Meat&Doria **75114338**
Hoffer Products **H75114338**

FOCUS

Gasoline Injectors



Our Premium Quality

A superior quality range, guaranteed by direct control of the entire process.

Design and production are supervised by the Group's engineers, in compliance with the original equipment specifications. Subsequently, each component undergoes end-of-line validation testing by the Quality team, with the aim of offering a product that always stands out for its quality, reliability, and durability.

Design | **Fleet Coverage** | **Testing** | **After-Sales Support**

What they are and what they do

Gasoline fuel injectors are electromechanical components designed to **precisely meter and atomize** fuel into the intake system or directly into the combustion chamber, depending on the engine technology.

Focus n. 011
November 2026

Their function is essential to ensure **proper air-fuel mixture formation** and **efficient combustion** under all operating conditions.

The engine control unit (ECU) continuously controls the injectors, determining injection quantity and timing based on several operating parameters, including:

- Engine speed
- Engine load
- Intake air and coolant temperature
- Accelerator pedal position
- Intake manifold pressure
- Torque demand

Proper fuel injection makes it possible to:

- Achieve optimal performance
- Reduce fuel consumption
- Limit pollutant emissions
- Ensure smooth operation
- Maintain engine reliability over time

System effectiveness depends not only on the quantity of fuel injected but also on **atomization quality**. A uniform spray promotes faster, more complete and more efficient combustion.

Main Functions

Gasoline fuel injectors perform four essential functions:

Precise fuel metering

The injector delivers exactly the amount of fuel requested by the ECU, continuously adapting to vehicle operating conditions.

Fuel atomization

The fuel is converted into an extremely fine mist, increasing the contact area with air and improving combustion efficiency.

Emissions optimization

Efficient combustion reduces the production of carbon monoxide (CO), hydrocarbons (HC) and particulate matter.

Performance improvement

Proper fuel delivery enables:

- Better throttle response
- Greater energy efficiency
- Improved power delivery
- Smooth engine operation

Types of gasoline injectors in the M&D range

Multi-Point Injection (MPI)

In MPI systems, fuel is injected into the intake manifold upstream of the intake valves.



Meat&Doria **75112160E**
Hoffer Products **H75112160E**

Advantages

- Proven technology
- Cost-effective solution
- High reliability
- Lower sensitivity to contaminants

Applications

- Naturally aspirated gasoline engines
- Turbocharged gasoline engines
- Sequential multi-point injection systems

Gasoline Direct Injection (GDI)

In GDI systems, fuel is injected directly into the combustion chamber at high pressure.



Meat&Doria **75114014**
Hoffer Products **H75114014**

Advantages

- Higher thermal efficiency
- Reduced fuel consumption
- Better combustion control
- Reduced CO_2 emissions

Applications

- GDI engines
- TSI engines
- TFSI engines
- EcoBoost engines
- PureTech engines
- TGDI engines

High-Pressure Injectors (GDI)

These injectors are used in modern direct-injection systems and operate at increasingly high pressures to improve fuel atomization.



Meat&Doria **75114065**
Hoffer Products **H75114065**

Repair kits and accessories

The range also includes:

- O-rings
- Spacers
- Connectors
- Injector filters
- Seals

Drawing on our expertise in gasoline fuel systems, we also offer a dedicated range of injector repair kits designed to support both **preventive maintenance** and the **restoration** of original performance.

The kits include **key wear components** such as filters, O-rings, seals and protective caps, allowing injectors to be properly serviced while helping maintain their efficiency, sealing performance and spray quality over time.

Periodic replacement of these components helps **restore** the injector's correct hydraulic characteristics, **reduce** the risk of fuel leaks and ensure **uniform fuel distribution** inside the combustion chamber.

An efficient injector helps maintain consistent flow rate and spray characteristics, **directly benefiting** engine performance, fuel consumption, emissions and idle stability.

Our repair kit offering reflects M&D Group's expertise in gasoline injection systems, enabling repair professionals to use dedicated components designed to restore proper injector operation and **extend its service life**.

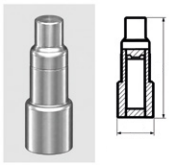
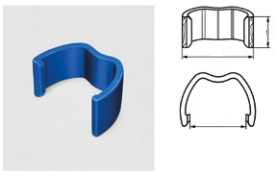
Technical Benefits

- Restores the seal between injector, fuel rail and intake manifold.
- Maintains correct spray pattern geometry and fuel atomization quality.
- Ideal for supporting professional injector cleaning and bench-testing operations.
- Replaces internal filters to maintain the rated flow rate.
- Reduces the risk of difficult starting, rough running and increased fuel consumption caused by deteriorated injectors.

By supplying complete injectors and the corresponding repair kits, M&D Group offers one of the most **comprehensive** aftermarket ranges for gasoline injection system maintenance.

