

AF: Symptom Chart 6[← AF: Introduction](#)**AF1 PRELIMINARY CHECKS**

- Perform the following preliminary checks:
 - Check engine oil level
 - Confirm oil change within 8046.5 km (5000 miles) (5632.6 km [3500 miles] if severe duty)
 - Check Air Filter Minder
 - Confirm acceptable SAE oil viscosity and API rating of oil. Refer to operator's guide.
 - Check fuel quality. Refer to [Section 4A](#) or [Section 4B](#) .
 - Confirm proper dipstick part number

Are all checks OK?

Yes	No
GO to AF2 .	REPAIR as necessary. VERIFY a symptom no longer exists.

AF2 PERFORM KOEO ON-DEMAND SELF TEST

- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform KOEO On-Demand Self Test.
- Retrieve and clear continuous codes.

Is a fault indicated?

Yes	No
GO to appropriate pinpoint test.	GO to AF3 .

AF3 PERFORM KOEO INJECTOR ELECTRICAL SELF TEST

- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform KOEO Injector Electrical Self Test.

Is a fault indicated?

Yes	No
GO to appropriate pinpoint test.	GO to AF4 .

AF4 CHECK FOR AERATED OIL

CAUTION: Before running oil aeration tests, make sure the high-pressure oil passages are free of air from recent repairs by running vehicle hard for 32 kilometers (20 miles) after repair.



CAUTION: Engine must be warmed up to normal operating temperature.

- Confirm proper oil change interval.
- Confirm proper oil level and type.
- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform Injection Control Pressure Test.
- Run engine at 3400 rpm for 30 seconds.

Does ICP read greater than 2.30 volts or 12,410 kPa (1,800 psi)?

Yes	No
GO to AF5 .	GO to AF7 .

AF5 CHECK FOR AIR LEAKS

- Overfill engine by 1.9 liters (2 quarts).
- Raise and support rear of vehicle 254 mm (10 inches).
- Run engine at 3400 rpm for 3 minutes.

Does ICP read greater than 2.30 volts or 12,410 kPa (1,800 psi)?

Yes	No
Oil is aerating due to lack of defoaming agents. GO to AF6 .	Aeration is caused by O-ring leak or a hole in the oil pickup tube. REPAIR as required.

AF6 OIL AERATION TEST

- Change to oil that meets CG4/SH specifications, and CONFIRM engine oil level is correct.
- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform Injection Control Pressure Tests.
- Warm engine to normal operating temperature.
- Run engine at 3400 rpm for 3 minutes.

Does ICP read greater than 2.30 volts or 12,410 kPa (1,800 psi)?

Yes	No
GO to AF7 .	VERIFY repair.

AF7 LOW IDLE STABILITY TEST

- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform Low Idle Stability Test.

Does idle immediately smooth out?

Yes	No
GO to Pinpoint Test DC . CONFIRM wiring is OK. If OK, REPLACE ICP.	GO to AF8 .

AF8 CHECK FOR BIASED ICP SENSOR**CAUTION:** Allow adequate bleed down time before testing or incorrect reading can result.

- Turn off engine for one minute.

Does ICP PID read greater than 0 kPa (0 psi) or ICP V PID read greater than 0.30 volt?

Yes	No
GO to Pinpoint Test DC . CONFIRM wiring is OK. If OK, REPLACE ICP sensor.	GO to AF9 .

AF9 CHECK FUEL PUMP PRESSURE

- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform Fuel Pump Pressure Test.

Is fuel pressure within specifications?

Yes	No
GO to AF10 .	FOLLOW Performance Diagnostic Procedures direction.

AF10 CHECK LUBRICATION PRESSURE

- Confirm engine oil level in high-pressure pump reservoir is within 25.4 mm (1 inch) of inspection plug.
- Attach 689 kPa (100 psi) oil pressure gauge on gauge bar (14-00761) to reservoir.
- Warm engine to normal operating temperature.

Is oil pressure 69 kPa (12 psig) or greater at idle (650 rpm)?

Yes	No
GO to AF11 .	GO to the Workshop Manual to check for cause of low oil pressure.

AF11 KOER ON-DEMAND SELF TEST**CAUTION:** Before running KOER On-Demand Self Test, make sure that the high-pressure oil passages are free of air from recent repairs by running vehicle hard for 32 kilometers (20 miles) after repair.

- Warm engine to normal operating temperature.
- Clear codes.
- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform KOER On-Demand Self Test.

Was DTC 1211 received?

Yes	No

GO to [AF12](#) .GO to [AF16](#) .**AF12 CHECK PRESSURE BALANCE**

- Plug off high-pressure hose for right cylinder head using adapter from 303-S626.
- Check IPR at 3000 rpm.
- Plug off high-pressure hose for left cylinder head using adapter from 303-S626, and reattach high-pressure hose on right cylinder head.
- Check IPR at 3000 rpm.

Is IPR duty cycle difference greater than 2%?

Yes	No
GO to AF13 .	REPLACE IPR.

AF13 CHECK FOR LEAK SOURCE

- Remove valve cover on cylinder(s) with higher IPR reading.
- With engine idling, look for bubbling around injector bores or oil gallery drain plugs.
- Or, with engine off, attach approximately 689 kPa (100 psi) air pressure to high-pressure oil gallery.
- Look/listen for leaks.

Is a leak present?

Yes	No
REPLACE seals on injectors or RESEAL oil galleries as required.	GO to AF14 .

AF14 CHECK ROUGH IDLE**Was rough idle present when vehicle was new or after installing a new high pressure pump?**

Yes	No
GO to AF15 .	GO to AF16 .

AF15 CHECK HIGH-PRESSURE OIL PUMP

- Attach right hose to left head and plug left hose.
- Check IPR at idle.
- Compare this reading to reading for left head in Step 6-12.

Is difference in readings greater than 0.2 volt or 2%?

Yes	No
Imbalance caused by high-pressure oil pump. CONFIRM high-pressure hoses are clear, and REPLACE high-pressure oil pump.	GO to AF16 .

AF16 KOER CYLINDER CONTRIBUTION TEST

- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform KOER Cylinder Contribution Test.

Is a cylinder identified?

Yes	No
GO to AF17 .	GO to AF18 .

AF17 CHECK FOR ENGINE WEAR

- Go to [Section 4A](#) or [Section 4B](#) , Diagnostic Subroutines, Performance Diagnostic Procedures. Perform Crankcase Pressure Test.

Is crankcase pressure higher than 4 inches of H₂O?

Yes	No
REPAIR engine as required.	REPLACE injector in identified cylinder.

AF18 CHECK FOR INCORRECT INJECTOR APPLICATION

- Remove engine valve covers.
- Check part number stamped on top of each injector.

Are the correct injectors installed?

Yes	No
Cause of rough idle cannot be determined. COMPARE idle performance with other vehicles.	REPLACE injectors.
