?	Yes: Proceed to <u>step 3.</u>
		No: Proceed to <u>step 4.</u>

3	• THOROUGHLY review the iKnow article you are currently in: 1200949 • Inspect the top AND bottom portion of the gasket. Is the gasket slipped out of place at #3?	Yes: See figures 1 and 2 just below this diag. procedure for gasket position criteria and proceed to <u>step 4.</u>
		No: Proceed to <u>step 5.</u>
4	Is the gasket position acceptable per the criteria in figures 1 and 2?	Yes: Proceed to <u>step 5.</u>
		NO: Replace manifold and gasket with p/n: 7092501C9* and install cuff seal p/n: 7092423C91 on the slip joint between ports 2/3. END OF REPAIR.
5	Inspect for soot near port 6. Is there any soot?	Yes: Proceed to <u>step 6.</u>
		No: Proceed to <u>step 8.</u>
6	• THOROUGHLY review the iKnow article you are currently in: 1200949 • Inspect the back of the gasket at #6. Is the gasket slipped out of place?	Yes: See figures 3 and 4 just below this diag. procedure below for gasket position criteria and proceed to <u>step 7.</u>
		No: Proceed to <u>step 8.</u>
7	Is the gasket position acceptable per the criteria in figures 3 and 4?	Yes: Proceed to <u>step 8.</u>
		No: Replace manifold and gasket with p/n: 7092501C9* and install cuff seal p/n: 7092423C91 on the slip joint between ports 2/3. END OF REPAIR.
8	Inspect for soot in other areas such as turbo housings, top of EGR cooler housing, EGR crossover pipe, exhaust clamps etc. Is there any soot found at these areas?	Yes: Proceed to <u>step 9.</u>
		No: Install cuff seal 7092423C91 at the slip joint between ports 2 and 3. END OF REPAIR.

9	Inspect turbo downpipe/doser pipe gasket(s) for leaks or loose v-band clamps. Were any leaks detected?	Yes: Repair as necessary and install cuff seal 7092423C91 at the slip joint between ports 2 and 3. END OF REPAIR.
		No: Proceed to step 10.
10	Inspect the manifold for cracks, particularly around cylinder 4. Were any cracks found?	Yes: Replace manifold and gasket with p/n: 7092501C9* and install cuff seal p/n: 7092423C91 on the slip joint between ports 2/3. END OF REPAIR.
		No: Please open a tech services case file with description of the steps you have taken so far and wait for assistance.

Figures that correlate to steps 3 and 6 of the diagnostic procedure above:

Figure 1 – "Good" manifold gasket, bottom of cyl. #3



This image shows **ACCEPTABLE** gasket position – if the gasket holes are aligned **HALFWAY OR BETTER** with respect to the bolt hole in the head, **DO NOT** replace the manifold or gasket. **WITHOUT** removing the manifold, install cuff seal 7092423C91. No case file/iApproval required.

Figure 2 - "Bad" manifold gasket, bottom of cyl. #3



This image shows **UNACCEPTABLE** gasket position – if the gasket holes are misaligned or overlapped **MORE THAN HALFWAY** across the bolt hole in the head, then replace the manifold and gasket with kit: 7092501C92 or subsequent and install cuff seal 7092423C91 at the slip joint between ports 2 and 3. No case file/iApproval required.