Example technical data sheet

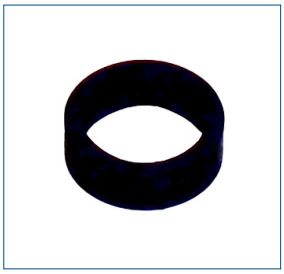
Part Number: **75117804**

Component Name	Photo
Filter	
Upper O-Ring	
Retaining clip	
Lower O-ring	

Examples of products available

Individual Spare Parts

Individual replacement parts (sealing rings and small filters) suitable for repairing complete injector **75114534**.



Code **71246**



Code **71247**

Repair Kit

Components:

71101 | Injector cover
71105 | Colored filter mesh
71106 | Sealing ring
71116 | Injector connection tube



Code **71006**

MEAT & DORIA SPECIAL PARTS SINCE 1945

HOFFER PRODUCTS SINCE 1999

Repair Kit

Components:

71100 | Injector cover
71103 | Sealing ring
71104 | Rubber ring
71105 | Colored filter mesh
71176 | Sealing ring



Code **71011**

Repair Case

This assortment has been designed to allow proper maintenance of **Multi Point Injection gasoline injectors**;

When cleaning injectors, it is strongly recommended to also replace the small filter at the injector inlet, as well as the sealing O-rings on the rail and the corresponding spacers;

This kit also includes the pintle cap, i.e. the plastic end piece located at the injector tip, whose function is to direct the fuel spray;

This kit contains an assortment of small components for servicing injectors from **Bosch, Siemens, Hitachi, Denso and Marelli**.



Code **71000**

Multipoint Gasoline Injector

The MPI injector ensures highly precise fuel delivery into the intake manifold, promoting **proper preparation of the air-fuel mixture** before it enters the combustion chamber.

Types

- Electromagnetic injectors
- EV1 injectors
- EV6 injectors
- EV14 injectors

Materials

- Stainless steel body
- Copper windings
- High-strength engineering polymers
- FKM (Viton®) O-rings

GDI Direct Gasoline Injector

GDI injectors introduce fuel **directly into the combustion chamber** at pressures that can exceed 200 bar, ensuring extremely precise metering and atomization.

Types

- Piezoelectric injectors
- High-pressure electromagnetic injectors

Materials

- Special high-strength steels
- Micron-precision components
- Anti-wear treatments
- FKM seals

How a gasoline injector works

1 ECU Command Processing

The engine control unit receives data from the sensors and determines the necessary quantity and opening time.

2 Injector Opening

The electromagnet or piezoelectric actuator operates the injector needle, allowing fuel to flow through.

3 Atomization

The fuel passes through calibrated nozzles and is atomized into extremely fine particles.

4 Closing

At the end of injection, the needle closes the passage again, maintaining sealing and the correct residual pressure in the circuit.

Technological evolution of gasoline injectors

In recent years, **anti-pollution regulations** and the need to **reduce fuel consumption and emissions** have encouraged the spread of gasoline direct injection.

Operating Pressures

Technology	Pressure
MPI	3-5 Bar
First-generation GDI	50-120 Bar
Current-generation GDI	200-350 Bar
Latest-generation systems	Over 500 Bar

The higher the injection pressure, the better the fuel atomization and the more efficient the combustion process becomes.

Differences between MPI and GDI injectors

Feature	MPI	GDI
Injection Point	Intake Manifold	Combustion Chamber
Operating Pressure	3-5 Bar	50-350+ Bar
Fuel Consumption	Good	Lower
CO_2 Emissions	Good	Better
Technical Complexity	Low	High
Sensitivity to Impurities	Medium	Very High

Main causes of failure

Injectors operate under particularly demanding conditions and may be subject to various types of failure.

Deposits and Contamination

The main causes are:

- Poor-quality fuel
- Sediment in the circuit
- Water in the fuel
- Impurities
- Carbon deposits
- Insufficient filtration

In GDI engines in particular, carbon residues can impair the spray pattern and combustion efficiency.

Mechanical Wear

The high number of opening and closing cycles can cause:

- Needle wear
- Seat wear
- Altered flow rate
- Reduced injection precision

Long Periods of Inactivity

Gasoline can leave residues and varnish deposits that hinder the correct movement of the internal needle.

Thermal Stress

The high temperatures in the engine compartment can accelerate material ageing.

