Mobile DPF Cleaning Services

Process Overview & Technical Reference

For fleet operators, owner-operators, and fleet maintenance managers

1. What Is a Diesel Particulate Filter (DPF)?

All diesel engines manufactured in Canada and the U.S. after 2007 are equipped with a Diesel Particulate Filter as part of their emissions aftertreatment system. The DPF is a porous ceramic or metallic honeycomb substrate installed in the exhaust stream. Its function is to trap fine carbon soot and particulate matter (PM) produced during combustion before they exit the exhaust.

The DPF system operates in two chambers:

- Chamber 1 (Diesel Oxidation Catalyst / DOC): Oxidizes nitric oxide (NO) to nitrogen dioxide (NO_2), which assists downstream combustion of soot.
- Chamber 2 (DPF Core): Traps and oxidizes soot particulates. Non-combustible ash — primarily metallic oxides from engine oil and fuel — accumulates and cannot be burned off through normal operation.

2. Why DPFs Require Periodic Cleaning

Diesel engines undergo a self-cleaning cycle called regeneration, where exhaust temperatures rise high enough to oxidize and burn off trapped soot. However, regeneration cannot remove non-combustible ash. Over time, ash accumulates in the filter channels, increasing backpressure against the engine. Left unaddressed, this causes:

- Reduced power and fuel economy
- Engine limp mode / fault code activation
- Premature DPF failure and costly replacement (filters range from $2,000–$5,000+)
- Failed emissions inspections

Fleet intervals vary by application. Highway trucks typically require service at 200,000 km, while high-idle or city-cycle vehicles may require cleaning as frequently as every 75,000–120,000 km.

3. DPF Cleaning Methods — Industry Context

Several methods exist for DPF cleaning. Edmonton DPF Services employs a combined hydrogenation and chemical injection approach — specifically designed for on-vehicle, on-site delivery without filter removal.

3a. Conventional Off-Vehicle Methods (Requiring Filter Removal)

Traditional approaches require pulling the filter from the vehicle and transporting it to a shop facility:

- Pulsed Air / Pneumatic Cleaning: Compressed air is forced through the filter in measured bursts to dislodge ash. Effective for loose ash but unable to address soot-plugged or chemically bonded deposits.
- Thermal Regeneration (Baking): The filter is placed in a controlled oven for 3–7 hours to thermally oxidize soot to ash, then pneumatically cleaned. Effective but time-intensive and requires shop infrastructure.
- Wet / Pressure Wash: Filter is soaked in de-ionized water and pressure-washed after pneumatic cleaning. Thorough but requires complete drying before reinstallation.

All off-vehicle methods require downtime for removal, transport, cleaning, and reinstallation — typically 1–3 days per unit.

3b. On-Vehicle Hydrogenation + Chemical Cleaning (Edmonton DPF Services Method)

Our mobile process eliminates filter removal entirely. The vehicle remains in your yard or facility throughout the service. The method combines two complementary mechanisms:

Step-by-Step Process

Step	Phase	What Happens
1	**Pre-Service Inspection**	The technician connects diagnostic tooling to the vehicle OBD port to read DPF backpressure, soot load percentage, and any active fault codes. Baseline data is recorded.
2	**Engine & DPF Warm-Up**	The engine is brought to operating temperature. The DPF system is warmed to optimize the chemical and hydrogenation reactions in subsequent steps.
3	**Hydrogen Gas Injection (HHO)**	Using electrolysis, distilled water is converted into oxyhydrogen gas (HHO — a 2:1 hydrogen-oxygen mixture). This gas is administered via the engine air intake. As HHO passes through combustion, atomic hydrogen reacts with carbon hydrocarbon chains in a process called pyrolysis — breaking down carbon deposits layer by layer into fine particles. H^+ ions travel through to the exhaust tract, chemically converting carbon deposits into hydrocarbon gases that exit through the DPF.
4	**Direct Chemical Injection & Dwell Time**	Specialized cleaning agents are injected directly into the DPF filter element at high pressure. Dwell time allows the detergent-based compounds to dissolve and loosen accumulated soot and ash that remain after the hydrogen phase, targeting deposits in the DPF core channels.
5	**Forced Regeneration**	Using diagnostic software, the technician initiates a forced active regeneration cycle. Exhaust temperatures are elevated (up to 700–900°C) to combust loosened soot to ash and purge

Step	Phase	What Happens
		the system. This step confirms the cleaning is complete and functional.
6	**Post-Service Verification**	Post-service diagnostic data is captured — backpressure reduction, exhaust opacity, and soot and ash load — and provided to the client.

4. The Science — How Hydrogen Cleaning Works

The HHO (oxyhydrogen) cleaning mechanism is grounded in electrochemistry and combustion science:

- Electrolysis: A machine uses electrical current to split distilled water (H_2O) into its component hydrogen and oxygen gases, producing HHO in a 2:1 ratio.
- Pyrolysis in the Combustion Chamber: When HHO is introduced via the air intake, hydrogen burns at significantly higher temperatures than diesel fuel alone. This elevated combustion temperature initiates pyrolysis — a thermal decomposition process that breaks down long-chain hydrocarbon carbon deposits layer by layer, atomizing them into particles small enough to be expelled through the exhaust.
- Chemical Reduction: Atomic hydrogen (H^+ ions) reacts with carbon deposits through oxidation — carbon combines with hydrogen to form hydrocarbon gases (e.g., methane analogues), which exit harmlessly through the exhaust as CO_2 and water vapour.
- DPF Penetration: Due to its small molecular size, HHO gas reaches areas that liquid solvents and mechanical methods cannot — including deep within DPF filter channels, EGR valves, and around injector tips.

The combined process — HHO decarbonization followed by direct chemical injection and forced regeneration — addresses both soot (combustible) and ash (chemical) deposits without requiring filter disassembly.

5. Fleet-Specific Advantages

Factor	Edmonton DPF Services Approach
Downtime	Service completed on-site in 3-4 hours. No towing, no transport, no overnight shop stays.
Filter Removal	None required. Filter remains in-chassis throughout the entire process.

Factor	Edmonton DPF Services Approach
Location	Fully mobile — we come to your yard, terminal, or job site anywhere in the Edmonton metro area.
DPF Lifespan	Regular preventive cleaning extends filter lifespan significantly, deferring costly replacement.
Fuel Economy	Removal of backpressure restores engine efficiency and reduces fuel consumption.
Emissions Compliance	Restores DPF to near-original filtration efficiency. Supports regulatory compliance.
Documentation	Pre- and post-service diagnostic data provided for fleet maintenance records.

6. Next Steps

DPF Cleaning Surrey is currently accepting fleet service agreements and scheduled maintenance contracts in the Edmonton region. We are happy to:

- Provide a no-obligation demonstration on a unit of your choice
- Develop a preventive maintenance schedule tailored to your fleet cycle and operational profile
- Discuss volume pricing for fleet accounts

Contact Us

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Service Area: Surrey Metro and Lower Mainland

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