Figure 3 – "Good" manifold gasket, back of cyl. #6

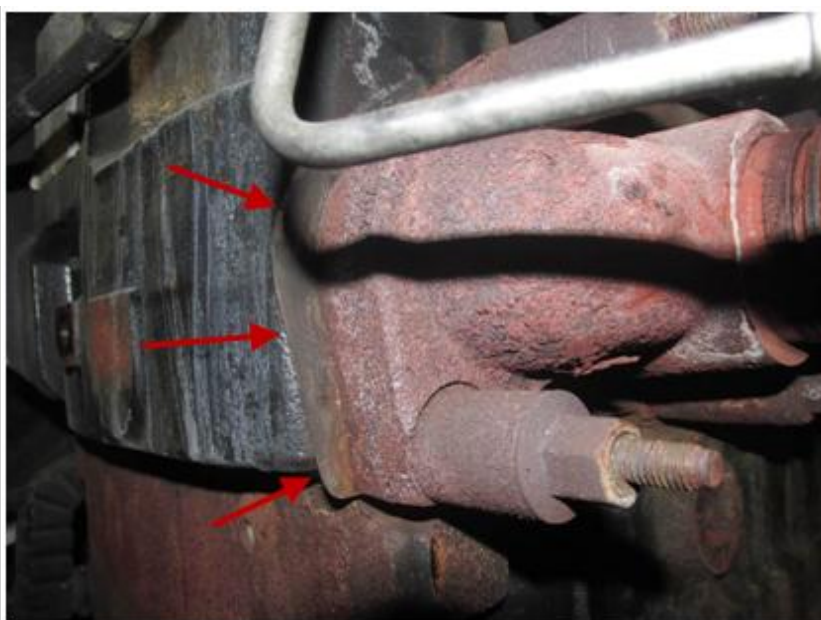


Figure 4 - "Bad" manifold gasket, back of cyl. #6





This image shows **ACCEPTABLE** gasket position – If the gasket is protruding out from the manifold flange **LESS THAN 3/8"**, then **DO NOT** replace the manifold or gasket. **WITHOUT** removing the manifold, install cuff seal 7092423C91 at the slip joint between ports 2 and 3. No case file/iApproval required.



This image shows **UNACCEPTABLE** gasket position – If the gasket has protruded out from the manifold flange **MORE THAN 3/8,"** then replace the manifold and gasket with kit: 7092501C92 or subsequent and install cuff seal 7092423c91 at the slip joint between ports 2 and 3. No case file/iApproval required.

Figure 6 - Cuff Seal Assembly



Figure 7 - Cuff Seal Assembly (broken down)



Possible Part Number Needed:

PART	PART NUMBER
Cuff Seal	7092423c9*

Cuff Seal Standard Repair Times (cuff seal ONLY):

[Click here for cuff seal SRT times](#)

NOTE: Cuff seal SRT's are only to be applied when installing one on an EXISTING manifold (manifold NOT removed). Cuff seal SRT is NOT to be added to a claim when a manifold & gasket are being replaced. This is included into the manifold & gasket SRT.

Below are examples of exhaust manifold conditions that will require manifold & gasket replacement. These include:

- Gasket damage that is **UNACCEPTABLE** per the diagnostic procedure, when gasket condition is questionable (not obviously blown out)
- Squealing or noisy exhaust
- Obvious signs of manifold gasket failure - completely blown out, severely slid out of position or deemed "UNACCEPTABLE" per the diagnostic procedure.
 - The gasket damage must be consistent with the information in the diagnostic procedure (above)
 - The diag. procedure needs to be followed to determine if a gasket has failed or is near failure without removing. The two most common failures are #3 and #6. Look at the unused bolt hole at the bottom of #3 to see if it is misaligned more than halfway or not. For #6, inspect to see if the gasket is protruding more than 3/8" away from the edge of the manifold flange. If the gasket you are inspecting indicates a replacement is required per the diagnostic procedure replace the manifold and gasket and install a cuff seal with the part numbers listed. NO CASE FILE NECESSARY.
- Cracked or damaged exhaust manifolds (no case file required, just photograph the crack in the manifold for warranty)

Warranty Coding:

Group	Noun
12000	356
12000	358

Possible Part Number Needed:

PART	PART NUMBER
Exhaust manifold Kit	7092501C9*

Exhaust Manifold and gasket Standard Repair Times (Cuff seal installation included):

[Click here for exhaust manifold+gasket SRT times](#)

NOTE: No iApproval or case file is necessary for installing a cuff seal only (without removing manifold) or replacing a CRACKED manifold.

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