Electrical Problems

- Open-circuit internal coil
- Short circuits
- Connector oxidation
- Wiring defects

Sealing Problems

- Deteriorated O-rings
- Worn seals
- External fuel leaks
- Reduced circuit pressure

Symptoms of a faulty injector

A faulty injector or one with an altered flow rate can cause:

- Difficult starting
- Misfires
- Engine knock during combustion
- Increased fuel consumption
- Fuel smell
- Malfunction indicator lamp illumination
- Unstable idle
- Jerking during acceleration
- Loss of power
- Increased emissions
- Engine vibrations
- Activation of limp-home mode

Symptom-Fault Correlation

Symptom	Possible Cause
Unstable Idle	Partially Clogged Injector
Misfire	Stuck Injector
Starting Difficulties	Loss of Fuel Pressure
Black Smoke	Leaking Injector
High Fuel Consumption	Flow Rate out of Tolerance
Engine Vibrations	Cylinder Imbalance
Engine Warning Light On	Electrical or Functional Fault
Reduced Performance	Inefficient Atomization

Consequences of incorrect atomization

When fuel is not atomized correctly, the following may occur:

- Incomplete combustion
- Increased HC and CO emissions
- Increased fuel consumption
- Loss of performance
- Engine warning light illumination
- Increased particulate formation
- Catalytic converter damage

Possible damage resulting from failure to replace

Injector Stuck Open

This can cause:

- Excessive fuel consumption
- Black exhaust smoke
- Catalytic converter damage
- Engine oil dilution

Injector Stuck Closed

This can cause:

- Cylinder misfire
- Loss of power
- Engine vibrations
- Catalytic converter damage due to irregular combustion

Professional Diagnosis

Electrical Checks

- Coil resistance
- Positive power supply
- ECU control signal
- Wiring integrity

Indicative Resistance Values

- High impedance: resistance 12-16 Ω
- Low impedance: resistance 1-5 Ω

Values outside specifications may indicate short circuits or damaged windings.

Hydraulic Checks

- Fuel rail pressure
- External leaks
- Fuel flow rate

Functional Checks

- Cylinder balance
- Injection timing
- Fuel trim corrections (Fuel Trim)
- Spray pattern shape and uniformity

Most common fault codes

P0200: injector circuit malfunction

P0201: cylinder 1 injector circuit

P0202: cylinder 2 injector circuit

P0203: cylinder 3 injector circuit

P0204: cylinder 4 injector circuit

P0205-P0208: subsequent cylinder circuits

Combustion Problems

- **P0300**: multiple misfires
- **P0301-P0308**: specific-cylinder misfire

Mixture Problems

- **P0171**: mixture too lean
- **P0172**: mixture too rich

Fuel Supply Problems

- **P0190**: fuel pressure sensor
- **P0087**: insufficient fuel pressure
- **P0088**: excessive fuel pressure

Preventive Maintenance

To maximize injector service life, it is advisable to:

Avoid frequently driving with the tank almost empty

Always replace O-rings and seals during installation

Replace the fuel filter periodically

Use fuel of certified quality

Clean the fuel supply system periodically

Technical Facts

A modern GDI injector can perform up to 5-7 injection events within the same engine cycle.

The nozzles have manufacturing tolerances in the order of microns.

At 6,000 rpm, an injector can perform over 3,000 cycles per minute.

In direct-injection systems, atomization quality directly affects particulate emissions.

An atomization hole may have a diameter smaller than 0.15 mm.

Opening time may be less than 1 millisecond.

A flow-rate difference greater than 5% between two cylinders can already cause noticeable irregularities and increased fuel consumption.

MEAT & DORIA SPECIAL PARTS SINCE 1945

HOFFER PRODUCTS SINCE 1999

Our Production-Stage Tests

To ensure quality, reliability and consistent performance, injectors undergo a series of specific checks.

Flow-Rate Test

Checks the quantity of fuel delivered against design values.

Atomization Test

Analyzes the quality, shape and uniformity of the spray.

Pressure Test

Assesses behavior at different operating pressures.

Vibration Test

Reproduces the stresses experienced during actual vehicle use.

Dimensional Inspection

Measures nozzles, tolerances and critical components using precision instruments.

Leak Test

Checks for the absence of leaks with the injector both open and closed.

Electrical Tests

Checks coil resistance, current draw and response times.

Durability Test

Simulates millions of opening and closing cycles.

Thermal Test

Checks operation at high engine-compartment temperatures.

Accelerated Ageing Test

Simulates years of service under demanding conditions to ensure reliability and long-term durability.

Related Products

Gasoline Fuel Supply System

- Gasoline injector repair kits (71011)
- Fuel pumps (76007)
- GDI high-pressure pumps (78993)
- Fuel pressure sensors (825031)
- Fuel pressure regulators (75107)
- Fuel rails (75117947)
- Fuel supply modules (76446)
- Throttle bodies (89001)

Engine Management

- MAP sensors (82301)
- Air temperature sensors (82043)
- Engine speed sensors (87136)
- Camshaft position sensors (87001)
- Lambda sensors (81001)
- Ignition coils (10300)