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Coding Information

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Title: Big Bore Cooling System Diagnostics
Applies To: 2010 Emissions MaxxForce® 11L & 13L Engines

CHANGE LOG

07/10/2015 - Added a note to Step 2 about the cap pressure.
 04/20/2015 - Un-tagged N13 from this article and the corresponding iKNow articles. The cooling system diagnostics for N13 is located in the respective diagnostic manual (linked from FCAP, when applicable). Modified the description. Changed EGR cooler leak detection tool number from "KL20060NAV" to "12-892-02".
 02/15/2015 - Fixed "Engine Overtemp" SRT.
 09/22/2014 - Changed Title. Tagged article for "Coolant Overflow & Coolant Over Temperature". Added these to the symptoms list. Added steps 3 & 5 to incorporate these new diagnostic articles. Added links to new Coolant overflow and Over Temperature diagnostic iKNow articles. Added T-Time to SRT table. Deleted SRTs; 1 through 3, 1 through 4, 1 through 5, and 1 through 6.
 06/23/2014 - Aligned SRTs to Updated SRT Manual
 06/23/2014 - Deleted the Social Bookmarks and Print Resources. Updated the article. Added NOTE under SRTs.

DESCRIPTION

This document addresses cooling system diagnostics and/or coolant consumption (SPN 111 FMI 1) on 2010 MaxxForce 11 and 13 liter engines. This procedure will guide the user through common failure areas, diagnostic tools, SRTs, and warranty filing. This document supersedes the 2010 MaxxForce 11, 13L Engine Diagnostic Manual.

Due to the likelihood of the fault codes being related, use the 2659-21 iKNow ([IK1201100](#)) **FIRST**, when **BOTH** 2659-21 and 111-1/Coolant consumption are present.

SYMPTOM

Consistent need to refill deaeration tank and active or previously active DTCs related to the cooling system.

Diagnostic Trouble Code & Dashboard Indicator Light:

DTC/Light	Description
SPN 111 FMI 1	Low Coolant
	Malfunction Indicator Light (MIL)
	Red Stop Lamp (RSL)

Customer Observations or Concerns:

- Malfunction Indicator Light (MIL)
- Red Stop Lamp (RSL)
- Coolant consumption
- Low coolant
- Coolant puddling under engine
- White smoke from the exhaust
- Coolant in the oil or oil analysis
- Coolant Overheat/Over Temperature
- Coolant Over Flow

SPECIAL TOOLS

Tool Description	Tool Number	Comments	Instructions
Plastic Plug / Cap Kit	ZTSE4891	Used for sealing components during repairs	
Radiator Pressure Testing Kit	ZTSE2384		
Coolant Cap Pressure Testing Kit	09-040-01	Perform with warm engine	
Coolant Management Tool	KL5007NAV	Cooling system drain and vacuum fill	
EGR Cooler Leak Detection Kit	12-892-02	HT and LT EGRC Pressure Tester	
EGR Cooler Alignment Tool	12-892-01	If replacing an HT or LT EGRC section	
EGR Cooler Lifting Bracket	12-892-03	If removing EGR Cooler	
Kit, Charge Air Cooler Test	ZTSE6042	LPCAC Pressure Test Tool	

OVERVIEW



GOVERNMENT REGULATION: Engine fluids (oil, fuel, and coolant) may be a hazard to human health and the environment. Handle all fluids and other contaminated materials (e.g., filters rags) in accordance with applicable regulations. Recycle or dispose of engine fluids, filters, and other contaminated materials according to applicable regulations.



WARNING:

To prevent personal injury or death, make sure the engine has cooled before removing components.



WARNING:

To prevent personal injury or death, do not let engine fluids stay on your skin. Clean skin and nails using hand cleaner and wash with soap and water. Wash or discard clothing and rags contaminated with engine fluids.

Before beginning, it is important to review a few areas of the vehicle, to prevent unnecessary repair. Each of the following can manifest in "consumption" or low coolant level.

- i. Is AFC 12917 open?
- ii. Was the vehicle recently in for a repair in which the cooling system was not properly filled (air pockets)?
- iii. Was the vehicle recently repaired and the fault code not successfully cleared?
- iv. Is the operator aware of the proper filling procedure (overfill)?

If the coolant leak path is known (white smoke from exhaust, coolant in oil samples, etc) proceed to the respective steps or iKNows, noted below. Otherwise, continue with Step 1.

