

EFI INJECTORS

ELECTRICAL DIFFERENCES

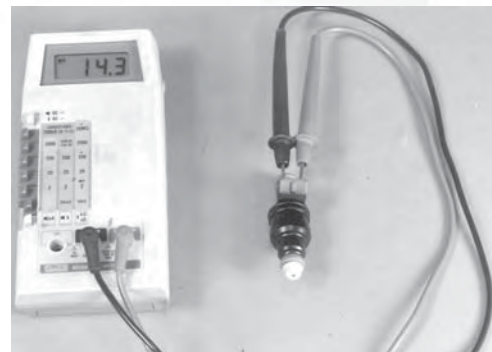
The solenoid inside an injector can be classified into one of two basic groups: low resistance or high resistance. The resistance of an injector coil can be measured with an ohm meter by attaching the meter leads to the two terminals on the injectors.

Low resistance injectors

Also referred to as *peak* and *hold*, measure between 2 and 5 ohms resistance. The drive circuit for these injectors are called current sensing or current limiting. A *peak* current is used to quickly open the injector, then a much lower *hold* current is used to maintain the open condition while reducing overall current draw.

High resistance injectors

Also referred to as saturation injectors, measure 12-16 ohms. The injector drivers for these injectors are called saturation drivers. These drivers simply turn the supply voltage on and off to pulse the injector. High resistance injectors typically respond slower than low resistance injectors. High resistance injectors may sometimes be controlled by a peak and hold driver. The drive circuit may not reach the peak current value and therefore not switch to the hold current. This may cause some drivers to overheat due to sustained high current. ECU manufacturers utilize various injector drivers. You must consult Kinsler Fuel Injection or the manufacturer regarding specific driver/injector compatibility.



Injector measures 14.3 ohm on voltiohm meter

EXAMPLE OF SYSTEM WITH INCREASING FUEL PRESSURE

FUEL FLOW versus FUEL PRESSURE

Injector flow capacity varies with changes in supply pressure. Increasing fuel pressure to the injector will result in additional flow and a potential improvement in atomization. When the pressure level is increased, the load against the injector solenoid will also increase. Some injectors solenoids will not handle the increased load. Please consult your Kinsler technical representative about specific injector operation. The load against the fuel supply system will also increase and fuel pump output will decrease. Please be sure that the fuel pump(s) will handle the increased load. (See Electric Fuel Pumps on Pages #124-130).

Formula:	Supply	-	Engine Usage	=	Bypass
System Pressure	1- #10208 Fuel Pump (tested at 13.2 volts)	-	8- #10057 Injectors (static flow)	=	Bypass Flow
45	330 lbs/hr	-	156.0 lbs/hr	=	174 lbs/hr - OK
70	300 lbs/hr	-	196.0 lbs/hr	=	104 lbs/hr - OK
100	260 lbs/hr	-	284.7 lbs/hr	=	-24.7 lbs/hr < Danger

Pressure rises as the square of the flow through an orifice, so to double the flow through an injector takes four times the pressure :

$$\text{New Press} = \text{Old Press} \times \left(\frac{\text{New Flow}}{\text{Old Flow}} \right)^2$$

If we know the flow of an injector at some pressure, we can figure the flow at a new pressure :

$$\text{New Flow} = \text{Old Flow} \times \sqrt{\frac{\text{New Press}}{\text{Old Press}}}$$

CALCULATION FOR INJECTOR SIZE SELECTION

Maximum Engine output (H.P.) times Brake Specific Fuel Consumption (B.S.F.C.) at Peak Power times 1.175 (Conversion factor from 85% duty cycle to static flow) divided by number of injectors equals Static Flow required per injector. If actual B.S.F.C. value is not available, use 0.5 for normally aspirated engines operating on gasoline. Use 1.1 - 1.2 B.S.F.C. for normally aspirated methanol burning engines.

- Example :**
- 1) Small block Chevrolet V8 on gasoline. $[500 \text{ (h.p.)} \times 0.5 \text{ (B.S.F.C.)}] \times 1.175 / 8 = 36.7 \text{ lbs/hr}$
 - 2) Big block Chevrolet V8 on methanol. $[1100 \text{ (h.p.)} \times 1.1 \text{ (B.S.F.C.)}] \times 1.175 / 8 = 177.7 \text{ lbs/hr}$

Look for an injector that has flow close to flow rate at the operating pressure and the correct resistance for your electronics.

METHANOL WITH EFI

Most EFI injectors are compatible with methanol based fuels. The problems are from the chemical affects of the methanol. Methanol attracts water which can cause rusting of internal components. When methanol comes into contact with aluminum it corrodes the aluminum and when it dries it turns to a 'sand-like' residue which can easily clog up injectors, filters, pressure relief valve, and fuel pump. The only 100% way not to have a problem is to totally flush the entire fuel system after each use with cleaning solvent or gasoline. Methanol is extremely corrosive to aluminum components, fuel rails, fittings, etc. This aluminum oxidation also will put contamination in the fuel system, possibly causing problems. It is highly recommended that stainless steel fuel rail be used.

FLOWING AND GROUPING

EFI injectors are not perfect out of the box. We have measured as much as 12% variation in flow rates of the same part number injector. To obtain the best possible fuel distribution, it is advisable to have the injectors flow tested. Kinsler flows new or used injectors and can provide the test results.

We group similar flowing injectors to minimize the spread in distribution.

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