2012 - Mazda6 - Engine

NO.8 ENGINE RUNS ROUGH/ ROLLING IDLE [MZR 2.5]

8	ENGINE RUNS ROUGH/ROLLING IDLE
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively. • Idle speed is too slow and engine shakes excessively.

POSSIBLE CAUSE	• Idle learning of drive-by-wire control system is not completed.
	• Electrical connector disconnection
	• External fuel shut off or accessory
	• Poor fuel quality
	• Fuse malfunction
	• Ignition wiring malfunction
	• Air leakage from intake air system
	• Vacuum leakage
	• PCM ground circuit (1E, 1F, 1G, 1BE, or 1BF) malfunction
	• Improper installation of EGR valve
	• PCM DTC is stored.
	• Engine overheating
	• MAF sensor and related wiring harness malfunction
	• Erratic signal from PSP switch
	• Improper operation of A/C system
	• CKP sensor and teeth of crankshaft pulley malfunction
	• Ignition system malfunction
	  ▪ Ignition coil and related wiring harness malfunction
	  ▪ Spark plug malfunction
	• Improper operation of drive-by-wire control system
	• Excessive or insufficient fuel pressure
	  ▪ Fuel pump relay or fuel pump circuit malfunction
	  ▪ Restriction in fuel line
	  ▪ Pressure regulator malfunction (built-into fuel pump unit)
	  ▪ Fuel pump malfunction
	• Fuel leakage from fuel system
	• Fuel injector malfunction
	• Purge solenoid valve malfunction
	• EVAP control system malfunction
	• Exhaust system part malfunction

- CMP sensor and teeth of camshaft malfunction
- EGR valve malfunction
- Improper operation of variable valve timing control system
- Low engine compression
- PCV valve malfunction
- Improper valve timing

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	**INSPECT IF MALFUNCTION CAUSE IS DRIVE-BY-WIRE CONTROL SYSTEM IDLE LEARNING NOT PERFORMED** • Warm up the engine. • Idle the engine for **5 min.** • Does the symptom disappear?	Yes	Symptom troubleshooting is completed. (Cause of this symptom is that the idle learning for drive-by-wire control system is not completed.)
		No	Go to the next step.
2	**INSPECT RELATED PART CONDITION** • Verify the following: ▪ External fuel shut off or accessory (such as kill switch, alarm) ▪ Fuel quality (such as proper octane, contamination, winter/summer blend) ▪ No air leakage from intake air system ▪ Proper sealing of intake manifold and components attached to intake manifold: EGR valve	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results. Repeat Step 2.

	▪ Ignition wiring ▪ Electrical connections ▪ Fuses ▪ Smooth operation of throttle valve ▪ Air cleaner restriction ▪ Vacuum leakage from intake air system ▪ PCM ground circuit (1E, 1F, 1G, 1BE, or 1BF) • Are all items normal?		
3	**VERIFY PCM DTC** • Retrieve any DTCs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Are there any DTCs displayed?	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	Go to the next step.
4	**VERIFY IF MALFUNCTION CAUSE IS OVERHEATING** • Is the engine overheating?	Yes	Go to the symptom troubleshooting "NO.17 COOLING SYSTEM CONCERNS-OVERHEATING". (See **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZR 2.5]**.)
		No	Go to the next step.
5	**INSPECT MAF SENSOR SIGNAL** **CAUTION:** • While performing this step, always operate the vehicle in a safe and lawful manner. • When the M-MDS is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the M-MDS using the PID/DATA MONITOR AND RECORD capturing function and inspect later. • Access the PCM PID MAF using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Drive the vehicle while monitoring the PID. • Is the MAF PID within the specification?	Yes	Go to the next step.
		No	Inspect for an open or short circuit in the MAF sensor and related wiring harness. Repair or replace the malfunctioning part according to the inspection results.
6	**INSPECT POWER STEERING OPERATION SIGNAL**	Yes	Go to the next step.