Step 1 - External Leaks

[iKnow 1201089 - Coolant in the exhaust](#)

[iKnow 1201090 - Coolant in the intake](#)

[iKnow 1201091 - Coolant in the oil](#)

[iKnow 1201192 - Big Bore Over Temperature](#)

[iKnow 1201193 - Big Bore Coolant Overflow](#)

DIAGNOSTIC PROCEDURE

If diagnosing a 111-1 code and have no associated coolant loss concern, go to 111-1 code circuit troubleshooting in the Engine Diagnostic Manual under Circuit Diagnostics > ECL Switch (Engine coolant level).

Step	Action	Decision
1	Visually inspect all components and hoses for external coolant leaks. WARNING: To prevent personal injury or death, do the following when removing the radiator cap or deaeration cap: - Allow engine to cool for 15 minutes. - Wrap a thick cloth around radiator cap or deaeration cap. - Loosen cap slowly a quarter to half turn counterclockwise to vent pressure. - Pause for a moment to avoid being scalded by steam. - Continue to turn cap counterclockwise to remove. - Remove deaeration tank cap. - Install Radiator Pressure Testing Kit ZTSE2384 with Surge Tank Cap Adaptor on deaeration tank. - Pressurize cooling system to 117 kPa (17 psi) for a minimum of 15 minutes. Are any external coolant leaks visible?	Yes: Repair as necessary. Restore the engine to operational condition and retest cooling system.
		No: Go to step 2

Step	Action	Decision
2	Remove deaeration tank cap. Pressurize cap to its rated pressure. - Remove deaeration tank cap. - Connect Radiator Pressure Testing Kit ZTSE2384 with Surge Tank Cap Adaptor to deaeration cap. NOTE: Do Not Exceed rated cap pressure! See TL2900027 - Pressurize deaeration cap to its rated pressure. Does the deaeration cap hold its rated pressure?	Yes: Go to step 3
		No: Replace deaeration cap. Restore the engine to operational condition and retest cooling system.

Step	Action	Decision
3	Inspect for Cooling System Pressure Loss. With the Radiator Pressure Testing Kit ZTSE2384 with Surge Tank Cap Adaptor already installed on deaeration tank. Pressurize cooling system to 117 kPa (17 psi) for a minimum of 15 minutes. Does the cooling system decrease in pressure after 15 minutes?	Yes: Go to step 6
		No: Reinstall deaeration tank cap. Go to step 4

Step	Action	Decision
4	Start engine. With engine at operating temperature and operating at high idle speed, inspect for coolant overflow out of deaeration tank. Top off the deaeration tank with coolant prior to running this test (If necessary).	Yes: Go to Coolant Overflow symptom based diagnostics. Refer to iKNow article IK1201193
		No: Go to step 5

	Is coolant overflowing out of the deaeration tank?	
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Step	Action	Decision
5	Verify Engine Overheat/Over Temperature Do not run the vehicle on a Dyno to try and duplicate an overheat/over temperature concern. This will give false results due to the lack of air flow across the engine.	Yes: Go to Coolant Over Temperature symptom based diagnostics. Refer to iKNow article IK1201192
	Does the vehicle have an overheat/Over Temperature concern?	No: Go to step 6

Step	Action	Decision
6	Inspect for coolant in the exhaust. WARNING: To prevent personal injury or death, do the following when removing the radiator cap or deaeration cap: - Allow engine to cool for 15 minutes. - Wrap a thick cloth around radiator cap or deaeration cap. - Loosen cap slowly a quarter to half turn counterclockwise to vent pressure. - Pause for a moment to avoid being scalded by steam. - Continue to turn cap counterclockwise to remove. - Remove deaeration tank cap. - Install Radiator Pressure Testing Kit ZTSE2384 with Surge Tank Cap Adaptor on deaeration tank. - Pressurize cooling system to 117 kPa (17 psi) for a minimum of 15 minutes. - Disconnect exhaust pipe at PRE-DOC and inspect for coolant	Yes: Go to Coolant in the Exhaust Symptom based diagnostics. Refer to iKNow article IK1201089 .
	Is coolant visible in the exhaust system?	No: Go to step 7

