2012 - Mazda6 - Engine

NO.29 SPARK PLUG CONDITION [MZR 2.5]

29	SPARK PLUG CONDITION
DESCRIPTION	• Incorrect spark plug condition.
POSSIBLE CAUSE	**NOTE:** • Inspecting the spark plug conditions can determine whether a problem is related to a specific cylinder or possibly all cylinders. Wet/carbon stuck on specific plug: • Spark—Weak, not visible • Air/fuel mixture—Excessive fuel injection volume • Compression—No compression, low compression • Malfunction spark plug Grayish white with specific plug: • Air/fuel mixture—Insufficient fuel injection volume • Malfunction spark plug Wet/carbon is stuck on all plugs: • Spark—Spark weak • Air/fuel mixture—Too rich, excessive fuel line pressure • Erratic signal to PCM ▪ ECT sensor or related circuit malfunction ▪ MAF sensor or related circuit malfunction ▪ A/F sensor or related circuit malfunction ▪ HO2S or related circuit malfunction • Compression—Low compression • Clogging in intake/exhaust system Grayish white with all plugs: • Air/fuel mixture—Too lean, insufficient fuel line pressure • Erratic signal to PCM ▪ ECT sensor or related circuit malfunction ▪ MAF sensor or related circuit malfunction ▪ A/F sensor or related circuit malfunction ▪ HO2S or related circuit malfunction **WARNING:**

The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:

- Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.
- Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See **BEFORE SERVICE PRECAUTION [MZR 2.5]**.) (See **AFTER SERVICE PRECAUTION [MZR 2.5]**.)

CAUTION:

- **Disconnecting/ connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and the quick release connector. Always clean the quick release connector joint area before disconnecting/ connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
1	**VERIFY SPARK PLUG CONDITION** • Remove all the spark plugs. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.) • Inspect the spark plug condition. (See **SPARK PLUG INSPECTION [MZR 2.5]**.) • Are the spark plugs conditions normal?	Yes	Symptom troubleshooting completed.
		No	Specific plug is wet or covered with carbon: • Go to the next step. Specific plug looks grayish white: • Go to Step 7. All plugs are wet or covered with carbon: • Go to Step 9. All plugs look grayish white: • Go to Step 15.
2	**DETERMINE IF MALFUNCTION CAUSE IS ENGINE OIL LOSS OR OTHER** • Are the spark plugs wet/covered with carbon from the engine oil?	Yes	Inspect all areas related to oil, working up and down.
		No	Go to the next step.
3	**INSPECT SPARK PLUG** • Inspect the spark plugs for the following: ▪ Cracked insulator ▪ Heat range ▪ Air gap ▪ Worn electrode • Are the spark plugs normal?	Yes	Go to the next step.
		No	Replace the spark plug. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.)
4	**INSPECT ENGINE COMPRESSION** • Inspect the compression pressure at the suspected malfunctioning cylinder.	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection

	(See **COMPRESSION INSPECTION [MZR 2.5]**.) • Is the compression pressure correct?		results.
5	**INSPECT IGNITION SYSTEM OPERATION** • Install all the spark plugs. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.) • Perform the spark test at the suspected malfunctioning cylinder. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is a strong blue spark visible? (Compare with normal cylinder.)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
6	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is the fuel line pressure correct?	Yes	Inspect the fuel injector for the following: • Open or short circuit in injector • Leakage • Injection volume Repair or replace the malfunctioning part according to the inspection results.
		No	Zero or low: • Inspect the following: ▪ Fuel pump relay ▪ Fuel pump circuit ▪ Fuel line for clogging • If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.) High: • Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
7	**INSPECT SPARK PLUG** • Inspect the spark plug for the following: ▪ Heat range	Yes	Go to the next step.
		No	Replace the spark plug. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.)

