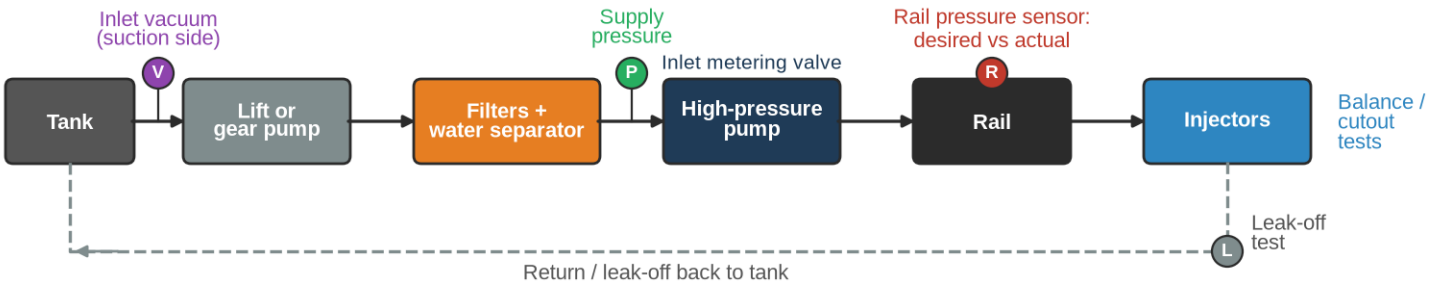
Fuel System Low Power Cheat Sheet

Common rail diesel: supply, rail pressure and injector tests. Values are typical only; always check the OEM spec.

Common rail fuel system and test points (typical)



Layouts vary: some use an in-tank electric pump that pushes fuel, and others use an engine gear pump that pulls it. Measure inlet vacuum on the suction side of whichever pump pulls fuel.

Tools needed

- Scan tool with live data, service tests and data logging
- Vacuum gauge (0 to 30 inches of mercury, inHg) and pressure gauge with original equipment manufacturer (OEM) test fittings
- Clear sample jar, clear hose for checking air in fuel
- Graduated containers and caps for the leak-off test
- Service information: supply, restriction, rail and leak-off specs

Safety

High-pressure fuel can pierce skin. Never feel for leaks by hand; use cardboard. An injection injury needs a doctor right away.

Never open high-pressure lines with the engine running. Wait until rail pressure reads near 0 on the scan tool and follow the OEM bleed-down procedure.

Fuel is a fire hazard. No sparks or open flame. Wear eye protection.

Keep everything clean: cap open lines and ports. Dirt destroys pumps and injectors.

Step-by-step procedure

1. **Verify the complaint.** When, what load, hot or cold. Check for an active derate first: low power can be a protection strategy, not a fuel fault.
2. **Codes and freeze frame.** Scan all modules. Note rail pressure, supply pressure and load at the time the code set.
3. **Fuel quality.** Sample into a clear jar: water, haze, debris, diesel exhaust fluid (DEF), gelling in the cold. Drain the water separator.
4. **Filters.** Check the change history and restriction. Cut the old filter open: metal glitter means stop. The debris is in the whole system.
5. **Supply side.** Inlet vacuum at the pulling pump (rule of thumb under about 6 to 10 inHg, OEM limits vary). Supply pressure after the filters, to OEM spec, at idle and under load.
6. **Air in fuel.** Clear hose or sight glass on the supply or return. Steady bubbles: suction leak at a fitting, filter head or pickup, often with no fuel leak outside.
7. **Rail pressure.** Compare desired to actual at crank, idle and under load. Actual should track closely.
8. **Injectors.** Read contribution or balance rates at warm idle, then run a cylinder cutout. A cylinder that changes nothing when cut is weak or dead; confirm with compression.
9. **Leak-off.** Where the injectors have return lines, cap them into containers per OEM. One high cylinder means internal leakage, bleeding rail pressure.
10. **Road test to verify.** Log desired vs actual rail pressure, supply pressure and boost under full load. A static test can miss a weak pump.

Readings and what they mean

Reading	Typical good	If not, suspect
Inlet vacuum	Under OEM max (often 6 to 10 inHg)	Plugged pickup, filter, kinked line
Supply pressure	To OEM spec, steady under load	Filters, lift pump, regulator
Rail actual vs desired	Actual should track desired closely (OEM tolerance)	Supply, pump, leaking injector, relief valve
Balance rates	All cylinders close to each other	Outlier: injector or mechanical
Leak-off	Even across cylinders, under the OEM milliliter limit	High one: worn injector

Notes

- Typical warm idle rail pressure (light-duty): about 4,000 to 7,000 psi, much higher under load. Actual should track desired closely. Always use the OEM spec.
- Low power can also be air or exhaust: check boost and diesel particulate filter (DPF) differential pressure (delta-P) before replacing fuel parts.
- After a filter change, prime fully per OEM before starting. Long cranking to purge air can starve the high-pressure pump.

Always verify against the OEM wiring diagram and service information for the vehicle.
Learn a structured diagnostic process with Mechanic Mindset training.