	Access the PCM PID PSP using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Do the PIDs indicate the correct values under trouble condition?	No	Inspect the PSP switch and the related harnesses. (See **POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [MZR 2.5]**.) Repair or replace the malfunctioning part according to the inspection results. • If the malfunction remains, perform the intermittent concern troubleshooting procedure. (See **INTERMITTENT CONCERN TROUBLESHOOTING [MZR 2.5]**.)
7	**DETERMINE IF MALFUNCTION CAUSE IS A/C SYSTEM OR OTHER** **NOTE:** • The following test is for stall concerns with the A/C on. If other symptoms exist, go to the next step. • Connect the pressure gauges to the A/C low side and high side pressure lines. • Turn the A/C on and measure the low side and high side pressures. • Are the pressures within the specifications? (See **REFRIGERANT PRESSURE CHECK**.)	Yes	Go to the next step.
		No	If the A/C is always on: • Go to the symptom troubleshooting "NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY". (See **NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZR 2.5]**.) For other symptoms: • Inspect the following: ▪ Refrigerant charging amount ▪ Cooling fan operation • Repair or replace the malfunctioning part according to the inspection results.
8	**VISUALLY INSPECT CKP SENSOR AND PULSE WHEEL** • Visually inspect the CKP sensor and teeth of the crankshaft pulley. • Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
9	**INSPECT IGNITION SYSTEM RELATED WIRING HARNESS** • Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. • Are the wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair or replace suspected wiring harness and connector.
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	**VERIFY SPARK PLUG CONDITION** • Verify the spark plug conditions when the spark plug removed in Step 10. (See **SPARK PLUG INSPECTION [MZR 2.5]**.)	Yes	Spark plug is wet or covered with carbon: • Inspect for fuel leakage from fuel injector. Spark plug is grayish white: • Inspect the fuel injector for clogging.

	• Is spark plug wet, covered with carbon or grayish white?		Repair or replace the malfunctioning part according to the inspection results.
		No	Install the spark plugs on original cylinders. Go to the next step.
12	**INSPECT DRIVE-BY-WIRE CONTROL SYSTEM OPERATION** • Perform the drive-by-wire control system operation inspection. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Does the drive-by-wire control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
13	**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]**.)
14	**INSPECT FUEL SYSTEM FOR FUEL LEAKAGE** • Visually inspect for fuel leakage at the fuel injector O-ring and fuel line. • Service if necessary. • Is the fuel line pressure held after ignition is off? (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
15	**INSPECT LONG TERM FUEL TRIM** • Start the engine and idle it. • Access the PCM PID LONG FT1 using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Measure the LONG FT1 PID at idle. • Is the PID value between **−14**	Yes	Go to the next step.
		No	Less than specification (too rich): • Inspect the EVAP control system. • Repair or replace the malfunctioning part according to the inspection results. Greater than specification (too lean): • Inspect for air leakage at the intake air system

	% and +14 % ?		components. • Repair or replace the malfunctioning part according to the inspection results. ▪ If the system is normal, go to the next step.
16	**DETERMINE IF MALFUNCTION CAUSE IS EVAP CONTROL SYSTEM OR OTHER** • Disconnect the vacuum hose between purge solenoid valve and intake manifold from the purge solenoid valve side. • Plug the open end of the vacuum hose. • Start the engine. • Does the engine condition improve?	Yes	Inspect the following: • If the purge solenoid valve is stuck open. • EVAP control system Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
17	**INSPECT DEFORMED IN EXHAUST SYSTEM** • Visually inspect the exhaust system part. • Is there any deformed exhaust system part?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
18	**VISUALLY INSPECT CMP SENSOR AND PULSE WHEEL** • Visually inspect the CMP sensor and teeth of the camshaft. (See **CAMSHAFT POSITION (CMP) SENSOR INSPECTION [MZR 2.5]**.) • Are the CMP sensor and teeth of the camshaft normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
19	**INSPECT EGR VALVE FOR STUCK** • Inspect the engine condition while tapping the EGR valve housing. • Does the engine condition improve?	Yes	Replace the EGR valve. (See **EGR VALVE REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
20	**INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Inspect the variable valve timing control system operation. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Does the variable valve timing control system operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
21	**INSPECT ENGINE COMPRESSION** • Is the engine compression correct? (See **COMPRESSION INSPECTION [MZR 2.5]**.)	Yes	Go to the next step.
		No	Inspect for cause. Repair or replace the malfunctioning part according to the inspection results.

22	**INSPECT IF MALFUNCTION CAUSE IS PCV VALVE OR VALVE TIMING** • Inspect the PCV valve. (See **POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [MZR 2.5]**.) • Is the PCV valve normal?	Yes	Inspect the valve timing. Repair or replace the malfunctioning part according to the inspection results.
		No	Replace the PCV valve and the oil separator as a single unit, then go to the next step. (See **POSITIVE CRANKCASE VENTILATION (PCV) VALVE REMOVAL/INSTALLATION [MZR 2.5]**.)
23	• 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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2012 - Mazda6 - Engine

NO.8 ENGINE RUNS ROUGH/ ROLLING IDLE [MZR 2.5]

8	ENGINE RUNS ROUGH/ROLLING IDLE
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively. • Idle speed is too slow and engine shakes excessively.