	▪ Air gap • Is the spark plug normal?		
8	**INSPECT FUEL INJECTOR OPERATION** • Perform the Fuel Injector Operation Inspection. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Do the fuel injectors operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
9	**INSPECT AIR CLEANER ELEMENT** • Is the air cleaner element free of clogging?	Yes	Go to the next step.
		No	Replace the air cleaner element.
10	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
11	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is the fuel line pressure correct?	Yes	Go to the next step.
		No	Zero or low: • Inspect the following: ▪ Fuel pump relay ▪ Fuel pump circuit ▪ Fuel line for clogging • If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [MZR 2.5]**.) High: • Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [MZR 2.5]**.)
12	**VERIFY CURRENT INPUT SIGNAL STATUS** • Access the following PCM PIDs: ▪ ECT ▪ O2S11 (When engine can be	Yes	Go to the next step.
		No	ECT PID is not as specified: • Inspect for an intermittent open circuit of the ECT sensor and the related wiring harness. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.) MAF PID is not as specified:

	started.) ▪ O2S12 (When engine can be started.) ▪ MAF • Are all PIDs normal? (See **PCM INSPECTION [MZR 2.5]**.)		• Inspect for an intermittent open circuit of the MAF sensor and the related wiring harness. (See **MASS AIR FLOW (MAF) SENSOR INSPECTION [MZR 2.5]**.) O2S11 PID is not as specified: • Inspect for an intermittent open circuit of the A/F sensor and the related wiring harness. (See **AIR FUEL RATIO (A/F) SENSOR INSPECTION [MZR 2.5]**.) O2S12 PID is not as specified: • Inspect for an intermittent open circuit of the HO2S and the related wiring harness. (See **HEATED OXYGEN SENSOR (HO2S) INSPECTION [MZR 2.5]**.) Repair or replace the malfunctioning part according to the inspection results.
13	**INSPECT PURGE CONTROL SYSTEM OPERATION** • Perform the purge control inspection. (When engine can be started.) (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is the purge control correct?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
14	**INSPECT ENGINE COMPRESSION** • Perform the compression inspection. (See **COMPRESSION INSPECTION [MZR 2.5]**.) • Is the compression correct?	Yes	Visually inspect for deformed exhaust system parts. Repair or replace the malfunctioning part according to the inspection results.
		No	Repair or replace the malfunctioning part according to the inspection results.
15	**INSPECT INTAKE-AIR SYSTEM FOR AIRSUCTION** • Inspect the following: ▪ Intake air system for air leakage (When the engine cannot be started.) ▪ Intake manifold vacuum (When the	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.

	engine can be started.) • Is air sucked in from intake air system?		
16	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is the fuel line pressure correct?	Yes	Go to the next step.
		No	Zero or low: • Inspect the following: ▪ Fuel pump relay ▪ Fuel pump circuit ▪ Fuel line for clogging • If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [MZR 2.5]**.) High: • Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/INSTALLATION [MZR 2.5]**.)
17	**VERIFY CURRENT INPUT SIGNAL STATUS** • Access the following PCM PIDs: ▪ ECT ▪ O2S11 (When engine can be started.) ▪ O2S12 (When engine can be started.) ▪ MAF • Are all PIDs normal? (See **PCM INSPECTION [MZR 2.5]**.)	Yes	Inspect the PCM ground condition. Repair or replace the malfunctioning part according to the inspection results.
		No	ECT PID is not as specified: • Inspect for an intermittent open circuit of the ECT sensor and the related wiring harness. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.) MAF PID is not as specified: • Inspect for an intermittent open circuit of the MAF sensor and the related wiring harness. (See **MASS AIR FLOW (MAF) SENSOR INSPECTION [MZR 2.5]**.) O2S11 PID is not as specified: • Inspect for an intermittent open circuit of the A/F sensor and the related wiring harness. (See **AIR FUEL RATIO (A/F) SENSOR INSPECTION [MZR 2.5]**.) O2S12 PID is not as specified: • Inspect for an intermittent open circuit of the HO2S and the related wiring harness. (See **HEATED OXYGEN SENSOR (HO2S) INSPECTION [MZR 2.5]**.) Repair or replace the malfunctioning part according to the inspection

			results.
18	• Verify test results. ▪ If normal, return to diagnostic index to service any additional symptoms. (See **SYMPTOM DIAGNOSTIC INDEX [MZR 2.5]**.) ▪ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, reprogram the PCM if a later calibration is available. Retest.		

