

GENERIC · POWERTRAIN

P02D6

OBD-II TROUBLE CODE

P02D6

Cylinder 6 Fuel Injector A Offset Learning At Min Limit

P02D6 indicates that the engine control module has learned a fuel injector offset correction for cylinder 6 that has reached its minimum allowable limit, meaning the injector is flowing less fuel than expected and the computer can no longer compensate by shortening the injector pulse. The code is set when the learned offset value for injector A on cylinder 6 stays at or below the calibrated minimum threshold during the diagnostic monitor.

SYSTEM

Powertrain

CODE TYPE

Generic (all makes)

SEVERITY

Medium

FIX DIFFICULTY

Professional

AREA

Fuel and air metering (injector circuits)

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms
- A rough idle or slight misfire that is most pronounced when the engine is cold
- Reduced fuel economy as the computer struggles to maintain the correct air-fuel ratio
- Hesitation or a flat spot during light acceleration
- In rare cases, a faint fuel odor or black smoke if the injector is stuck partially open, though this is less common for a min-limit fault

Common causes, most likely first

- 1 Clogged or restricted fuel injector nozzle on cylinder 6, reducing flow below the learnable range
- 2 Internal injector wear or failure causing a lower-than-expected flow rate
- 3 Low fuel pressure or volume from a weak fuel pump, clogged filter, or faulty pressure regulator
- 4 Wiring harness damage or poor electrical connection at the cylinder 6 injector, altering its effective opening time
- 5 Engine control module software calibration issue or a faulty injector driver circuit inside the ECM
- 6 Mechanical engine problem such as low compression or a vacuum leak affecting only cylinder 6, which skews the offset learning



How to diagnose and fix it

- 1 Connect a scan tool and verify the code is current, then check for any related misfire or fuel trim codes that could indicate a broader issue
- 2 Inspect the cylinder 6 injector electrical connector and harness for corrosion, chafing, or loose pins, and perform a resistance check against the manufacturer's specification
- 3 Measure fuel pressure and volume at the rail to rule out a weak pump or restricted filter before condemning the injector
- 4 Perform a cylinder contribution test or injector balance test to confirm that cylinder 6 is indeed underperforming compared to the others
- 5 Remove and inspect the cylinder 6 injector for clogging or damage, and consider professional ultrasonic cleaning or replacement if flow is below specification
- 6 After repair, clear the adaptive learning memory and perform a relearn drive cycle so the ECM can establish a new offset value
- 7 If the code returns with all mechanical and electrical checks passing, have the ECM inspected or reflashed by a dealer or specialist

Why a min-limit offset is not always the injector

- A min-limit offset learning code often appears when the injector is flowing less fuel than the learned baseline, but a dirty mass airflow sensor or a small vacuum leak can also skew the fuel trim learning and trigger this code on one cylinder.
- Technicians frequently replace the injector only to find the code returns because a weak fuel pump is delivering marginal pressure that affects the furthest injector first, so always verify fuel delivery before parts swapping.
- The offset learning value is stored in the ECM's adaptive memory, and disconnecting the battery or clearing codes resets it; the code may not reappear immediately until the monitor runs through a complete drive cycle.
- On engines with direct injection, a min-limit offset can be caused by carbon buildup on the injector tip or intake valves, which is often missed if only port-injection diagnostic routines are followed.
- A faulty engine coolant temperature sensor or intake air temperature sensor can cause the ECM to misjudge fuel requirements during warm-up, leading to an offset that hits the minimum limit without any injector fault at all.

Can I keep driving with P02D6?

You can generally continue driving with this code, but avoid heavy acceleration or towing until it is diagnosed, because a persistently lean cylinder can lead to elevated combustion temperatures and long-term engine damage. If the check engine light begins flashing or you notice a pronounced misfire, stop driving and have the vehicle inspected promptly.



Tools that help

- OBD-II scan tool with live data and bidirectional control capability
- Fuel pressure gauge and fuel volume test kit
- Digital multimeter for injector resistance and circuit testing
- Noid light or injector pulse tester
- Cylinder contribution or injector balance test equipment
- Hand tools for injector removal and replacement

Reading P02D6

P	Powertrain: engine, transmission and emissions.
0	Generic (SAE) code: it means the same thing on every OBD-II vehicle.
2	Fuel and air metering (injector circuits).
D6	The exact fault within that area.

Often seen with

P0171 System Too Lean (Bank 1) · **P0174** System Too Lean (Bank 2) · **P02D5** Cylinder 5 Fuel Injector A Offset Learning At Max Limit · **P02D7** Cylinder 6 Fuel Injector A Offset Learning At Max Limit · **P0306** Cylinder 6 Misfire Detected

See it working

Watch the animated explainer [EV Powertrain Trainer: How an Electric Car Drives](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p02d6/>