Step	Action	Decision
7	Inspect for coolant and/or white coolant residue in the charge air intake. - Disconnect CAC pipe at ETV housing. - Inspect CAC pipe for visual signs of white coolant residue. - Inspect the ETV Housing for visual signs of coolant.	Yes: Go to Coolant in Intake symptom based diagnostics. Refer to iKNow article IK1201090 .
	Is coolant and/or white coolant residue present in intake?	No: Go to step 8

Step	Action	Decision
8	Inspect for visible evidence of coolant on the engine oil level gauge (dipstick). - Remove and inspect the engine oil dipstick for visible evidence of contamination. - Oil contaminated with coolant generally causes the oil to thicken and coagulate, giving the oil a light gray sludgy appearance.	Yes: Go to Coolant in Lube Oil symptom based diagnostics. Refer to iKNow article IK1201091 .
	Does the lube oil show signs of visible contamination?	No: Restore the engine to operational condition and retest cooling system.

WARRANTY INFORMATION

NOTE: There are multiple noun groups that diagnostic time could be charged to.

Warranty Claim Coding:

Group:	Multiple Groups - Code to repair made
Noun:	Multiple Nouns - Code to repair made

STANDARD REPAIR TIMES

Use individual SRTs for warranty claim submission.

ProStar			
Step	Description	SRT Link	Hours
1-3	Visual Inspection, Pressure test	R12-2901U	0.3
4	Inspect for Coolant Overflow/Deaeration Tank	R12-2902U	0.2
5	Verify Engine Over Temperature	R12-2904U-20	0.2
6	Inspect for Coolant in Exhaust	R12-2903U	0.4
7	Inspect for Coolant in the Intake CAC Pipe	R12-2904U	0.1
8	Inspect for Coolant in Oil (Dipstick)	R12-2905U	0.1

TranStar			
Step	Description	SRT Link	Hours
1-3	Visual Inspection, Pressure test	Q12-2901U	0.3
4	Inspect for Coolant Overflow/Deaeration Tank	Q12-2902U	0.2
5	Verify Engine Over Temperature	Q12-2904U-20	0.2
6	Inspect for Coolant in Exhaust	Q12-2903U	0.4
7	Inspect for Coolant in the Intake CAC Pipe	Q12-2904U	0.1
8	Inspect for Coolant in Oil (Dipstick)	Q12-2905U	0.1

WorkStar			
Step	Description	SRT Link	Hours
1-3	Visual Inspection, Pressure test	N12-2901U	0.3
4	Inspect for Coolant Overflow/Deaeration Tank	N12-2902U	0.2
5	Verify Engine Over Temperature	N12-2904U-20	0.2
6	Inspect for Coolant in Exhaust	N12-2903U	0.4

7	Inspect for Coolant in the Intake CAC Pipe	N12-2904U	0.1
8	Inspect for Coolant in Oil (Dipstick)	N12-2905U	0.1

PayStar			
Step	Description	SRT Link	Hours
1-3	Visual Inspection, Pressure test	T12-2901U	0.3
4	Inspect for Coolant Overflow/Deaeration Tank	T12-2902U	0.2
5	Verify Engine Over Temperature	T12-2904U-20	0.2
6	Inspect for Coolant in Exhaust	T12-2903U	0.4
7	Inspect for Coolant in the Intake CAC Pipe	T12-2904U	0.1
8	Inspect for Coolant in Oil (Dipstick)	T12-2905U	0.1

LoneStar			
Step	Description	SRT Link	Hours
1-3	Visual Inspection, Pressure test	S12-2901U	0.3
4	Inspect for Coolant Overflow/Deaeration Tank	S12-2902U	0.2
5	Verify Engine Over Temperature	S12-2904U-20	0.2
6	Inspect for Coolant in Exhaust	S12-2903U	0.4
7	Inspect for Coolant in the Intake CAC Pipe	S12-2904U	0.1
8	Inspect for Coolant in Oil (Dipstick)	S12-2905U	0.1

CAT CT660			
Step	Description	SRT Link	Hours
1-3	Visual Inspection, Pressure test	TC12-2901U	0.3
4	Inspect for Coolant Overflow/Deaeration Tank	TC12-2902U	0.2
5	Verify Engine Over Temperature	TC12-2904U-20	0.2
6	Inspect for Coolant in Exhaust	TC12-2903U	0.4
7	Inspect for Coolant in the Intake CAC Pipe	TC12-2904U	0.1
8	Inspect for Coolant in Oil (Dipstick)	TC12-2905U	0.1

Link to the Standard Repair Time Manual: [Click Here](#)

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