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CAUTION:

- **Disconnecting/ connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and the quick release connector. Always clean the quick release connector joint area before disconnecting/ connecting, and make sure that it is free of foreign material.**

Diagnostic procedure

STEP	INSPECTION	RESULTS	ACTION
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		No	Specific plug is wet or covered with carbon: • Go to the next step. Specific plug looks grayish white: • Go to Step 7. All plugs are wet or covered with carbon: • Go to Step 9. All plugs look grayish white: • Go to Step 15.
2	**DETERMINE IF MALFUNCTION CAUSE IS ENGINE OIL LOSS OR OTHER** • Are the spark plugs wet/covered with carbon from the engine oil?	Yes	Inspect all areas related to oil, working up and down.
		No	Go to the next step.
3	**INSPECT SPARK PLUG** • Inspect the spark plugs for the following: ▪ Cracked insulator ▪ Heat range ▪ Air gap ▪ Worn electrode • Are the spark plugs normal?	Yes	Go to the next step.
		No	Replace the spark plug. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.)
4	**INSPECT ENGINE COMPRESSION** • Inspect the compression pressure at the suspected malfunctioning cylinder.	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection

	(See **COMPRESSION INSPECTION [MZR 2.5]**.) • Is the compression pressure correct?		results.
5	**INSPECT IGNITION SYSTEM OPERATION** • Install all the spark plugs. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.) • Perform the spark test at the suspected malfunctioning cylinder. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is a strong blue spark visible? (Compare with normal cylinder.)	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
6	**INSPECT FUEL LINE PRESSURE** • Inspect the fuel line pressure. (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.) • Is the fuel line pressure correct?	Yes	Inspect the fuel injector for the following: • Open or short circuit in injector • Leakage • Injection volume Repair or replace the malfunctioning part according to the inspection results.
		No	Zero or low: • Inspect the following: ▪ Fuel pump relay ▪ Fuel pump circuit ▪ Fuel line for clogging • If there is no malfunction, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.) High: • Replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
7	**INSPECT SPARK PLUG** • Inspect the spark plug for the following: ▪ Heat range	Yes	Go to the next step.
		No	Replace the spark plug. (See **SPARK PLUG REMOVAL/ INSTALLATION [MZR 2.5]**.)

	▪ Air gap • Is the spark plug normal?		
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9	**INSPECT AIR CLEANER ELEMENT** • Is the air cleaner element free of clogging?	Yes	Go to the next step.
		No	Replace the air cleaner element.
10	**INSPECT IGNITION SYSTEM OPERATION** • Perform the Spark Test. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is a strong blue spark visible at each cylinder?	Yes	Go to the next step.
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12	**VERIFY CURRENT INPUT SIGNAL STATUS** • Access the following PCM PIDs: ▪ ECT ▪ O2S11 (When engine can be	Yes	Go to the next step.
		No	ECT PID is not as specified: • Inspect for an intermittent open circuit of the ECT sensor and the related wiring harness. (See **ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [MZR 2.5]**.) MAF PID is not as specified:

	started.) ▪ O2S12 (When engine can be started.) ▪ MAF • Are all PIDs normal? (See **PCM INSPECTION [MZR 2.5]**.)		• Inspect for an intermittent open circuit of the MAF sensor and the related wiring harness. (See **MASS AIR FLOW (MAF) SENSOR INSPECTION [MZR 2.5]**.) O2S11 PID is not as specified: • Inspect for an intermittent open circuit of the A/F sensor and the related wiring harness. (See **AIR FUEL RATIO (A/F) SENSOR INSPECTION [MZR 2.5]**.) O2S12 PID is not as specified: • Inspect for an intermittent open circuit of the HO2S and the related wiring harness. (See **HEATED OXYGEN SENSOR (HO2S) INSPECTION [MZR 2.5]**.) Repair or replace the malfunctioning part according to the inspection results.
13	**INSPECT PURGE CONTROL SYSTEM OPERATION** • Perform the purge control inspection. (When engine can be started.) (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Is the purge control correct?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
14	**INSPECT ENGINE COMPRESSION** • Perform the compression inspection. (See **COMPRESSION INSPECTION [MZR 2.5]**.) • Is the compression correct?	Yes	Visually inspect for deformed exhaust system parts. Repair or replace the malfunctioning part according to the inspection results.
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15	**INSPECT INTAKE-AIR SYSTEM FOR AIRSUCTION** • Inspect the following: ▪ Intake air system for air leakage (When the engine cannot be started.) ▪ Intake manifold vacuum (When the	Yes	Repair or replace the malfunctioning part according to the inspection results.
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	engine can be started.) • Is air sucked in from intake air system?		
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18	• Verify test results. ▪ If normal, return to diagnostic index to service any additional symptoms. (See **SYMPTOM DIAGNOSTIC INDEX [MZR 2.5]**.) ▪ If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. • If vehicle is repaired, troubleshooting completed. • If vehicle is not repaired or additional diagnostic information is not available, reprogram the PCM if a later calibration is available. Retest.		

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