

MAXXFORCE

INTERNATIONAL DIESEL POWER

Hard Start and No Start Diagnostics

International® MaxxForce® DT, 9, and 10

2007 through 2009 Model Years

WARNING

To prevent personal injury or death, read all safety instructions in the "Safety Information" section of International MaxxForce DT, 9, and 10 *Diagnostics Manual* EGES-370-1 before doing procedures on this form.

Header Information and Specifications

Look up the VIN on ISIS for build date, engine hp, engine serial number, ECM calibration, and transmission.

See EGES-370-1 Appendix A Performance Specifications for EFRC, injector number, and turbocharger number.

Use Performance Specifications to fill in the specifications needed for some tests.

See "Hard Start and No Start Diagnostics" for detailed information on these procedures which can be found in *Engine Diagnostics Manual* EGES-370-1.

Do Required Test Procedures in sequence and do Special Test Procedures when needed.It is not necessary to complete the rest of the form after the problem has been found and corrected.

Required Test Procedures

1. Initial Ignition Switch ON (Do not crank.)

☐ Listen for injectors to pre-cycle buzz. (Time is temperature dependent.)

☐ Look for WAIT TO START lamp to come on. (2-10 seconds, temperature dependent.)

☐ Look for WATER IN FUEL lamp or dash message.

Comments

- If the INJ did not pre-cycle, do Test 5.
- If the WATER IN FUEL is displayed, go to Test 4 and take a fuel sample.

2. Engine Cranking

- ☐ Cranking above 100 rpm. (Instrument panel)

☐ Oil pressure increased. (Instrument panel)

Specification	Actual
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- If cranking rpm is below specification, check batteries and starting system.
- If oil pressure does not increase, check oil.

3. Visual Inspection

- ☐ Check all fluid levels.

☐ Inspect electrical harness and connections.

☐ Inspect air filter minder.

☐ Inspect for exhaust damage.

Fuel	Oil	Coolant	Electrical	Air
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Note: Engine will not start if the IPR valve, CMP, or CKP sensor is disconnected.

Technician _____	Miles _____	Ambient temperature _____	Engine SN _____	ECM Calibration _____
Date _____	Hours _____	Coolant temperature _____	Engine HP _____	Turbocharger _____
Unit No. _____	EFRC _____	Build date _____	VIN _____	

4. DTCs and ECM Calibration

- ☐ Open VIN-Plus session with EST (Verify ECM software matches vehicle).

Active DTCs	Inactive DTCs
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- If ECM software does not match, reprogram the ECM.
- If any DTCs are set, correct fault before continuing.

5. EST Data List

- ☐ Enter KOEO values in KOEO column.

☐ Crank engine for 20 seconds and enter values in the Cranking Actual column.

PID	KOEO	Cranking Spec	Cranking Actual
VBAT			
RPM			
EFP			
ICP			
EGRP			
BCP			

- If VBAT is below spec, do Main Power Voltage at ECM test.
- If rpm is below spec, check starting system.
- If EOP is below spec, see Low Oil Pressure in Section 4.
- If EGRP is above 0%, do test 7.
- If BCP is out-of-range, see BCP Sensor in "Electronic Control System Diagnostics" section of EGES-370-1.

6.1 KOEO Standard Test

- ☐ Use EST to run KOEO Standard Test.

DTCs

If any DTCs are set, correct fault code before continuing.

6.2 KOEO Injector Test

- ☐ Use EST to run KOEO Injector Test.

DTCs

If any DTCs are set, correct fault before continuing.

7. EGR Valve and ITV Operation

- ☐ Turn the ignition switch to ON. (Do not start engine)

☐ Run KOEO Output State Low and High tests.

PID	Specification	Actual
EGR (close position)	0 to 5 %	
EGR (open position)	95 to 100 %	
ITV (close position)	0 to 5 %	
ITV (open position)	45 to 55 %	

If out of specification, see ITV or EGR in Section 7 of EGES-370-1.

Special Test Procedures

Main Power Voltage to ECM

- ☐ Connect breakout harness between ECM main power relay and power distribution center.

☐ Crank engine for a maximum of 20 seconds. Use a DMM to measure voltage to ECM.

☐ Check voltage between connector Pin 87 and ground.

Specification	Actual
9 volts (Minimum)	

Inlet Air Heater System

- ☐ Use an amp clamp to measure amperage on each heater element.

☐ Run Intake Heater Output state test and record measurement after 2 sec.

☐ If amperage reading is not to specification for Amperage Draw test, do all remaining tests for that circuit.
- Note: Later models have only one relay and heater element.