POSSIBLE CAUSE	• Idle learning of drive-by-wire control system is not completed.
	• Electrical connector disconnection
	• External fuel shut off or accessory
	• Poor fuel quality
	• Fuse malfunction
	• Ignition wiring malfunction
	• Air leakage from intake air system
	• Vacuum leakage
	• PCM ground circuit (1E, 1F, 1G, 1BE, or 1BF) malfunction
	• Improper installation of EGR valve
	• PCM DTC is stored.
	• Engine overheating
	• MAF sensor and related wiring harness malfunction
	• Erratic signal from PSP switch
	• Improper operation of A/C system
	• CKP sensor and teeth of crankshaft pulley malfunction
	• Ignition system malfunction
	  ▪ Ignition coil and related wiring harness malfunction
	  ▪ Spark plug malfunction
	• Improper operation of drive-by-wire control system
	• Excessive or insufficient fuel pressure
	  ▪ Fuel pump relay or fuel pump circuit malfunction
	  ▪ Restriction in fuel line
	  ▪ Pressure regulator malfunction (built-into fuel pump unit)
	  ▪ Fuel pump malfunction
	• Fuel leakage from fuel system
	• Fuel injector malfunction
	• Purge solenoid valve malfunction
	• EVAP control system malfunction
	• Exhaust system part malfunction

- CMP sensor and teeth of camshaft malfunction
- EGR valve malfunction
- Improper operation of variable valve timing control system
- Low engine compression
- PCV valve malfunction
- Improper valve timing

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	**INSPECT IF MALFUNCTION CAUSE IS DRIVE-BY-WIRE CONTROL SYSTEM IDLE LEARNING NOT PERFORMED** • Warm up the engine. • Idle the engine for **5 min.** • Does the symptom disappear?	Yes	Symptom troubleshooting is completed. (Cause of this symptom is that the idle learning for drive-by-wire control system is not completed.)
		No	Go to the next step.
2	**INSPECT RELATED PART CONDITION** • Verify the following: ▪ External fuel shut off or accessory (such as kill switch, alarm) ▪ Fuel quality (such as proper octane, contamination, winter/summer blend) ▪ No air leakage from intake air system ▪ Proper sealing of intake manifold and components attached to intake manifold: EGR valve	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results. Repeat Step 2.

	▪ Ignition wiring ▪ Electrical connections ▪ Fuses ▪ Smooth operation of throttle valve ▪ Air cleaner restriction ▪ Vacuum leakage from intake air system ▪ PCM ground circuit (1E, 1F, 1G, 1BE, or 1BF) • Are all items normal?		
3	**VERIFY PCM DTC** • Retrieve any DTCs using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Are there any DTCs displayed?	Yes	Go to the appropriate DTC inspection. (See **DTC TABLE [MZR 2.5]**.)
		No	Go to the next step.
4	**VERIFY IF MALFUNCTION CAUSE IS OVERHEATING** • Is the engine overheating?	Yes	Go to the symptom troubleshooting "NO.17 COOLING SYSTEM CONCERNS-OVERHEATING". (See **NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [MZR 2.5]**.)
		No	Go to the next step.
5	**INSPECT MAF SENSOR SIGNAL** **CAUTION:** • While performing this step, always operate the vehicle in a safe and lawful manner. • When the M-MDS is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the M-MDS using the PID/DATA MONITOR AND RECORD capturing function and inspect later. • Access the PCM PID MAF using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Drive the vehicle while monitoring the PID. • Is the MAF PID within the specification?	Yes	Go to the next step.
		No	Inspect for an open or short circuit in the MAF sensor and related wiring harness. Repair or replace the malfunctioning part according to the inspection results.
6	**INSPECT POWER STEERING OPERATION SIGNAL**	Yes	Go to the next step.

	Access the PCM PID PSP using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Do the PIDs indicate the correct values under trouble condition?	No	Inspect the PSP switch and the related harnesses. (See **POWER STEERING PRESSURE (PSP) SWITCH INSPECTION [MZR 2.5]**.) Repair or replace the malfunctioning part according to the inspection results. • If the malfunction remains, perform the intermittent concern troubleshooting procedure. (See **INTERMITTENT CONCERN TROUBLESHOOTING [MZR 2.5]**.)
7	**DETERMINE IF MALFUNCTION CAUSE IS A/C SYSTEM OR OTHER** **NOTE:** • The following test is for stall concerns with the A/C on. If other symptoms exist, go to the next step. • Connect the pressure gauges to the A/C low side and high side pressure lines. • Turn the A/C on and measure the low side and high side pressures. • Are the pressures within the specifications? (See **REFRIGERANT PRESSURE CHECK**.)	Yes	Go to the next step.
		No	If the A/C is always on: • Go to the symptom troubleshooting "NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY". (See **NO.24 A/C IS ALWAYS ON OR A/C COMPRESSOR RUNS CONTINUOUSLY [MZR 2.5]**.) For other symptoms: • Inspect the following: ▪ Refrigerant charging amount ▪ Cooling fan operation • Repair or replace the malfunctioning part according to the inspection results.
8	**VISUALLY INSPECT CKP SENSOR AND PULSE WHEEL** • Visually inspect the CKP sensor and teeth of the crankshaft pulley. • Are the CKP sensor and teeth of the crankshaft pulley normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
9	**INSPECT IGNITION SYSTEM RELATED WIRING HARNESS** • Inspect the ignition coil related wiring harness condition (intermittent open or short circuit) for all cylinders. • Are the wiring harness conditions normal?	Yes	Go to the next step.
		No	Repair or replace suspected wiring harness and connector.
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	**VERIFY SPARK PLUG CONDITION** • Verify the spark plug conditions when the spark plug removed in Step 10. (See **SPARK PLUG INSPECTION [MZR 2.5]**.)	Yes	Spark plug is wet or covered with carbon: • Inspect for fuel leakage from fuel injector. Spark plug is grayish white: • Inspect the fuel injector for clogging.

	• Is spark plug wet, covered with carbon or grayish white?		Repair or replace the malfunctioning part according to the inspection results.
		No	Install the spark plugs on original cylinders. Go to the next step.
12	**INSPECT DRIVE-BY-WIRE CONTROL SYSTEM OPERATION** • Perform the drive-by-wire control system operation inspection. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Does the drive-by-wire control system function properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
13	**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]**.)
14	**INSPECT FUEL SYSTEM FOR FUEL LEAKAGE** • Visually inspect for fuel leakage at the fuel injector O-ring and fuel line. • Service if necessary. • Is the fuel line pressure held after ignition is off? (See **FUEL LINE PRESSURE INSPECTION [MZR 2.5]**.)	Yes	Go to the next step.
		No	Inspect the fuel injector. (See **FUEL INJECTOR INSPECTION [MZR 2.5]**.) • If the fuel injector is normal, replace the fuel pump unit. (See **FUEL PUMP UNIT REMOVAL/ INSTALLATION [MZR 2.5]**.)
15	**INSPECT LONG TERM FUEL TRIM** • Start the engine and idle it. • Access the PCM PID LONG FT1 using the M-MDS. (See **ON-BOARD DIAGNOSTIC TEST [MZR 2.5]**.) • Measure the LONG FT1 PID at idle. • Is the PID value between **−14**	Yes	Go to the next step.
		No	Less than specification (too rich): • Inspect the EVAP control system. • Repair or replace the malfunctioning part according to the inspection results. Greater than specification (too lean): • Inspect for air leakage at the intake air system

	% and +14 % ?		components. • Repair or replace the malfunctioning part according to the inspection results. ▪ If the system is normal, go to the next step.
16	**DETERMINE IF MALFUNCTION CAUSE IS EVAP CONTROL SYSTEM OR OTHER** • Disconnect the vacuum hose between purge solenoid valve and intake manifold from the purge solenoid valve side. • Plug the open end of the vacuum hose. • Start the engine. • Does the engine condition improve?	Yes	Inspect the following: • If the purge solenoid valve is stuck open. • EVAP control system Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
17	**INSPECT DEFORMED IN EXHAUST SYSTEM** • Visually inspect the exhaust system part. • Is there any deformed exhaust system part?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
18	**VISUALLY INSPECT CMP SENSOR AND PULSE WHEEL** • Visually inspect the CMP sensor and teeth of the camshaft. (See **CAMSHAFT POSITION (CMP) SENSOR INSPECTION [MZR 2.5]**.) • Are the CMP sensor and teeth of the camshaft normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
19	**INSPECT EGR VALVE FOR STUCK** • Inspect the engine condition while tapping the EGR valve housing. • Does the engine condition improve?	Yes	Replace the EGR valve. (See **EGR VALVE REMOVAL/ INSTALLATION [MZR 2.5]**.)
		No	Go to the next step.
20	**INSPECT VARIABLE VALVE TIMING CONTROL SYSTEM OPERATION** • Inspect the variable valve timing control system operation. (See **ENGINE CONTROL SYSTEM OPERATION INSPECTION [MZR 2.5]**.) • Does the variable valve timing control system operate properly?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results.
21	**INSPECT ENGINE COMPRESSION** • Is the engine compression correct? (See **COMPRESSION INSPECTION [MZR 2.5]**.)	Yes	Go to the next step.
		No	Inspect for cause. Repair or replace the malfunctioning part according to the inspection results.

22	**INSPECT IF MALFUNCTION CAUSE IS PCV VALVE OR VALVE TIMING** • Inspect the PCV valve. (See **POSITIVE CRANKCASE VENTILATION (PCV) VALVE INSPECTION [MZR 2.5]**.) • Is the PCV valve normal?	Yes	Inspect the valve timing. Repair or replace the malfunctioning part according to the inspection results.
		No	Replace the PCV valve and the oil separator as a single unit, then go to the next step. (See **POSITIVE CRANKCASE VENTILATION (PCV) VALVE REMOVAL/INSTALLATION [MZR 2.5]**.)
23	• 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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