Test	Spec	Element 1	Element 2
Amperage Draw	125 ± 10 amps		
Voltage at Element	BATT V		
Element Continuity		☐ Yes ☐ No	☐ Yes ☐ No
Wiring Harness Continuity and Resistance	< 5 ohms		
Relay Operation Battery feed Relay output	B+ B+		

Fuel Quality

- ☐ Take a fuel sample from filter housing drain port.

Comments

- If fuel is contaminated with water, icing, gasoline, kerosene, etc., clean fuel system as necessary to remove all contaminants.
- If fuel is clean, do Fuel Pressure and Aeration test.

Note: If engine was run out of fuel, ensure the system is primed.

Fuel Pressure and Aeration

- ☐ Connect fuel gauge to fuel pressure test port on intake manifold.

☐ Start or crank engine for 20 seconds.

☐ Measure fuel pressure with shut-off valve closed, open shut-off valve to check for aeration.

Pressure	Spec	Low idle	High idle
0-160 psi gauge			
Is fuel aerated?			

- If pressure is high and pulsating, see Combustion Leaks to Fuel in Section 4 of EGES-370-1.
- If fuel is aerated, check for leaks in suction side to the pump.
- If pressure is below specification and not aerated, replace filter and test again.
- If pressure is still low after changing filter, do Fuel Inlet Restriction test.

Fuel Inlet Restriction

Note: Test is only valid if engine starts and achieves high idle.

☐ Connect 0-30 in-Hg vacuum gauge and fuel inlet restriction adaptor to fuel strainer housing.

☐ Start engine and accelerate to high idle.

Restriction	Specification	Actual
0-30 in Hg vac gauge		

- If restriction is above specification, check lines between tank and pump for blockage.
- If fuel pressure is low and not restricted, inspect and clean regulator valve. Test again.
- If fuel pressure is still low after cleaning regulator, replace fuel pump.

ICP Unplugged Test

- ☐ Disconnect ICP sensor from engine harness.

☐ Crank engine for 20 seconds maximum.
- If engine starts, see ICP Sensor in Section 7 of EGES-370-1.

Injection Control Pressure (ICP) System Test

- ☐ Use EST to monitor ICP and EOP.

☐ Crank engine for 20 seconds maximum.

PID	Specification	Actual
ICP		
EOP		

- If ICP and EOP are below specification, remove EOT sensor and check oil level in high-pressure pump reservoir.
- If EOP is below specification and reservoir is low, check lube oil system.
- If EOP is in specification, but ICP is below spec, then do IPR Control System Test.

IPR Control System Test

- ☐ Disconnect IPR harness connector and inspect for faulty connection. Repair as required.

☐ Connect IPR breakout tee to IPR valve. Leave engine harness disconnected.

☐ Connect IPR breakout tee to B+ and ground.

☐ Turn ignition switch ON. Do not start engine.

☐ Open Hard Start and No Start session.

☐ Crank engine for 20 seconds maximum.

☐ Monitor ICP and record results.

PID	Specification	Actual
ICP		

- If ICP is below specification or engine does not start, do High-pressure Oil Pump Test.
- If ICP is above specification or engine starts, see IPR in Section 7 of EGES-370-1.

High-pressure Oil Pump Test

- ☐ Retain previous test set-up.

☐ Remove high-pressure hose from cylinder head and connect test ICP sensor to hose.

☐ Connect breakout tee between MAP harness and test ICP sensor.
- Note: MAP sensor connector only being used in this test for VREF and SIG GND circuits.
- ☐ Use DMM to monitor ICP sensor signal voltage.

☐ Crank engine for 20 seconds maximum.

PID	Specification	Actual
ICP		

- If ICP is above specification, do High-pressure Oil Rail Leak Test.
- If ICP is below specification, do IPR Block-off Test.

IPR Block-Off Test

- ☐ Retain previous test set-up.

☐ Remove IPR valve from high-pressure oil pump.

☐ Install IPR block-off tool.

☐ Use DMM to monitor ICP sensor signal voltage.

☐ Crank engine for 20 seconds maximum.

PID	Specification	Actual
ICP		

- If results are out of specification, replace the high-pressure pump.
- If results are in specification, replace IPR valve.

High-pressure Oil Rail Leak Test

- ☐ Retain previous test set-up.

☐ Install the high-pressure hose to the cylinder head.

☐ Crank engine for 20 seconds maximum.

☐ Inspect high-pressure oil rail for leaks while cranking.

Comments

Repair where ever oil is leaking heavy from.